Star EV Lithium Conversion Kit Installation Guide

Check applicable models

Contacts to know

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Foreword

Hi there folks! This is Jonathan, from the Star EV technical support team! I've put this manual together to help you complete your Star lithium conversion kit installation as quickly and easily as possible.

There are a few things I hope to convey through this manual:

- First, I hope you can feel how seriously we take your jobs, livelihoods and families. We know that your shop's reputation is on the line, and you want to protect it.
- Second, we want you to know that we are here to reduce your stress as much as possible. The easier we can make your job, the better your life will be. Also, it helps you move on to the next job quicker, and keep your customers happier. And this helps everyone involved!
- Third, I've tried to keep things simple and straightforward. When you need information, you don't want to search for hours. And I know that. You need the help right away, with simple testing that will narrow down any problems fast. We value your time, and know there isn't any that you can waste.

And beyond this, we just want to thank YOU for all your hard work!! Without you guys, slogging it out in the trenches, day in and day out there would be no need for us. There would be no need for this company, or even a conversion manual at all! So I thank you again, for all you do!

Please bear in mind that this is an ever-expanding document. Updates will be added, and refined as time goes on, and we hope that you will see this as ongoing responsiveness to your needs! Thank you for giving us this opportunity to serve and work alongside you!

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Applicable Models

IMPORTANT NOTE: You must verify your vehicle falls within these models and model years for your conversion kit to work. Star EV technical support will not be able to offer support for vehicles outside of these listed.

Star Capella
If your Capella was made before 3/21, you will need a patch cable. Refer to Capella section.

Star Classic/Sport
See special notes for Classic/Sport, if factory equipped with off-board charger.

Star Sirius
Must be made after mid-year 2021, have 21 or 22 in the serial number, AND have CAN connector under the center cupholder.

EZ-GO RXV
Made after Jan 23rd, 2012.

EZ-GO TXT
Made after 2010.

Yamaha Fleet Drive II
Must be the fleet version. The PTV version will not work with this kit.

IMPORTANT NOTE: It is STRONGLY advised that you test the battery on the floor, before installation. Place battery on the floor. Install the silver connector into the KEY/CAN connector on the side of the battery. Using a jumper wire, jumper the red wire to the black wire in the 4-pin black connector near the silver connector, or the outer pins on the 3-pin white connector depending on the kit you have. Press the battery power button if applicable. The battery should turn on. This will verify the battery has sufficient charge, before installing. Once this is performed, you can proceed to mock up the entire kit on the floor, to verify you have all parts needed, and the kit is working properly before installation.

Battery Bench Testing

To turn the Star lithium battery on you simply need to depress the power button on the side of the battery and provide a key switch signal. The 210Ah battery does not have a power button. So the 210Ah only needs the keyswitch signal to turn on.

Every Star lithium conversion kit comes with a keyswitch harness that plugs into the KEY/CAN port on the side of the battery. This harness supplies the keyswitch signal to the battery.

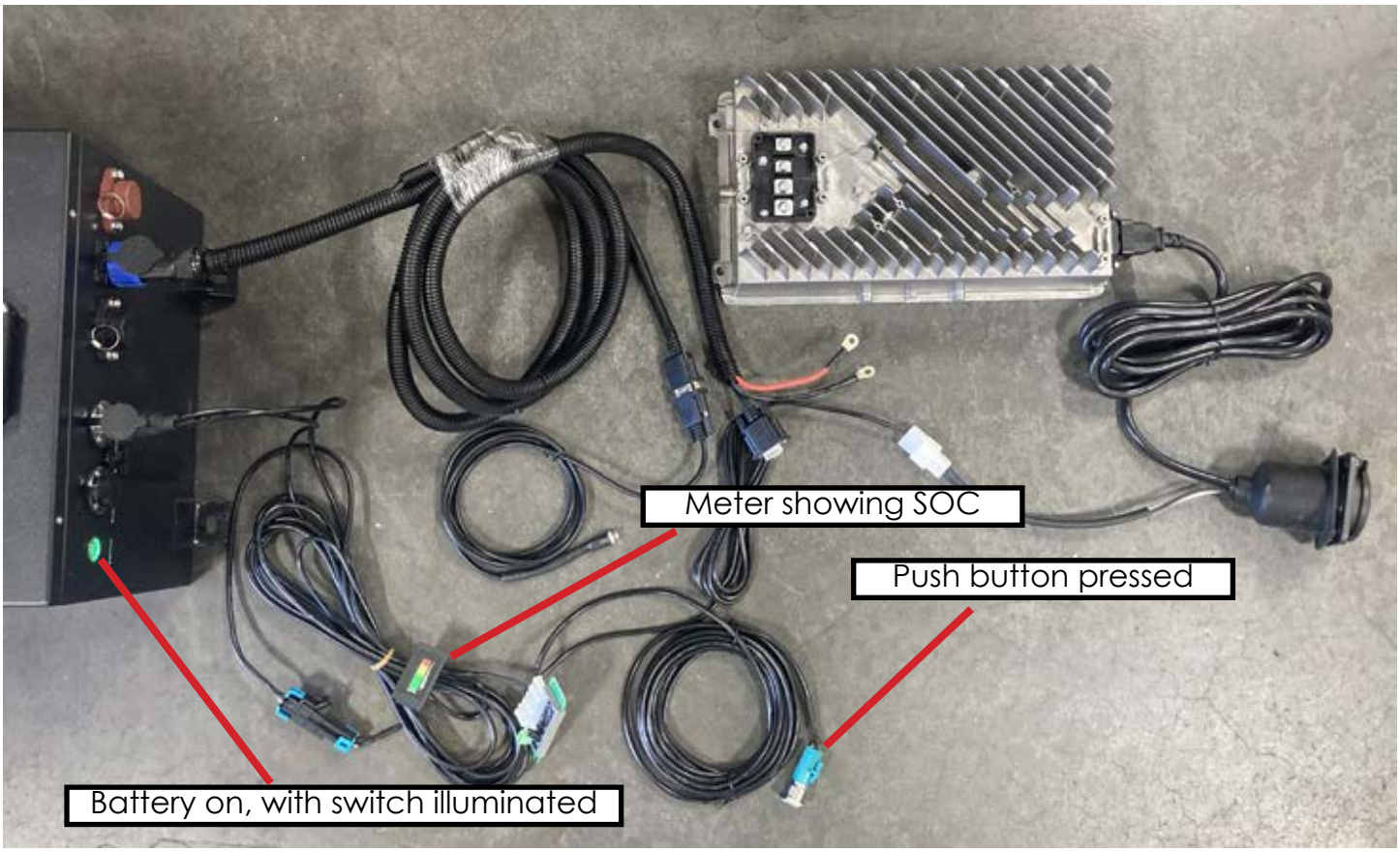
To turn the battery on, simply plug the harness with the silver connector into the KEY/CAN port. Press the battery power button. Place a jumper wire between the red and black wire in the harness's 4-pin keyswitch connector.

The battery should power on. In the photo, we're using the Sirius connector. But most of the lithium kits come with some form of this harness, providing either a 3-pin or 4-pin connector. You can perform this jumper wire test on every kit battery right on the floor before installing it into the vehicle.

In the RXV/TXT kits, this harness provides a 3-pin connector that plugs into the PCB board. On this harness, you will jumper the two outer pins in the 3-pin connector.

If you jumper any of these connectors and the battery doesn't come on, or only comes on for a few seconds it means that it is too discharged. You will need to trickle charge the battery and retest it again.

If you have purchased a battery kit and you've had it in storage for more than a month, it is most likely discharged. See the advanced troubleshooting section of this manual, for the trickle charger part number.



In this example photo, we've connected everything that's included in an RXV conversion kit, except for the charging cord. You will see that the battery power button is illuminated, indicating that it has turned on. The meter is showing battery state of charge, and the dash pushbutton is pushed in.

This example shows how you can assemble your kit on the floor, and verify that everything is able to connect and operate, before the installation into the cart. Once this is verified, you only need to install these components into the vehicle. This lets me know that the kit is working properly, so I know it worked before installation.

If the kit is verified working, and then does not work when installed, you will know you need to double check your connections and then check the connections to the cart. These connections are in the EN, or P- pins of the PCB board, depending on the application. Some kits don't utilized the EN pin.

Star EV Lithium Capella Installation Guide

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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 also need a drill and an 8mm (5/16") drill bit. You will also need a Phillips screwdriver. It will also be helpful to have an assistant nearby, throughout the whole conversion.

To install the lithium battery, and battery mounting plate, you will need the same tools, a ratchet, a long extension and a 5mm Allen socket, along with a 13mm wrench.

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

For cutting off the battery compartment floor mounting tabs, you will need a die grinder with a cutting wheel, sawzall, or porta-band saw.

For installing the rear battery compartment cover, you will need either a drill or impact driver with a nut driver attachment, with an 8mm socket. This is for installing the self-tapping screws

Kit Contents

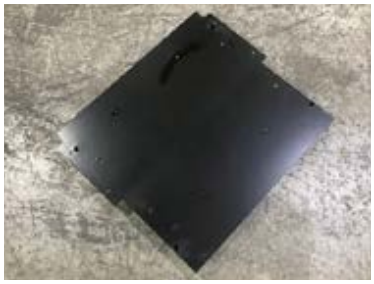
The installation of this kit must be performed by a Star dealer, in order to retain your Star vehicle warranty.

2CR020 Charger Cable (From battery to charger)

2HD355 Capella Lithium Hardware Kit

2BA405 80Ah Lithium Battery

2BA410 105Ah Lithium Battery



2BT291 Capella Battery Mounting Plate

IF YOUR CAPELLA WAS MADE BEFORE 3/21, ONE OF THESE CABLES WILL BE NEEDED. THEY ARE NOT INCLUDED WITH THE KIT.

2BT804 Capella 4P/4+2 KEY SWITCH PATCH CABLE SET for STAR EV Lithium Battery

2BT802 Capella 2P/2+2 KEY SWITCH PATCH CABLE SET for STAR EV Lithium Battery

2MT223 Battery indicator, meter w/ 10 LED bars AND wire harness

2BT289 and 2BT290 Charger Mounting Legs

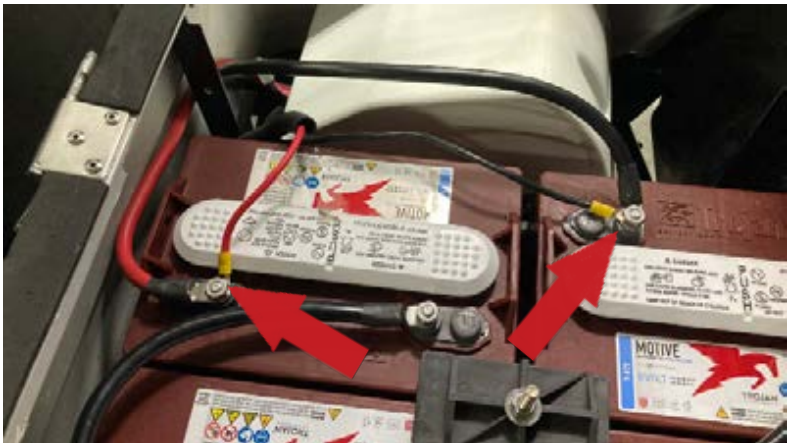
2CH020 Lester Summit II Charger

2BT296 Lithium Rear Battery Cover

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 holdown. Remove all the battery cables that connect the batteries to each other.

To gain better access to the all the batteries, you can remove the Phillips screws and black push clips from the rear battery compartment cover. This will make better room for getting the batteries lifted out.

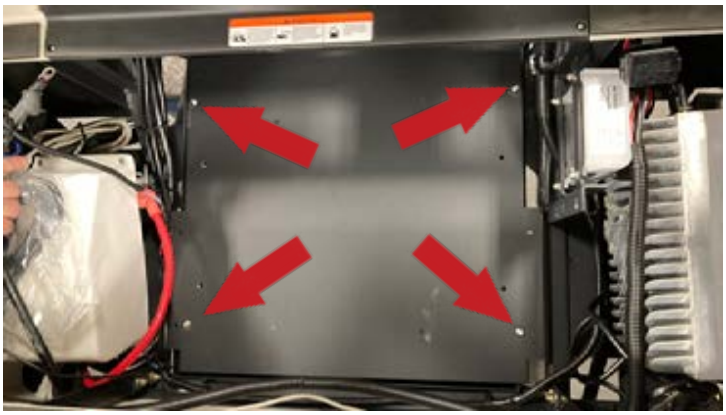


You will need to remove the cable that leads from the charger to the batteries. This will be replaced with a new cable for the lithium battery configuration.

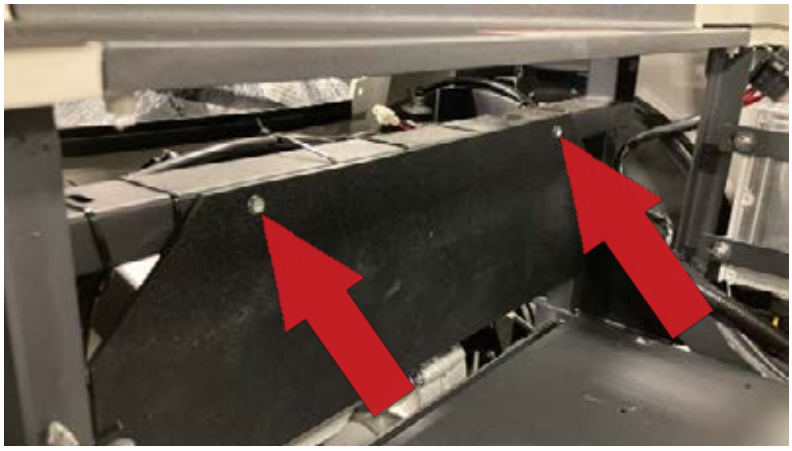
Battery Compartment Preparation

Reach into the bottom of the battery compartment, and remove the lower, black plastic battery compartment tub. This will not be needed with the new battery, since it will be replaced by the new battery mounting plate.

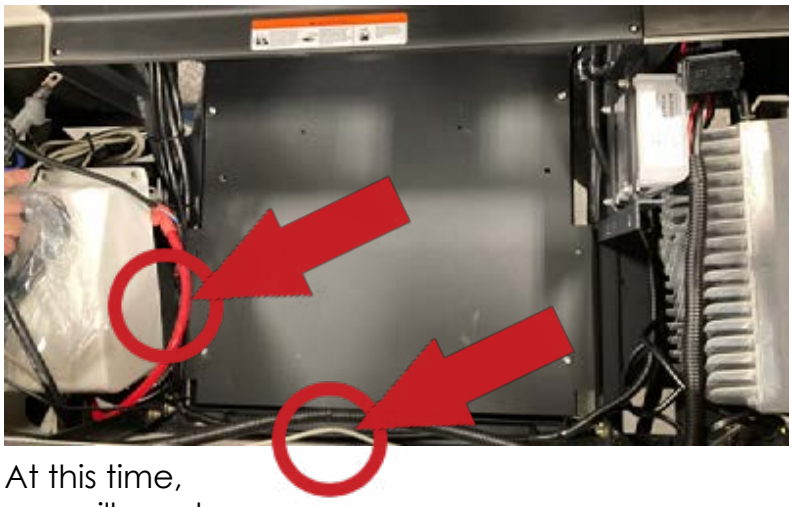
Once the batteries have been removed, you will need to cut the battery holdown straps from the center of the battery compartment floor. Use a die grinder with cutting wheel, grinder or porta-band saw to cut the straps flush with the center angle iron brace.



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-M8x1.25x60mm button head bolts, 4-M8x1.25 nylock nuts, and 4-M8 flat washers to secure this plate into the car, from the hardware kit 2HD355.



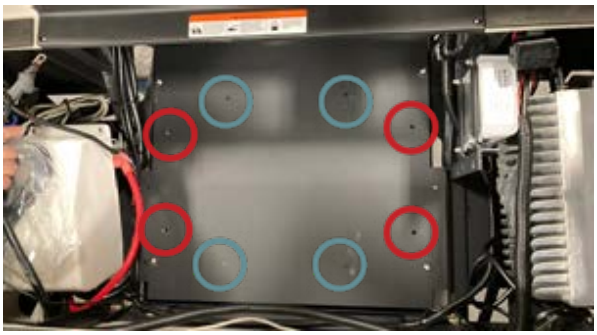
At the rear of the battery compartment, you will find the frame bar shown above. Use the two self-tapping screws to attach the 2BT296 Lithium Battery Rear Cover. Place the angled corners facing toward the top.



At this time, you will want to locate your 4 pin connector, that leads to your key switch. For the 2P model, it will be along the passenger side frame rail area. For the 4P model, it will be located at the front of the battery compartment. You will not find this connector if the vehicle was made before March, 2021. This is why you need to have the patch cable that was mentioned in the parts list. The patch cable provides this 4-pin connector and harness to the key switch.

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. In the photo below, you will see the 105Ah battery mounting holes circled in red.



Locate the 4-M8x1.25x20mm 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

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

If you need to install the patch cable for your application, start from the key switch and connect the white 4-pin connector to the key switch. Route the rest of the harness under the vehicle, to the battery compartment. This will now provide the connection point, near the battery, for the key switch signal.

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. Using a 13mm socket and torque wrench, torque the bolts to 105 in-lbs.

The next item to connect to the battery, is the 2MT223 state of charge meter with key switch cable.

Remove the two Phillips screws from under the center dash cupholder. Pull up on the cupholder and pivot it over to the steering column side.

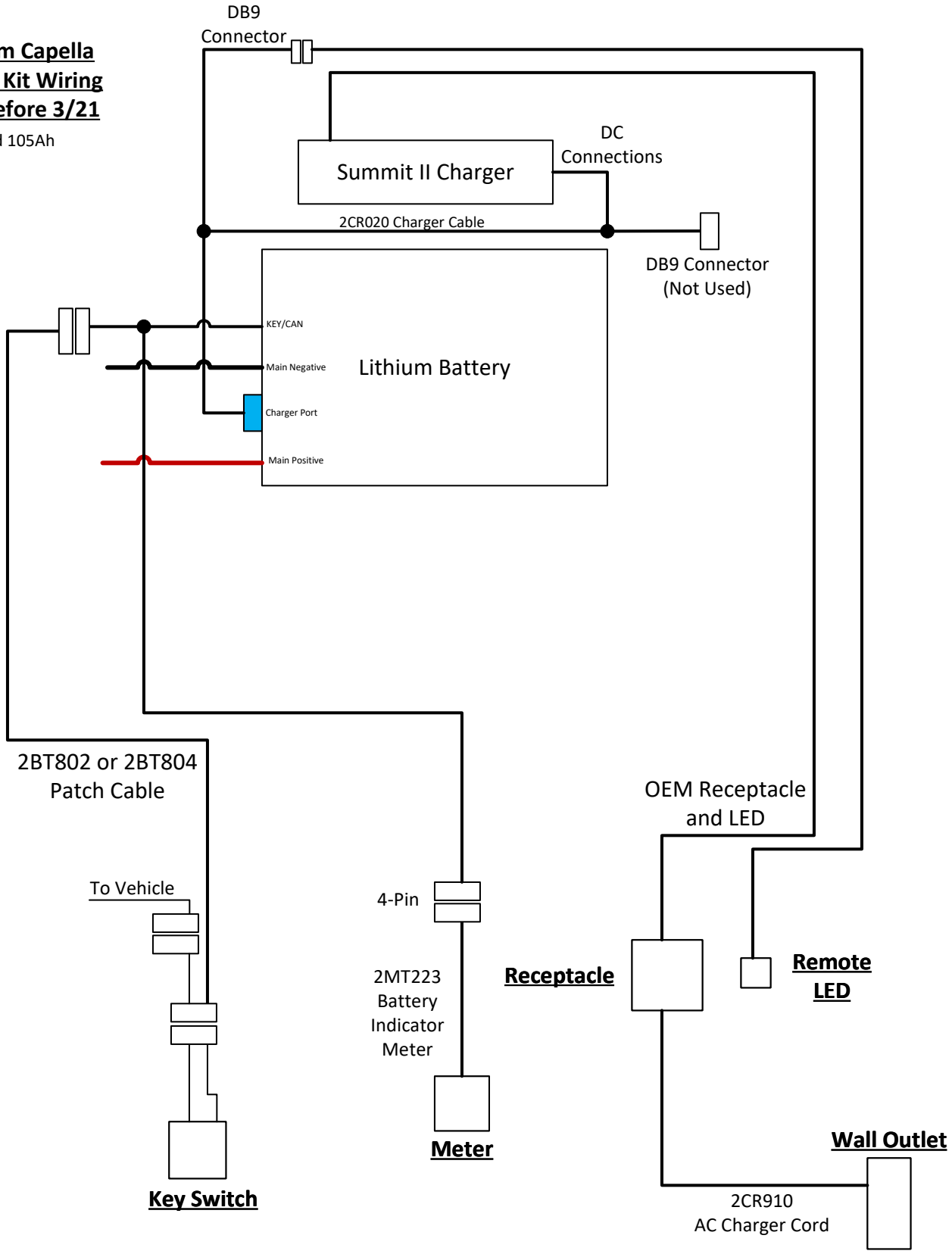
Once you have connected the MT223 Cable to the 4-pin connector, this is what you should have. This is where the key switch signal will come to the battery pack.

The MT223 state of charge meter cable will connect to the KEY/CAN port on the side of the battery, using the chrome-plated screw lock connector. The 4-pin connector on this same cable, will connect to the 4-pin connector in the battery compartment. If you cannot locate this connector in the battery compartment, you may be missing it because your cart was made before March of 2021. SEE PARTS LIST.

Route the meter cord under the vehicle, so that it can travel into the cupholder area. You will see an insert alongside the key switch, that is able to be removed. Once removed, this will leave an opening for the SOC meter. You will need to disconnect the meter from the cord, so that you can install it into the dash. Reconnect the cord to the meter, to finish the meter installation.

Star Lithium Capella Conversion Kit Wiring Diagram-Before 3/21

80Ah and 105Ah



Installing Your Charger

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 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 below. You will now use the M8 bolt/washer/nut assemblies from above, to secure the charger feet to the vehicle, using two 13mm wrenches.

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

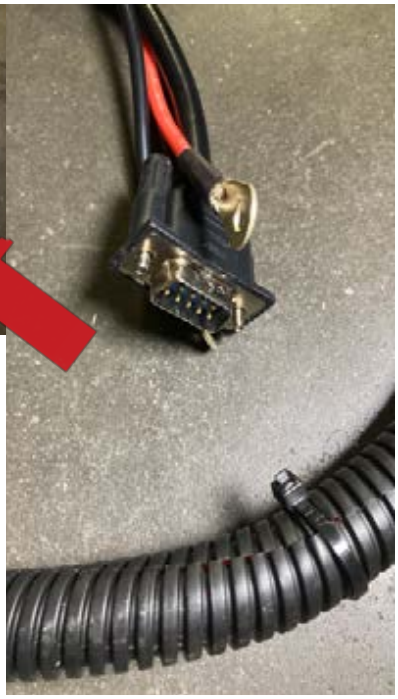
Now that you have the charger installed you will connect the 3 prong plug from the charger receptacle to the charger.

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.

Use this connector

Please note: there are two DB9 ends on this cable. One has male pins (shown on the right), and is beside the DC cable ends, and one has female pins (shown on the left). Be sure to connect the LED cord connector to the connector on the left.

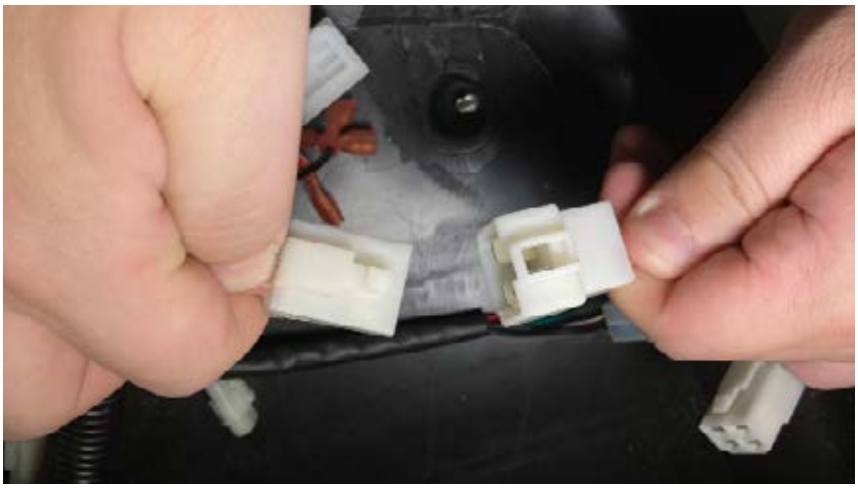


Do not use this connector.

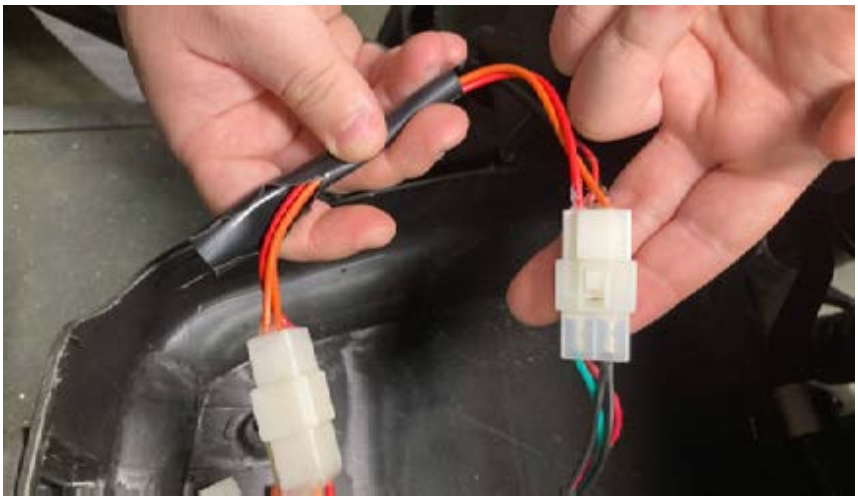
Installing the patch cable

If your Capella was manufactured before March 2021, you will need to install either the 2BT802 patch cable for 2 passenger models, or 2BT804 for 4 passenger models. Your battery will not be able to turn on, if there is no connection to the key switch. If you have a 4-pin connector, coming off the KEY/CAN port on the side of the battery, with no connection to the vehicle, then you are missing this cable.

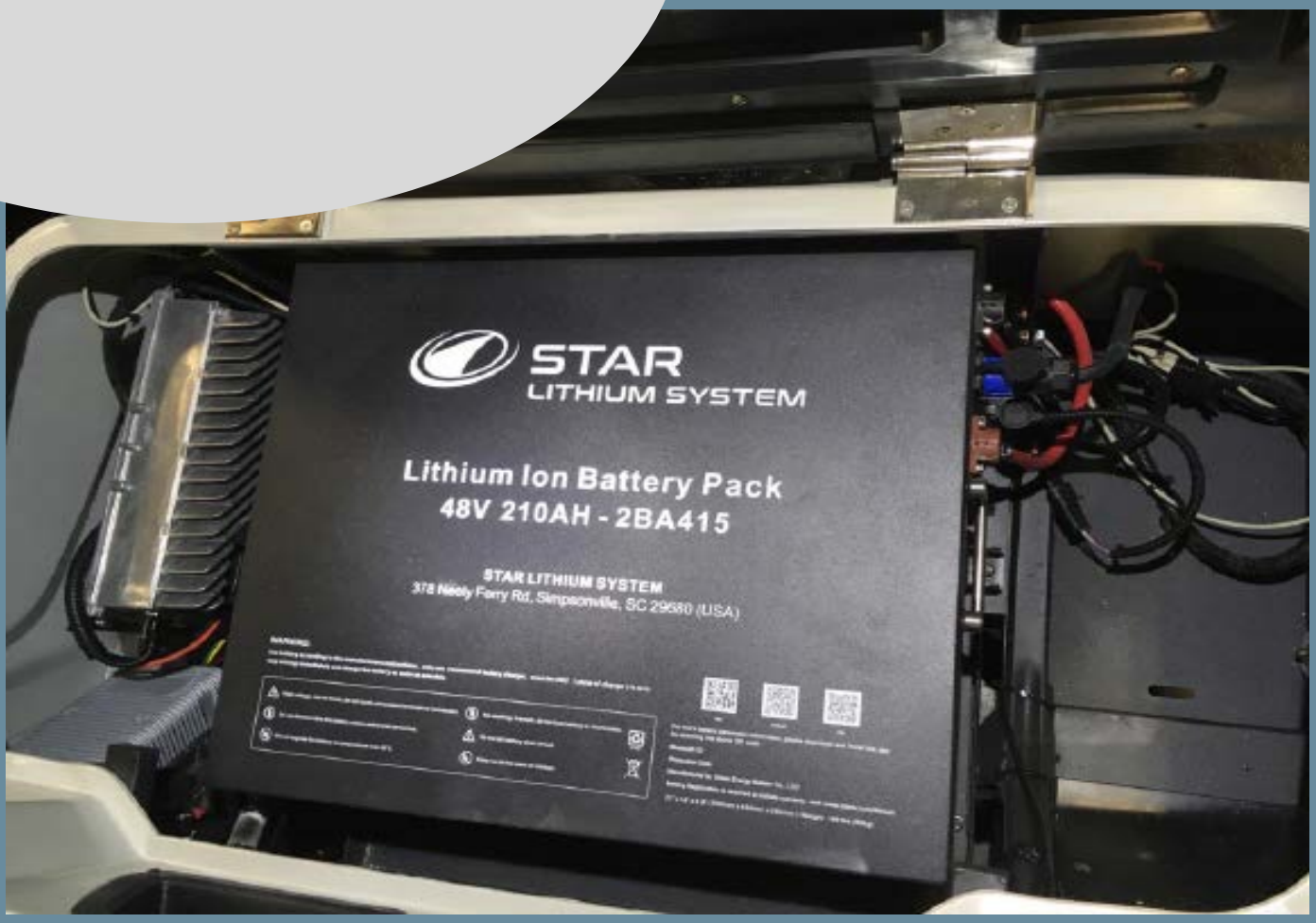
When installing your patch cable, whether the 2BT802 or 2BT804, they will go into the vehicle the same way. With the center dash cupholder removed, you will find the white key switch connector connected to the vehicle.



Disconnect the key switch connector from the vehicle. This will leave you with a male and female connector. The patch cables are made to provide a jumper between these two connectors. From that jumper, the wires "T" out to the 4-pin connector for the battery pack.



Once you've connected either of the patch cables, your key switch harness will now look like this. Route the remaining part of the harness under the vehicle, to the battery pack. This is only necessary for Capellas made before 3/21.



Star EV Lithium 48V Classic/Sport Installation Guide

Contacts to know

Star EV Technical Support
864-549-7224
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, 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, porta-band 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

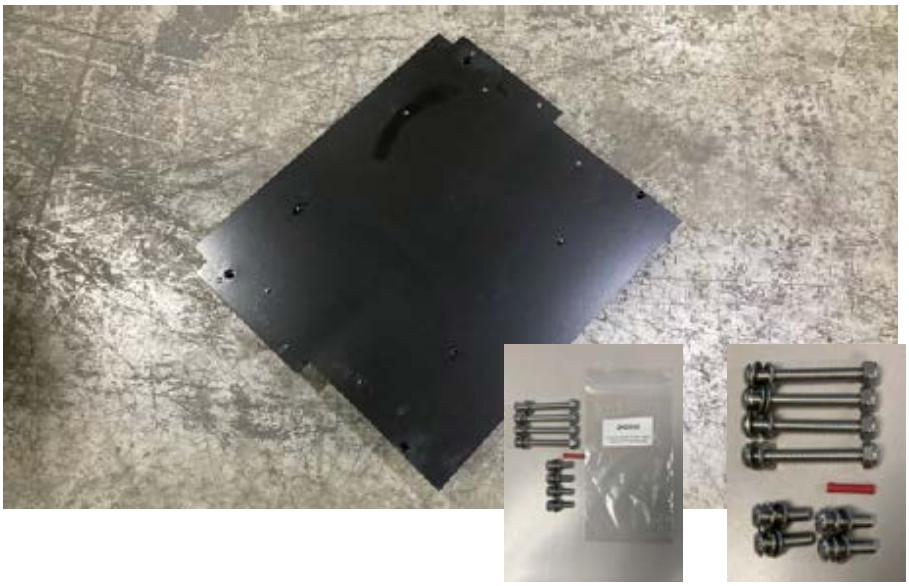
2MT223 Battery Indicator with LED

Battery Removal Process

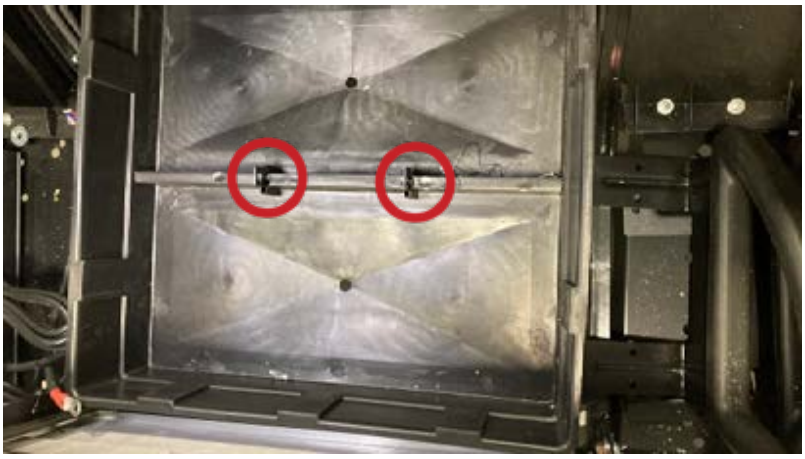
To make it easier to access and remove the batteries, it will be a huge help to remove the seat cushion. To remove, raise the seat upward, and slide the hinges apart. You will see that the hinges are able to slide apart, when the seat cushion is in the upright position. Set the cushion aside, so it is 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 holdowns in the center area of the battery array. But you'll also find two on each holdown for the outrigger batteries. Once you've removed the holdown 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.

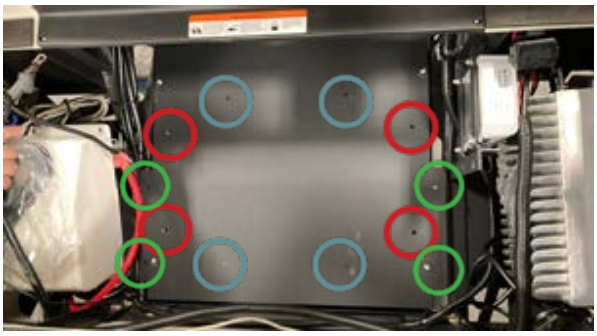
You will move all wiring so that it is outside of the horizontal lip of the angle iron that makes up the frame. You can use zip ties to secure the wiring out of the way, if needed. You do not want any wiring caught between the new battery mounting plate and the frame. This could cause a short circuit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

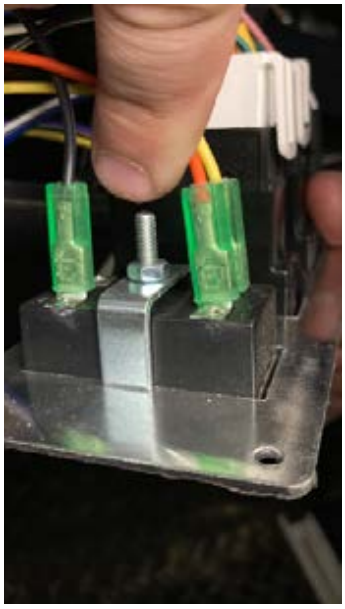
Once the screws are all installed, use an Allen socket with an extension to secure all the bolts to the mounting plate.

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.

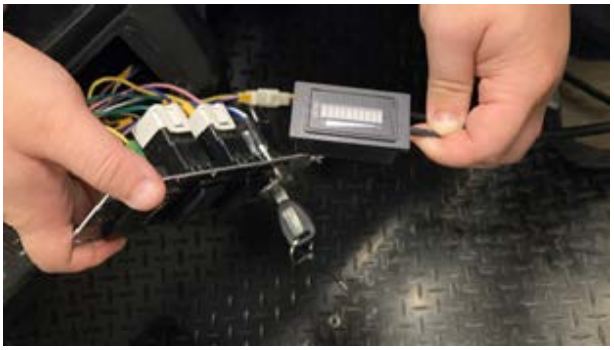
Locate your key switch cable, PN: 2MT223. This is the harness that will provide a key switch signal to the battery, to tell it to turn on. With this cable installed, and the battery's power switch pushed in, the battery should power on. The meter will replace the dash Coulometer in a later step. The 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.

2MT223 Meter Cable

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.

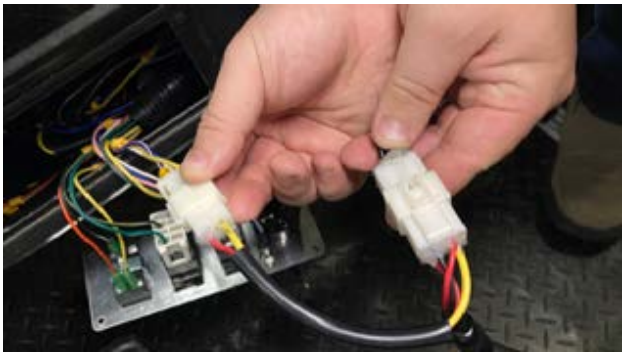


Remove the retaining nut from the back of the dash Coulometer. This will allow the old meter to be removed, leaving an opening for the new meter on the end of the 2MT223 cable that was just run from the battery compartment. Install the new meter into the dash. It should snap into the opening. Next, we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

2MT291 Key Switch Patch Cable



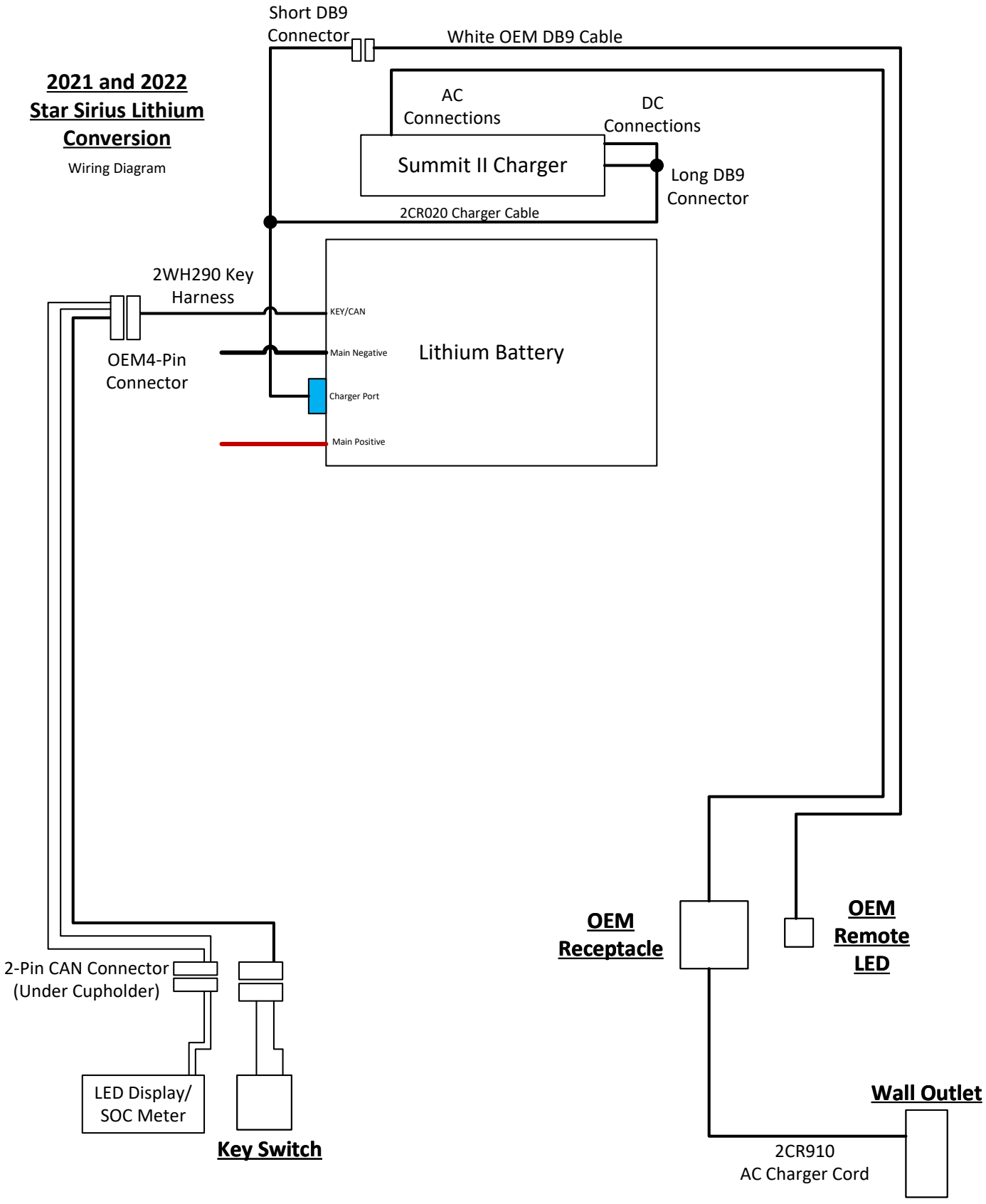
At this point, you will connect the chrome-plated screw lock connector to the KEY/CAN port on the side of the battery.

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.

2021 and 2022 Star Sirius Lithium Conversion

Wiring Diagram



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.

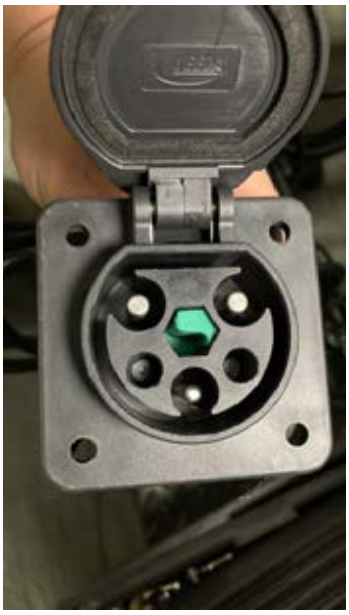
Bring the long end, of the cord with the blue spring lock connector, so that the DB9 can connect to the new charger as shown. Snugly tighten the screw retainers.

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.

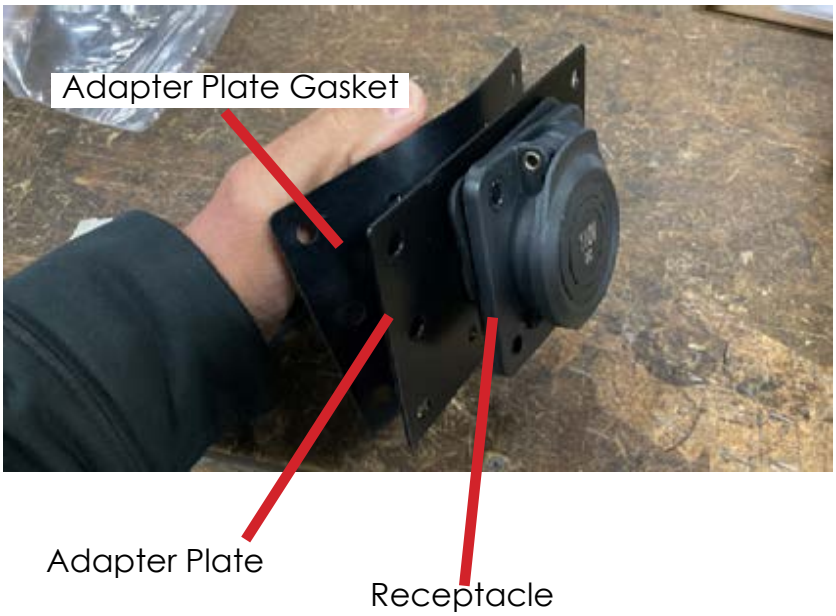
You will find a remote LED light that goes directly above the charger receptacle. This LED is labeled part number 2CH913 and has a cord attached to the back of it. This cord has a computer monitor style DB9 connector on the end. The LED DB9 connector will need to be connected to the circled connector in the photo.

Installing Your Charger | Off board



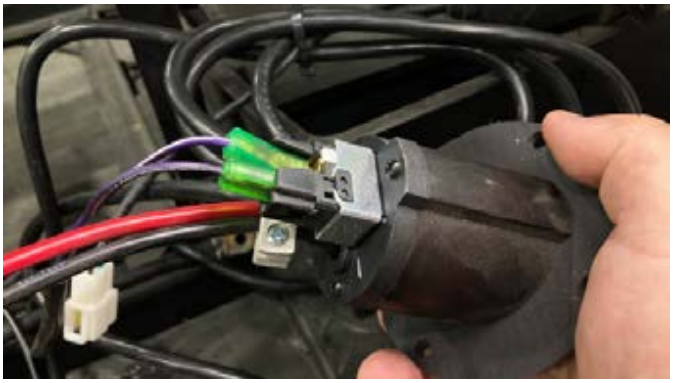
If your vehicle originally came with an off-board charger configuration, we will now convert it to on-board. Locate your charger receptacle, PN: 2RC080. You will also need to locate your M4x0.7x25mm button head screws, M4 washers, M4 lock washers, and M4x0.7 nuts. These will be used to attach the receptacle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

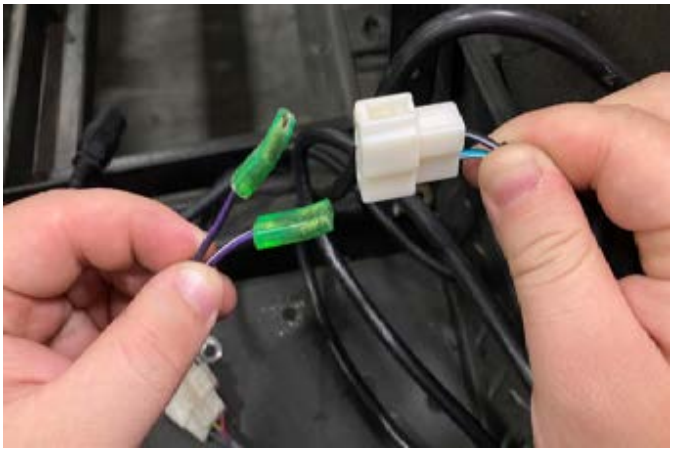


Assemble the receptacle, mounting plate and mounting plate gasket together as shown. Use the hardware, from above, to attach the three parts together.

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.

Star EV Lithium 48V RXV Installation Guide

Applicable to RXV's manufactured after Jan 23rd, 2012

Contacts to know

Star EV Technical Support
864-549-7224

www.starev.com

Table of Contents

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 blue wire leading to the OEM charger receptacle. You will also need a T40 and T50 Torx socket. 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, or grinder to grind the outside of the main terminals so they can fit inside the main terminal enclosures on the lithium battery.



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)

RXV Lithium Hardware kit
2HD300, 2HD301, 2HD303, 2HD304

2BI805 PCB Board

2BA405 80Ah Lithium Battery

2BA410 105Ah Lithium Battery

2BT800 RXV Battery Mounting Plate

2CB800 Cord Interlock to Board

2MT800 Meter-RXV SOC Meter

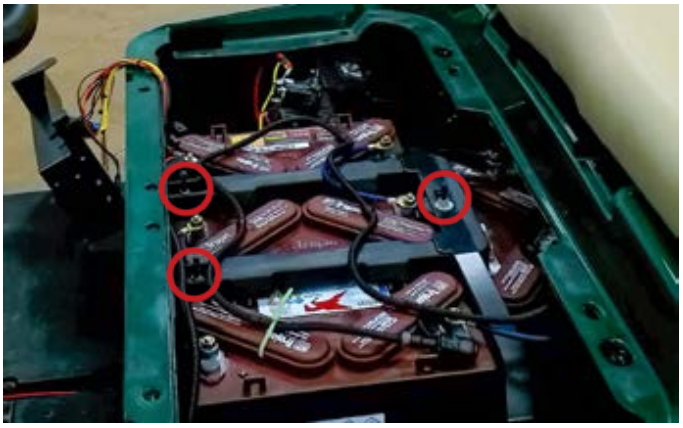
2SW800 Switch-RXV Push Button

2BT289 and 2BT290 Charger Mounting Legs

2CH020 Lester Summit II Charger

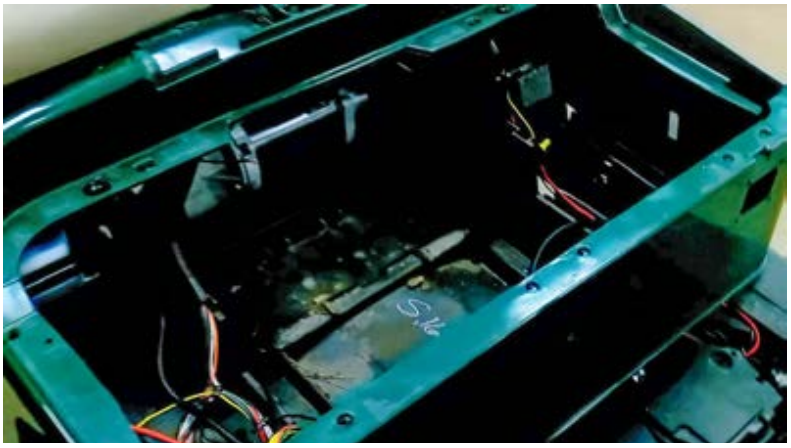
2CH917 and 2CH918 Receptacle Adapter Plate and Seal

Battery Removal Process



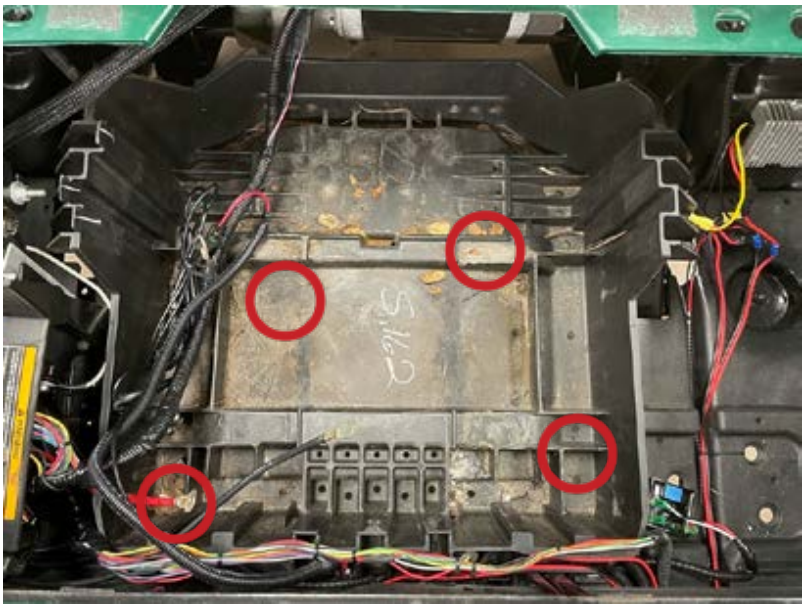
To remove the sealed lead acid batteries, you will need to disconnect the main battery cables from the battery pack, and keep them from contacting the batteries. Use the 13mm deep socket, ratchet and extension to remove the three nuts from the battery holdown. Remove all the battery cables that connect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

Now you will need to remove the bolts on the sides of the battery retaining strap. There is one on each side of the battery pack. These are T50 Torx bolts. To access the passenger side bolt, you will need to use the T40 Torx socket to remove the controller assembly. Two bolts hold the controller assembly in the vehicle.



You are now ready to lift out the lead acid batteries, using a battery lifting strap. At this point, the batteries, battery cables, controller assembly, and battery holdown straps will be gone, leaving the empty compartment.

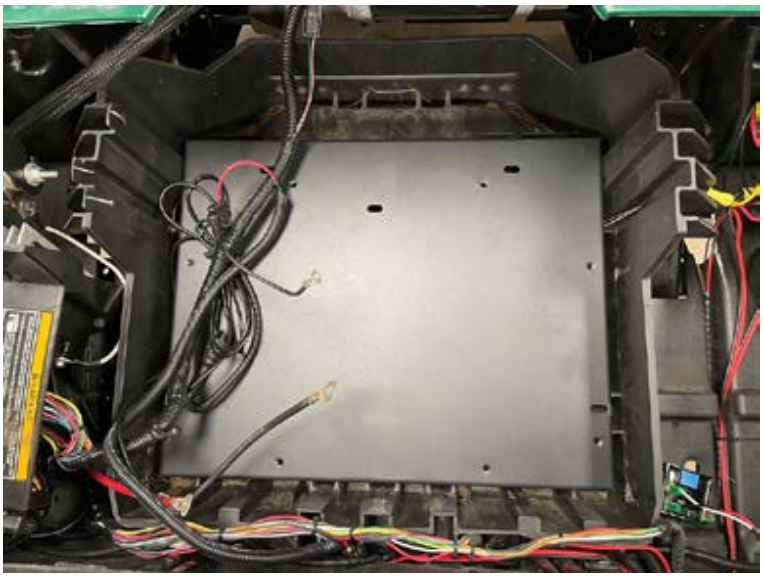
With the compartment now cleared out, you can install the Star EV lithium battery mounting plate. Position the plate with the slotted holes pointed toward the rear of the vehicle. You will need the (4) M8x1.25x116mm J-bolts, (4)M8x1.25 nuts, and M8 washers to secure this plate into the car, from the hardware kit 2HD303.



You will align the slotted holes in the mounting plate, with these holes in the battery compartment floor.

Inside the package marked 2HD303, you will find extra bolts, along with the J-bolts. These bolts will be needed for installing the 105Ah battery. They can be discarded if you're installing the 80Ah unit.

Battery Compartment Preparation



With the help of an assistant, you will insert the j-bolts from underneath the vehicle, up through the slotted holes. The assistant will install the washers and nuts from above. Don't tighten the nuts until all of the j-bolts are installed, so that they can all be tightened evenly. From the underside of the vehicle, position the j-bolts so that the hooks contact the frame of the compartment as shown below.

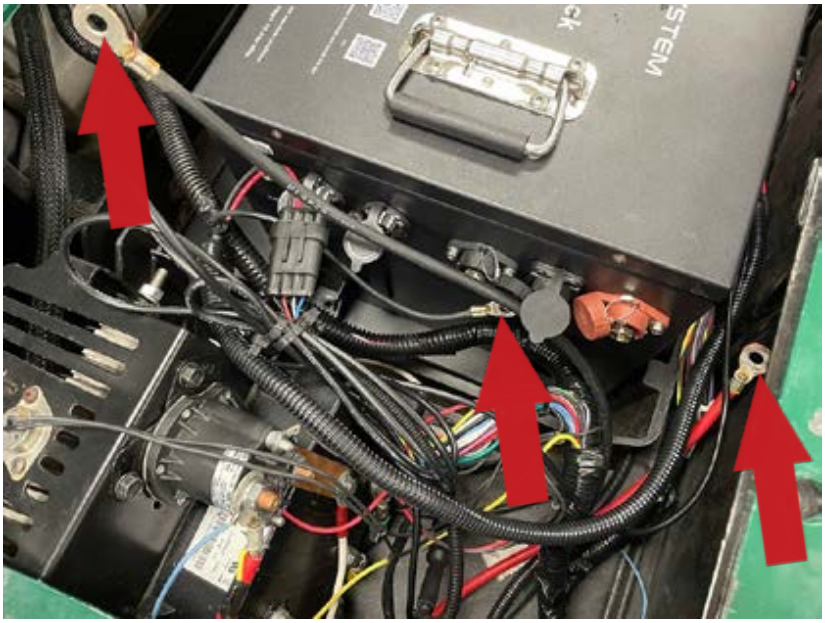
Tighten the j-bolt nuts using the 13mm deep socket, ratchet and extension. Tighten the bolts in a criss-cross pattern so that the plate will remain flat in the compartment and not bend as you tighten the nuts. This is now the point where the cart is ready for the battery to be installed. You will need your assistant to help with lifting the battery into the vehicle.

Battery Installation

The battery shown here, is the 105Ah lithium unit, but the 80Ah unit is almost the same, except for the spacing 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 when it is reinstalled.

Use the (4) M8x1.25x25mm hex bolts 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, and the ground wire, all with arrows shown.

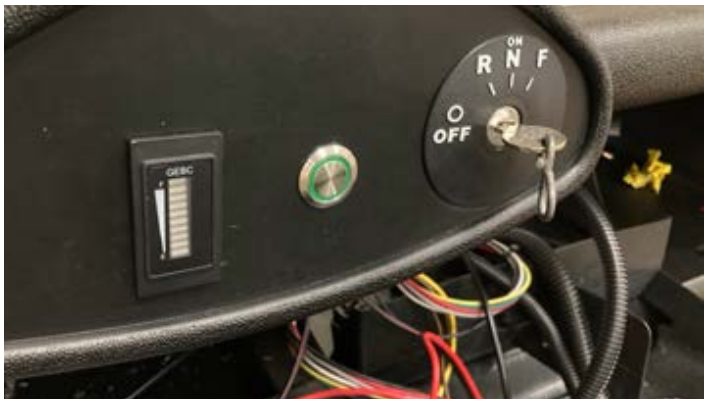
In order for the main battery cables to connect to the battery, you will need to use a grinder or Dremel tool to grind the outer edges of the eyelets. This is so that the terminals will fit inside the battery connectors on the side of the battery. Once this is done, you will stack the main ground with 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 3 ground connections at the main negative terminal of the battery. These will be the ground lead for the PCB, the vehicle ground lead, and the controller ground lead.

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

Route the cord in the channel in the center of the vehicle floor, to the back of the dashboard area, beside the key switch. You can remove the SOC meter, and use the back of its body, to cut an opening in the dashboard.

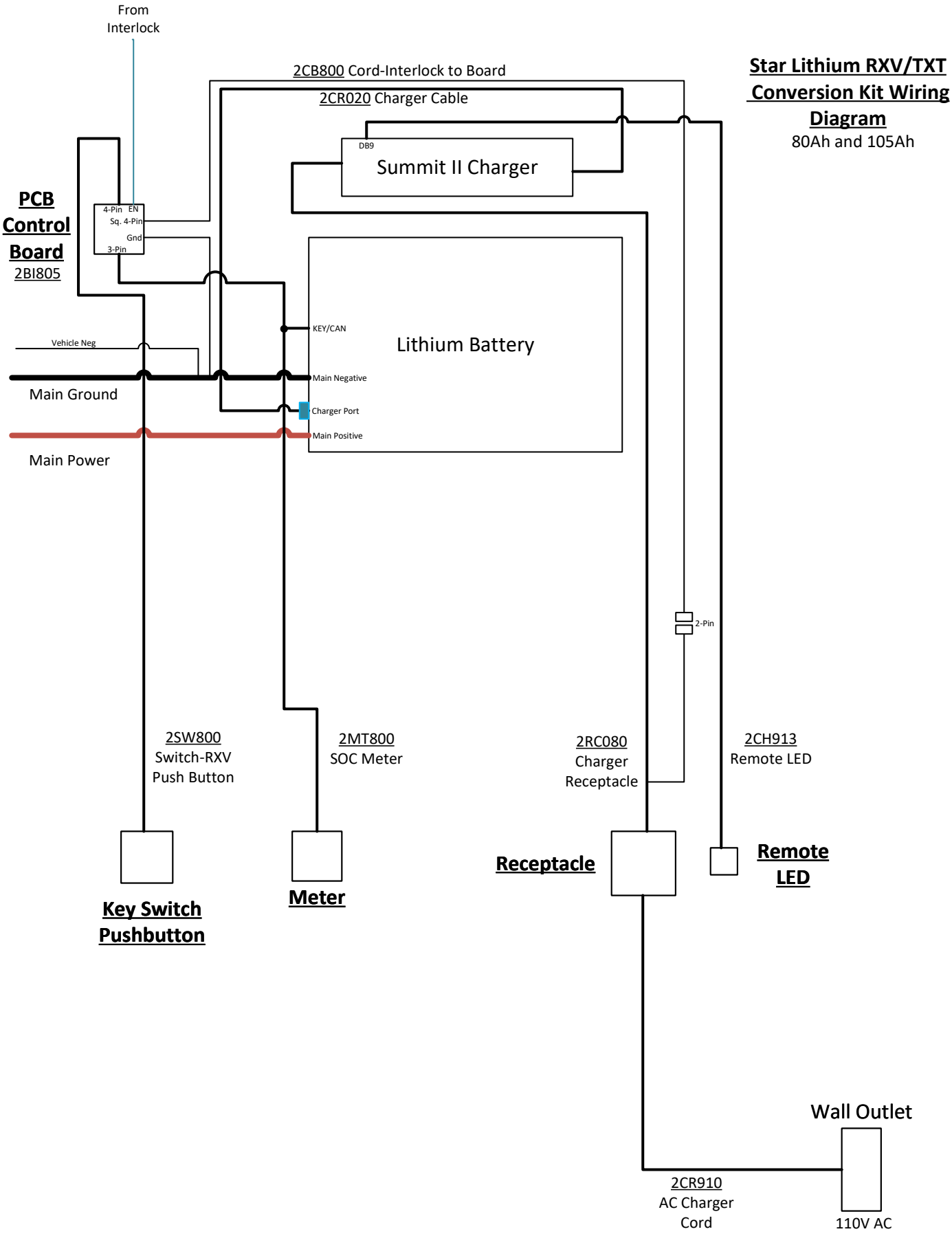
In this image, you will see how we have positioned the individual components into the dashboard area. Cut the rectangular opening in the dashboard, to accept the meter, and install the meter into the opening. Reconnect the cord to the meter connector.



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.

Star Lithium RXV/TXT Conversion Kit Wiring Diagram

80Ah and 105Ah



Installing Your Charger-80Ah

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.

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 into the battery hold-down tabs, on the rear side of the battery. 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.

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-105Ah

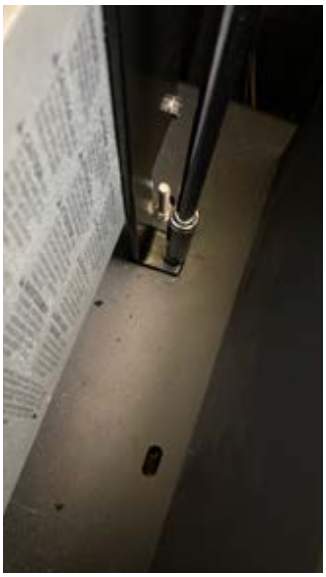
So far, this installation guide has focused on the 80Ah battery pack. But your battery may be the 105Ah unit instead. If this is the case, you will need to know the differences between the two.

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

As shown above, the 80Ah charger brackets fit between the battery mounting tabs. On the 80Ah battery, the mounting tabs are located along the long sides of the battery case. For the 105Ah unit, the mounting tabs are on the short ends of the battery case.

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

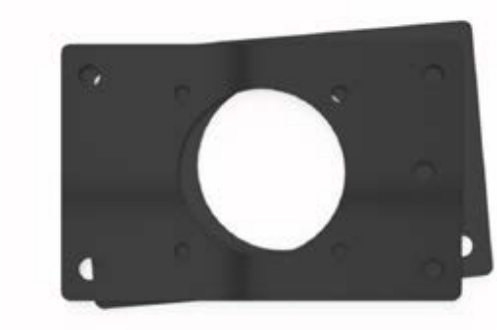
Align the battery end mounting tabs with the mounting plate holes. Install the bolts into the holes by hand, so as not to cross thread the bolts. Use the ratchet, long extension and 13mm socket to tighten the bolts securely. When this is finished, you will have two open holes toward the back of the battery mounting plate.



Now position the charger bracket feet over the now open holes. These holes will be open, when compared to the 80Ah battery. Install two additional M8x1.25x25mm bolts with M8 washers and lock washers by hand, through the charger bracket feet, into the mounting plate. Use the ratchet, extension and 13mm socket to secure the mounting bolts. These will be the extra bolts that were mentioned on page 7, from hardware kit 2HD303.

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 105Ah battery/charger installation is complete.

Installing Charger Receptacle

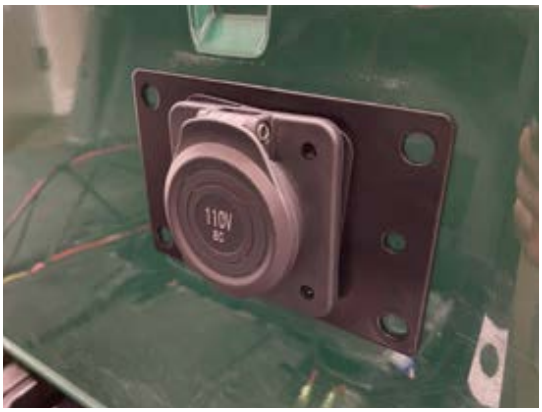


Begin by removing the OEM charging receptacle. You will need to keep the blue wire, for use with the lithium kit.

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 a recess in the seat frame rail. This will allow the receptacle bolt and nut 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.

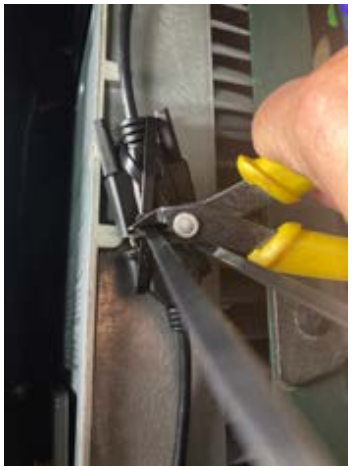
The Remote LED cord comes with a decal that explains the meaning of the colors and flashes that the LED can display. At the other end of the cord, opposite the LED, there is a female DB9 connector. This connector will plug into the male DB9 connector on the charging cord with the blue twist-lock connector.

The female DB9 connector on the cord with the twist-lock connector will connect to the end of 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.

Place a piece of heat shrink tubing onto one of the cables, then route the LED cord between the charger and the battery, so that you can connect the DB9 connectors of the two cables. The retaining screws will not reach the holes on the other connector. This is normal.

Using two zip ties, tighten the two cables together using an 'X' pattern. This will hold the two ends together. Using a small pair of snips, clip the ends of the zip ties. Slide the heat shrink tubing over this connection and heat the tubing until shrinks down and secures this bundle together.



The cable with the blue twist-lock connector also has a female DB9 connector. This end will now connect to the charger. Thread in the thumbscrews and secure.

You are now ready to connect the blue twist-lock cable end, to the CHARGE port on the side of the battery. Push the connector into the port until you see the twist-lock snap into place, indicating a good connection.

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 underside of the controller cover. This is where we mounted ours, alongside the run/tow switch. Using a drill and 4mm drill bit, make four holes for the PCB board mounting screws.

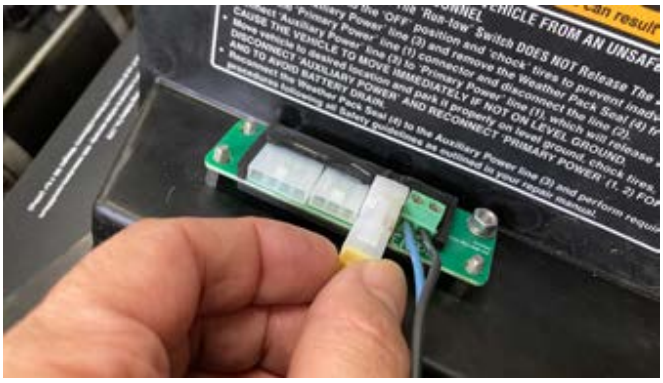
Place a flat washer onto each screw, and insert through the plastic cover. Then thread the screws into the mounting screw spacers. See the photo, for how to stack the spacers between the plastic cover and the PCB board. You can now install the 4mm lock washers and nuts, and snug the nuts down.

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

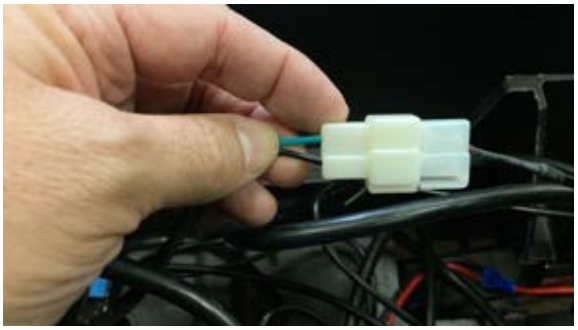
Strip the insulation from the end of the black wire, where you previously removed the eyelet. Insert the freshly stripped end into the P- opening in the PCB screw lock connector. Tighten the screw, using the small flathead screwdriver, to secure the black wire. Connect the eyelet end of the black wire,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

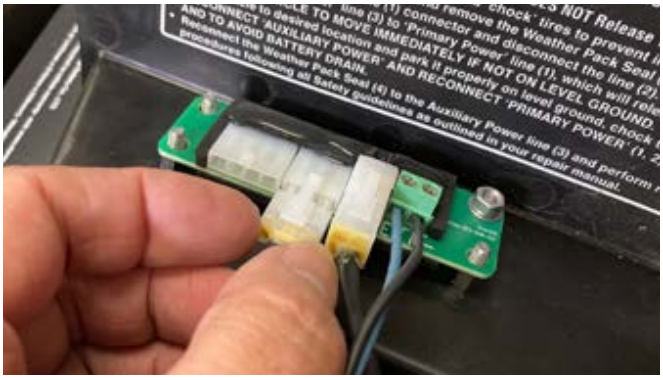
Now, connect the screw lock connector of the state of charge meter cord, to the port on the side of the battery, marked KEY/CAN. This will provide the state of charge to the meter at the other end of the cord, when the battery is turned on. This end of the cord was left loose, in the step where we installed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



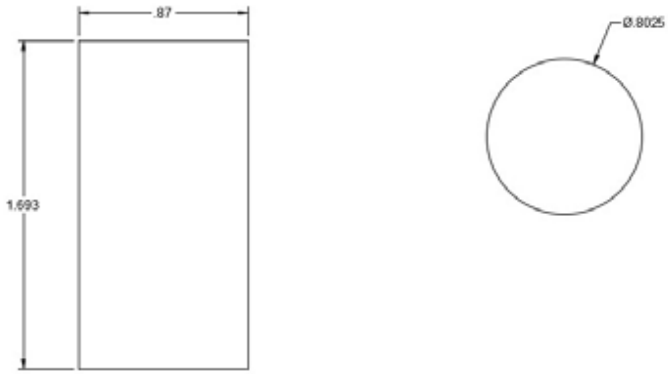
This cable is now properly installed. This leaves the other two openings ready for connections.



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.

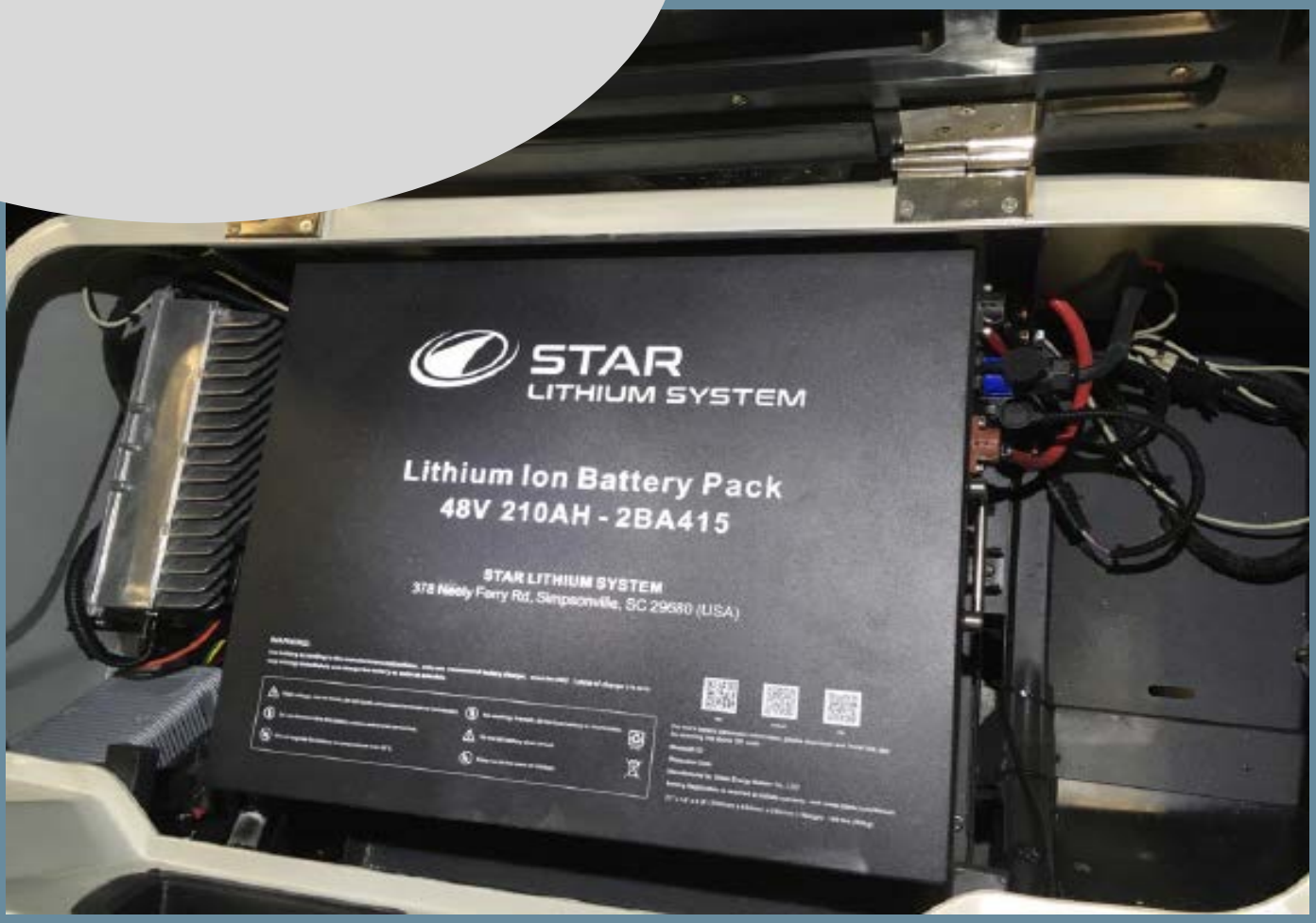
Locate the package that has the label 2SW800. This is the pushbutton switch, to turn the battery on from the dashboard. You will find a linear 4-pin connector at one end of this cable, and a pushbutton switch at the other. You can remo the switch and set it aside, but it is not a requi step.

Connect the 4-pin connector to the PCB boar 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.

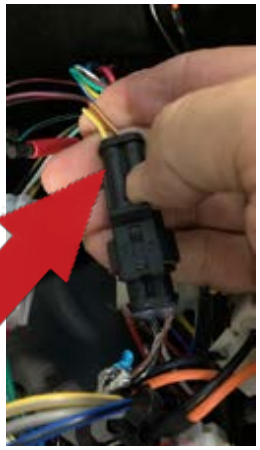


Star EV Lithium 48V Sirius Installation Guide

Applicable to 2021 and 2022 Sirius' with CAN connector

Contacts to know

Star EV Technical Support
864-549-7224
www.starev.com



STOP!!

This kit will not work with your Sirius vehicle unless it:

1. Has 21 or 22 in the serial number year designation
2. Has the 2-Pin CAN connector under the center cupholder
3. Has the 4-Pin key switch connector in the battery comp.

Table of Contents

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, 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, porta-band 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 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.

2CR020 Charger Cable (From battery to charger)

2HD355 Sirius/Capella Lithium Hardware Kit

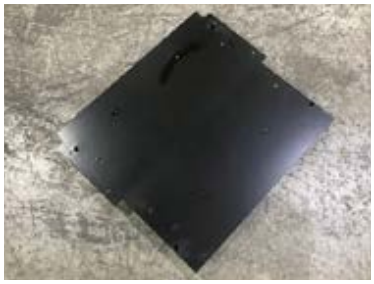
2BA405 80Ah Lithium Battery

2BA410 105Ah Lithium Battery

2BA415 210Ah Lithium Battery

2WH290 Main Harness for Lithium Key Switch

2BT296 Lithium Rear Battery Cover



2BT291 Sirius/Capella Battery Mounting Plate

2BT289 and 2BT290 Charger Mounting Legs

2CH020 Lester Summit II Charger

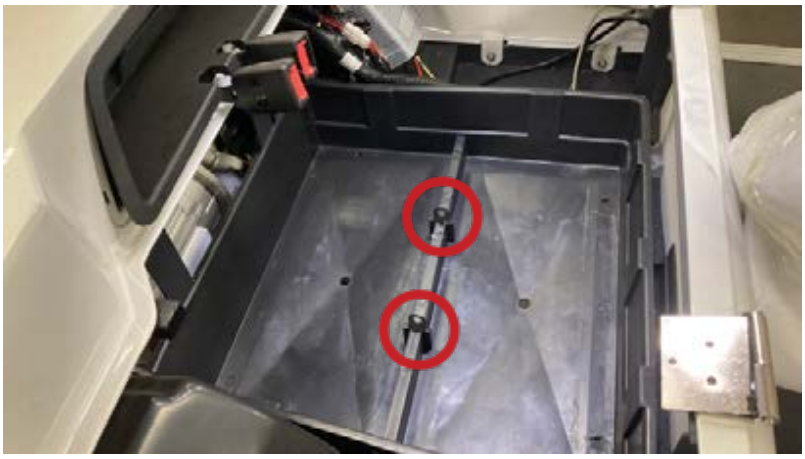
Battery Removal Process

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 holdowns in the center area of the battery array. But you'll also find two on each holdown for the outrigger batteries. Once you've removed the holdown 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-M8x1.25x60mm button head bolts, 4-M8x1.25 nylock nuts, and 4-M8 flat washers to secure this plate into the car, from the hardware kit 2HD355.



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

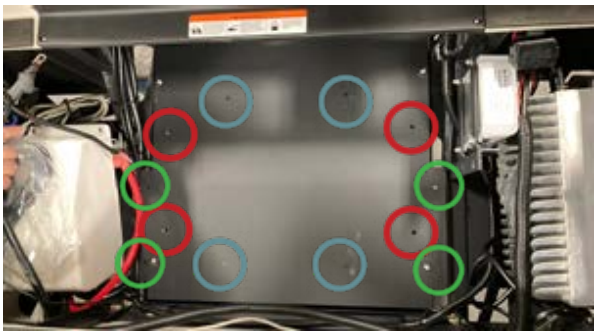
When your battery tray tub has been removed, tabs cut off and painted, this is what the battery compartment will look like.

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. Slide the mounting plate so that it is centered in the frame rails, and pushed almost all the way toward the front of the compartment.

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.

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.



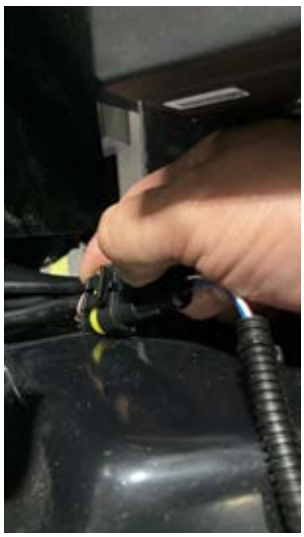
Locate the 4-M8x1.25x20mm button head screws, 4-M8 flat washers, and 4-M8 lock washers and install them with fingers only. This will allow you to pivot the battery into place, to get all the other screws started.

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

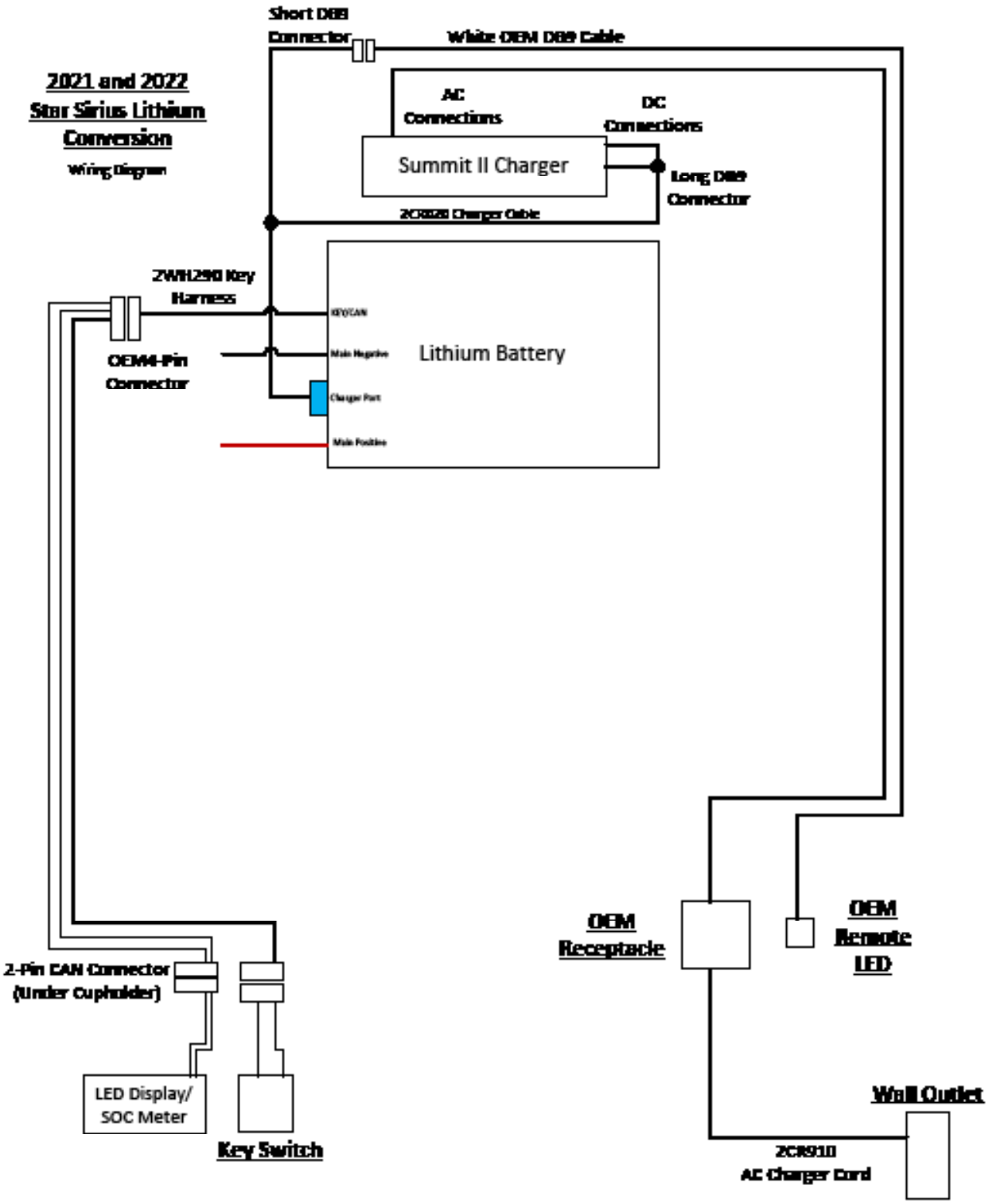
Once the screws are all installed, use an Allen socket with an extension to secure all the bolts to the mounting plate.

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: 2WH290. 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.



You will find a 4-pin, black connector along the passenger side frame rail. This connector is where you will plug in the end of the key switch harness. The chrome-plated screw lock connector at the other end, will be connected to the battery **at the end of the installation process.**


2021 and 2022
Star Sirius Lithium
Conversion
Wiring Diagram
Short DB9
Connector
White OEM DB9 Cable
AC
Connections
DC
Connections
Summit II Charger
Long DB9
Connector
2CR020 Charger Cable
2WH290 Key
Harness
OEM 4-Pin
Connector
Lithium Battery
2-Pin CAN Connector
(Under Cupholder)
LED Display/
SOC Meter
Key Switch
OEM
Receptacle
OEM
Remote
LED
Wall Outlet
2CR910
AC Charger Cord

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. You will find the lead acid charger mounted underneath the front end of the vehicle. If you look along the top of the front wheels, you will see the charger on the firewall area of the cart.

Begin by raising the vehicle and cutting all the zip ties that connect the charger cables along the frame rails. Disconnect the AC cord where it connects to the charger. This is the cord coming from the receptacle.

Route the AC supply cord back into the battery compartment, and coil the cord together into a bundle, securing with a zip tie. This will prepare the cord for connecting to the new charger, since it will now be mounted right behind the receptacle.

Now you will need to disconnect the white DB9 cable from the charger. You will need to coil this cable back into the battery compartment as well. This cable will now connect to the DB9 connector on the cable with the blue spring lock connector.

Coil the excess wire and secure with a zip tie.

Once connected to the short DB9 from the cord with the blue spring lock connector, you can use a zip tie and heat shrink to secure the two DB9's together and protect them from the elements.

It is not necessary to remove the DC connections to the old charger. This is because the entire old DC harness will be removed and discarded with the original charger.

When the two cables have been removed from the original charger and relocated, you can use a ratchet with a Phillips bit or Phillips screwdriver to remove the four Phillips screws that hold the charger to the vehicle. The charger can now be removed from the vehicle.

Installing Your New Charger

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 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 below. You will now use the M8 bolt/washer/nut assemblies from above, to secure the charger feet to the vehicle, using two 13mm wrenches.

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.

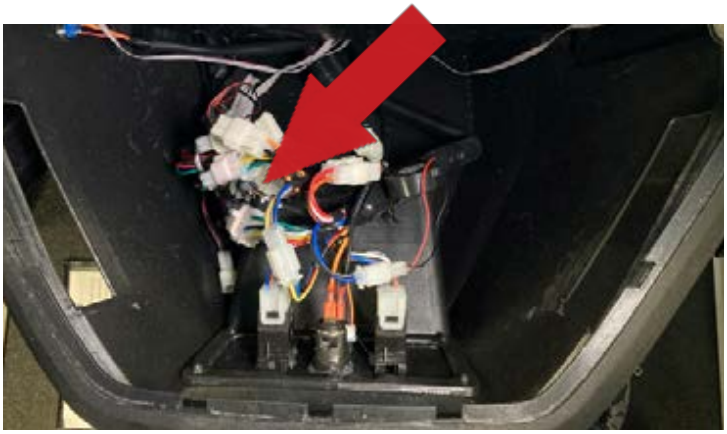
Now that you have the charger installed you will connect the 3 prong plug from the charger receptacle to the charger.

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.

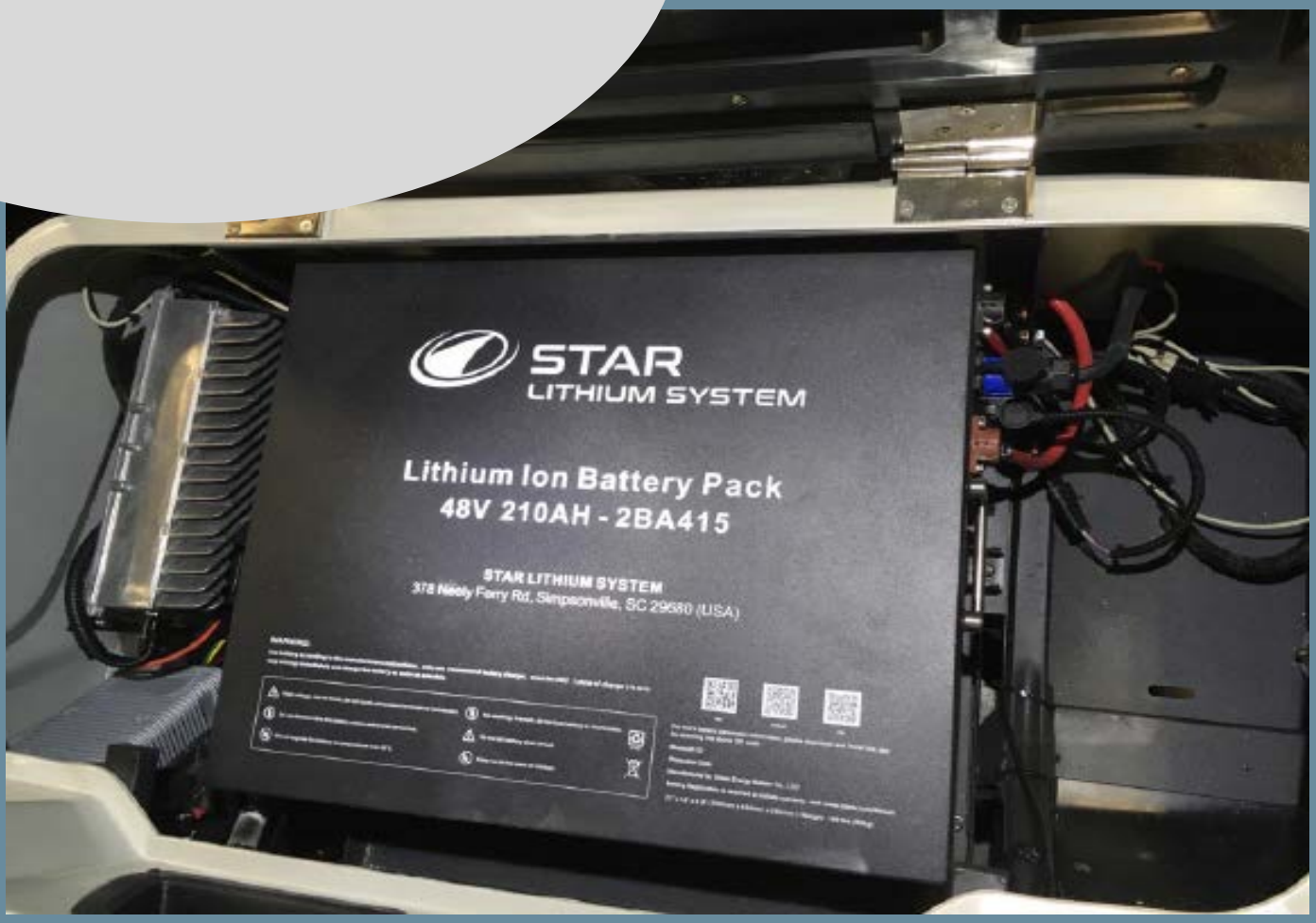
There are only a few remaining steps to complete the full installation. Connect the chrome-plated screw lock connector to the side of the battery, to the port labeled KEY/CAN. This will now supply the key switch signal to the battery, and the CAN signal to the vehicle's steering column mounted display. There is a separate connector from the display, that we will connect next. If this is not connected, the display will not show an accurate state of charge on the meter. **Push in the power button on the side of the 80Ah and 105Ah batteries. This power button can be left pushed in indefinitely. The 210Ah battery does NOT have a power button.**

In the center of the dash, you will pull straight upward on the cupholder. This will unhook the retaining tabs from the dash. Under the cupholder, you will find two black, two pin connectors. These connectors will need to be plugged into each other.



When you see red dots overlaid across the state of charge meter, instead of white dots, you will know that the display is receiving the CAN signal from the battery. This will now show an accurate indication of the state of charge in the battery. **Your display will be inaccurate unless there are red dots on the display.**

BE ADVISED: THE CLOCK ON THE DISPLAY WILL NOW RESET EACH TIME THE VEHICLE IS TURNED OFF. THIS IS NORMAL FOR SIRIUS VEHICLES WITH STAR LITHIUM BATTERIES.



Star EV Lithium 48V TXT Installation Guide

Applicable to TXT's manufactured after 2010

Contacts to know

Star EV Technical Support
864-549-7224

www.starev.com

Table of Contents

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

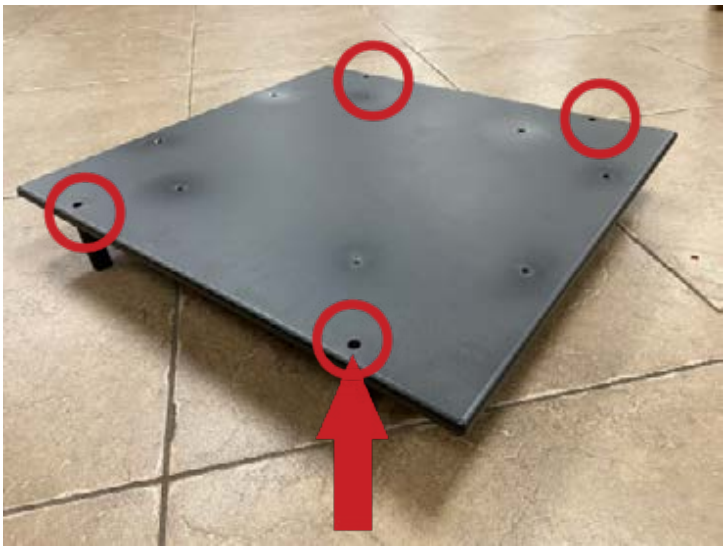
2CH917 and 2CH918 Receptacle Adapter Plate and Seal

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.

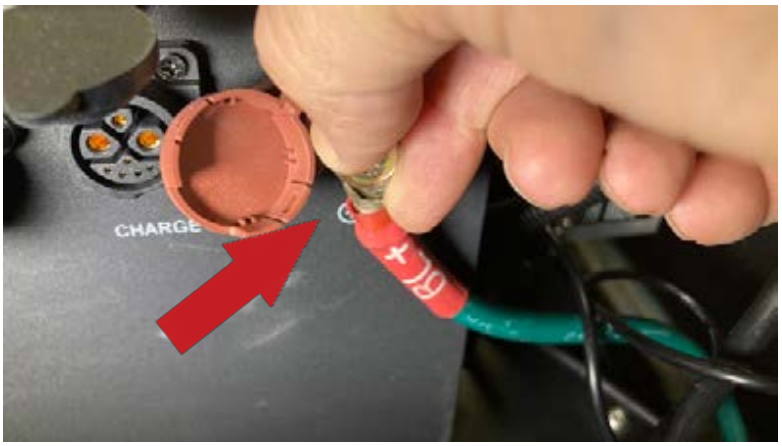
Place a flat washer, lock washer and nut on each of the bolts from the underside. You may need an assistant to help tighten the bolts from the topside. You will need the ratchet with the 13mm socket, and a 13mm wrench to secure these bolts.

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.

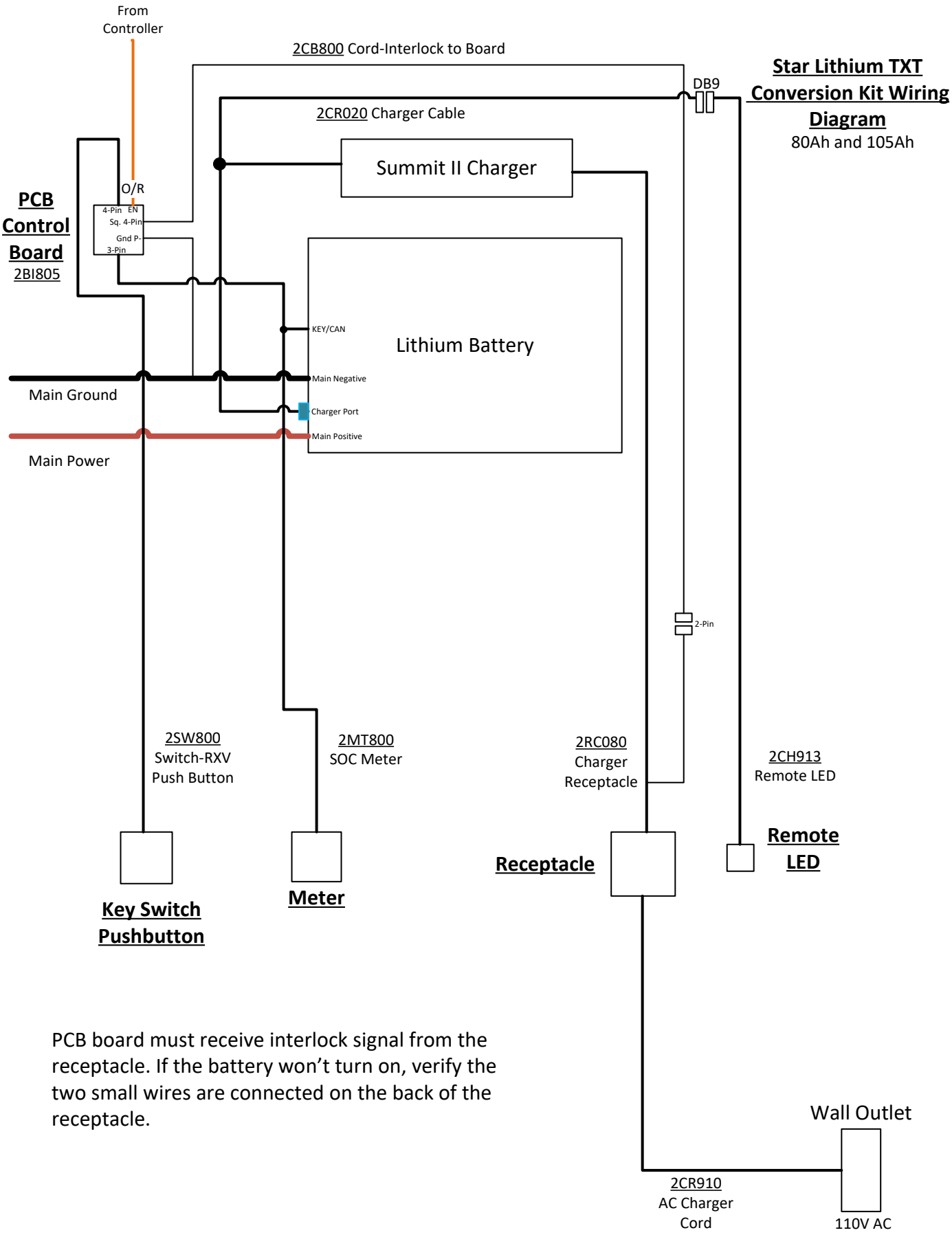
Route the cord from the battery compartment area under the vehicle floor, under the passenger side, through the openings in the frame, to the area behind the key switch. You can remove the SOC meter, and use the back of its body, to cut an opening in the dashboard. Leave the chrome-plated screw lock 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.

Star Lithium TXT Conversion Kit Wiring Diagram

80Ah and 105Ah



PCB board must receive interlock signal from the receptacle. If the battery won't turn on, verify the two small wires are connected on the back of the receptacle.

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.

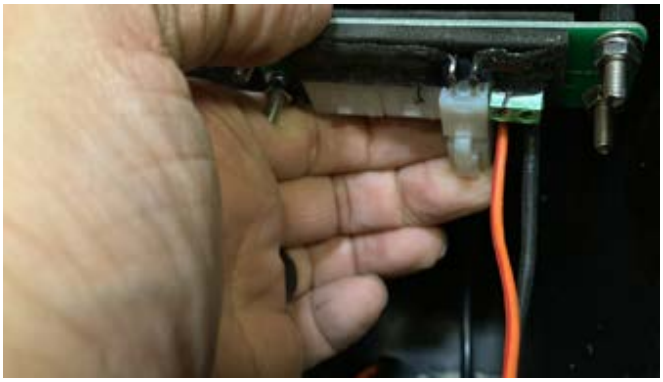
Use your wire cutters to cut the orange/red wire from the OEM charger receptacle, and route the wire to the PCB screw lock connector. Strip the insulation from the end of the orange/red wire you just cut, and insert it into the EN (enabler) opening. Tighten the screw to secure the wire.

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.

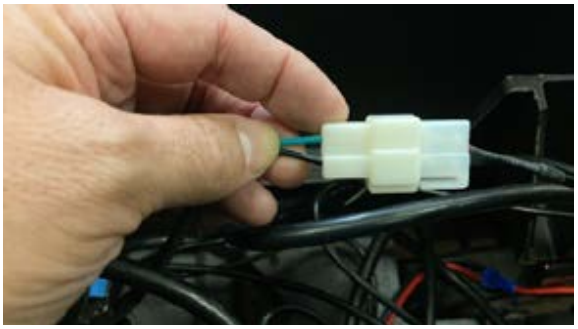
Strip the insulation from the end of the black wire, where you previously removed the eyelet. Insert the freshly stripped end into the P- opening in the PCB screw lock connector. Tighten the screw, using the small flathead screwdriver, to secure the black wire. Connect the eyelet end of the black wire,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

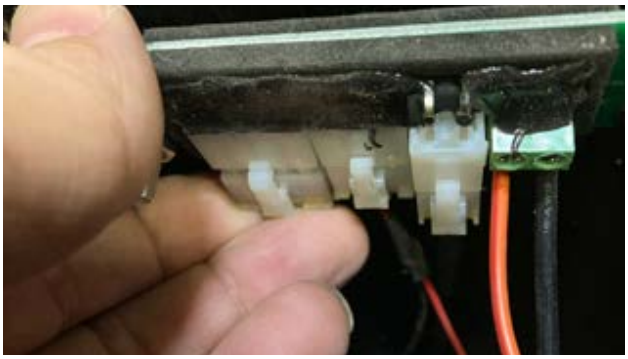


This cable is now properly installed. This leaves the other two openings ready for connections.

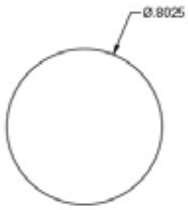
Locate the 3-pin connector that is part of the harness that has the screw lock ring on the side of the battery. It is the harness that we attached to the KEY/CAN port, and the other end goes to the meter in the dashboard. Plug this 3-pin connector into the 3-pin opening on the PCB board.

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 remo the switch and set it aside, but it is not a requ 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.

Star EV Lithium 48V Yamaha Fleet Drive II Installation Guide

Contacts to know

Star EV Technical Support
864-549-7224
www.starev.com

STOP!! **Your Yamaha Drive II vehicle must be a fleet version to work with this upgrade kit! The PTV version will not work with this kit!**

Table of Contents

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, a 13mm deep socket, and a 12mm deep socket. You may also want to have a battery lifting strap, to help lift the lead acid batteries out of the vehicle. 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.



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 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.

2CR020 Charger Cable (From battery to charger)

2BI805 RXV/ TXT PCB Board

2MT800 RXV/TXT SOC Status meter w/key switch cord

2CB800 RXV/TXT Interlock Cable to Board

2SW800 RXV/TXT Pushbutton with Cable

2RC080 110V Charger Receptacle with Cord

2CR910 110V AC Charging Cord

2BA405 80Ah Lithium Battery

2BA410 105Ah Lithium Battery

2BA414 160Ah Lithium Battery

2BT808 Short mounting strip, 2BT809 Long mounting strip

2BT807 Yamaha Drive II battery mounting plate

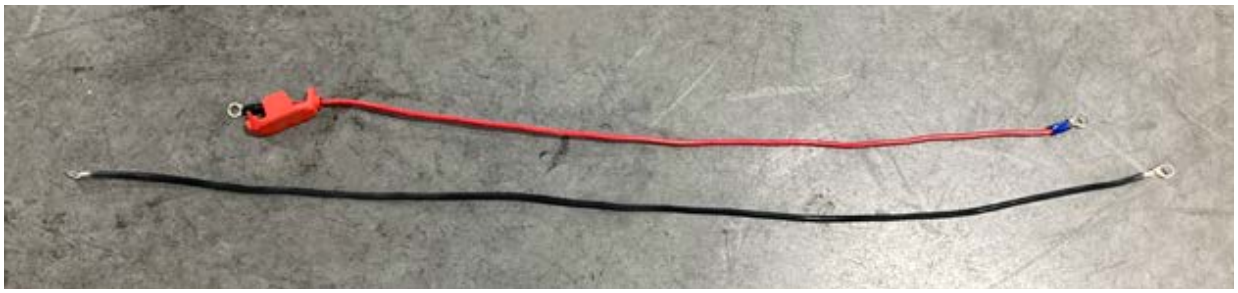
2CH924 Charging receptacle adapter plate and 2CH923 Charging receptacle adapter plate gasket

2BT289 and 2BT290 Charger Mounting Legs

2CH020 Lester Summit II Charger

2CH913 Remote LED for Lester Summit II

Kit Contents



2BT810 Battery Positive Cable (RED), 2BT811 Battery Negative Cable (Black)

2HD354 Yamaha Lithium Installation Full Hardware Kit

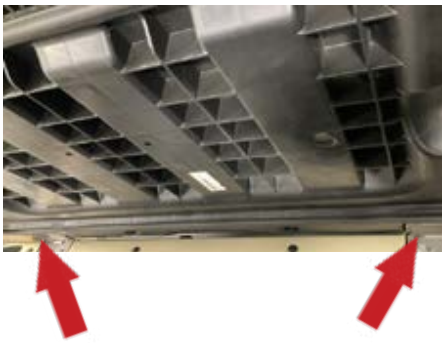
2HD306 Hardware kit for battery to battery mounting plate, and mounting plate to vehicle

2HD300 Hardware kit for attaching charger legs to charger and mounting charger to vehicle

2HD301 Hardware kit for receptacle to adapter plate, and receptacle to Vehicle

2HD304 Hardware kit for PCB to Vehicle. Black wire goes from the negative battery terminal to the PCB board screw lock connector.

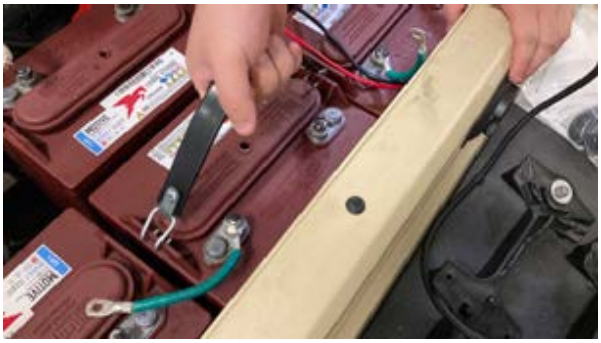
Battery Removal Process



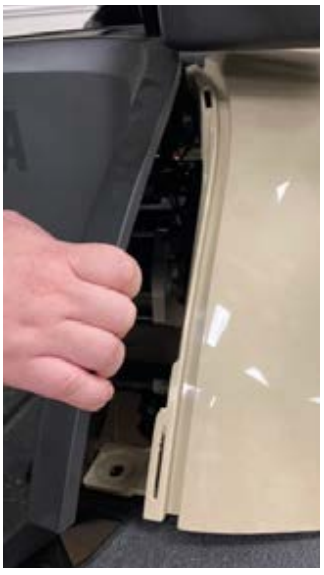
To make it easier to access and remove the batteries, it will be a huge help to remove the seat cushion. To remove, raise the seat upward, and lift upward, to separate the hinges.You will see that the hinges are able to lift apart, when the seat cushion is in the upright position. Set the cushion aside, 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 12mm 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 holdowns in the center area of the battery array. But you'll also find two on each holdown for the outrigger batteries. Once you've removed the holdown nuts, remove the black plastic battery retainers with the outer batteries.



You will lift all the batteries out, in order to empty out the battery compartment.



Moving to the rear of the vehicle, remove the screws that hold in the rear golf bag compartment. This will allow access to the other ends of the main battery cables. You will need to have access, since we will be replacing these cables in a future step.

Battery Compartment Preparation

To help in installing your charging receptacle you will remove the push pin clips from the front of the battery compartment. This will allow you to pull the front cover away from the battery compartment.

You can also remove the original charging receptacle. This will be replaced with the receptacle from the kit components.

You will also need this front cover to be removed, to reach the front bolts that mount the battery to the battery plate.

Attach your new receptacle to the receptacle adapter plate. This will allow you to place the receptacle assembly into the receptacle hole, and mark the adapter plate mounting holes. You will also mark the hole for the charging status LED.

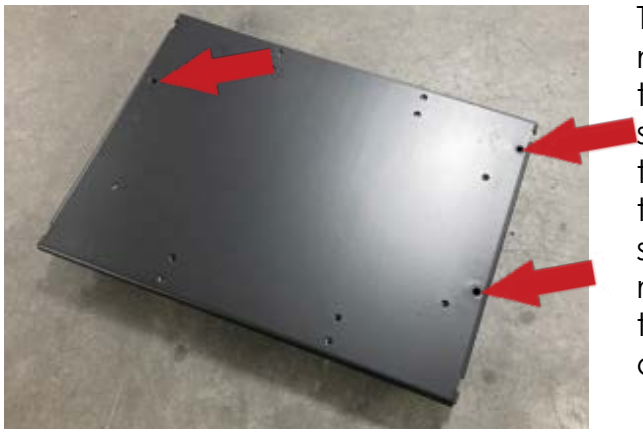
Be sure that your receptacle will line up with the structural plate that is behind it, before marking your bolt holes. This is important, because you only want to drill the holes once.

Once your receptacle mounting holes are marked, install the adapter plate gasket, and the bolts. This is how the assembly will look from the back side.

Battery Installation

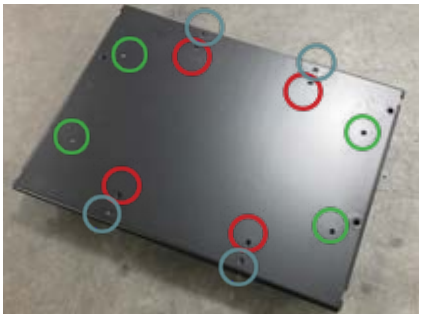
The battery shown here, is the 105Ah lithium unit, but the 80Ah and 210Ah units are almost the same, except for the orientation of the mounting tabs. In the photo below, you will see the 105Ah battery mounting holes circled in red, and the 210Ah shown in green.

Place the battery mounting plate inside the battery compartment. Using a pencil, you will mark through the three mounting standoffs. This side, with one mounting hole goes toward the driver's side.



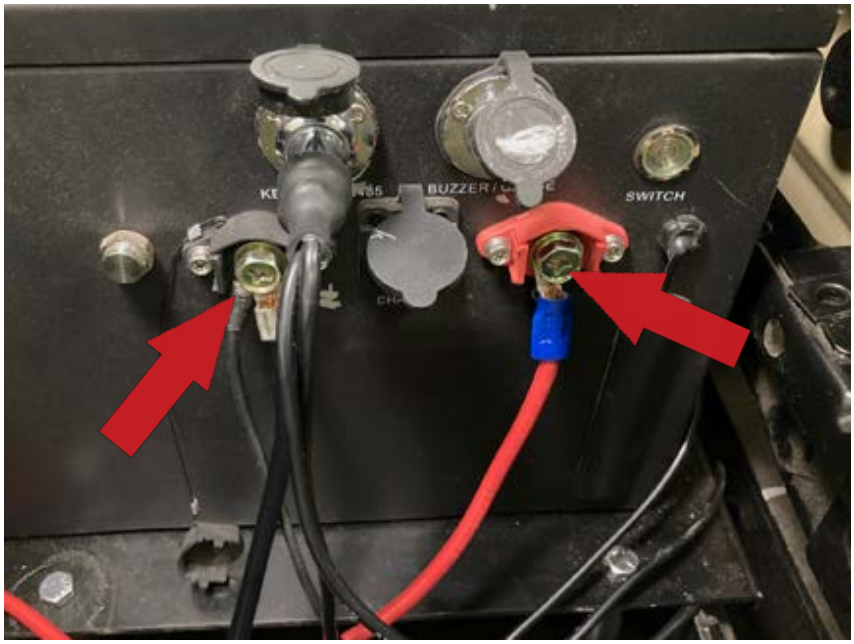
This side, with two mounting holes, goes toward the passenger's side of the vehicle. Once the holes are marked, set the mounting plate aside, so that you can drill the mounting holes down through the plastic battery compartment floor.

Using a 13mm wrench and a ratchet with a long extension and 13mm socket, install the three 130mm bolts down through the battery mounting plate, and through the mounting strips. Install three lock washers and the M8x1.25 nuts. Tighten strips so that they span across the ribs of the honeycomb.



Locate the 4-M8x1.25x20mm hex head bolts, 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. Tighten all bolts once they are all installed.

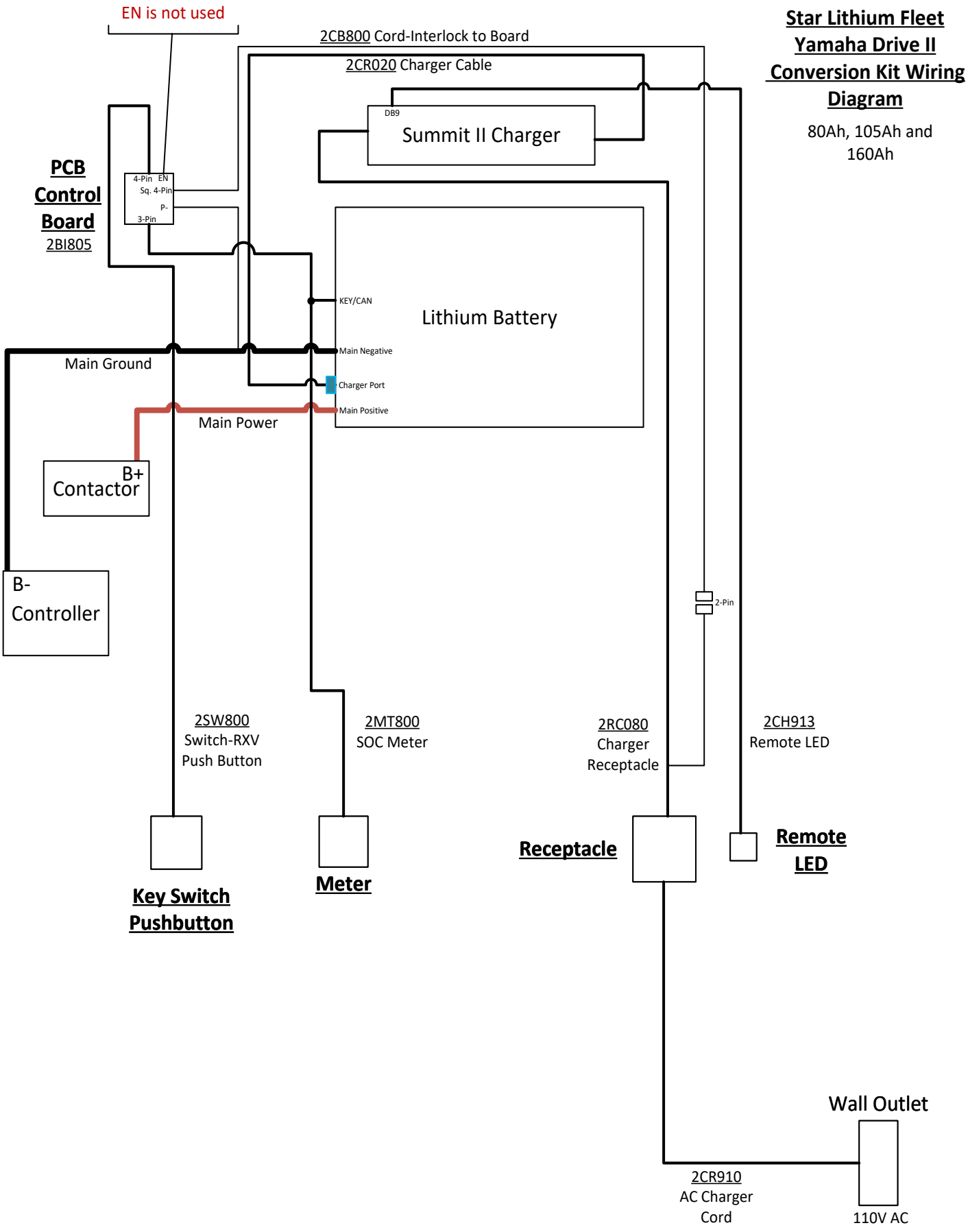
80Ah mounting points
105Ah mounting points
160Ah mounting points



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 all batteries.
Using a 13mm socket and torque wrench, torque the bolts to 105 in-lbs.

The other end of the main negative battery cable will attach to the controller here.

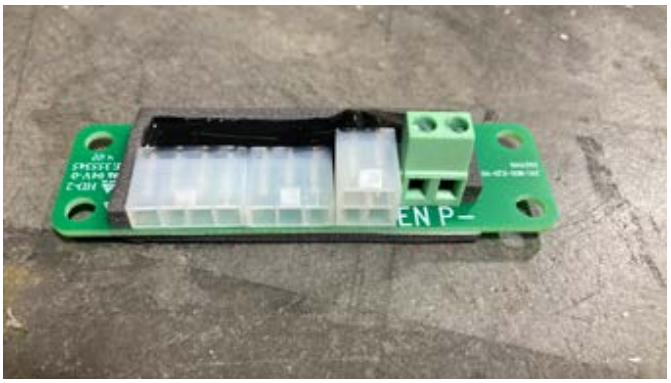
The free end of the main positive battery cable will attach here, to the contactor terminal.



Star Lithium Fleet Yamaha Drive II Conversion Kit Wiring Diagram

80Ah, 105Ah and 160Ah

PCB Board Installation

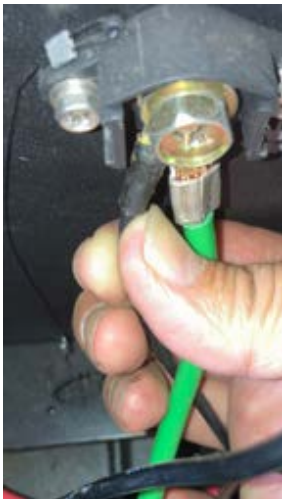


The PCB board is the main component that makes the whole kit work. The various connections are all different, so they can only be plugged in one way. But I will show them close-up, to make sure there isn't any confusion.

The key switch button connector plugs into the flat, 4-pin connector on the left.

The charger interlock cable connects to the square 4-pin connector on the right.

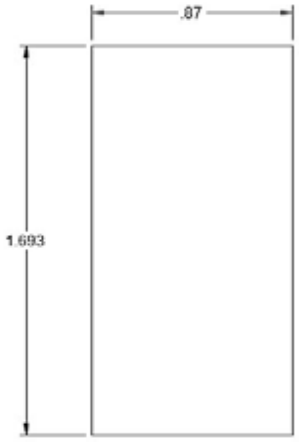
The flat 3-pin connector goes into the middle connector. This is the connector on the cable that goes to the battery and SOC meter.

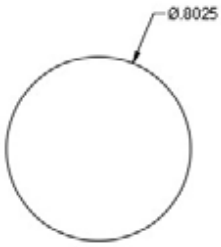


The last connection is from the battery negative terminal, to the terminal marked P-. This is a screw lock connector, and should be tightened with a flat head screwdriver until secure. DO NOT USE THE PORT MARKED **EN**

Once all your connections are made, to the PCB board, you are able to affix the board to the RR inner fender liner, inside the battery compartment.

Your meter, and battery power button will run from the PCB board, through the battery compartment, up to the dashboard. You will make holes for the meter, and battery power button. We have mounted ours beside the REV/FWD switch. The hole for the meter can be cut using an oscillating saw. The dimensions are .87 wide, by 1.693 high for the meter opening. The switch hole is .8025 in diameter. The meter has tabs on the ends that allow it to simply be snapped into its opening. The switch has a retaining nut that must be removed and reinstalled once the switch is installed.





Installing Your New Charger

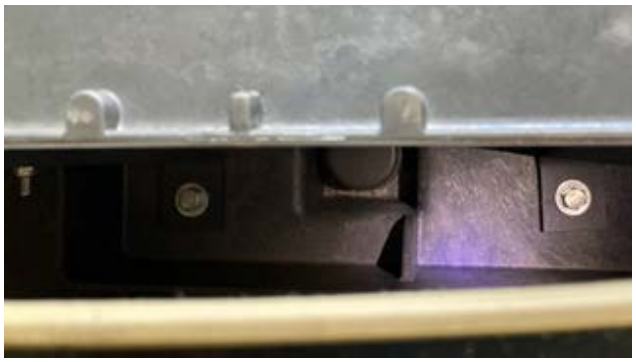
Now find the cord package marked 2CR020. This cord will connect the DC side of the charger to the battery pack.

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 nuts. Set these bolts aside. You will need them to install the charger brackets to the vehicle.

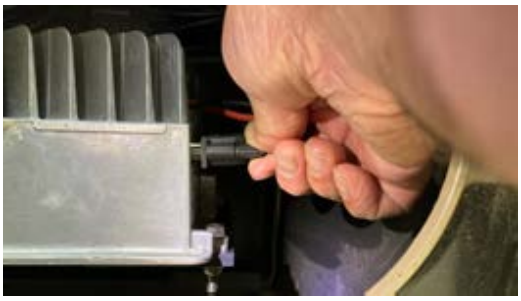
Locate your charger brackets and use the M6x1.0x25mm bolts, 8-M6 flat washers, and 4-nylock nuts to attach the charger brackets to the back of the charger, loosely at this time. Next, you will need to use a drill and a 3/8" drill bit to place 2 holes in the side tray area of the battery compartment. 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 below. You will now use the M8 bolt/washer/nut assemblies from above, to secure the charger feet to the vehicle, using a ratchet with a long extension and a 13mm socket, and a 13mm wrench.

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 install the charger status LED beside the hole in the charger receptacle adapter plate. This cord has a computer monitor style DB9 connector on the end. This DB9 connector will need to be connected to its mating connector on the charger cord with the blue twist lock connector.

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 864-549-7208.

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.

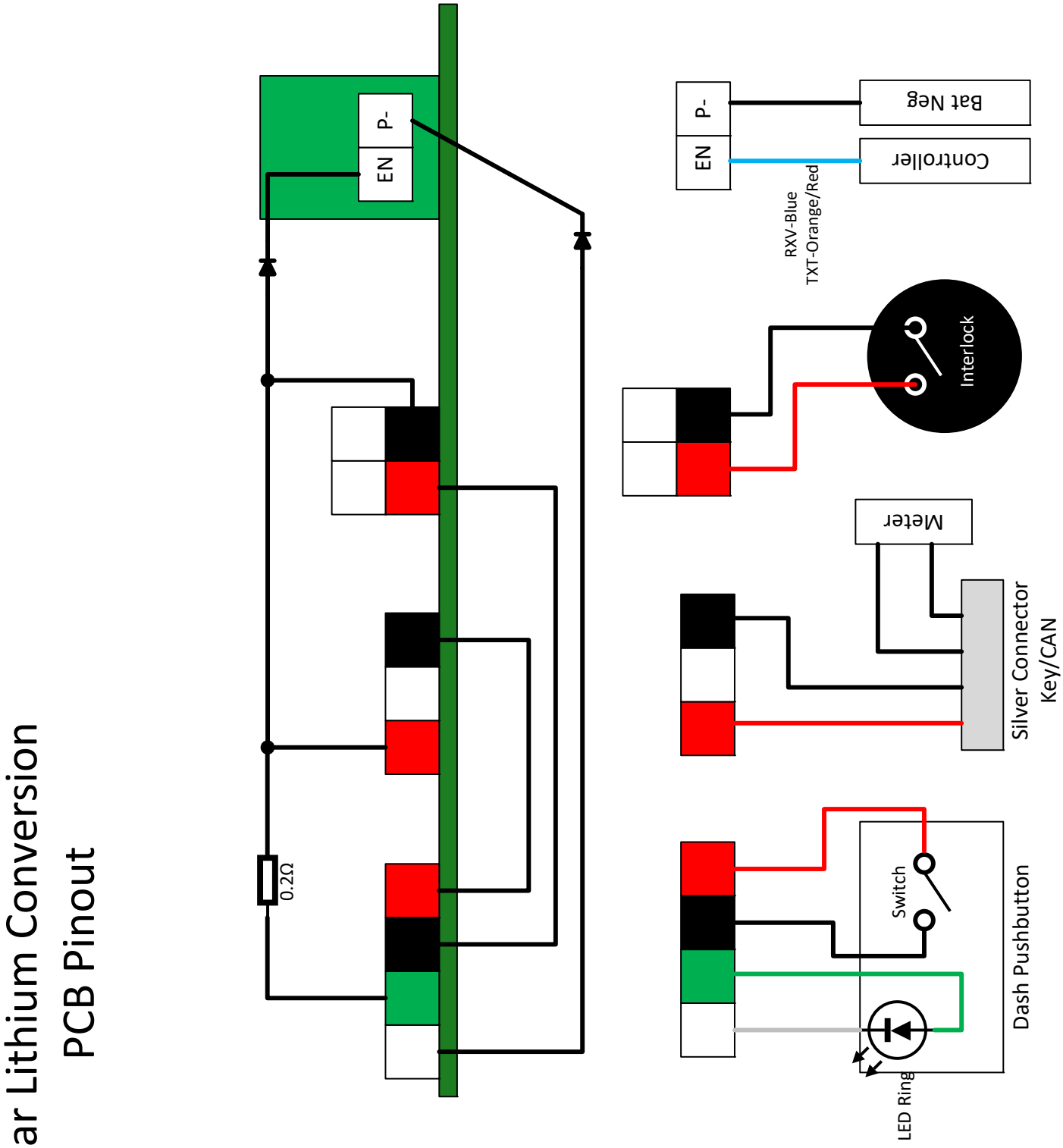
Q: What if my meter seems to be inaccurate?
A: You MUST fully charge your Lithium battery before operating!

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.

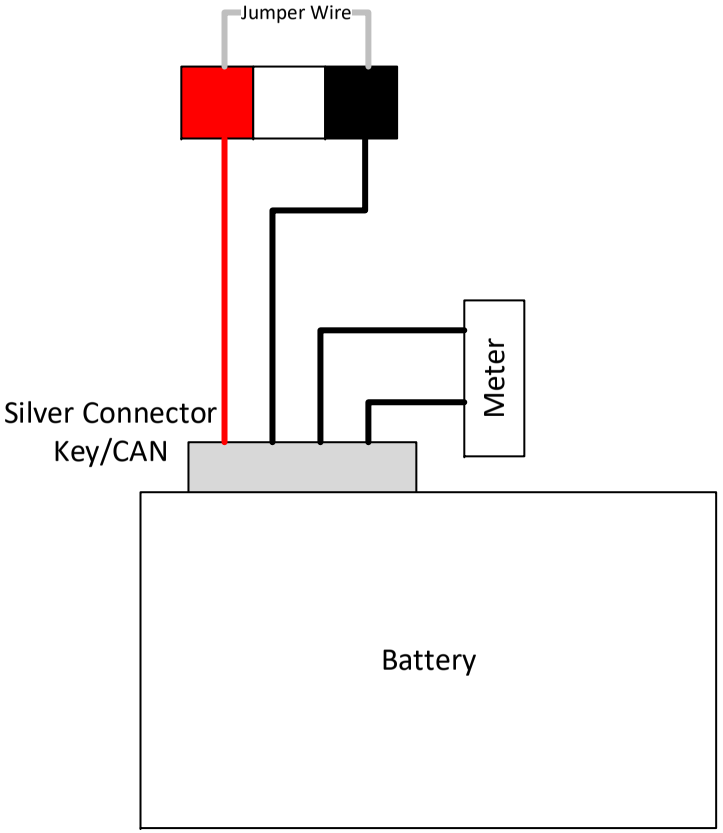
Q: What if I've tried all the steps above, and still need help?
A: Call Star Technical Support, at 864-549-7224.

Advanced Troubleshooting

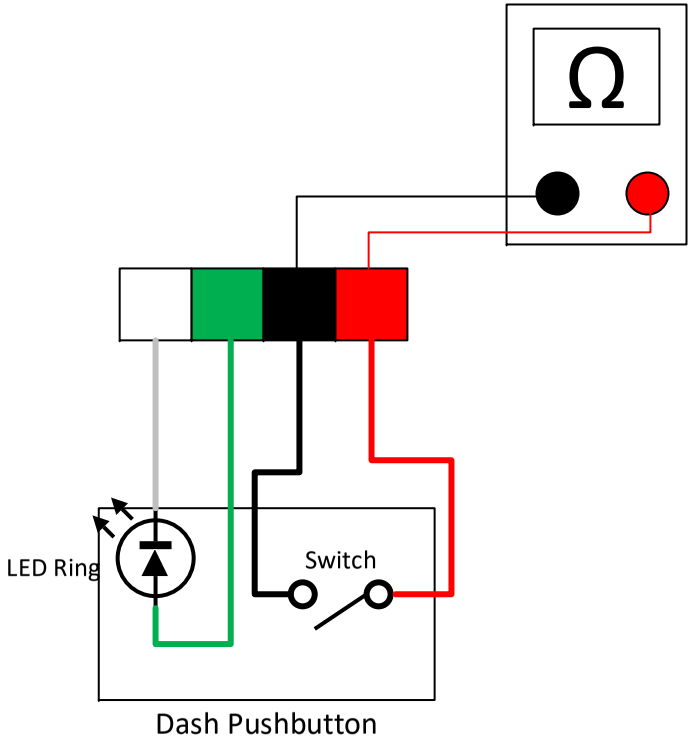
Star Lithium Conversion
PCB Pinout

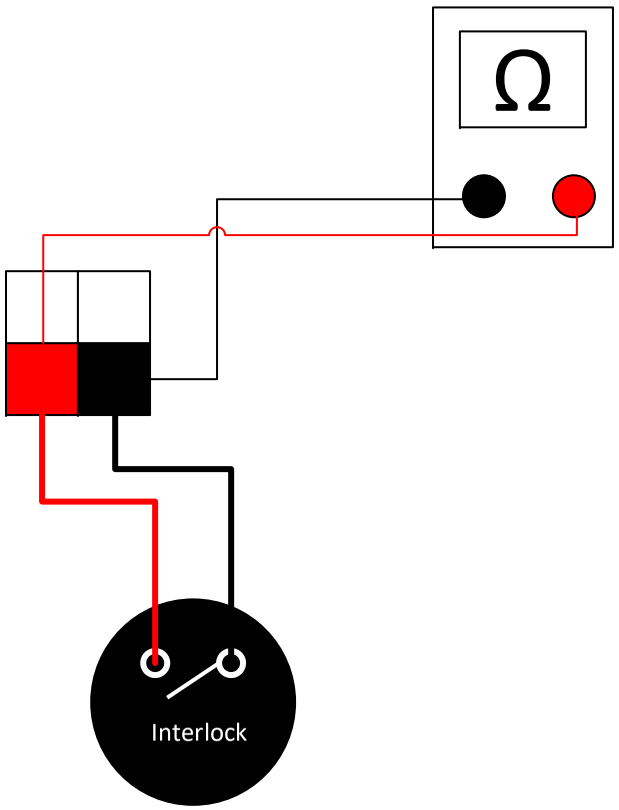


If the battery won't turn on:
1. Verify vehicle is in neutral.
2. Press battery power switch on 80Ah, 105Ah, 160Ah.
3. Disconnect 3-pin connector from the PCB board and place a jumper wire between the red and black wires.
4. Battery should now come on, go to next test.
5. If battery still won't come on, check continuity through the cable to the battery silver KEY/CAN connector.
6. Battery may also be too discharged. If this is suspected, you will need to order a trickle charger-PN: 2CH971.



If the battery came on during last test:
1. Verify vehicle is in neutral.
2. Press battery power switch on 80Ah, 105Ah, 160Ah.
3. Disconnect the 4-pin connector from the PCB board.
4. Check for continuity between the red and black wires, with dash pushbutton pressed in. This will make sure the pushbutton is able to supply a key switch signal to the PCB.
5. If there is no continuity, check the switch and its connections.





If the pushbutton switch tested good in the last test:
1. Disconnect the Square 4-pin connector from the PCB board.
4. Check for continuity between the red and black wires, with the receptacle interlock switch pressed in. You can do this by inserting the charging cord. Do not plug the cord into the wall outlet. This will make sure the interlock switch is able to provide a closed circuit to the PCB.
5. If there is no continuity, check the interlock switch and the wires on the back of the receptacle.
6. If these wires are connected, verify the white 2-pin connector is plugged in, between the receptacle and the 4-pin connector.
7. If continuity is present, reconnect the square 4-pin to the PCB. If continuity cannot be restored, check for bad connections in the wiring and if the interlock switch is closing the circuit. Repair or replace as necessary.

Trickle Charging

For trickle charging:

1. The Star lithium battery needs to have a sufficient amount of charge, to be able to turn on. When the battery turns on, it will then supply voltage and ground to the outside terminals.
2. To determine if your battery has sufficient voltage, you will push the power button and provide a keyswitch signal, through a jumper wire. If the battery doesn't turn on, you will try to connect to the battery using the Star lithium app. You can find this app on the app store for your smart device.
3. If the app is unable to connect to the battery, and the battery won't power on, with the keyswitch connection jumpered, the battery is most likely too discharged.
4. The battery will need to be trickle charged, using the 2CH971 trickle charger. This charger is available through the Star EV parts department.
5. You will connect this charger to the BUZZER/GAUGE port on the side of the battery. Plug the power cord into the wall. The charger will begin to charge the battery. The charger may become warm to the touch, and this is normal. It may take several hours to charge the battery, depending on how discharged it is.
6. Once the battery has reached sufficient voltage, it will be able to power on, and the Star lithium app will be able to connect.
7. The Lester charger that is supplied with your kit, will not operate unless the battery has this sufficient level of voltage. Once the battery has been trickle charged until the trickle charger has stopped, the Lester charger can be used to charge it to full charge.

LED Color Chart	Description	Meaning	What to do
	No Light	Battery voltage is below 13V. Charger should feel warm to the touch. It will turn red once it reaches 13V.	Continue charging if charger feels warm to the touch. If charger isn't warm, charging is not happening. Stop charging if the charger doesn't warm up.
	Amber	Battery is too old to be trickle charged, or has a dead cell.	Battery will need to be replaced.
	Red	Battery is above 13V and being charged.	Continue charging until LED turns green.
	Green	Battery has reached maximum charge possible (42V) with the trickle charger.	Stop charging. Connect with Star lithium app and perform battery update. Then connect Lester charger to finish charging.
	Red-Green Immediately	Battery is at 42V, or this is a false green, indicating that the charger will not work with this Bluetooth ID.	If the battery is able to connect with the app, perform any updates. If this is not possible, contact Star Technical Support at 864-549-7224 for further assistance.

Lester Charging

Your new Lester charger is equipped with LED indicator lights on the side. These lights have different meanings, and turn on during the different stages of the charging process. The blue LED will illuminate any time there is AC power available from the wall outlet. The other LED's will indicate charging stages, completion of charge, or faults that have prevented full charge from taking place. You can use the Lester Connect App to connect to the charger to read any faults in the charger. The remote LED displays the charging status to the outside of the battery compartment so that it is easier for the user to view the charging status. If the remote LED doesn't light, check the DB9 connections between the remote LED and the charger.

State of Charge

The battery sends out its state of charge, via a CAN network. The battery state of charge meter converts this to a visual scale for use by the operator of the cart, using a 10 bar scale. The two versions of meters are the add-on meter as shown to the left, or the built-in meter in the Sirius steering column display.

This is why the Sirius must have the CAN connector under the dash cupholder, for transmitting the CAN data to this display. At the top of the Sirius OEM display, you will see three white dots overlaying the meter bars. These white dots show that the display is in SLA mode and not receiving CAN data. Once the display CAN connector is connected to the battery, these three dots will turn red, indicating it is receiving CAN information.

If CAN data is not being shared from the battery, the state of charge meter reading will be inaccurate.

Lithium CAN SOC display	
10 Bars	100%-95%
9 Bars	94%-90%
8 Bars	89%-80%
7 Bars	79%-70%
6 Bars	69%-60%
5 Bars	59%-50%
4 Bars	49%-40%
3 Bars	39%-30%
2 Bars	29%-20%
1 Bar	19%-5% flashing begins at 19%
0 Bars	4%-0%

In the chart shown, you will see how the bars of the SOC meter are divided on the Sirius display. In the auxiliary SOC meter, there is one less green bar, but the amount of charge remaining is roughly the same.

On the Sirius display, if there is no CAN communication with the display, it will have white dots, and remain at roughly 50% SOC regardless of the actual charge in the battery.