Documentation for
The 12 Volt DC System
in the
RAM Promaster 1500
136WB High Roof
VIN: 3C6TRVBG9GE100665

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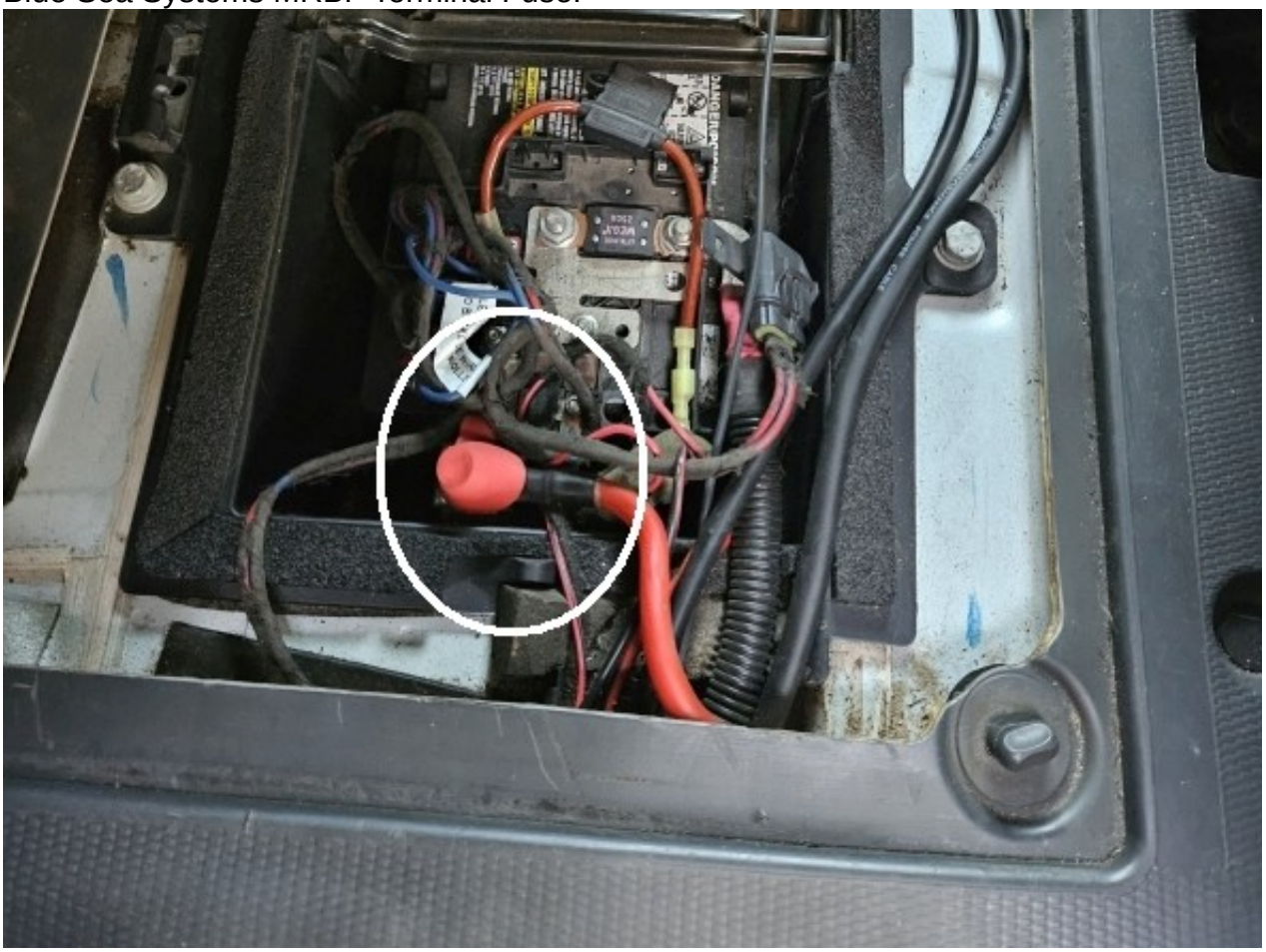
Input (Charging):

The 12 Volt System can be charged from the vehicle's engine, shore power, or solar power.

A note on the switches used in this system. They are 1-2-Both-Off battery disconnect switches. Although the "Both" option is available, the system has not been designed with that option in mind. Using the "Both" position is not recommended.

Vehicle Engine Charging (through the DC to DC Charger):

A positive lead is taken off the vehicle's battery positive busbar protected by an 80A Blue Sea Systems MRBF Terminal Fuse.



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The cable runs under the step panel to **Switch #1**. Only position #1 is active in this switch.

From **Switch #1**, the positive cable attaches to the back side of the Renogy 60A DC to DC charger.

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A dedicated cable runs from the DC to DC Charger to the battery ground/negative even though many people say a negative cable is unnecessary because the frame can simply be used. Many I consulted, including the techs at Renogy, strongly recommended running a dedicated negative cable instead of relying on the frame. For that reason, a cable runs from the negative of the DC to DC Charger near the lug to which the battery connects on the vehicle frame.

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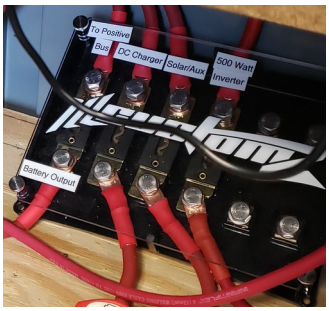
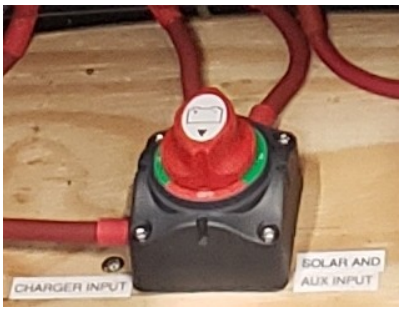
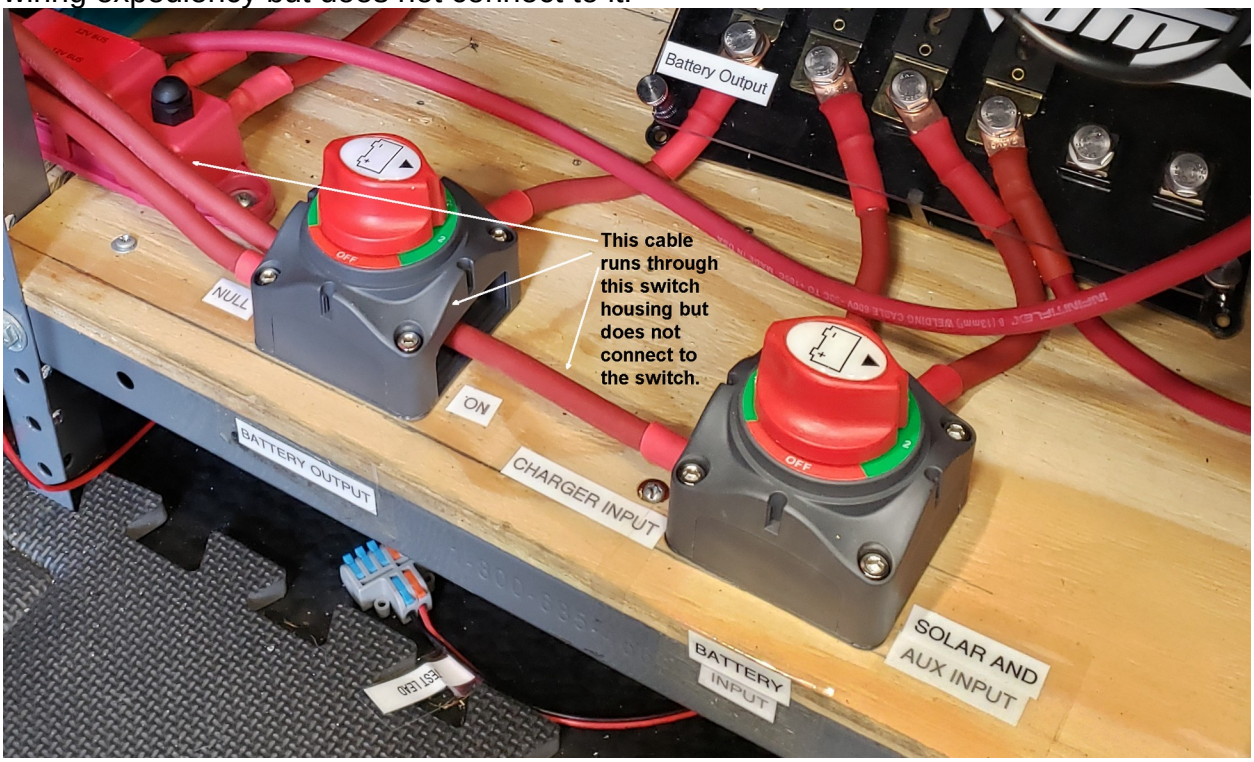
The negative comes out of the DC to DC Charger and goes to the negative busbar. The positive comes out of the DC to DC Charger, runs through a 70A ANL fuse in the six spot fuse block, to **Switch #2**.





Position #1 selects the vehicle engine charging option while Position #2 selects Solar and Aux input. The selection between Solar and Aux is made through **Switch #4** and will be discussed later.

The output of this switch runs *through the housing* of the switch to its left for the sake of wiring expediency but does not connect to it.



The cable runs to the 12V system positive bus bar which connects to the positive terminal of the JITA 12V 200Ah Plus LiFePO4 Battery with Built-in 200A BMS.

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On the DC to DC Charger, there are two other connections and a dip switch block.

This photo shows the front of the DC to DC Charger.

DIP switches

For this battery's requirements, a 14.6V setting should be selected:
To set the DIP switch block for 14.6V, 1,2,3,4 are ON and 5 is OFF

(See page 17 of the DC to DC Charger's Owner's Manual)

The two additional connections are D+ and LC.

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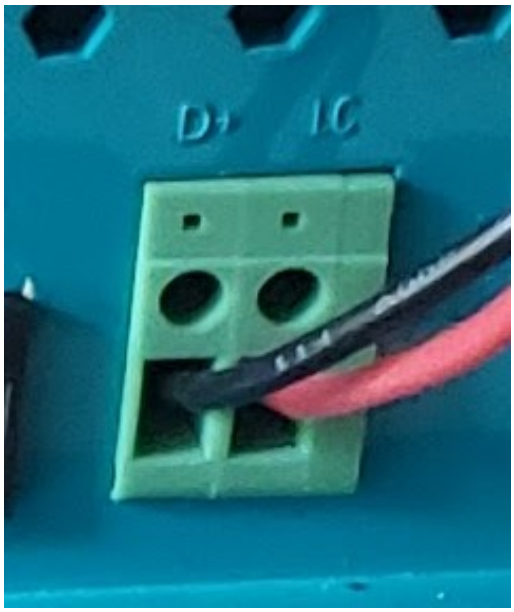

D+

D+ is a voltage sensing circuit. When voltage is detected by the D+ circuit, the DC to DC Charger will operate. This prevents the possibility of draining the vehicle starter battery.

D+ should be attached to a vehicle circuit that has voltage only while the engine is running. On the Promaster, one such fuse position is F31 in the Interior Fuse Panel (under the driver dash area). I connected to F31 using a circuit fuse tap.

Fuse F31, labeled INT/A, means “Ignition Switch” according to https://www.promasterforum.com/threads/fuse-abbreviation-meanings.90532/

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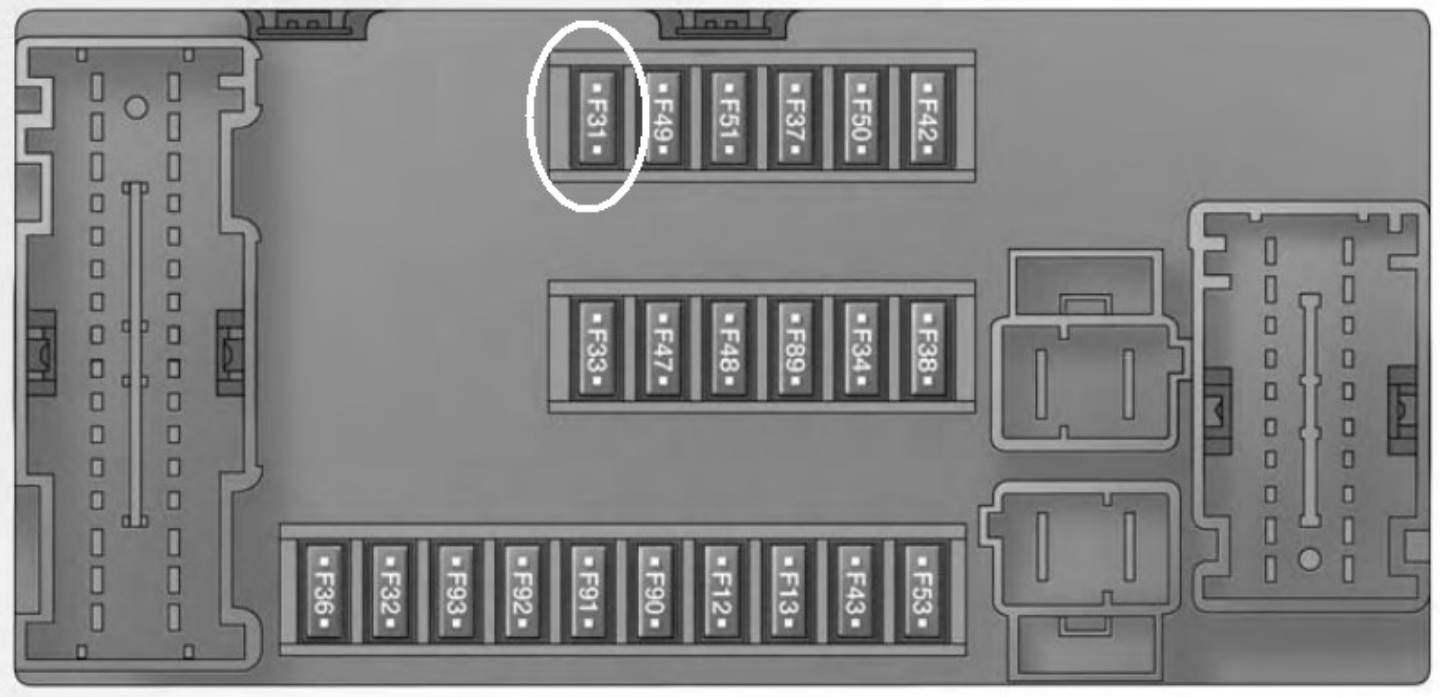

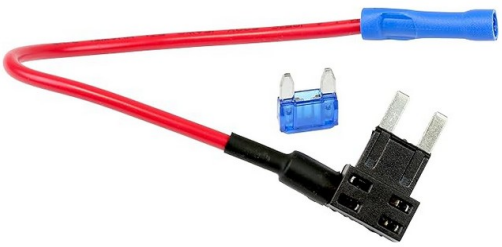

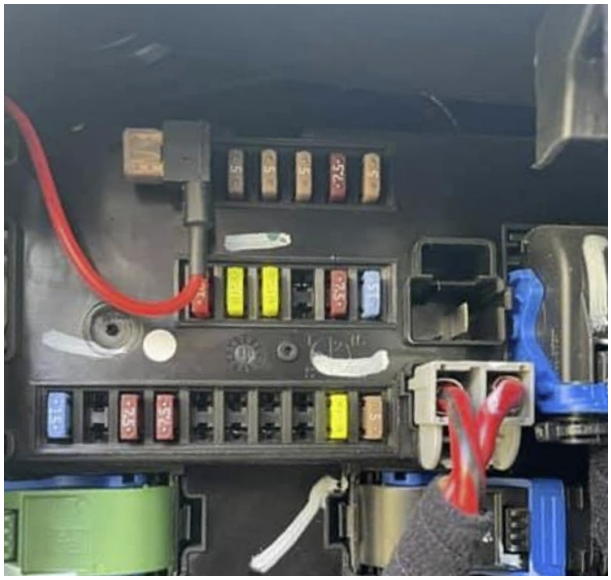

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LC

LC stands for Low Current. It causes the DC to DC charger to operate at half its rated amperage. The people at RENOGY did not believe the Promaster 1500 stock battery and alternator could properly handle 60A charging and strongly recommended I use the LC operation to set the charging at 30A. However, if you have an upgraded battery and alternator system in your Promaster, you may be able to make use of 60A charging.

LC connects to the same circuit as the D+ and can be spliced at any point. I spliced the LC near the front of the DC to DC Charger.

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Shore Power Charging

Industry standard terminology for power that is supplied externally from the vehicle is called “shore power.” I will refer to providing power using an extension cord externally from the vehicle (as in, a house, garage, external generator and so on) as “shore power.”

I installed a power inlet on the driver side of the vehicle behind the driver door. It takes a standard extension cord. I recommend a 10/3 extension cord.

This inlet supplies power to an outlet strip mounted below the countertop surface.

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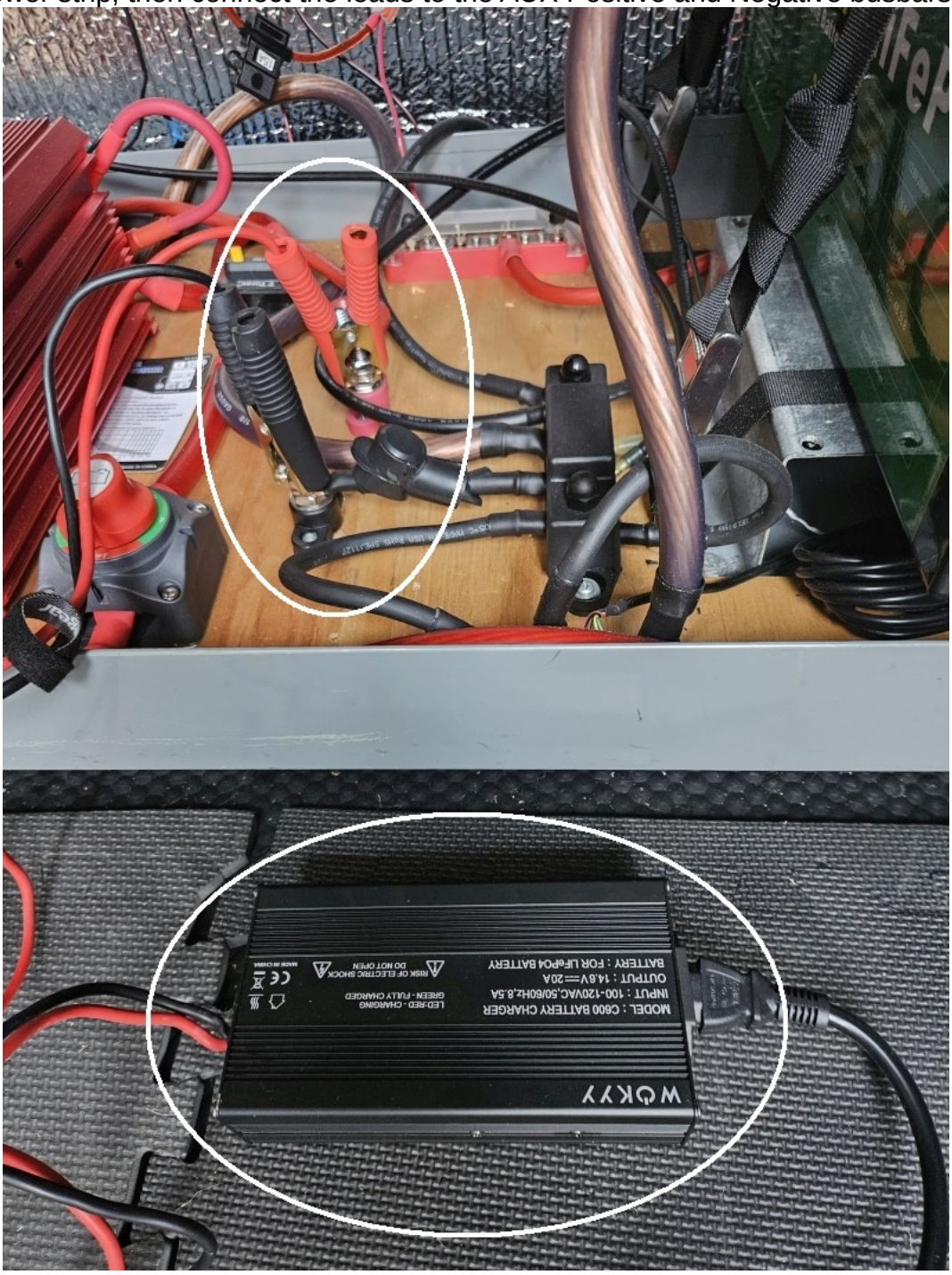
To charge the LiFePO4 battery using shore power, plug in a LiFePO4 charging unit into this power strip, then connect the leads to the AUX Positive and Negative busbars.



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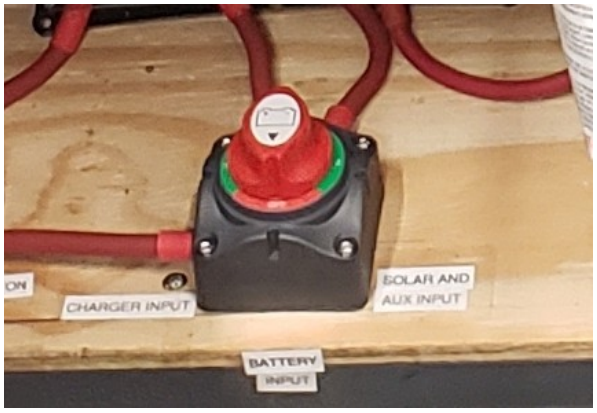
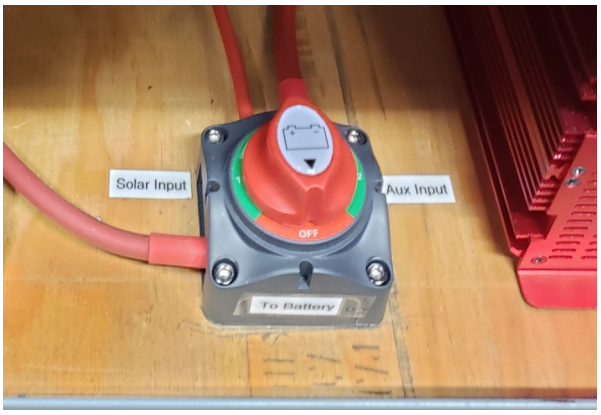
The AUX positive busbar connects through a 60A ANL fuse to position #2 of **Switch #2**. To use shore power charging, **Switch #2** and **Switch #4** should both be set to position #2.





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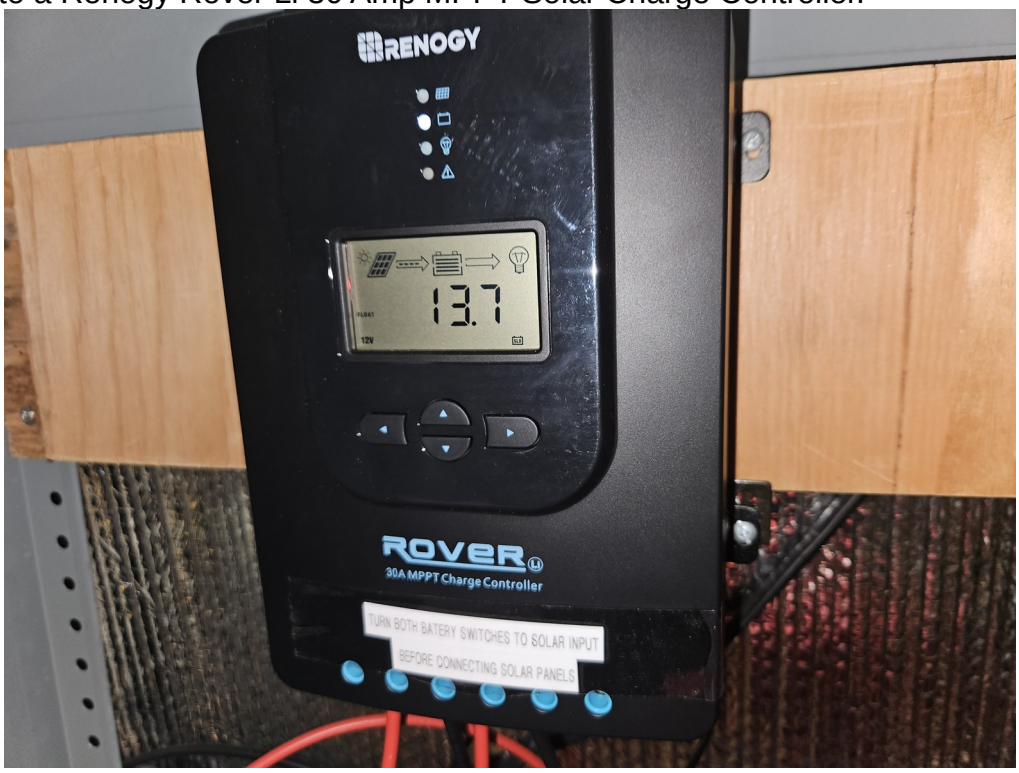
Solar Power Charging

The vehicle has two 100W solar panels on the roof that lead to standard IP67 positive and negative solar panel connectors below the countertop. This allows you to use the panels on the roof, or if you like, to use solar panels that are external to the system.

The positive connection goes to position #1 of **Switch #3** that sends the solar panel voltage to a Renogy Rover Li 30 Amp MPPT Solar Charge Controller.



The Rover Solar Charge Controller's output goes to **Switch #4** position #1. To use solar charging, be sure **Switch #2** is set to position #2.

It's important to note that the connection to the battery must be made before connecting the solar panels to the Charge Controller. I have placed notes on the components as reminders.

Aux input uses **Switch #4** position #2.

Switch #4 is where the selection between solar input and Aux Input is made, as we mentioned previously. Position #2 is the selection for the Aux input.

The output of **Switch #4** goes to a 60A ANL fuse, through **Switch #2** and then to the positive post of the LiFePO4 battery through .

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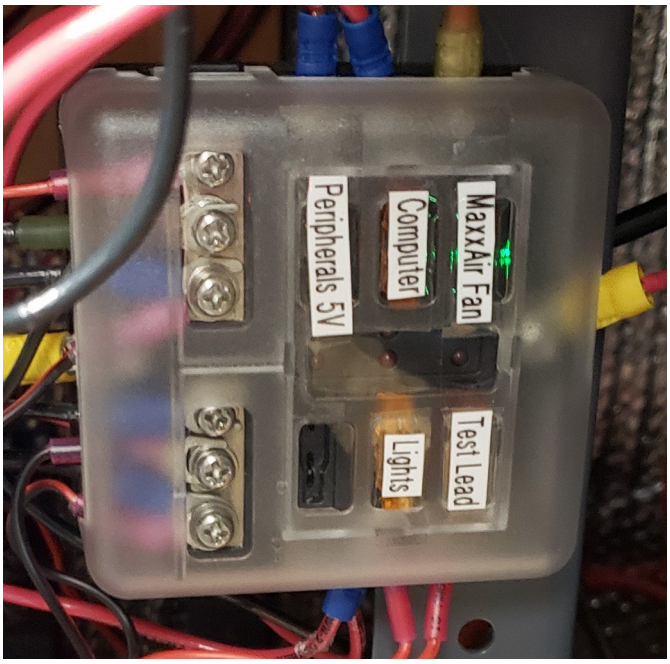
Output (Using)

Switch #5 Controls the presence of output voltage from the battery. The current is routed through a 200A ANL fuse, and position #2 sends it to the positive bus. Position #1 of **Switch #5** is unused.

From the output bus, all components except the power inverters get their operating power after going through a fuse box mounted on the countertop corner leg.



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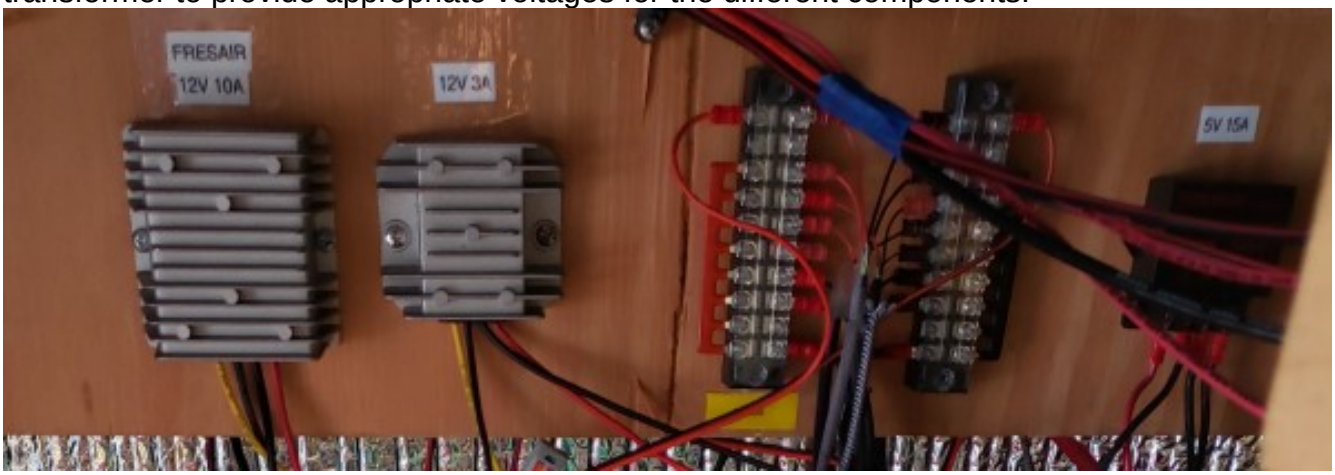
Voltage Regulators and Step-down Transformers

Under the countertop, on the back wall, are voltage regulators and a step-down transformer to provide appropriate voltages for the different components.



Fresair Evaporative Cooler

The Fresair unit has its own 12V 10A voltage regulator to provide a consistent voltage not to exceed 10A.

Mini-Computer

The 12V mini-computer requires a regulated 12V current so I provided a 12V 3A voltage regulator. Normally, the mini-computer would use the 12V 3A power supply that came with it to convert 120V to 12V, but since we have a 12V system, it makes no sense to use a power supply to convert 12V (form our system) to 120V (using the inverter) only to use the power supply to convert that 120V back to 12V to run the computer. The voltage regulator permits using the 12V already available.

5 Volt components

There is a pair of 5V busbars (positive and negative) for 5V components. A step-down transformer converts 12V to 5V 15A.

500W Inverter

The 500W pure sine wave inverter connects directly to the positive and negative buses and the positive goes through a 60A ANL fuse.

2000W Inverter

The 2000W inverter connects directly to the positive post of the battery using 1/0 gauge wire, through **Switch #6**, and through a 150A 12V circuit breaker.

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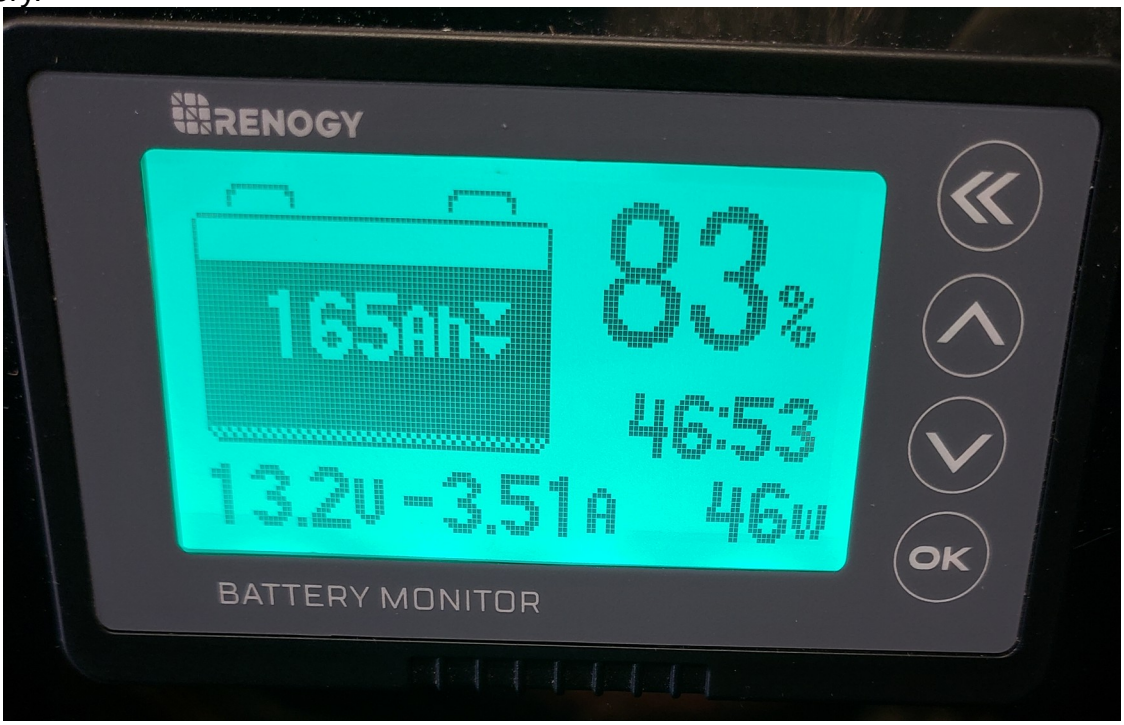
Battery Monitor and Switch Panel

Renogy 500A Battery Monitor

The battery monitor displays remaining amp-hours, remaining percentage, current battery voltage with indication of current charge, or drain on the charge, as well as wattage being used or, when being charged, the amount of wattage being applied to the battery.



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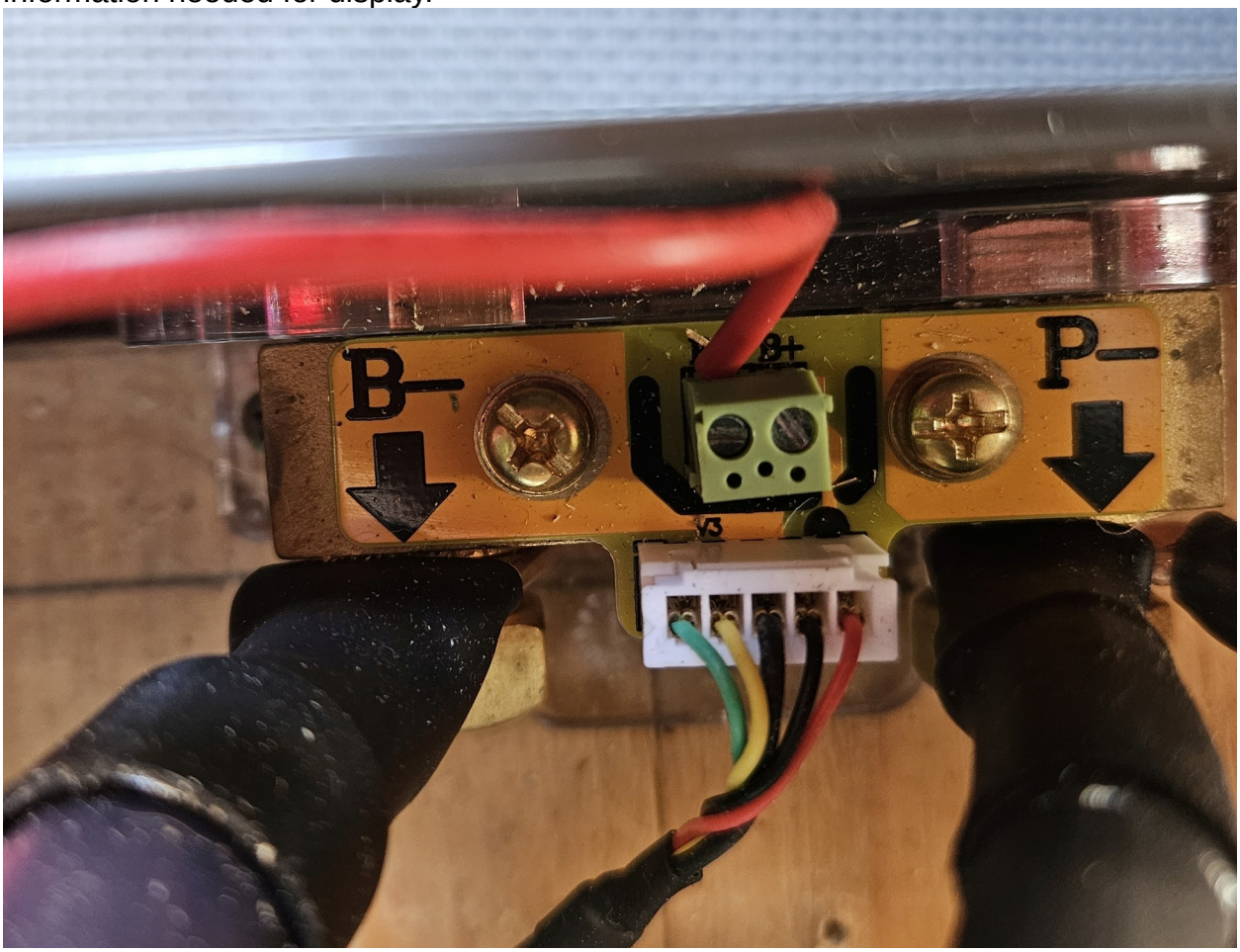
Monitor Shunt

There is a device called a “shunt” that is inserted into the 12V system right before the negative battery post. This allows the battery monitor to collect the power-related information needed for display.



The large black wires are 1/0 gauge passing through the shunt to the battery.

The red wire is connected to the battery positive post to provide operating power for the shunt.

The collection of five colored wires in the black insulation are for power and information being sent to the monitor.

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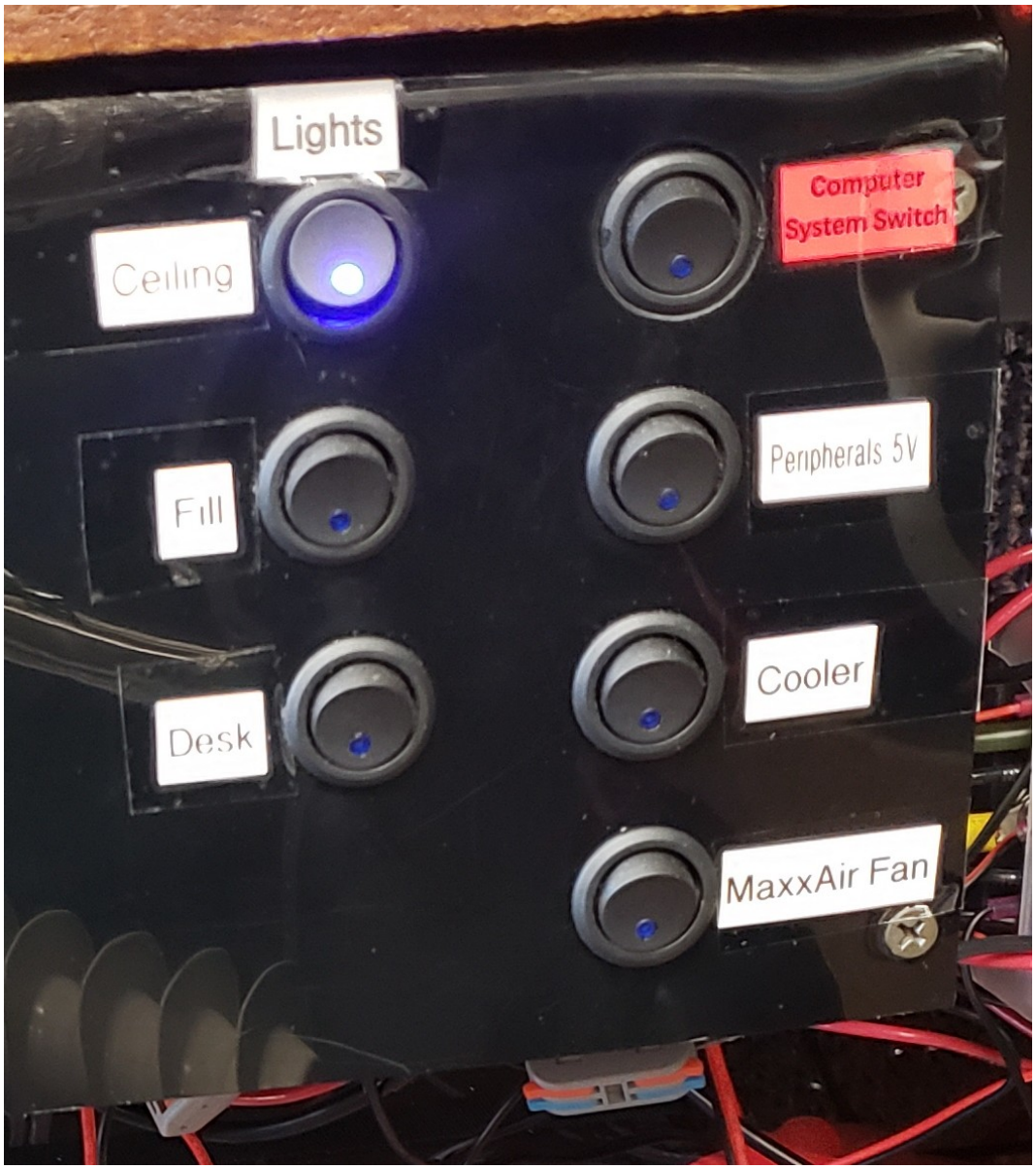
Switch Panel

The switch panel controls the lights, the computer system power, the computer peripherals power, the Fresair cooler, and the MaxxAir Fan.



For best results, when powering up the computer, turn on the Peripherals switch first, wait about fifteen seconds, then turn on the Computer System power switch. The computer will automatically boot.

Thunderbolt Deadbolt Locking System

The Thunderbolt Deadbolt Locking System is powered by lines run directly from the vehicle starter battery. This ensures that the internal 12V system does not interfere with the functioning of the Thunderbolt System, and if the vehicle battery fails, just adding 12V to the circuit will allow the Thunderbolt System to operate.

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Circuit Map