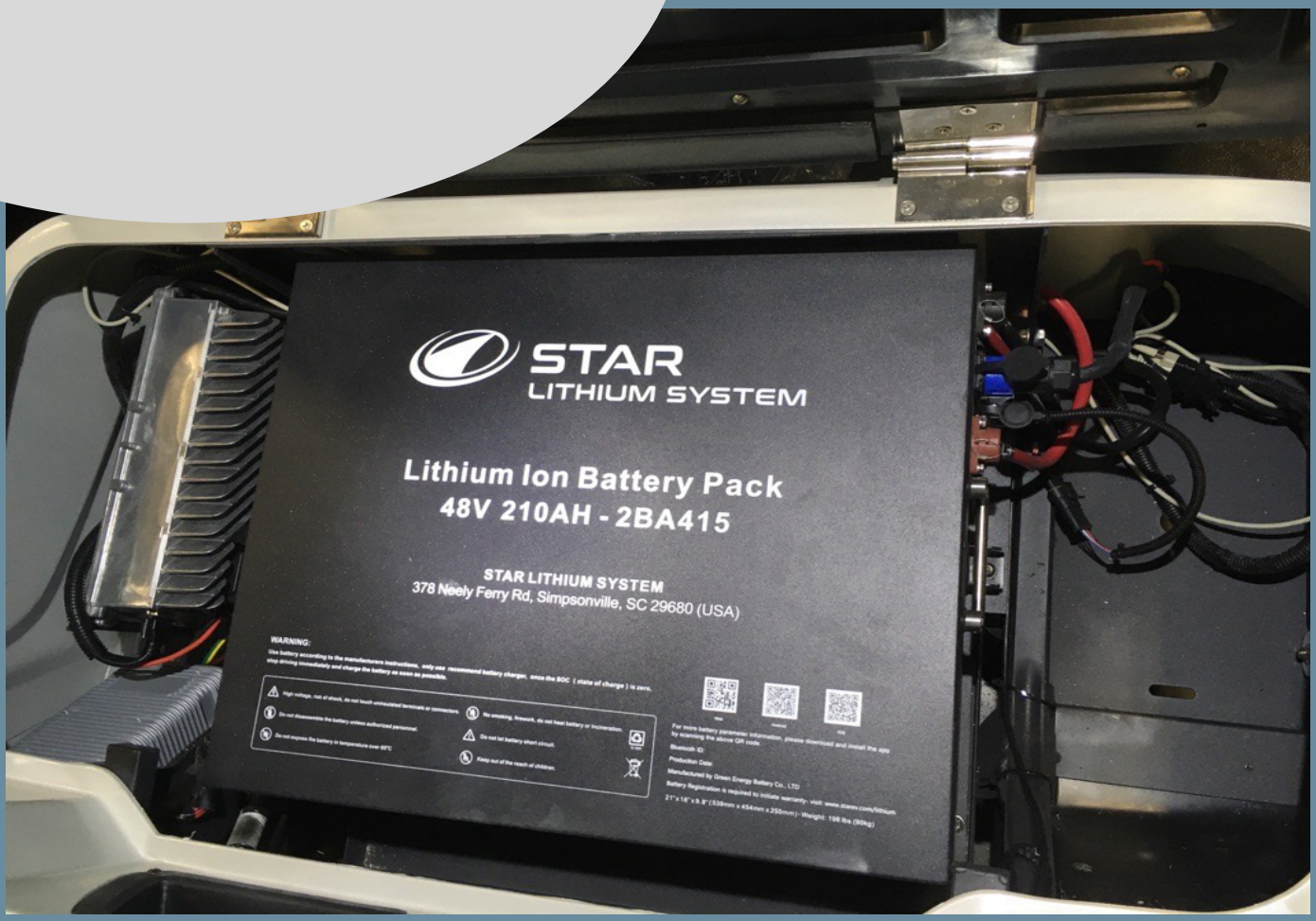

Star EV Lithium 48V TXT Installation Guide

Applicable to TXT's manufactured after 2010

Contacts to know

Star EV Technical Support
864-553-7147

www.starev.com

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IMPORTANT NOTE: Your Lithium battery will not arrive fully charged! You must fully charge your Lithium unit BEFORE operating! This Lithium kit is intended for OEM motor/contoller applications!

Tools Needed

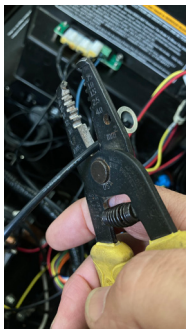
For battery removal, you will need to have a ratchet, with an extension and 13mm deep socket. You may also want to have a battery lifting strap, to help lift the lead acid batteries out of the vehicle. You will need wire cutters for cutting the orange/ red wire leading to the OEM charger receptacle.

To install the lithium battery, you will need the same tools, a ratchet, extension and deep 13mm socket, along with a 13mm wrench. You will also need access to a die grinder, Dremel tool, or grinder to grind the outside of the OEM receptacle opening, to receive the bolts for the lithium charging receptacle adapter plate.



For installing the charger, you will need a Phillips screwdriver, a ratchet with a 10mm socket, a long extension, a 13mm socket and a 10mm wrench.

To install the charger receptacle and adapter plate, you will need a 4mm Allen wrench, a 2mm Allen wrench, a 10mm wrench and a 7mm wrench. You will also need a fine-tip marker, and a drill with a 1/4" drill bit, and a die grinder or grinding wheel.

To install the PCB board, you will need a Phillips screwdriver, and a ratchet with a 7mm socket. You will also need a wire cutter/stripper, along with a drill and 4mm drill bit.

To make the required holes in the dashboard, you will need a measuring tool, a drill with a Uni-bit, and a fine-tip marker that can mark on plastic. You will also need a razor knife or an oscillating saw.

Kit Contents

The installation of this kit must be performed by a Star dealer, in order to retain your Star vehicle warranty.

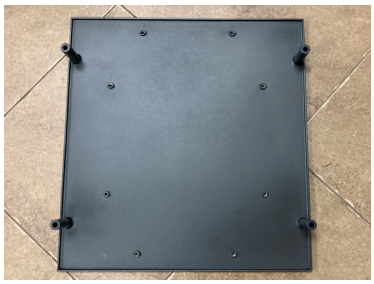
2RC080 Receptacle (top left)
2CH913 Remote LED (top right)
2CR020 Charger Cable (bottom left)
2CR910 AC Charger Cord (bottom right)

TXT Lithium Hardware kit 2HD351-2HD300, 2HD301, 2HD302, 2HD304

2BI805 PCB Board

2BA405 80Ah Lithium Battery

2BA410 105Ah Lithium Battery



2BT801 TXT Battery Mounting Plate (Bottom side shown)

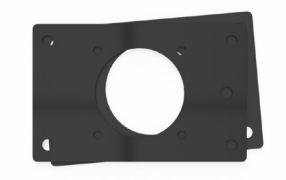
2CB800 Cord Interlock to Board

2MT800 Meter-TXT SOC Meter

2SW800 Switch-TXT Push Button

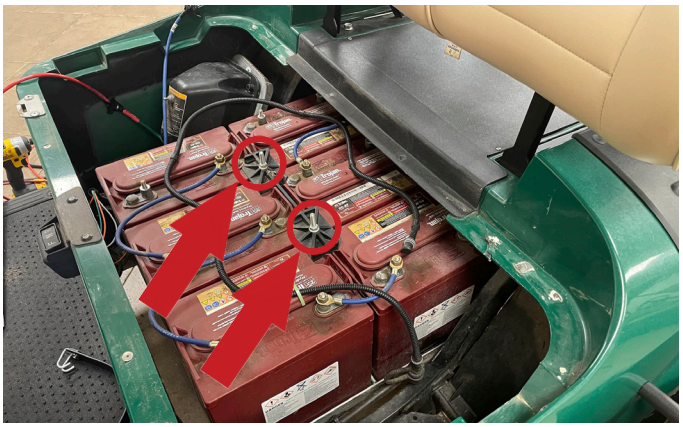
2BT287 and 2BT288 Charger Mounting Legs

2CH020 Lester Summit II Charger

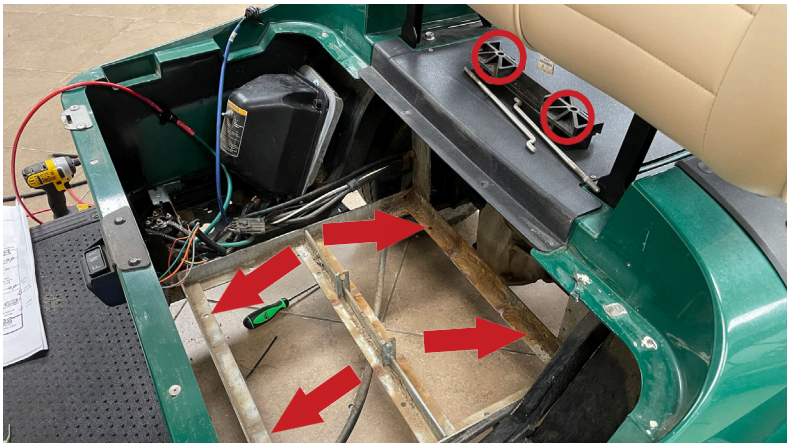


2CH917 and 2CH918 Receptacle Adapter Plate and Seal

Battery Removal Process

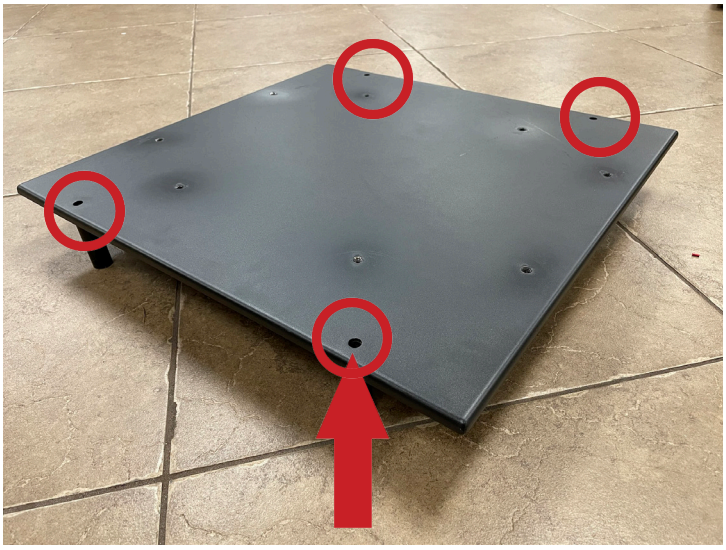


To remove the sealed lead acid batteries, you will need to disconnect the main battery cables from the battery pack, and keep them from contacting the batteries. Use the 13mm deep socket, ratchet and extension to remove the two nuts from the battery holdowns. Remove all the battery cables that connect the batteries to each other.



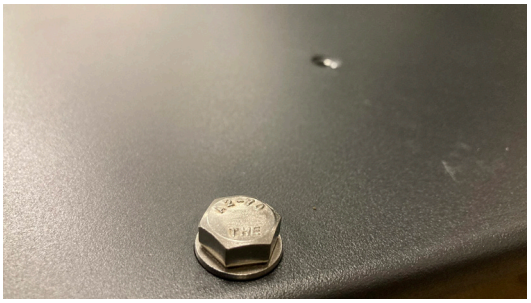
You are now ready to lift out the lead acid batteries, using a battery lifting strap. At this point, the batteries, battery cables, and battery holdowns and their bolts will be gone, leaving the empty compartment. Please note, the arrows pointing to the preexisting holes in the battery tray frame. These will be used with the battery mounting plate.

Battery Compartment Preparation



With the compartment now cleared out, you can install the Star EV lithium battery mounting plate. Position the plate with the bottom standoffs pointed toward the front/rear of the vehicle. You will need the 4-M8x1.25x55mm bolts, M8x1.25 nuts, M8 flat and lock washers to secure this plate into the car, from the hardware kit 2HD302.

Install a flat washer onto each of the four bolts and install through the holes in the battery tray frame. The standoffs are intended to line up with the preexisting holes in this frame.



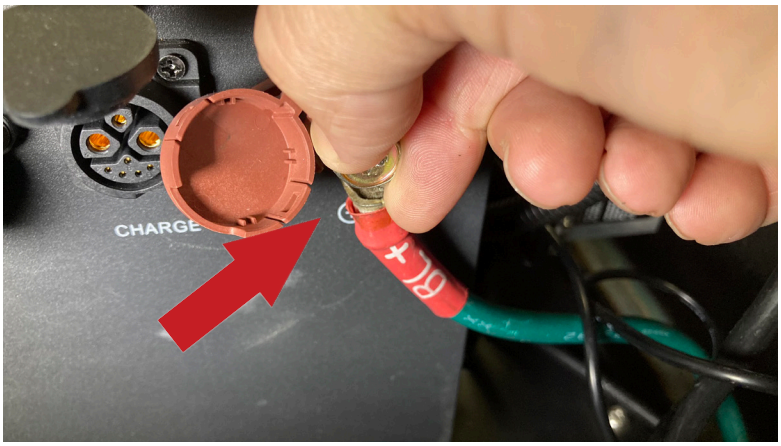
Place a flat washer, lock washer and nut on each of the bolts from the underside. You may need an assistant to help tighten the bolts from the topside. You will need the ratchet with the 13mm socket, and a 13mm wrench to secure these bolts.

Battery Installation

The battery shown here, is the 105Ah lithium unit, but the 80Ah unit is almost the same, except for the orientation of the mounting tabs.

Place the battery into the compartment with the lettering readable from the rear of the car. This will place the terminals facing the passenger side of the vehicle. This will position the terminals near the controller side of the compartment.

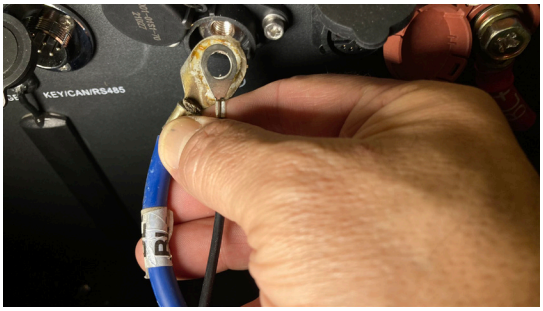
Use the (4) M8x1.25x25mm hex bolts, M8 lock washers, and (4) M8 flat washers to secure the battery to the mounting plate. Finger start all of the bolts into the threaded holes before tightening, so that the battery mounting tabs will be properly aligned with the mounting plate holes.



At this point, you will have the battery mounting plate bolted in, along with the lithium battery. You will need to connect the main battery cables to the main terminals of the battery pack.

In order for the main battery cables to connect to the battery, you will need to use a grinder or Dremel tool to grind the outer edges of the eyelets. This is so that the terminals will fit inside the battery connectors on the side of the battery. Once this is done, you will stack the main ground with the ground lead for the vehicle. The inner diameter of the connector is .800" or 20.32mm.

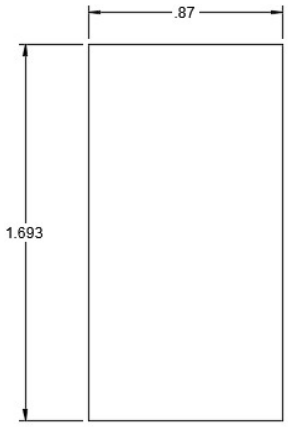
When the installation is complete, there should be 2 ground connections at the main negative terminal of the battery. These will be the ground lead for the PCB, the vehicle ground lead.

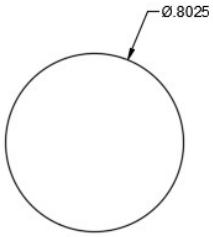


The next item to install, is the 2MT800 state of charge meter with key switch cable.

Route the cord from the battery compartment area under the vehicle floor, under the passenger side, through the openings in the frame, to the area behind the key switch. You can remove the SOC meter, and use the back of its body, to cut an opening in the dashboard. Leave the chrome-plated screw lock connector unhooked from the battery at this time. You can route the key switch wiring connector through the frame at the same time. This is the red end of the cord marked 2SW800

In this image, you will see how we have positioned the individual components into the dashboard area. Cut the rectangular opening in the dashboard, to accept the meter, and install the meter into the opening. Reconnect the cord to the meter connector.





For making the openings in the dashboard, here are the starting measurements. Use a Uni-bit for the push button hole, and a razor knife or oscillating saw can be used for the meter opening. You can use the measurements shown, and then use a razor knife to adjust for a precision fit. You would rather be undersized, and then adjust to fit, than be oversized. This will ensure the components fit snugly, without any gap around them.

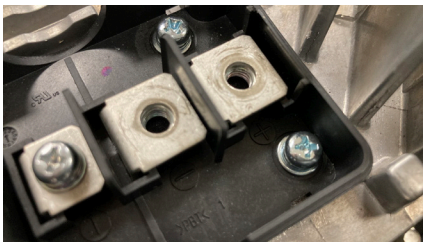
Installing Your Charger-105Ah

Before installing your charger, there are some components you will need to assemble first. Here are the items you will need. Find the hardware kit marked 2HD300. Then you will need to locate the two charger brackets shown. You will use the hardware kit to mount the brackets to the charger. Depending on your battery size, you may have 2 extra bolts from this kit. So this will be normal.

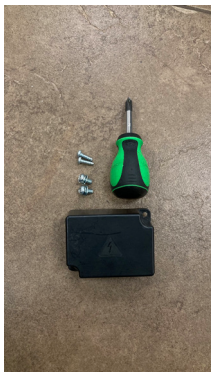
Refer to the photo below, for the orientation of the brackets to the charger fins. When installed properly, the feet of the brackets will point away from the charger fins.

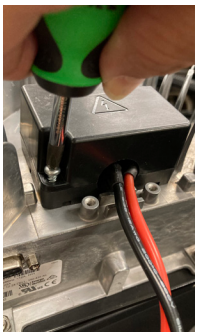
For each bolt, install a flat washer, then insert the bolt through the bracket and charger. Then install a flat washer, lock washer, and nut onto the bolt, to secure the bracket. The end of the bolt, with the nut, should face toward the charger fins. You will use a ratchet, 10mm socket and 10mm wrench for this step. **Do not fully tighten these bolts at this time.** This will allow you to pivot and position the feet of the brackets into the battery mounting holes in the nest step.

Now find the cord package marked 2CR020. This cord will connect the DC side of the charger to the battery pack.



You will use a Phillips screwdriver to remove the black plastic cover from the finned side of the charger. Remove the two small screws to expose the DC terminals. Pay particular attention to the polarity of the terminals. In the photo shown, the positive terminal is the one on the right.

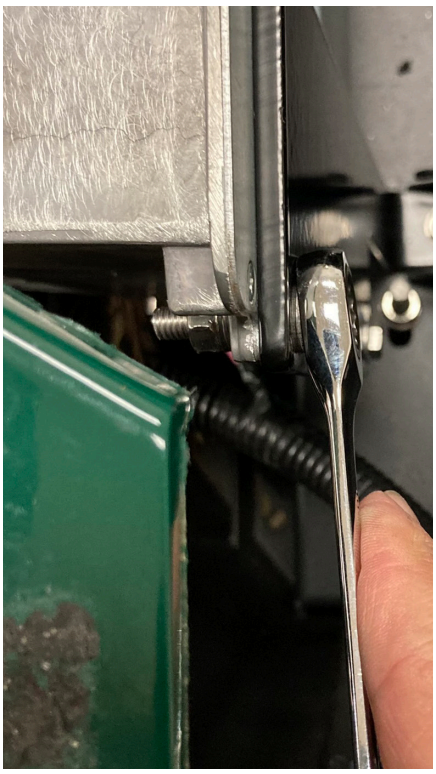




Now you can connect the red wire, from the 2CR020 cord to the positive terminal. Connect the black wire to the negative terminal. Be sure to route the wires through the recess in the lower cover, so that the wires don't get pinched when the top cover is re-installed. Re-install the top cover and the two retaining screws.

You are ready to place the charger assembly into the vehicle. The cord should be connected to the DC terminals and the brackets should be only snugly attached. Carefully grip the charger and cord and position the bracket feet over the mounting holes in the battery mounting plate, toward the front of the vehicle. Use a long extension, with a 13mm socket, to hand-start one of the bolts into one of the bracket feet. Do not fully tighten this bolt.

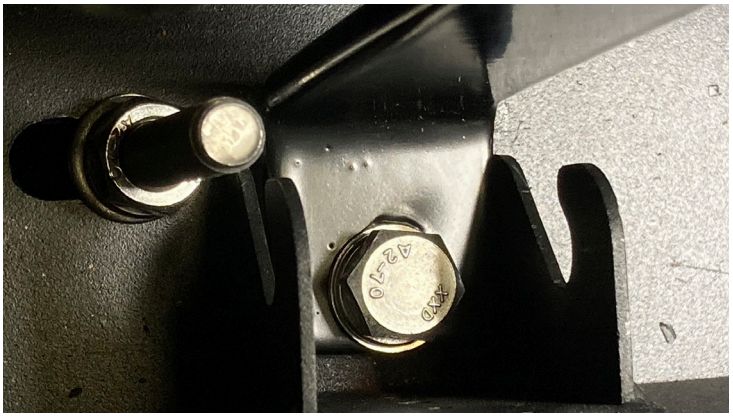
Now hand-start the other bracket foot bolt, using the long extension and 13mm socket. Once this bolt is started into the threads, do not fully tighten it. These will be the extra bolts that were mentioned on page 11, from hardware kit 2HD300.



Using the 10mm socket and 10mm wrench, from when the brackets were loosely attached to the charger, you can now fully tighten the four attaching bolts. These bolts should now be tight, leaving the foot bolts only snug.

Now, fully tighten the bracket foot bolts. The charger installation is now complete.

Installing Your Charger-80Ah



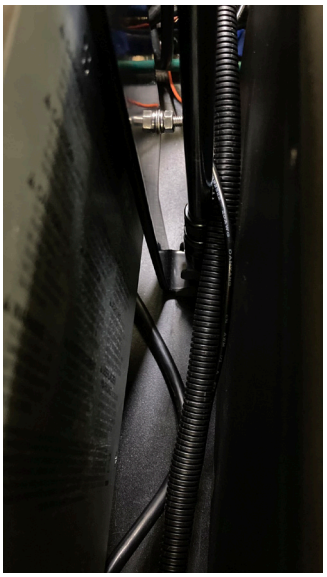
So far, this installation guide has focused on the 105Ah battery pack. But your battery may be the 80Ah unit instead. If this is the case, you will need to know the differences between the two.

The connections of all the components are the same, including the charger connections. The key difference is in the mounting of the charger.

For the 105Ah battery pack, the battery mounting tabs are along the short ends of the battery. This allows the charger to mount directly to the mounting plate. With the 80Ah battery, the mounting tabs are located along the long sides of the battery. Because of this, you will need to insert the charger bracket feet inside the battery mounting tabs.

The overall installation doesn't change much, even with this difference in orientation. The 80Ah battery mounts with the same four M8x1.25x20mm bolts with M8 washers and lock washers as with the 105Ah. But now they will be moved to the long ends of the battery pack. There are already mounting holes in the mounting plate, for either battery pack.

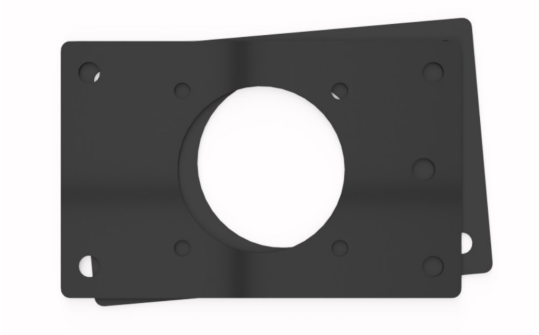
Align the battery side mounting tabs with the mounting plate holes. Install the two rear-facing bolts into the holes by hand, so as not to cross thread the bolts. Use the ratchet, long extension and 13mm socket to start the bolts finger tight. You may need to lift the black, plastic battery compartment cover, in order to access the two rear bolts.



Now position the charger bracket feet inside the battery mounting tabs toward the front of battery compartment. Install two M8x1.25x25mm bolts with M8 washers and lock washers by hand, through the charger bracket feet, through the mounting tabs, into the mounting plate. Use the ratchet, extension and 13mm socket to secure the mounting bolts.

All other cords and components will remain the same, as with the larger battery installation. Only your charger mounting will be different. It should look like the photo shown, when your 80Ah battery/charger installation is complete.

Installing Charger Receptacle



Begin by removing the OEM charging receptacle. You will need to keep the orange/red wire, for use with the lithium kit.

For installing the new charger receptacle, you will locate the 2CH917 and 2CH918 receptacle adapter plate and rubber seal.

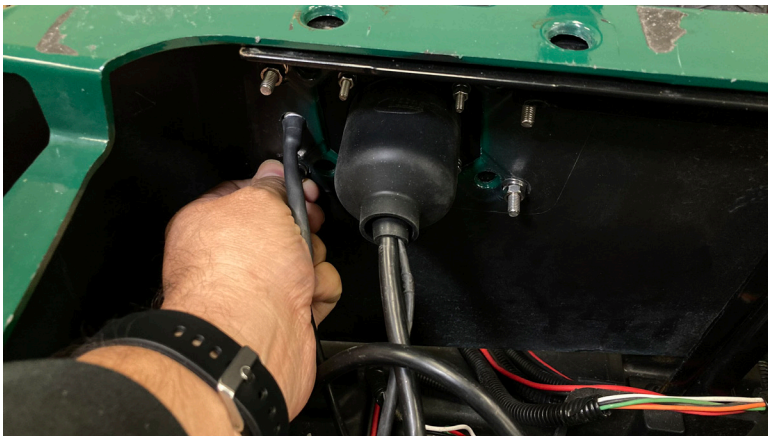
Then locate the 2HD301 hardware kit. These are the screws you will need to assemble the adapter plate onto the receptacle, and then to the body of the vehicle.

Find the 2RC080 receptacle cord. This cord will connect to the AC side of the charger that is now mounted in the vehicle.

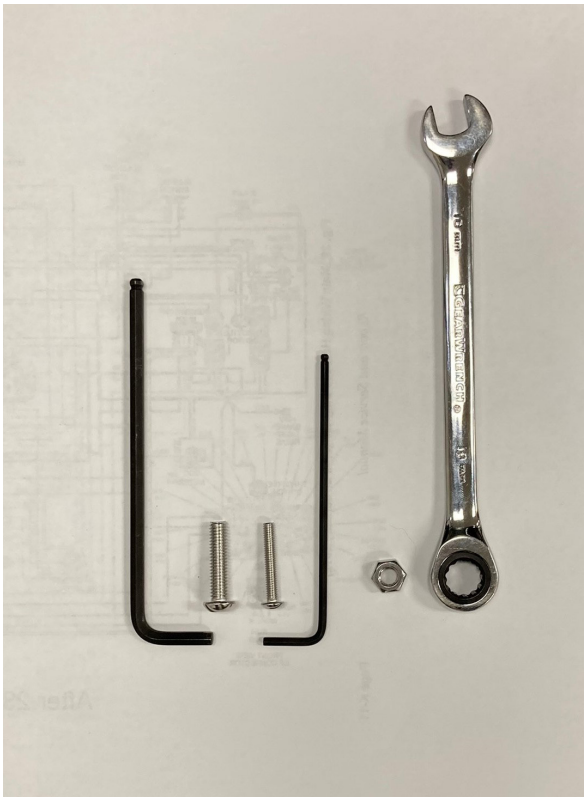
Position the receptacle adapter plate onto the body of the vehicle so that you can mark the new positions of the mounting holes. Be sure to include a hole for the remote LED cord. Once the locations have been marked, you will use a drill and a 1/4" drill bit to drill the 5 mounting holes.

Be aware you will need to use a die grinder with a burr, Dremel tool, or a grinding wheel to create recesses in the receptacle opening. This will allow the smaller receptacle bolts to pass through without being at an angle.

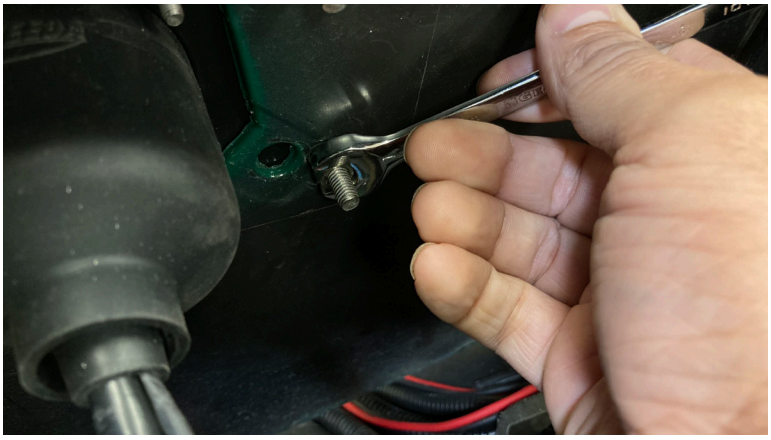
You can now place M4 flat washers onto the M4 screws, and join the receptacle to the adapter plate and seal. Install a lock washer onto the screw, followed by an M4 nut. You can tighten these nuts fully, using a 2mm Allen wrench, and 7mm wrench. You are now ready to install the receptacle and adapter assembly into the receptacle opening.



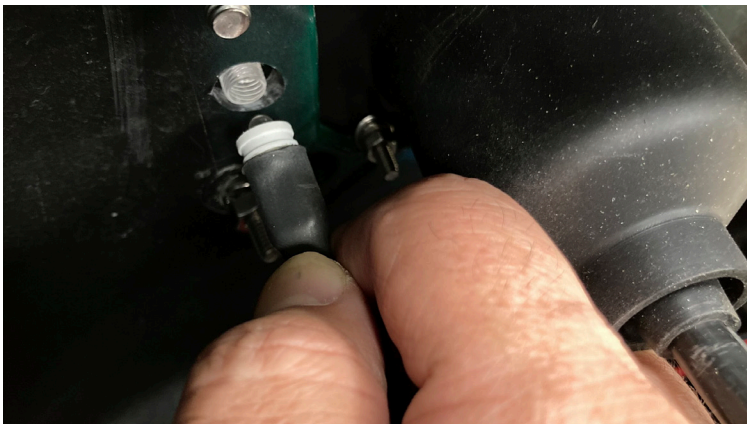
Using the M6 screws, install M6 flat washers and insert through the receptacle adapter plate, through the body. On the back side, place a flat washer and lock washer, followed by the M6 nuts.



The tools you will need, for installing the receptacle and adapter plate, are a 2mm Allen wrench, a 4mm Allen wrench, a 10mm wrench or socket with ratchet, and a 7mm wrench or socket with ratchet.



Here, you will see we are using a 4mm Allen wrench on the outside of the adapter plate, with a 10mm wrench on the inside of the battery compartment.



At this time, you can also install the remote LED cord, into the receptacle adapter plate. The cord is in the package marked 2CH913 Remote LED. This LED will indicate the charger status, to the user.

The Remote LED cord comes with a decal that explains the meaning of the colors and flashes that the LED can display. At the other end of the cord, opposite the LED, there is a DB9 connector. This connector will plug into the charger.

Peel the backing off the LED decal, to expose the self adhesive glue. Clean an area near the receptacle, and position the sticker so that it can be seen by the user.

Route the LED cord to the charger so that you can connect the DB9 connector to the charger. Thread the retaining screws into the charger, and snug them with your fingers.

At this point, the Remote LED is installed and connected. Now we'll connect the AC input cord from the receptacle, to the charger.

Plug the black, AC power cord end of the receptacle cord, into the end of the charger. This will only leave the white connector end, on the receptacle cord, not connected. We will connect this to the PCB board in a later step.

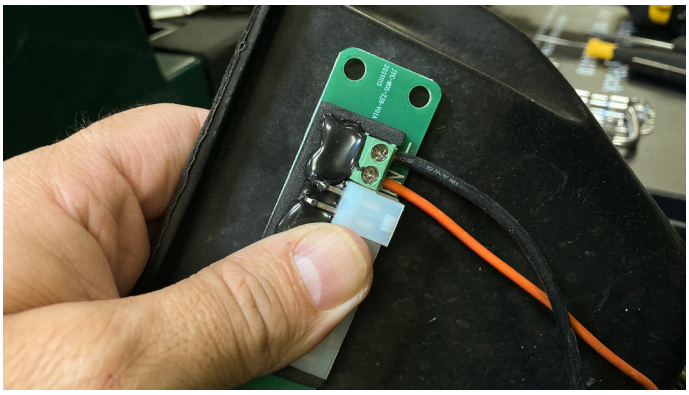
Locate the package that is labeled 2CR910 AC Charger Cord. This will be the cord that you will provide to the user, for charging the battery. There is a latch that is formed on the back of the gray plug, and this locks the cord into the receptacle lid, to keep it from falling out. When connected properly, the lid will lock with the plug tooth.

You can verify that the cord is ready for use, by plugging the 3-prong plug into a wall outlet, and looking at the charger cord LED. This red LED will be lit, when AC power is available for charging.

Installing the PCB control board

You are now ready to install the PCB control board. Locate the sealed Mylar package labeled 2BI805 PCB Board and the hardware kit marked 2HD304. You will find a black wire included with the hardware, with a metal eyelet at each end. Begin by taking this wire and cutting one eyelet off, using wire cutters.

You will need a 7mm socket and ratchet, and a wire cutter, along with a Phillips screwdriver. You will also need a small flathead screwdriver. You will need a drill and 4mm drill bit, for drilling PCB mounting holes into the black, plastic controller cover. You will also need a fine-tip marker for marking on plastic.

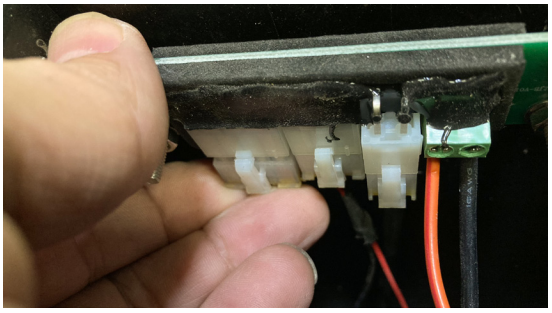


Use the PCB board to mark the position of the mounting holes, on the top end of the controller cover. This is where we mounted ours, above the run/tow switch. Using a drill and 4mm drill bit, make four holes for the PCB board mounting screws. This is the end of the cover, that faces up when installed over the controller. Orient the board so that the wires face away from the controller, when the cover is replaced.

Place a flat washer onto each screw, and insert through the plastic cover. Then thread the screws into the mounting screw spacers. See the photo, for how to stack the spacers between the plastic cover and the PCB board. You can now install the 4mm lock washers and nuts, and snug the nuts down.

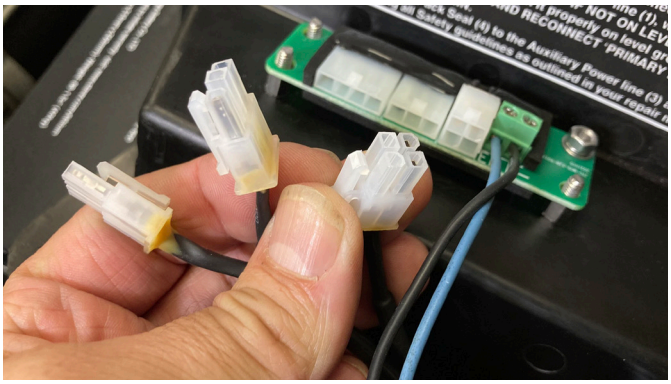
Use your wire cutters to cut the orange/red wire from the OEM charger receptacle, and route the wire to the PCB screw lock connector. Strip the insulation from the end of the orange/red wire you just cut, and insert it into the EN (enabler) opening. Tighten the screw to secure the wire.

You will need to cut the black tape around the shroud material from the OEM receptacle wiring harness. This will allow the wiring to reach far enough to go into the controller cover when bolted up.

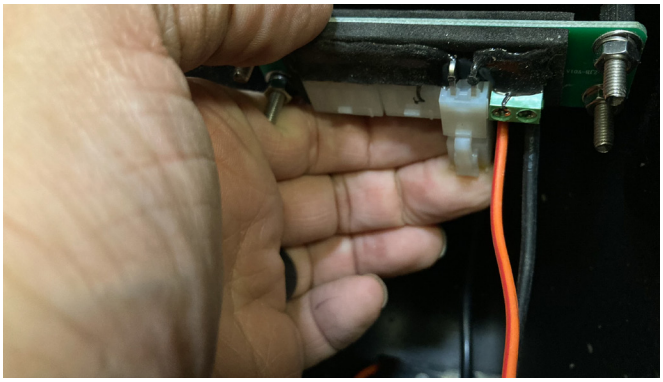


Strip the insulation from the end of the black wire, where you previously removed the eyelet. Insert the freshly stripped end into the P- opening in the PCB screw lock connector. Tighten the screw, using the small flathead screwdriver, to secure the black wire. Connect the eyelet end of the black wire, to the main negative post of the lithium battery.

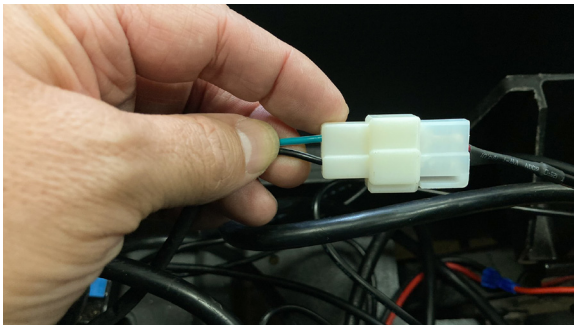
It is now time to begin making the connections to the PCB board. Beside the screw lock connector, you will see three white plug in connectors. They each have different configurations, to prevent incorrect connections, but we will go through them separately.



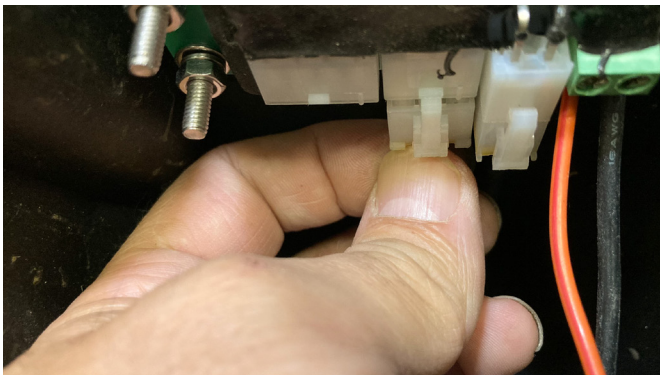
Now, connect the screw lock connector of the state of charge meter cord, to the port on the side of the battery, marked KEY/CAN. This will provide the state of charge to the meter at the other end of the cord, when the battery is turned on. This end of the cord was left loose, in the step where we installed the SOC meter.



Locate the package with the cord labeled 2CB800. This cord will have a square, white 4-pin connector at one end, and a white 2-pin connector at the other. Insert the 4-pin connector into the 4-pin female connector on the PCB board. Route the cable over to the back side of the receptacle. Connect the 2-pin connector on the cable, to the 2-pin, open connector on the receptacle harness.



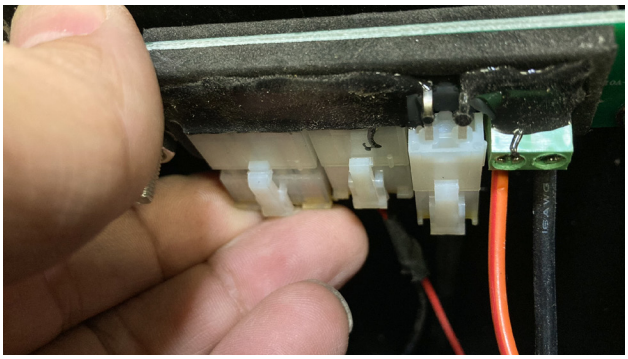
This cable is now properly installed. This leaves the other two openings ready for connections.



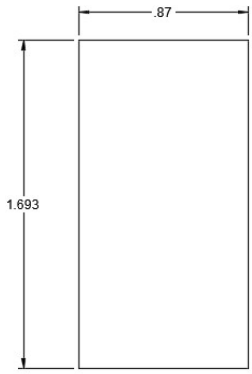
Locate the 3-pin connector that is part of the harness that has the screw lock ring on the side of the battery. It is the harness that we attached to the KEY/CAN port, and the other end goes to the meter in the dashboard. Plug this 3-pin connector into the 3-pin opening on the PCB board.

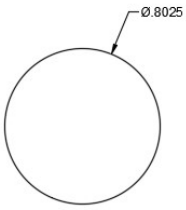
Before re-installing the controller cover, be sure to route all wires in the guide channel at the bottom of the cover. This will make sure that wires aren't pinched when the cover is tightened down.

Locate the package that has the label 2SW800. This is the pushbutton switch, to turn the battery on from the dashboard. You will find a linear 4-pin connector at one end of this cable, and a pushbutton switch at the other. You can remove the switch and set it aside, but it is not a required step.

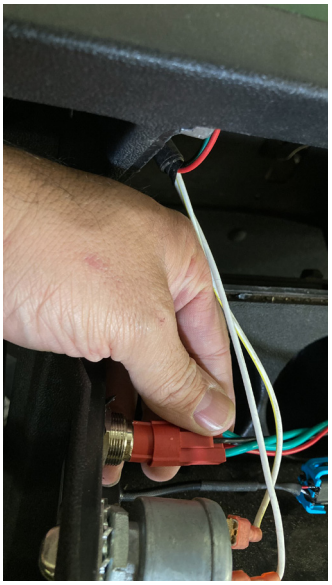


Connect the 4-pin connector to the PCB board, in the last available opening. Once you've plugged it in, you can route the cable into the center of the vehicle floor, running alongside the meter cable we installed previously. Route the rest of the cable up to the area behind the dashboard.





Using the Uni-bit, create the round hole for the pushbutton switch. See the diagram for the measurements. Try to keep the hole as small as possible without going over. You should have a relatively snug fit when finished drilling the hole. Remove the retaining nut from the back of the switch, to allow it to pass through the hole. Insert the push button switch, and re-install the retaining nut.



Your pushbutton switch should now be installed and secure in the dashboard. If it's not plugged in, connect the blue end onto the back of the switch. Press the ON/OFF button on the side of the battery. Then press this dashboard switch. The battery ON/OFF switch should illuminate, letting you know that it is now turned on and ready for operation.

Basic Operation

Lithium Battery Pack:

1. Battery must be fully charged before use, in order to properly calibrate the meter.
2. The lithium battery must have continuity through the key switch circuit in order to power on. The dashboard pushbutton acts as this key switch input. Turn on the battery power switch, then the dash pushbutton. Both LED's on both switch buttons will light green, when turned on. From this point on, the battery power button can remain pushed in, and the dash button will act as the power button.
3. When the charger is plugged in, the vehicle will not drive.
4. The charger can be plugged in with the power button on or off. Either scenario is acceptable.
5. The battery has a sleep mode, which is activated after 1 hour of key switch input without vehicle operation. The green dash pushbutton LED may or may not be lit when this happens. You can simply cycle the dash pushbutton on and off, to return the battery to operational status.

Lester Summit II Charger:

Slow Blinking	Fast Blinking	Solid Amber	Steady
Bulk Phase/Start Phase	Absorption Phase (Above 80%) 12.6 amps	Finished Charge Cycle Phase	Charge Cycle Complete

1. The Lester charger needs to have adequate AC power available from the wall outlet to operate. This can be confirmed by viewing the red AC present indicator on the gray charger plug.
2. On the side of the charger, you will find a blue, red, yellow, and green LED. The blue LED is also an AC present light. It confirms that there is AC power available to the charger.
3. The slow blinking amber LED indicates the bulk phase. The fast blinking amber LED indicates the battery has reached 80% of full charge. A solid amber light means the charge phase has ended.
4. The 105Ah battery typically takes 5 hours to reach full charge.
5. The charger must also receive a DC voltage supply from the battery. This voltage must be above 13-15 volts, so this further solidifies the need for the meter to be properly calibrated, as outlined in #1 of the lithium battery pack section above. If the battery pack voltage should drop below 13 volts, the charger will not operate.

General Troubleshooting

Here are some general troubleshooting questions: (**You MUST fully charge your Lithium battery before operating!**)

Q: What if there is something missing from my Star lithium battery kit?
A: Call the Star accessory parts department, at 864-553-7969.

Q: What if my battery won't turn on?
A: Verify that your battery power switch is pushed in, along with your dashboard pushbutton switch. Your battery should power up, with both of the switches pushed in.

Q: What if my meter seems to be inaccurate?
A: You MUST fully charge your Lithium battery before operating!

Q: What if my battery won't charge?
A: Verify that the red LED is lit on the AC charger cord plug. Then verify there are three cords connected to the charger, and that they are secure. Verify the correct polarity of the red and black wires under the black, plastic terminal cover on the finned side of the charger. On the side of the charger, look to see if there are any LED lights lit. If AC power is available to the charger, the blue LED should be lit. You can then download the Lester Charger Connect app onto your smartphone, to connect to the charger, for diagnostics.

Q: What if I've tried all the steps above, and still need help?
A: Call Star Technical Support, at 864-553-7147.