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Tools Needed for Installation

- Deep Well Socket: 1/2"
- Magnetic Socket: 5/16"
- Sockets: 8mm, 10mm, 17mm
- Drill
- Ratchet Wrench
- Wire Cutters
- Wire Strippers
- Wire Crimpers
- Screwdriver (Jeweler's Flat Head)
- Small Pick
- Lifting Aid for Batteries
- Safety Glasses
- Gloves Rated to Protect Against Battery Acid Exposure
- Foaming Engine Cleaner or Similar for Neutralizing and Cleaning Battery Acid
- Marking Device Suitable for Dark Plastic
- Digital Voltage Meter



Contents of Kit

BATTERY CABLES (2 AWG)							
Qty.	Length	From	Terminal and Heat Shrink Color		To	Terminal and Heat Shrink Color	
1	9"	Solenoid (+) OUT	5/16" Ring	RED	Controller (B+)	5/16" Ring	RED
1	12"	SOC Shunt (P-)	3/8" Ring	BLK	Controller (B-)	5/16" Ring	BLK
1	12"	+24V on Battery	5/16" Ring	RED	Fuse Block	5/16" Ring	RED
1	12"	Fuse Block	5/16" Ring	RED	-36V on Battery	5/16" Ring	BLK
1	12"	+12V on Battery (Cross Tie)	5/16" Ring	RED	-24V on Battery (Cross Tie)	5/16" Ring	BLK
1	12"	+36V on Battery (Cross Tie)	5/16" Ring	RED	-48V on Battery (Cross Tie)	5/16" Ring	BLK
1	20"	+48V on Battery	5/16" Ring	RED	Solenoid (+) IN	5/16" Ring	RED
1	24"	-12V on Battery	5/16" Ring	BLK	SOC Shunt (B-)	3/8" Ring	BLK

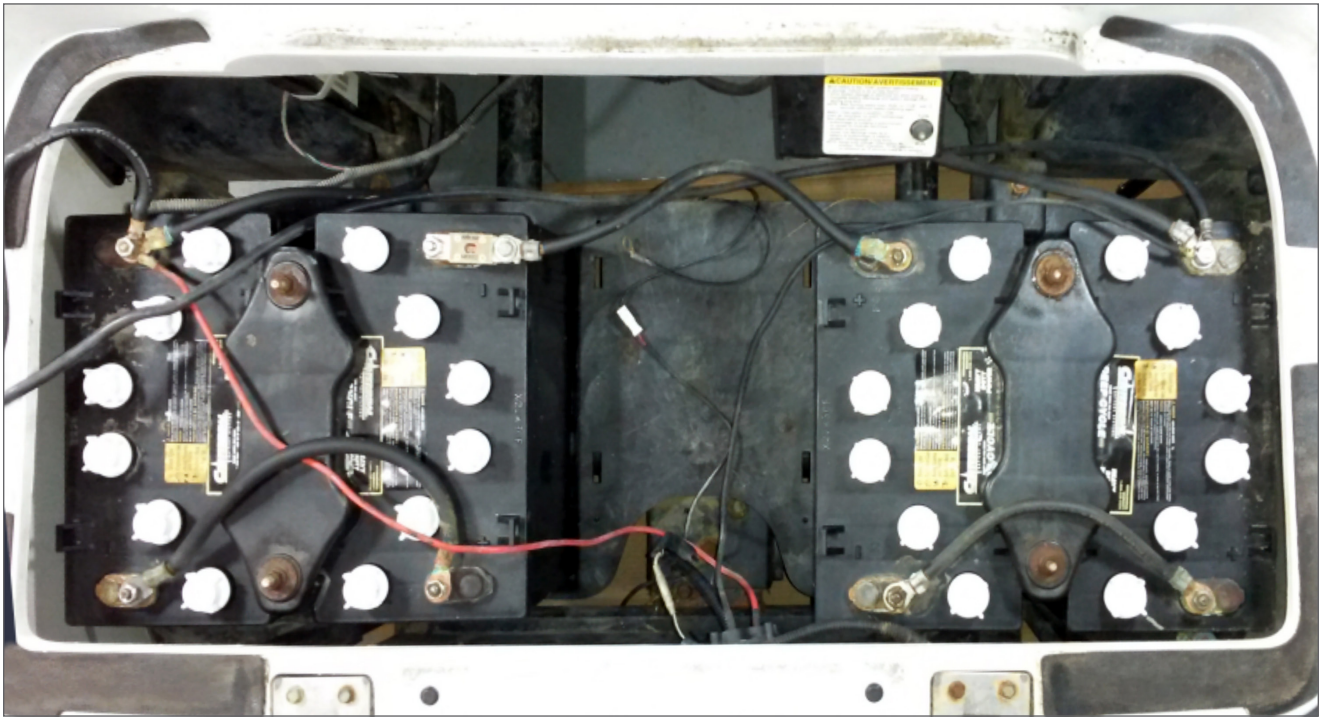
STATE OF CHARGE (SOC) METER TO TOW / RUN SWITCH					
Qty.	Item	From	Notes	To	Notes
1	34", 20 AWG Wire, PINK	SOC Shunt	Strip End 1/4" (~5mm)	OEM Pink Wire on TOW / RUN	Strip End 1/4" (~5mm)
1	Blue Spade Connector, Female, 14-16 AWG	TOW / RUN (RED Wire)		34", 20 AWG Wire, PINK	
1	End Splice Connector, Female, 14-16 AWG	TOW / RUN (RED Wire) (Alternative Option)		34", 20 AWG Wire, PINK	

ADDITIONAL COMPONENTS		
Qty.	Description	Part #
1	Fuse Holder (ANL/ANN)	
1	Fuse, 200A, 72V, for BAT-12100-01 Battery Pack	
2	#8 x 1" Self Tapping Screws, Flat Head	
1	Heavy Duty Solenoid, 200A, 48V JCC-200	SOL-1021
1	Coil Suppression Diode, 3A	CON-004
1	State of Charge (SOC) Meter, 350A, 80V	
1	SOC Meter Shunt, 350A, 80V, 10mm Terminal	
2	#12 x 1" Self Tapping Screws, Hex Head	
4	1/2" PVC Pipe Spacer x 1.0" Long	
6	Zip Ties, 8" Long, Black	
1	5/16" Yellow Ring Terminal, 10 AWG (Red Charger Receptacle Wire to Fuse)	
1	3/8" Yellow Ring Terminal, 10 AWG (Black Charger Receptacle Wire to SOC Shunt P-)	
1	Printed Instructions	
1	Controller Settings Chart for BAT-12100 Battery Pack (Amp Volt Limits)	



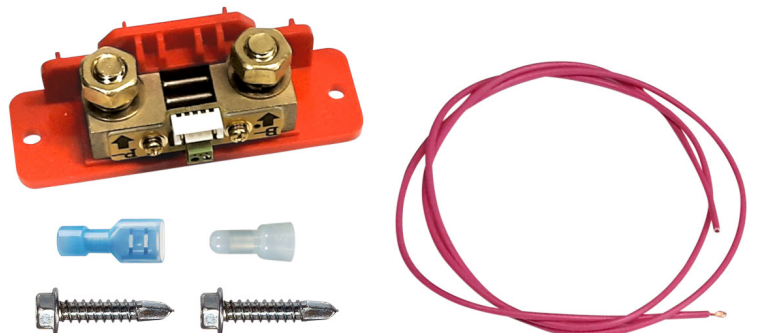
Remove Lead Acid Batteries and Clean Battery Compartment

1. Turn Key OFF.
2. Engage parking brake.
3. Place Tow/Run Switch in Tow.
4. Remove the system's positive (+) and negative (-) connections from the battery pack.
5. Remove the main battery pack's fuse.
6. Remove the battery hold down brackets using a 1/2" deep well socket. Retain brackets, hold down rods and hardware for reuse.
NOTE: Clean or replace any corroded rods.
7. Carefully and safely remove the (4) 12V batteries and cables. They will not be reused.
8. Clean and remove any debris from the battery tray. A foaming engine cleaner can be used to neutralize the battery acid and clean the compartment.



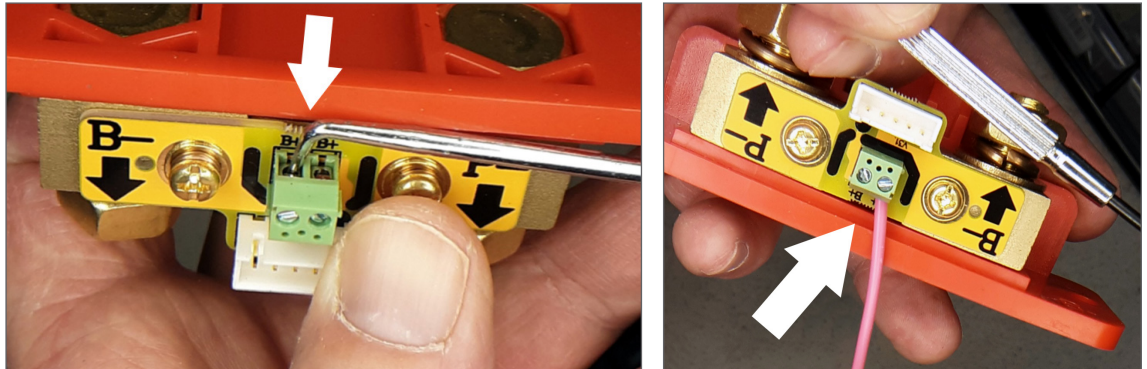
Install State of Charge (SOC) Shunt

1. Identify the SOC Shunt, (2) #12 x 1" Self Drilling Screws, (1) 34", 20 AWG Pink Wire, (1) Blue Spade Connector and (1) End Splice Connector.



- Carefully loosen (1) screw on either of the (B+) terminals on the SOC Shunt using a jeweler's screwdriver. Use a pick to open the hole by sliding the tab out of the way, as shown.
- Insert (1) stripped end of the 34", 20 AWG Pink Wire into the (B+) terminal that was opened in Step 2 and tighten the screw.

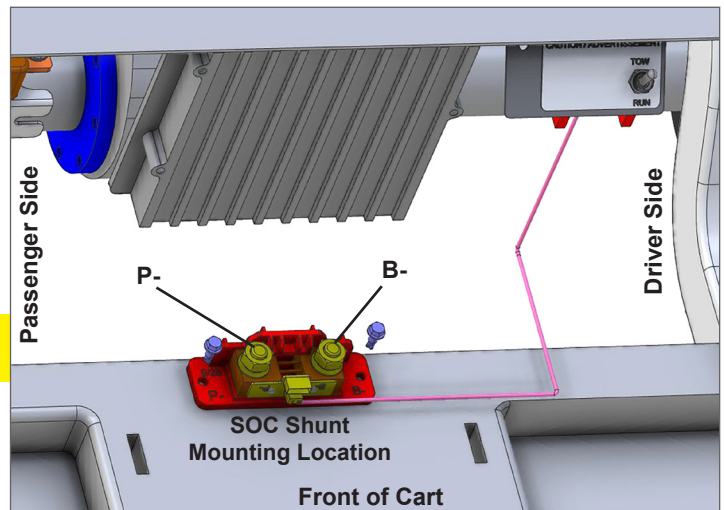
NOTE: Please review the manufacturer's SOC Instruction Manual for details.



- Following the diagram on Page 8, place the SOC shunt on the floor of the battery bucket, between the two rear most battery positions. When oriented correctly, (P-) will face the passenger side and (B-) will face the driver side.
- Once the SOC shunt is in the desired location, use a marking device to mark the mounting hole locations.
- Use a drill with a magnetic 5/16" socket and (2) #12 Self Tapping Screws, to start the (2) holes. Hand tighten.

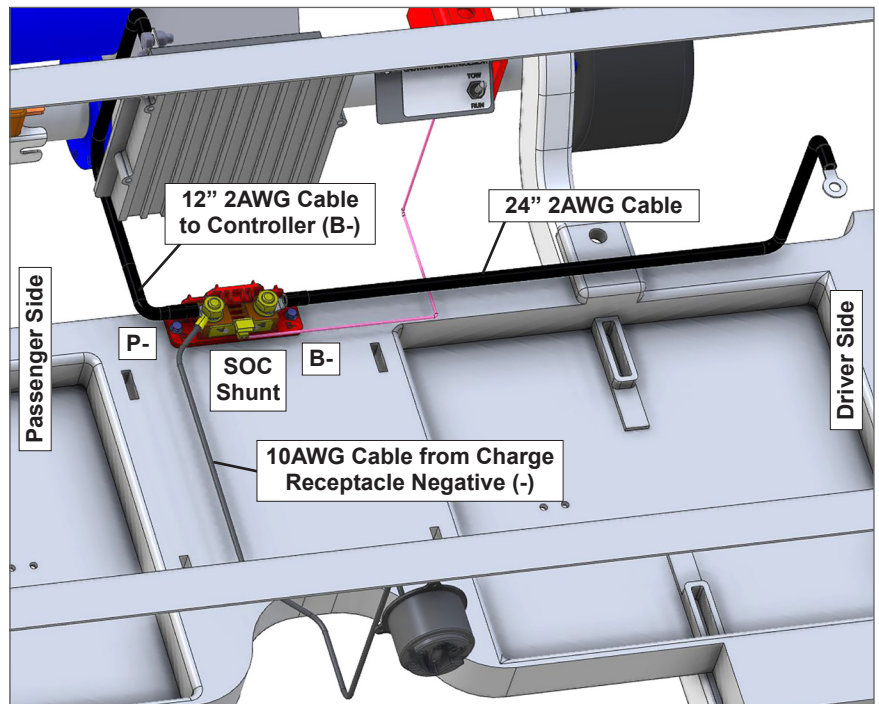
CAUTION: Look on all sides of the drilling area before you drill to make sure you are not drilling through wires, cables or brake lines.

- Locate (1) 24" 2AWG Battery Cable included in the kit. Loosely install the 3/8" ring terminal to "B-" on the SOC shunt.
- Following the diagram and the steps below, connect the remaining wires to the "P-" terminal on the SOC shunt.



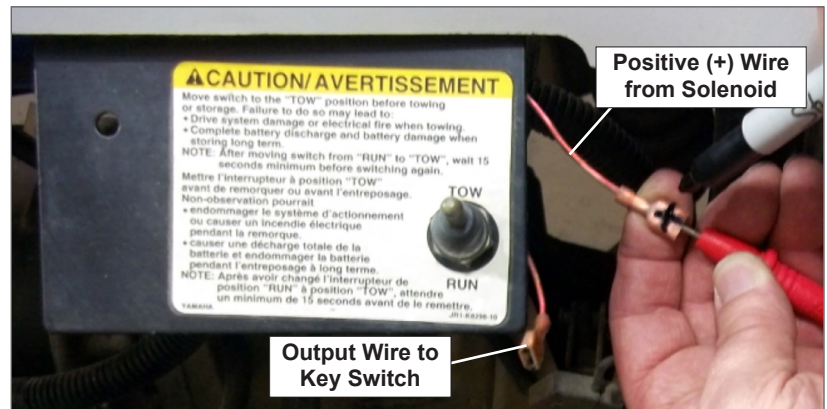
NOTE: Multiple wires may be attached to the "P-" terminal.

- Locate (1) 12" 2AWG Battery Cable included in the kit. Connect the 3/8" ring terminal (larger of the two terminals) to the "P-" terminal on the SOC shunt. Connect the 5/16" ring terminal (smaller of the two ring terminals) to the "B-" terminal on the controller.
- Locate the 10AWG black OEM wire that goes to the charger receptacle's negative (-) port. Cut off the 5/16" ring terminal. Strip the end of the wire and replace the terminal with the included 3/8" Yellow Ring Terminal. Run this end to the "P-" terminal on the SOC shunt.
- If installing a voltage reducer, connect the negative (-) wire from the reducer to the "P-" terminal on the SOC shunt.
- Using a socket wrench, carefully tighten the 17mm nuts on the SOC shunt.



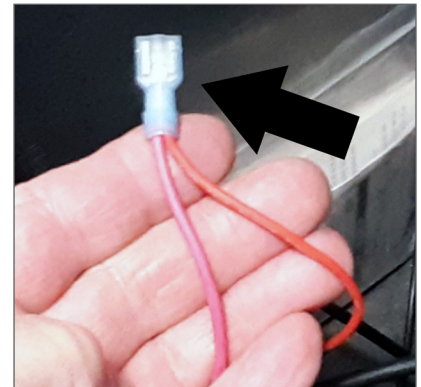
13. Locate the Tow/Run switch and verify it is set to TOW.
14. Locate the (2) wires coming off of the Tow/Run switch. One wire is connected to the solenoid's main input terminal from the battery pack. The other wire is the output wire to the key switch. To identify which wire is which, start with the top wire and disconnect it from the Tow/Run switch.

15. Set a multimeter to the resistance setting (Ω) to test the continuity. Place the negative probe (black wire) on the solenoid's main input terminal from the battery pack (larger terminal). Connect the positive probe (red wire) to the disconnected wire on the Tow/Run switch. The multimeter should read "0 OHMS". If it reads "0 OHMS", this is the positive (+) wire connected to the solenoid. Use a marking device to mark the connector with a "+" symbol. Reconnect these wires.



16. Disconnect the bottom wire from the Tow/Run switch. With the multimeter still set to the resistance setting (Ω), place the negative probe (black wire) on the solenoid's main input terminal from the battery pack (larger terminal). Connect the positive probe (red wire) to the disconnected wire on the Tow/Run switch. The multimeter should read "OPEN". If it reads "OPEN", this is the output wire to the key switch.

17. Cut off the spade connector from the output wire running to the key switch. Splice the pink wire from the "B+" terminal on the SOC shunt with the output wire running to the key switch using a wire crimper and a 14-16AWG Blue Spade Connector included in the kit. Reconnect the wires to the Tow/Run switch and leave the switch in Tow.



NOTE: The SOC shunt meter is powered all of the time with the Tow/Run switch ON. It consumes very little power, but must be installed before the key-switch in order to store energy charge and discharge data to memory.

ALTERNATIVE OPTION: If connecting the pink wire to the Tow/Run switch using a spade connector is not possible, splice the wires using the included End Splice Connector.

Install ANL Fuse Holder

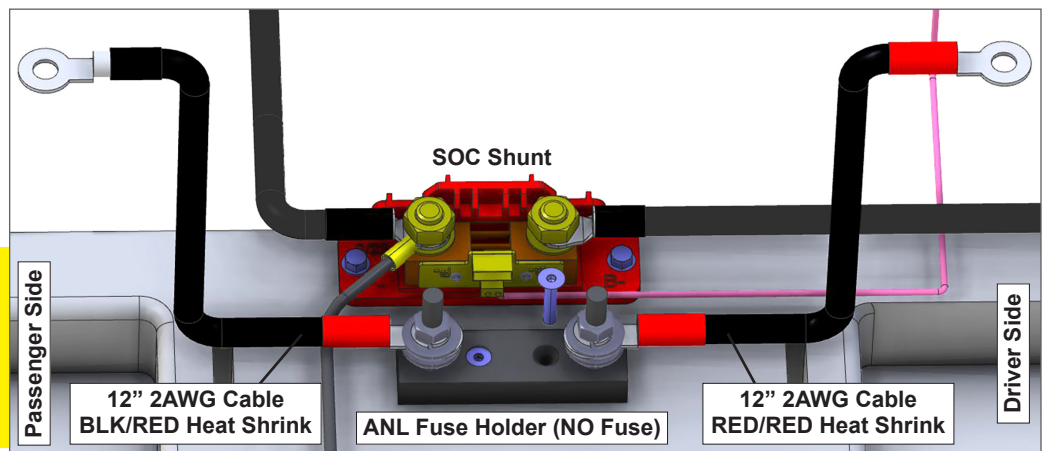
1. Locate the ANL fuse holder and remove the fuse if pre-installed.

CAUTION: Do NOT install the fuse until instructed to do so.

2. Place the fuse holder about 2-3" away from the SOC shunt as shown. Use a marking device to designate the area.

NOTE: The fuse holder in the kit may vary from the one pictured to the right.

CAUTION: Look behind the mounting location to ensure it is free of other components (i.e. brake lines, electrical wiring or other critical components). Installer is responsible for damage.



3. Install the fuse holder to the rear wall of the battery compartment using (2) #8 x1" Self Tapping Screws.

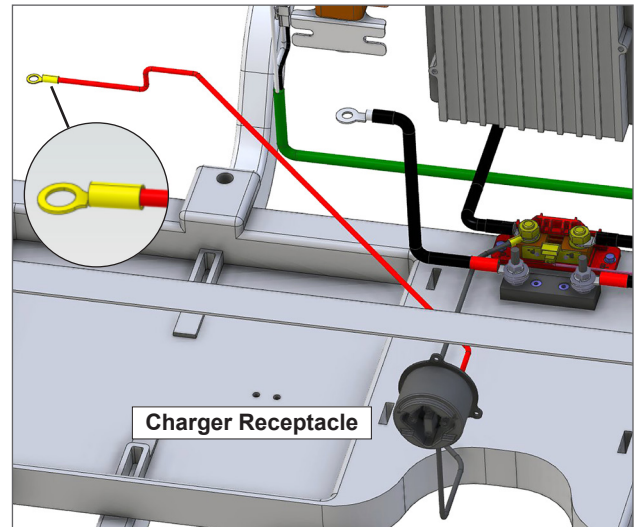
CAUTION: Do NOT install the fuse until instructed to do so.

4. Locate (1) 12" 2AWG Battery Cable with Red Heat Shrink on Both Ends included in the kit. Loosely install one side of the cable to the fuse holder on the driver side of the cart. Route the cable towards the driver side of the cart.

5. Locate (1) 12" 2AWG Battery Cable with a Red and a Black Heat Shrink included in the kit. Connect the end with the red heat shrink to the fuse holder on the empty post on the passenger side. Route the rest of the cable towards the passenger side of the cart as shown on page 6.

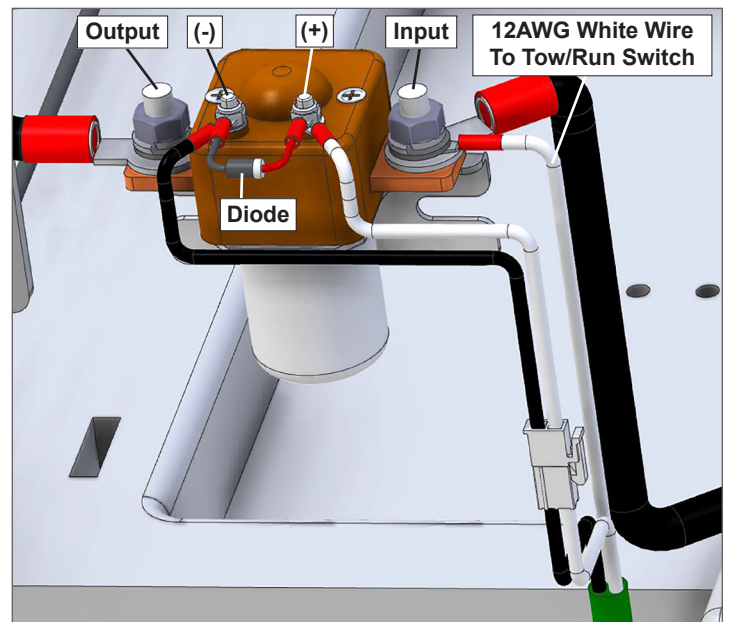
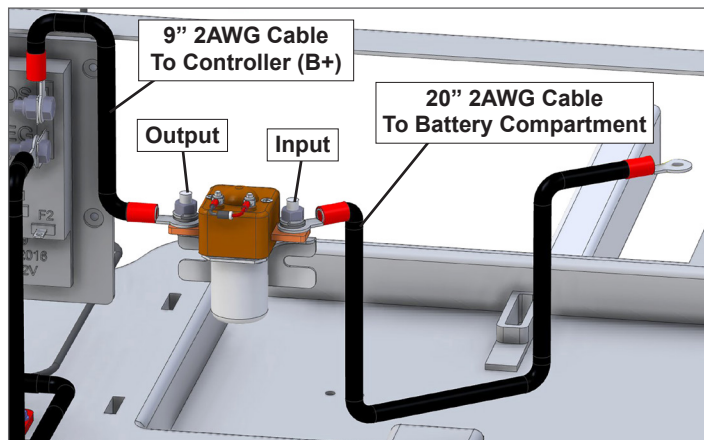
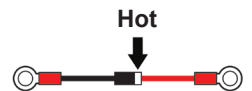
Modify Charger Receptacle Wire

1. Locate the Red 10AWG Wire from the charger receptacle. Cut off the old 5/16" ring terminal, strip the wire and replace it with (1) new 5/16" 10AWG Yellow Ring Terminal included in the kit.
2. Keep this wire in the battery compartment until the batteries are installed.



Install Solenoid

1. Remove the old solenoid and install the new solenoid in its place. Connect the leads in the same position as the one removed, with the exception of the main battery cables because they will be replaced. A 200A solenoid is included in the kit, but a 400A solenoid can be used as an option.
2. Locate (1) 20" 2AWG Battery Cable. Install one end of the 20" cable to the solenoid's input terminal along with the White 12AWG Wire feeding the Tow/Run switch. Run the opposite end under the frame rail and into the battery compartment.
3. Locate (1) 9" 2AWG Battery Cable included in the kit. Install one end to the solenoid's output terminal. Connect the other end to (B+) on the controller.
4. Install new diode to small terminals on the solenoid with the hot side being closer to the larger input terminal as shown. Connect the white factory wire to the positive (+) side and the black factory wire to the negative (-) side.



Install Batteries

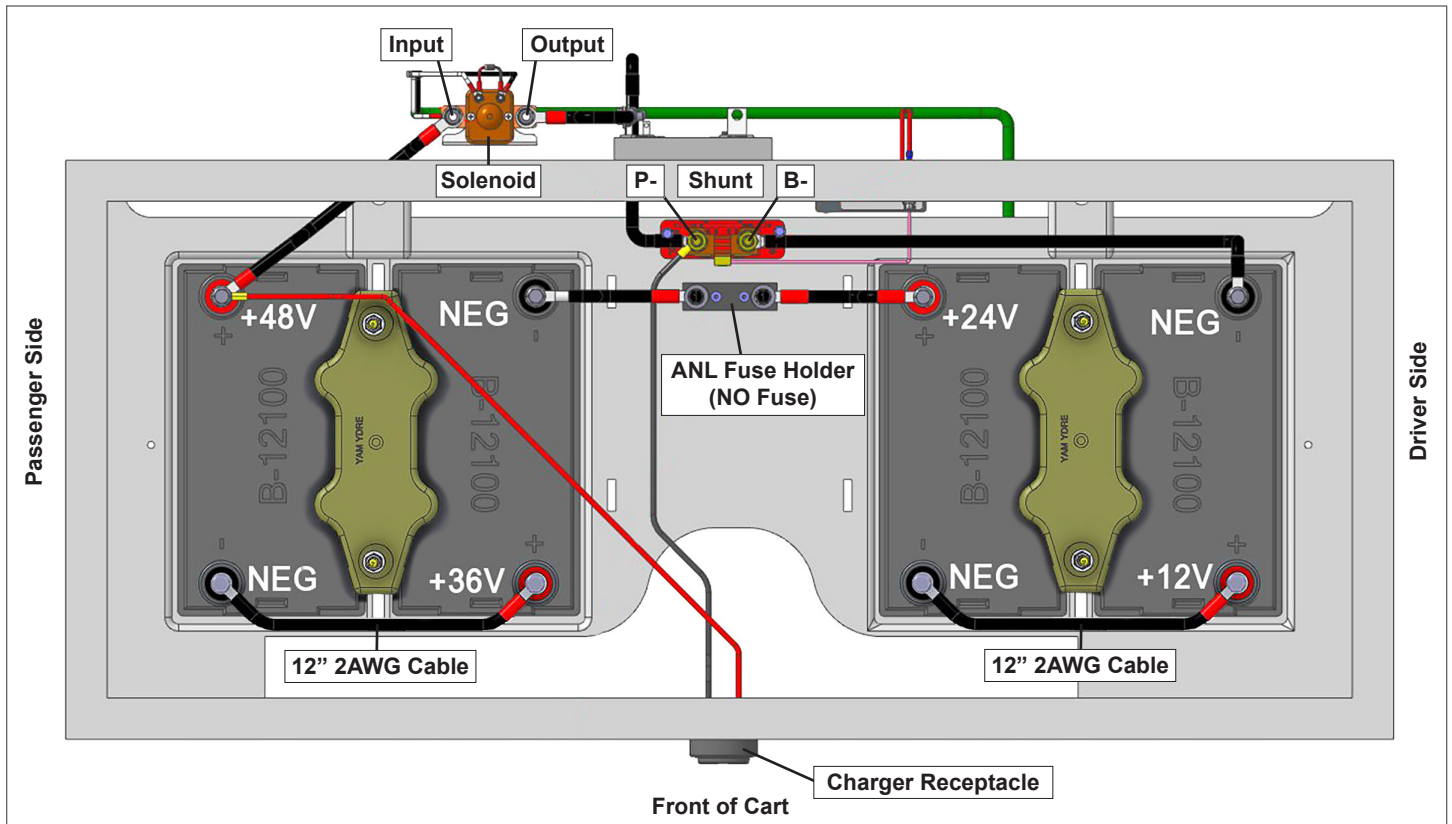
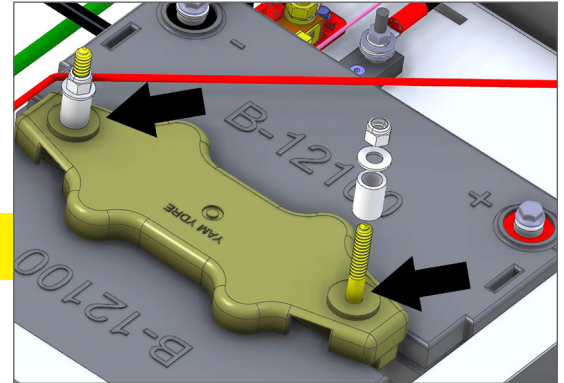
1. Place the (4) batteries as shown in below, paying attention to where the positive and negative terminals are positioned.
2. Install both OEM battery hold down plates using the (4) Original Hold Down Rods, Nuts and Flat Washers along with (4) Included PVC Spacers. If new battery hold down plates are needed, they can be purchased as Red Hawk part BAT-2017. New hold down rods can be purchased as BAT-2016.

CAUTION: Do NOT over tighten. These are lightweight batteries. They cannot slide around when secure.

3. Locate the (2) 12" 2AWG Battery Cables and place them as shown below. The side with the red heat shrink will go on the positive (+) terminals.
4. Connect the 24" 2AWG Battery Cable from the (B-) terminal on the SOC shunt to the negative (-) terminal on the first battery as shown below.
5. Connect the 20" 2AWG Battery Cable from the solenoid and the red wire from the OEM charger receptacle to the positive (+) 48V terminal on the last battery as shown below. If installing optional SB-50 connector, do so at this time (page 10).
6. Connect the 12" 2AWG Battery Cable with the Red Heat Shrink from the input side of the ANL fuse holder to the positive (+) terminal on the battery as shown below.
7. Connect the 12" 2AWG Battery Cable with the Black Heat Shrink from the output side of the ANL fuse holder to the negative (-) terminal on the battery as shown below.

CAUTION: Do NOT install the fuse until instructed to do so.

8. Tighten all battery cables using the torque requirements in the battery's Operator Manual. Do NOT over tighten.

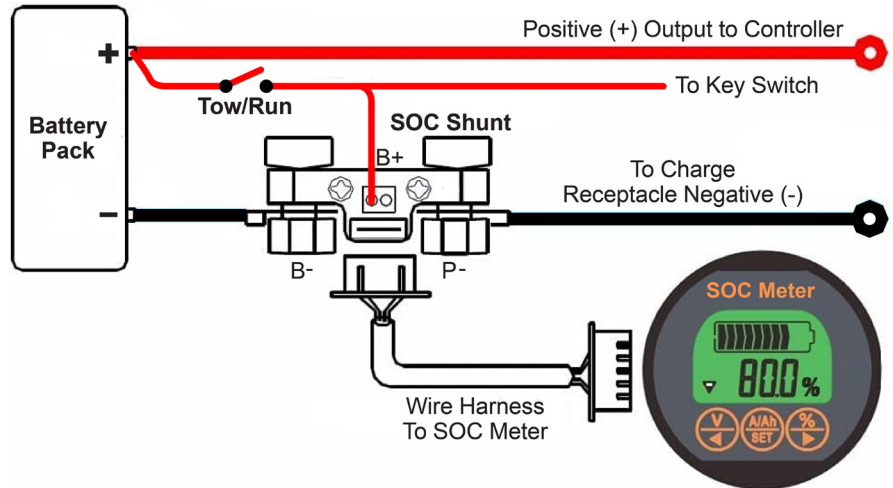


Install State of Charge (SOC) Meter, Dash Mount

1. Find a location on the dash to mount the SOC meter.
2. Mount the meter and connect the wire harness to the meter per the instructions included with the SOC meter.

Run the opposite end of the wiring harness under the cart in the center, towards the SOC shunt within the battery compartment. Use cable ties to secure the harness to the frame or other structures so it is out of the way of pinch points or areas where it could get damaged or pulled.

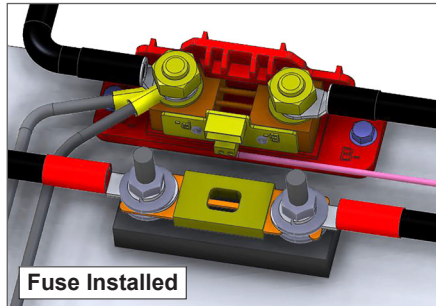
CAUTION: Do not zip-tie any SOC wires to any high power cables. High power noise can cause SOC reading errors.



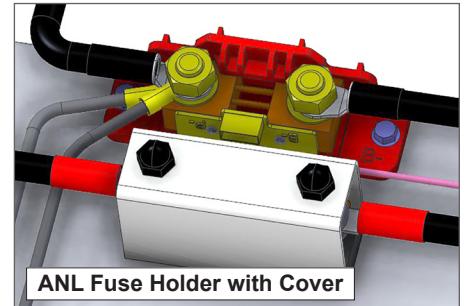
3. Connect the wire harness to the SOC shunt as shown in the diagram. Secure loose wires with wire ties.

Complete Assembly

1. Verify all components and connections are correct and hardware is tightened according to instructions.
2. Install the ANL fuse in the ANL fuse holder per the instructions or diagram included with the fuse holder, using the Included Hardware. Leave the pre-installed cables sticking out of the ends of the fuse holder so the cover can be placed on top of it.
3. Tighten the nuts on the ANL fuse holder according to the manufacturer's torque specifications. Do NOT over tighten.
4. Snap the ANL fuse holder's cover over the fuse and cables.

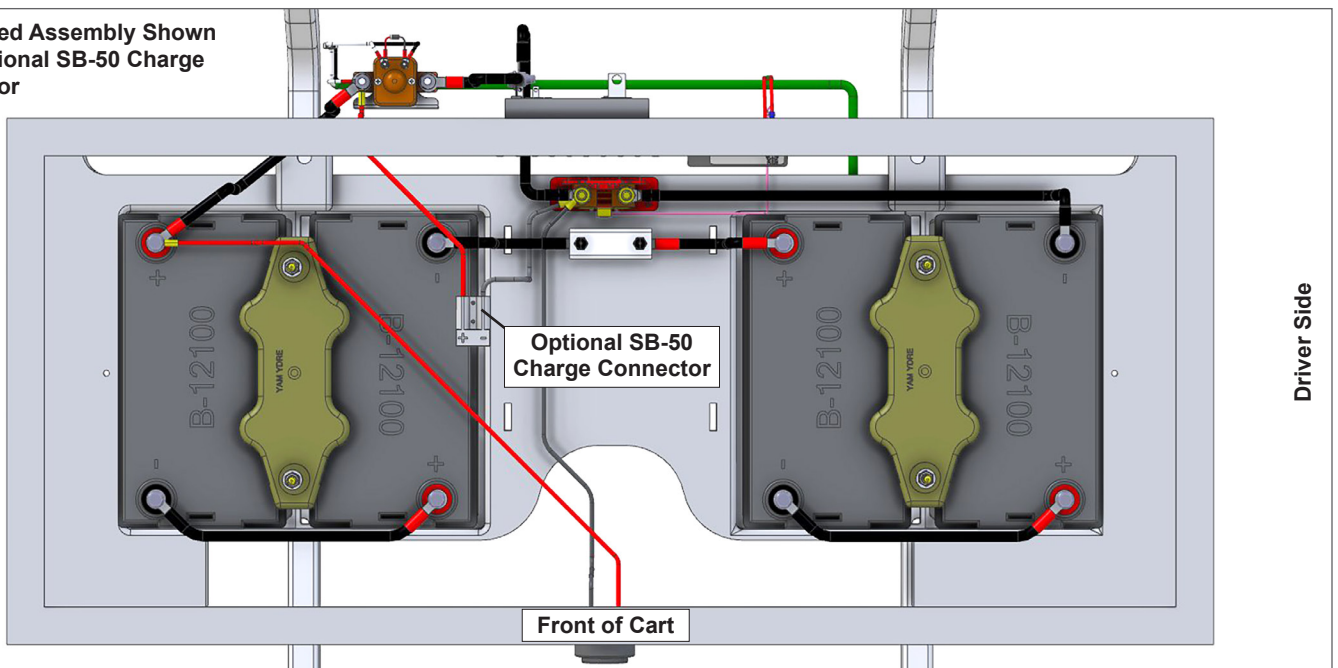


Fuse Installed



ANL Fuse Holder with Cover

Completed Assembly Shown with Optional SB-50 Charge Connector



5. Use a digital voltmeter to verify all connections and the total voltage of the pack.
 6. Check the charger receptacle's voltages and the battery pack's main negative (-) to the positive (+) 48V terminal for the correct polarity and voltage. The reading should be above +48V. Lithium batteries will generally read +52V static and not fully charged.
 7. Place Tow/Run Switch in RUN.
 8. Turn the Key-Switch ON to verify the motor and controller work, but do NOT drive it until the battery pack is fully charged.
 9. Turn the Key-Switch OFF.
 10. Connect the charger for the first time and allow it to fully charge before driving the cart.
- NOTE:** The SOC may not read correct on the first charge cycle. Once driven, the SOC will learn the discharge to charge curve.
11. When the pack is fully charged, see the SOC Manual for instructions on how to "Reset to Full".

Optional: Install SB-50 Charger Plug (Sold Separately)

1. Connect the positive (+) wire from the SB-50 charger plug to the positive (+) 48V input terminal on the solenoid.
2. Connect the negative (-) wire from the SB-50 charger plug to the SOC shunt's (P-) terminal.

NOTE: The diagrams in this manual show both OEM charger receptacle and optional SB-50 charger plug.

