



Star EV Lithium 48V Classic/Sport Installation Guide



STAR

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Table of Contents

Tools Needed	4
Kit Contents	5
Battery Removal Process	6
Battery Compartment Preparation	8
Battery Installation	10
Removing Your SLA Charger	15
Installing Your New Charger-On-board	16
Installing Your New Charger-Off-board	19
Basic Operation	21
General Troubleshooting	22

**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/controller applications!**

Tools Needed

For battery removal, you will need to have a ratchet, with an extension, a 14mm deep socket, and a 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 zip ties that hold the old charger wiring to the frame rails. It will also be helpful to have an assistant nearby, throughout the whole conversion.

To install the lithium battery, you will need the same tools, a ratchet, extension and deep 13mm socket. You will also need access to a die grinder, Dremel tool, portaband saw, or grinder to cut off the SLA mounting tabs at the bottom of the battery compartment.



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, and a 13mm wrench. You will also need a pair of wire cutters/ strippers.



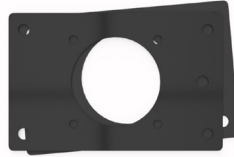
You will need a drill, with a 3/8" drill bit, a medium length Phillips screwdriver or a Phillips screwdriver bit socket, a 8mm nut driver or 8mm nut driver bit socket, and a long 5mm, ball end Allen socket. These sockets can be driven with a cordless ratchet, or cordless 1/4" drive impact gun.

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)
2CR910 AC Charger Cord (bottom right)
2CR020 Charger Cable (bottom left)



2CH917 and 2CH918 Receptacle Adapter Plate and Seal
 These parts in red are only needed for OEM Off-board charger applications



2HD050 Classic/Sport Lithium Hardware Kit



2BA405 80Ah Lithium Battery (For Classic only)



2BA410 105Ah Lithium Battery (For Classic or Sport)



2BA415 210Ah Lithium Battery (For Classic or Sport)



2SW291 Universal Ignition Switch for Sirius/Capella



2WH291 Lithium Key Switch Patch Cable for Classic



2BT291 Sirius/Capella Battery Mounting Plate



2BT289 and 2BT290 Charger Mounting Legs

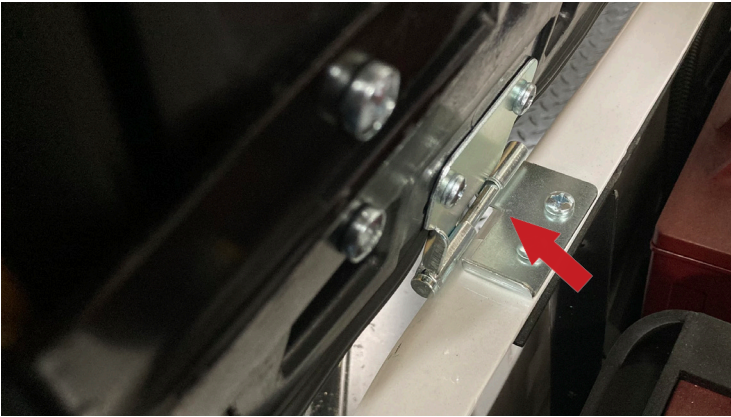


2CH020 Lester Summit II Charger

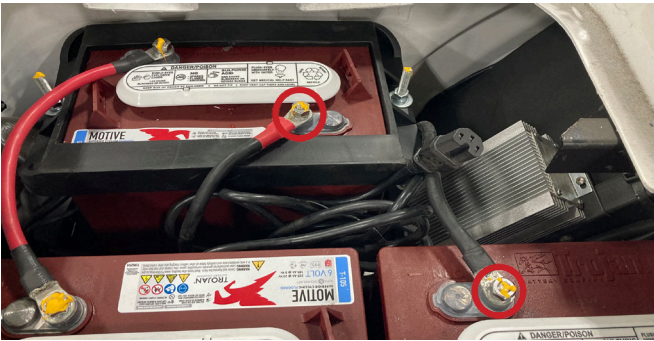


2MT223 Battery Indicator with LED

Battery Removal Process



To make it easier to access and remove the batteries, it will be a huge help to remove the seat cushion. To remove, raise the seat upward, and slide the hinges apart. You will see that the hinges are able to slide apart, when the seat cushion is in the upright position. Set the cushion aside, so it is now out of the way.



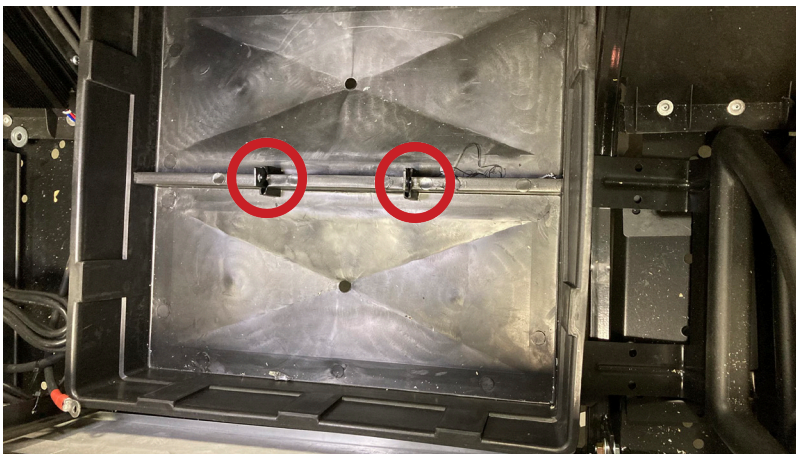
To remove the sealed lead acid batteries, you will need to disconnect the main battery cables from the battery pack, and keep them from contacting the batteries. Use a 14mm socket for removing the terminal nuts. Use the 13mm deep socket, ratchet and extension to remove the nuts from the battery holdowns. Remove all the battery cables that connect the batteries to each other.



There are battery holddowns in the center area of the battery array. But you'll also find two on each holddown for the outrigger batteries. Once you've removed the holddown nuts, remove the black plastic battery retainers with the outer batteries.



With the compartment now cleared out, you can install the Star EV lithium battery mounting plate. This is the 2BT291 Mounting Plate. You will need the 4-M8x1.25x65mm button head bolts, 4-M8x1.25 nylock nuts, and 4-M8 flat washers to secure this plate into the car, from the hardware kit 2HD050-Hardware Kit #3 (2HD002).



At the bottom of your battery compartment you will have the original plastic battery tray. Remove this tray and you will be left with the open, bare frame below. You will see there are two straps sticking up in the center, where the lead acid battery holdowns used to attach. Use a die grinder, with a cutting wheel, grinder or porta-band saw to cut these straps off flush with the frame. Use black spray paint to coat the cut ends, to prevent rusting.



Battery Compartment Preparation

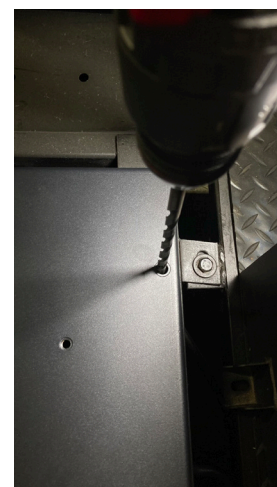


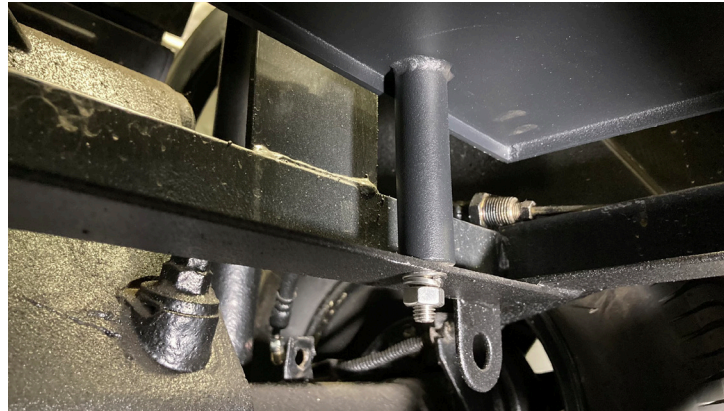
When your battery tray tub has been removed, tabs cut off and painted, this is what the battery compartment will look like.



You will move all wiring so that it is outside of the horizontal lip of the angle iron that makes up the frame. You can use zip ties to secure the wiring out of the way, if needed. You do not want any wiring caught between the new battery mounting plate and the frame. This could cause a short circuit situation that will be very hard to locate.

You can use one of the mounting plate bolts as a spacer, to align the mounting plate within the frame equally around the perimeter. Then, beginning with any of the mounting plate holes, drill a 3/8 hole through the frame. This will go down through the mounting plate standoff and all the way through the frame rail. With each new hole drilled, insert a bolt, to prevent the plate from “walking” as you drill the next hole. This will ensure that all the bolts will remain lined up until the last hole.



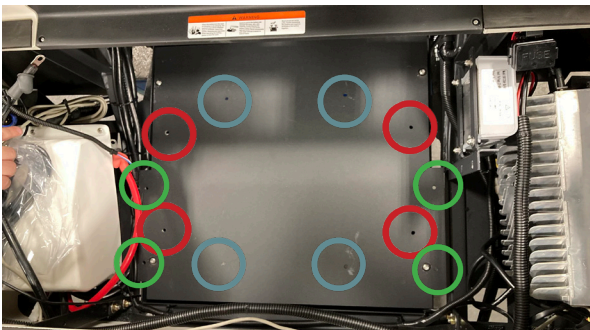


You are ready to install the washers and nylock nuts onto the mounting plate bolts. Use a wrench and 13mm socket to tighten all 4 of the bolts and nuts. Your battery mounting plate is now installed, and ready for the battery installation.

Battery Installation



The battery shown here, is the 105Ah lithium unit, but the 80Ah and 210Ah units are almost the same, except for the orientation of the mounting tabs. In the photo below, you will see the 105Ah battery mounting holes circled in red, and the 210Ah shown in green.



Locate the 4-M8x1.25x25mm button head screws, 4-M8 flat washers, and 4-M8 lock washers and install them with fingers only. This will allow you to pivot the battery into place, to get all the other screws started.

80Ah mounting points
105Ah mounting points
210Ah mounting points

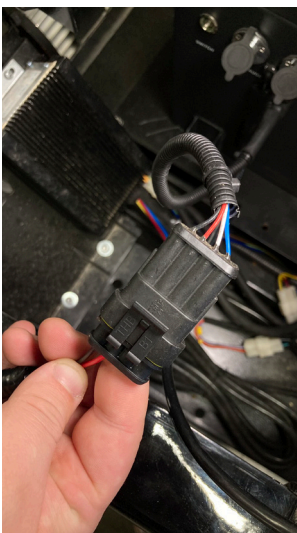


Once the screws are all installed, use an Allen socket with an extension to secure all the bolts to the mounting plate.

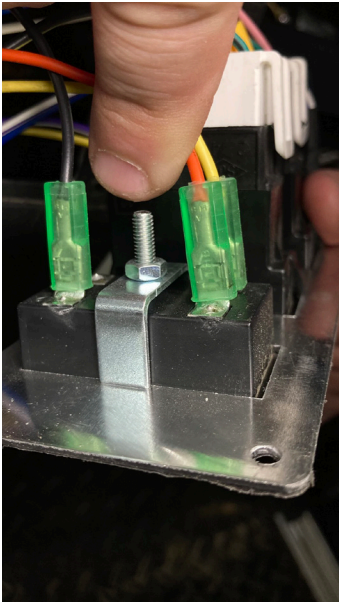


At this point, you will have the battery mounting plate bolted in, along with the lithium battery. You will need to connect the main battery cables to the main battery terminals on the side of the battery. Be sure the battery power switch is off, for the 80Ah or 105Ah batteries. Using a 13mm socket and torque wrench, torque the bolts to 105 in-lbs.

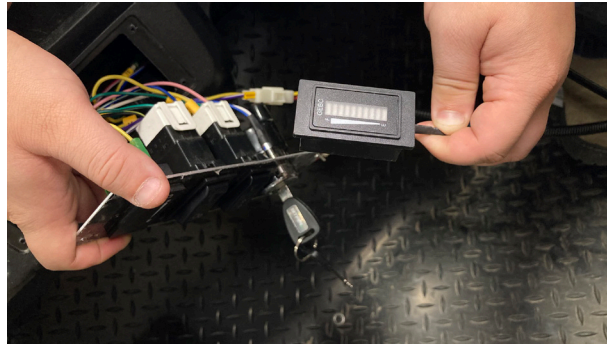
Locate your key switch cable, PN: 2MT223. This is the harness that will provide a key switch signal to the battery, to tell it to turn on. With this cable installed, and the battery's power switch pushed in, the battery should power on. The meter will replace the dash Coulometer in a later step. The chrome-plated screw lock connector goes into the battery's KEY/CAN port, but we won't install that until later. We are mainly interested in the 4-pin connector at this time.



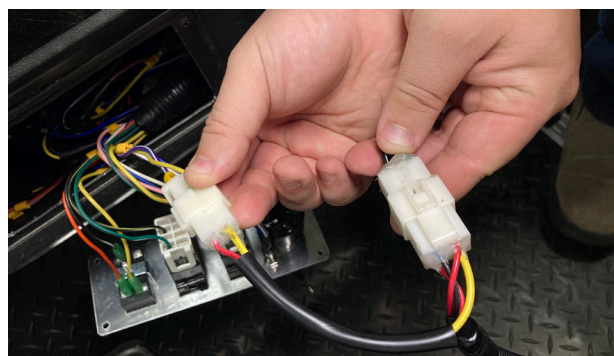
You can lay the cable alongside the battery and you can locate the 4-pin, black connector along the passenger side frame rail. This connector is where you will plug in the end of the 2WH291 Lithium Key Switch Patch Cable for Classic. The other end will connect to the new key switch that will be replaced as part of the kit. You will route the meter under the vehicle, to the cupholder area so that you can install the meter into the dash.

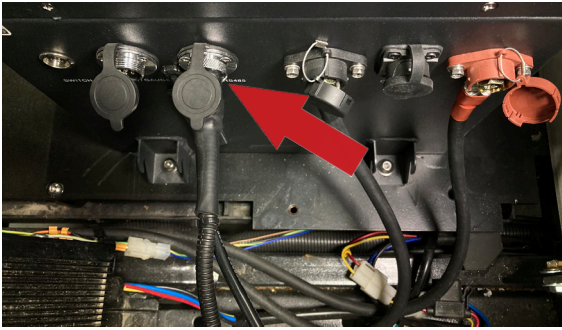


Remove the retaining nut from the back of the dash Coulometer. This will allow the old meter to be removed, leaving an opening for the new meter on the end of the 2MT223 cable that was just run from the battery compartment. Install the new meter into the dash. It should snap into the opening. Next, we will replace the key switch, on the other side of the dash panel.

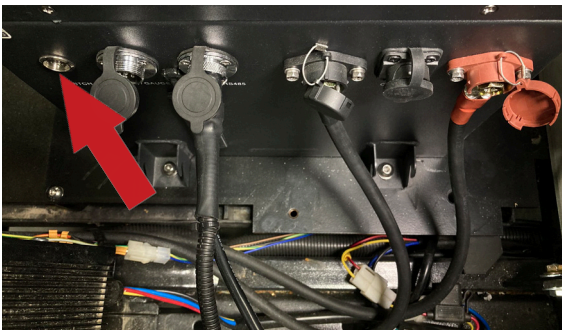


The 2WH291 patch cable connects to the 4-pin connector at one end, beside the battery. The other ends has a "T" in it. One side of this "T" connects to the newly installed key switch, and the other connects to the vehicle wiring. See photo below for how the wiring should look once you're done with this step.





At this point, you will connect the chrome-plated screw lock connector to the KEY/CAN port on the side of the battery.



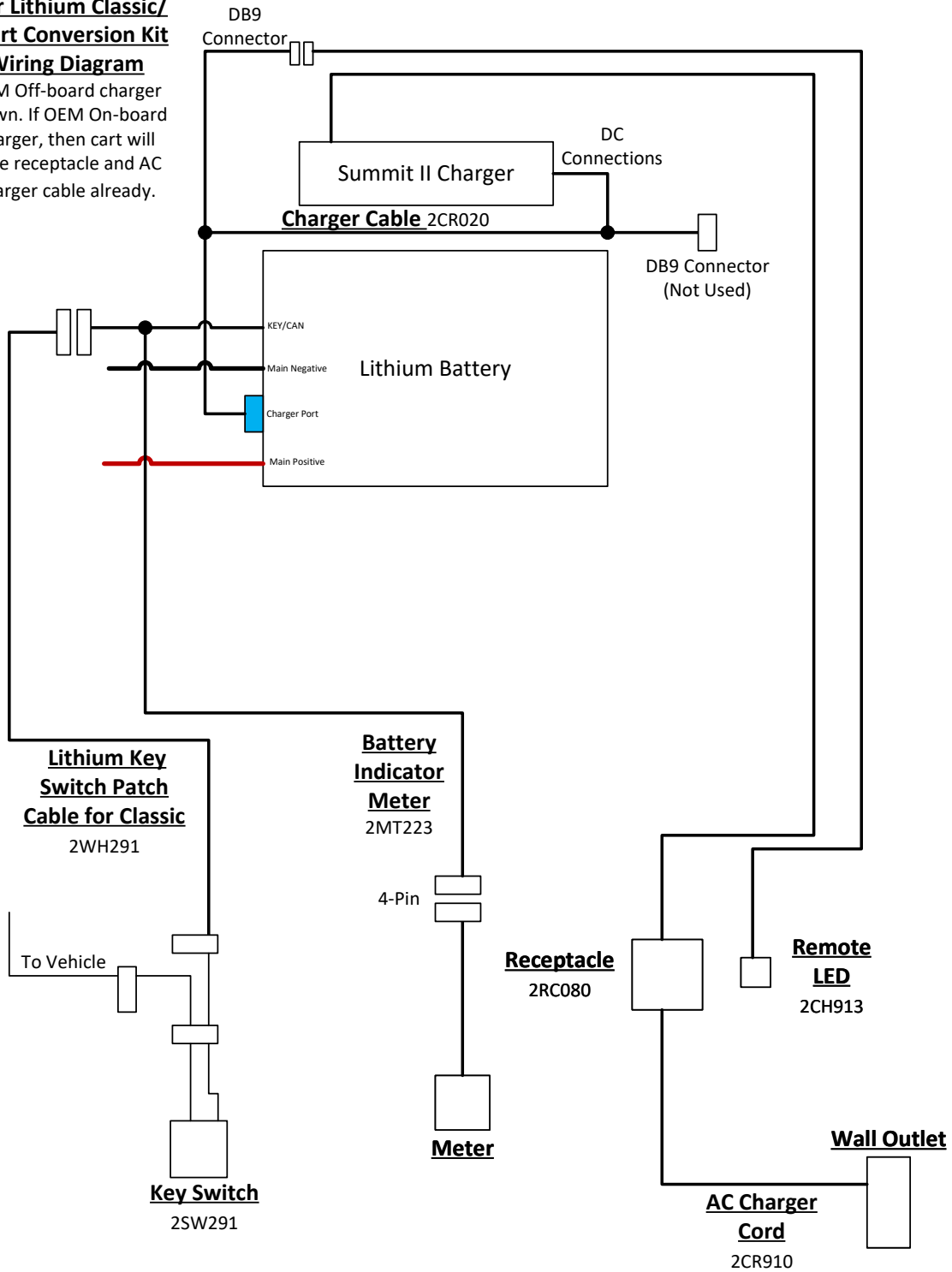
You can now press the battery power button, for 80Ah and 105Ah, and turn the key and the battery should turn on. With the 210Ah, there is no power button, so you will just need to turn the key for it to come on. The battery power switch will illuminate green around the button. Or, for the 210Ah, you will hear a solenoid click inside the battery.

The vehicle should be able to drive with this much of the installation completed. The DT Smart Battery app should also be able to connect to the battery. But the battery will need to be fully charged before use. We will now turn our attention to installing the charger, and the necessary cords for an on-board charger configuration. If your battery doesn't turn on at this point, please refer to the wiring diagram on the following page, to review your connections.

**Star Lithium Classic/
Sport Conversion Kit**

Wiring Diagram

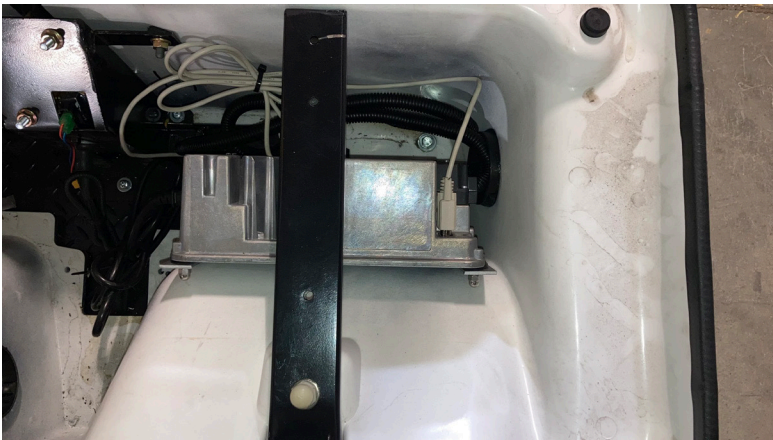
OEM Off-board charger shown. If OEM On-board charger, then cart will have receptacle and AC charger cable already.



Removing Your SLA Charger



You will need to remove the 650W charger, for the lead acid batteries in order to replace it with the new 1050W charger for the lithium application. For the 4 or 4+2 cart, you will find the lead acid charger mounted underneath the front seat of the vehicle.



Remove the OEM charger, along with the charger brackets. You will find the attaching nuts on the outside of the pod seat. Your new charger will be mounted inside the battery compartment, alongside the lithium battery. Remove the remote LED DB9 cable, and all the cords that are attached to the charger, but they will remain connected to the receptacle in the vehicle.



For the 2 or 2+2 cart, the OEM charger will be in the rear bagwell area. You will see it through the opening under the rear flip seat. Remove the charger, the charger brackets and the charger cords.

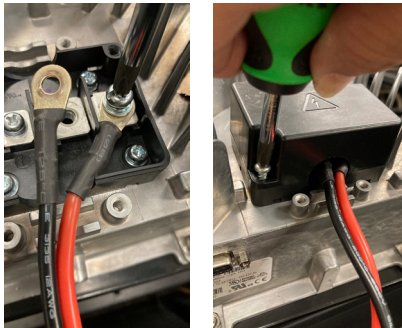
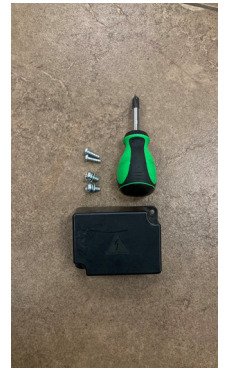
Replacing Your Charger | On board



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



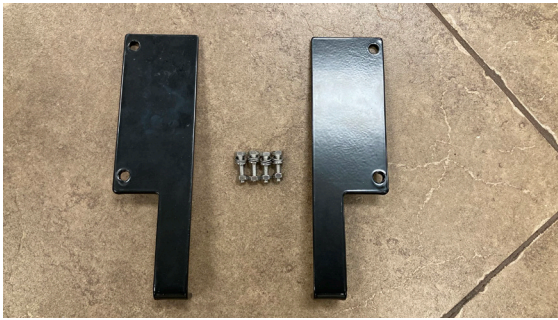
You will use a Phillips screwdriver to remove the black plastic cover from the finned side of the charger. Remove the two small screws to expose the DC terminals. Pay particular attention to the polarity of the terminals. In the photo shown, the positive terminal is the one on the right.



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.



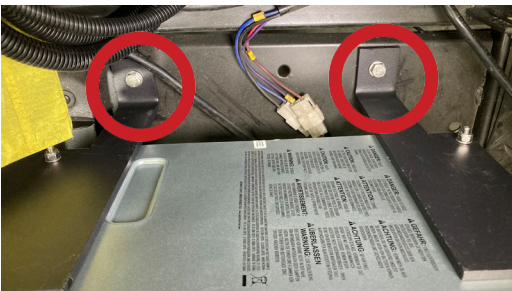
Before installing your charger, there are some components you will need to assemble first. Here are the items you will need. Find the M8x1.25x20mm bolts, with 4-M8 flat washers and 2-M8 nylock nuts. Set these bolts aside. You will need them to install the charger brackets to the vehicle.



Locate your charger brackets and use the M6x1.0x25mm bolts, 8-M6 flat washers, and 4-nylock nuts to attach the charger brackets to the back of the charger, loosely at this time. Next, you will need to use a drill and a 3/8" drill bit to place 2 holes in the driver side tray area of the battery compartment. These holes need to be 9.150" apart.



Your charger brackets will be loosely held to the charger at this time. You should have two holes drilled in the side tray area. Be sure that your charger bracket feet are oriented similar to the photo to the left. You will now use the M8 bolt/washer/nut assemblies from above, to secure the charger feet to the vehicle, using two 13mm wrenches. The finned side of the charger will face outward, toward the outside body of the car.



Use a 10mm socket with ratchet, and 10mm wrench to tighten the charger to bracket bolts fully at this time.

The direction of the charger bracket feet is shown above. You will need to position your side tray holes far enough in, from the side of the body, to allow the charger to fit into the compartment, AND allow you to access the bolts for final tightening.



Bring the long end, of the cord with the blue spring lock connector, so that the DB9 can connect to the new charger as shown. Snugly tighten the screw retainers.



Now that you have the charger installed you will connect the 3 prong plug from the charger receptacle to the charger.

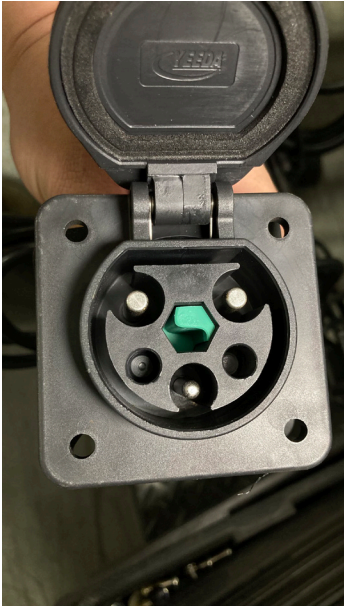


You are now able to connect the charger cord, with the blue twist-lock connector to the charger port of the battery.



You will find a remote LED light directly above the charger receptacle. This LED has a cord attached to it, that was leading to the original charger. This cord has a computer monitor style DB9 connector on the end. This connector will need to be connected to this connector.

Installing Your Charger | Off board



If your vehicle originally came with an off-board charger configuration, we will now convert it to on-board. Locate your charger receptacle, PN: 2RC080. You will also need to locate your M4x0.7x25mm button head screws, M4 washers, M4 lock washers, and M4x0.7 nuts. These will be used to attach the receptacle to the receptacle adapter plate.



On current Classic/Sport models, the charging receptacle is mounted as shown, on the passenger side of the vehicle. Your receptacle will be able to replace the off-board charger receptacle. You will need to use the adapter plate to mark the mounting holes on the body of the vehicle, around where the new receptacle will be installed. Drill four holes to allow for mounting screws to pass through.



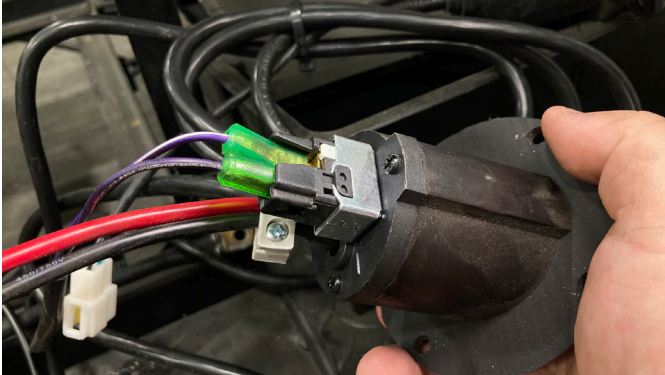
Adapter Plate

Receptacle

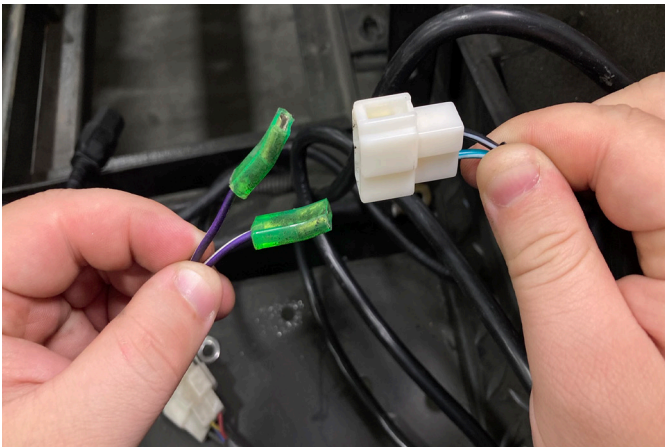


Assemble the receptacle, mounting plate and mounting plate gasket together as shown. Use the hardware, from above, to attach the three parts together.

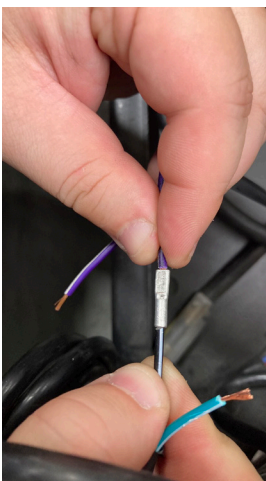
Using the M6x1x25mm button head screws, M6 washers, M6 lockwasher and M6x1 nuts you will attach the receptacle/plate/gasket assembly into the vehicle body. Tighten the bolts to hold the assembly into the cart.



Now we will turn our attention to the charger receptacle wiring. As shown, the OEM off-board charging receptacle has two purple/white wires that connect to the charger interlock switch. These wires will need to be spliced into the replacement charger receptacle wires. Remove these two wires, and you can discard the OEM receptacle.



On the replacement charger receptacle, you will find a white 2-pin connector. This connector will need to be removed, by cutting the two wires behind it. Cut the terminals off the purple/white wires also. You will strip the insulation from the ends of all four wires, in preparation for the butt splice connectors.



After the insulation is stripped, locate the two butt connectors in the hardware kit contents. Use the butt connectors to crimp and connect the two purple/white wires to the two wires from the replacement receptacle. It does not matter which wire is matched to which color, as long as each purple/white wire is connected to one wire from the new interlock switch in the new receptacle. Insulate all exposed wiring connections with electrical tape, to prevent water intrusion and/or chafing.

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:

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.

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

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.