Quantum Harvest®

Faraday Enclosures

Portable Solar Power Stations

Owner's Manual

Quantum Harvest Model 6000-80 TSW

Introduction

Congratulations on your purchase of a Quantum Harvest EMP protected* portable solar power station! These units have been carefully designed and hand-crafted to provide many years of trouble-free operation. In the unlikely event of malfunction, we offer a 1 year warranty on the batteries (if provided by us.); 3 years on the inverter and charge controllers; 5 years on everything else. For warranty details, see page 34.

To obtain maximum performance and long life from your new power station, it is important to gain a basic understanding of how such units operate and their limitations. The heart of the unit, and it's main component, is the battery bank. This is where the energy from the solar panels or the included 120 volt AC battery charger is stored for later use. The particular batteries I have selected are state of the art deep-cycle Absorbed Glass Mat (AGM) medical-grade batteries. These batteries are maintenance free and can be stored and used in any position. Since they do not give off gases as they charge, there is no danger of fire and they never need to have water added.

To obtain maximum life from these, or any other batteries, it is important to try to avoid deep cycling, that is, drawing them down flat before allowing them to recharge. Sometimes this cannot be avoided, but if at all possible, strive to avoid doing so.

Another important component is the inverter. This is the device that converts the low voltage DC current from the batteries into the high voltage AC current that we are familiar with. (All Quantum Harvest power stations also have 12 volt DC receptacles and USB charging sockets for the appropriate devices, in addition to standard 120 volt AC house current.) The inverter is protected internally from overheating and low battery voltage, and externally from over-current draw by a 400 ampere ANL type fuse. The Model 6000 will sustain a continuous 6000 watts of current, and will provide up to 18,000 surge watts for 20 seconds to start motors and other inductive loads.

*A quick note on EMP

*An EMP, or **E**lectro-**M**agnetic **P**ulse is a devastating phenomenon that, while harmless to living things, absolutely destroys anything electronic. It consists of extremely powerful electromagnetic fields building and collapsing hundreds of thousands of times per second. This induces potentially huge electric currents in anything that conducts electricity, causing components connected to said conductor to burn out. An EMP can be caused by either a deliberate, high-altitude nuclear warhead detonation, or can be caused naturally by a solar event called a Coronal Mass Ejection, or CME.*

All Quantum Harvest power units are built into a specially designed enclosure, more properly called a Faraday Cage, named after Michael Faraday, an early pioneer in electromagnetic research. The purpose of a Faraday cage is to intercept and divert electromagnetic energy away from the box's interior, thus protecting the contents.

The principles involved are fairly simple, but the proper execution is critical. In order for the enclosure to be useful, it must have a door, but any opening larger than a square centimeter or so allows too much energy to penetrate the interior, thus defeating the purpose of the Faraday cage.

The solution to this conundrum is to gasket the door with a special type of conductive gasket, mated to a copper or silver strip that is electrically bonded to the main box. The key is to have very low electrical resistance between the door and the enclosure, with no gaps. This is not as easy as it sounds, and requires special materials designed specifically for this application.

My experience with Faraday apparatus comes from 8 years experience with very powerful industrial machines called RF welders. These machines use extremely powerful and focused bursts of electromagnetic energy to weld and form plastic parts. These machines basically create a local EMP every time they fire, and it is critical that stray energy be confined and dissipated safely to avoid damage to other sensitive electrical machinery.

Table of Contents

Base Unit Specifications

Assembled Dimensions:	124” Long, including tongue, with the rear stabilizers retracted. 90“ Long, not including tongue 70” Wide by 68” High
Assembled Weight:	2,580 lbs.
Inverter:	AIMS PICOGLF60W24V230VS True sine-wave, 24 volt
Battery Bank:	12 AGM Deep-Cycle Batteries, 110 amp/hrs each.
Battery Bank Capacity:	1320 Amp/hours; 15,840 Watt/hours
AC Charger:	50 Amp Smart Battery Charger
Solar Charger/Controller:	Outback 80 amp MPPT controller

In this manual, the following symbols are used to highlight important facts:


Denotes circumstances where failure to follow the procedures outlined in the manual may result in property damage.


Denotes circumstances where failure to follow the procedures outlined in the manual may result in personal injury or death. Always remember that electricity is utterly devoid of mercy and never grants second chances!

Note on Batteries

This Quantum Harvest power station is designed to use AGM batteries that measure 12.91” Long, by 6.77” Wide by 9.29” High. The particular battery model we use is the UB121100 110AH model. Other models of similar dimensions and specifications will also work.


***Caution* Although the low voltage at the battery terminals means that electrical shock or electrocution is impossible, nonetheless, batteries store an enormous amount of potential energy, that if accidentally released by a short-circuit, can melt metal tools, start fires and cause personal injury. Eye protection MUST BE WORN whenever working with batteries of this size, and extreme care must be exercised at all times. Anything electrical is unforgiving of mistakes.**


!Warning! Note that although the voltage at the battery terminals is insufficient to shock a person, the current coming from the inverter receptacles is 120 volt house current, and that is indeed capable of inflicting a severe, potentially fatal shock. Always be sure that extension cords are not frayed or worn, and that all equipment plugged into the inverter is in a safe condition.

Section 1: Capacities and recommended usages

This 6,000 watt model is the largest true sine-wave unit we currently produce, and with it's premium, marine-grade AIMS inverter with proven soft-start technology, will reliably start and power anything within it's capability, even fussy items that will not run with cheaper, modified sine-wave inverters. It will run full-size refrigerators and freezers, table saws and chop saws, as well as any hand-held tools, such as drills, grinders and circular saws, etc. It will also, of course, power smaller items such as TVs, cell phones,laptops, tablets, etc.

This Model will reliably start and power up to to a 5 hp air compressor, or a 2 hp submersible well pump. It is NOT recommended to power large resistive loads like central air-conditioners,water heaters and electric space heaters.

Used within it's limits, this unit will provide many years of trouble-free service, and be a joy to own and use. But like most things, if you push it beyond it's limits, you will be plagued by expensive repairs and poor performance.

This machine contains a battery bank of twelve, 110 amp/hour batteries, for a total capacity of 1320 amp/hrs. How much real power is that? If we multiply the 1320 amp/hours by the nominal voltage (12 volts), we get a capacity of 15,840 watt/hours (watts = volts times amps). This machine will run a full-sized refrigerator or freezer for several days, even without the solar panels hooked up.

On the next page is a partial list of common electrical appliances and their approximate loads, provided in part by the good folks at: *http://www.energy.gov*

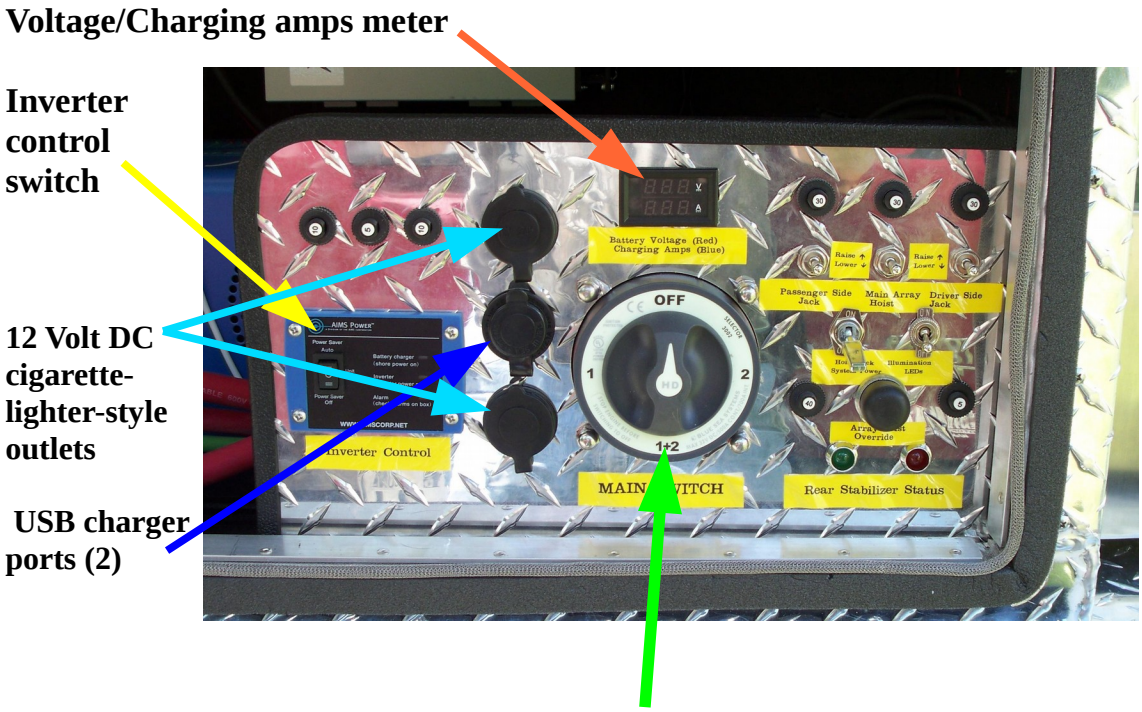
Appliance	Watts used	Load type R= Resistive I= Inductive	Notes	Quantum Harvest Model 1500	2500/2505	3000
Aquarium	50-1210	R	1	X	X	X
Clock radio	10	R	2	X	X	X
Coffee maker	900-1200	R	2	X	X	X
Clothes washer	350-500	I		X	X	X
Clothes dryer	1800-5000	R				
Dishwasher	1200-2400	R				X
Dehumidifier	785	I		X	X	X
Electric blanket (Single/Double)	60-100	R		X	X	X
Fans:						
Ceiling	65-175	R		X	X	X
Window	55-250	R		X	X	X
Furnace	750	R		X	X	X
Hair dryer	1200-1875	R	3		X	X
Heater (portable)	750-1500	R	3		X	X
Clothes iron	1000-1800	R	3		X	X
Microwave oven	750-1100	R	2	X	X	X
Personal computer (desktop w/LCD monitor)	150	R		X	X	X
Radio (stereo)	70-400	R		X	X	X
Refrigerator (frost-free, 16 cubic feet)	725	I		X	X	X
Televisions-CRT (color)						
19"	65-110	R		X	X	X
27"	113	R		X	X	X
36"	133	R		X	X	X
53" - 61" Projection	170	R		X	X	X
Flat screen	120	R		X	X	X
Toaster	800-1400	R		X	X	X
Toaster oven	1225	R	3	X	X	X
VCR/DVD	17-21 / 20-25	R		X	X	X
Vacuum cleaner	1000-1440	R	3	X	X	X
Water heater (40 gallon)	4500-5500	R		NR	NR	NR
Water pump, 1/3 to ½ hp (120 volt)	500-1100	I	4		X	X
Water pump ½ to 1 hp (220 volt)	1000-3000	I	4			X
Water bed (with heater, no cover)	120-380	R		X	X	X

Notes: 1=Higher wattage indicates use of an aquarium heater. 2= May have difficulty with Modified sine-wave inverters
3= High power usage, but usually short duration. 4= High surge requirement for starting.

Section 2: Controls/Circuit Protection Devices

There is one main fuse, a 400 ampere ANL type fuse, shown to the right, located beside the inverter. There is one spare fuse included in the spare parts kit. To replace the fuse, first, be sure the main switch is turned off, then, using a 9/16” wrench, remove the two nuts. Lift the fuse out and place the new one over the studs; reapply the nuts, being careful to not over-tighten.

Detail 1 of Main Control Panel



Main Switch; 4 positions available.

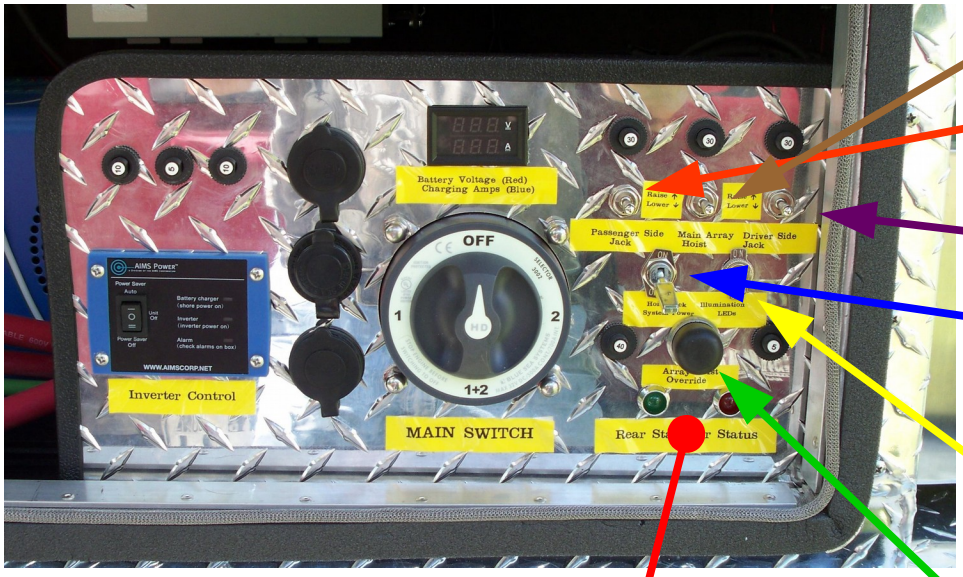
Off position isolates the inverter and control panel from the batteries.

Position #1 is the normal use position in which the unit draws from the internal battery bank.

Position #1&2 is the position used when using an external battery(s), and allows the unit to run from both the internal battery bank and the external source .

Position #2 is not normally used, and allows the load to be run directly from an external source, bypassing the internal battery bank.

Detail 2 of Main Control Panel;



Main array hoist control

Passenger-side jack control

Driver's side jack control

12 volt main power switch and breaker (40 amp)

Hoist and jack illumination LED switch

Rear stabilizer status LEDs

Array hoist lockout override button

Detail of Main Panel Circuit Breakers

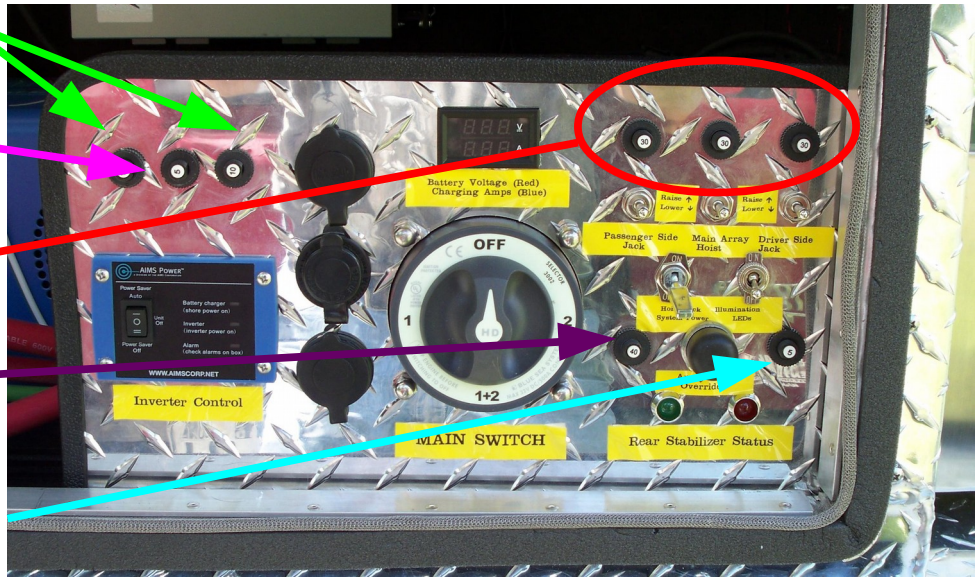
10 amp for each 12 volt DC outlet

5 amp for USB charger

30 amp breakers for jacks and hoist

40 amp for main 12volt feed

5 amp for illumination LEDs



Detail of AC Charger

40 amp automotive-style fuses

There are no adjustments or maintenance required for the AC charger; all it's functions are fully automatic.

Detail of Solar Charger/Controller and related circuit-breakers

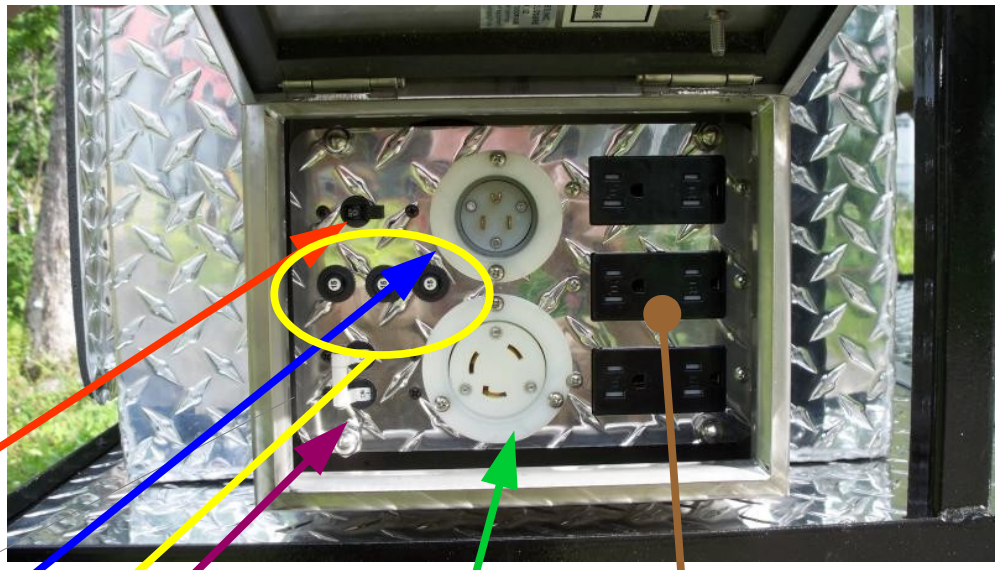
There are no adjustments or maintenance required for the solar charger; all it's functions are fully automatic.

Right; The solar charge controller is protected by an 80 amp fuse to the battery bank, and a 70 amp switchable circuit-breaker to the solar array.

To avoid damage to the solar controller, it is important that it be used in accordance with the instructions on page 12.

Section 3: External Connectors

(Right) **The connectors for attaching the power cord for the AC charger and the inverter output are located on the driver's side of the control cabinet.**



20 amp breaker for AC charger input

AC input for AC charger.

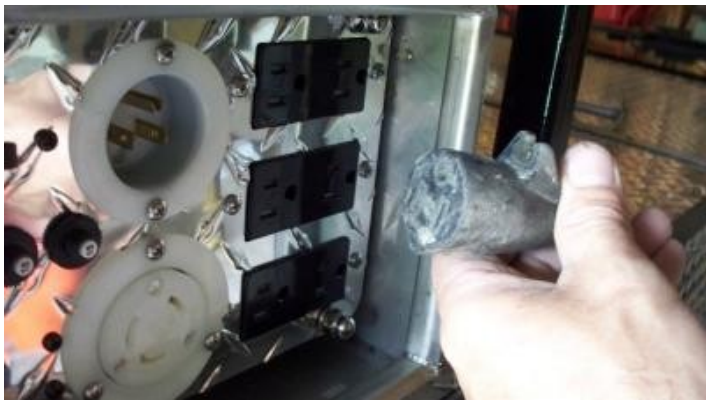
120 volt outlets

15 amp circuit-breakers for 120 volt outlets

240 volt circuit-breaker

240 volt twist-lock outlet; 30 amp

AC Charger port



(Above) Insert the plug into the socket as shown above. Switch on the black breaker to the left of the plug. Nothing else need be done; all AC charger functions are automatic.

Section 4A: Setup and General Operation

The Model 6000 is the largest of our power stations, and is the first of our machines to feature a large, integral solar panel array. Because of it's size, weight, and susceptibility to wind forces, it is very important to follow the setup procedure outlined below. There are safety systems designed to help prevent damage to the machine; nevertheless, the best safety feature has always been a careful operator.

!BECAUSE OF THE LARGE SURFACE AREA OF THE PANEL ARRAY, HIGH WINDS CAN CAUSE DAMAGE, EVEN PERSONAL INJURY. ALWAYS BE SURE TO FOLLOW THE PROCEDURES OUTLINED BELOW TO ASSURE MAXIMUM STABILTY, AND DO NOT DEPLOY THE PANELS IN HIGH WINDS, OR WHEN SUCH WEATHER IS ANTICIPATED!

!IT IS IMPORTANT THAT THE MAIN SWITCH BE TURNED ON, SUPPLYING BATTERY POWER TO THE SOLAR CHARGE CONTROLLER <u>BEFORE</u> CLOSING THE ARRAY DISCONNECT SWITCH , ALLOWING POWER FROM THE PANELS TO FLOW TO TO THE CONTROLLER!

Step 1; *Right*, Park the unit such that it will be out of the way of any vehicular traffic, and with the rear of the unit facing South, as near as is practical. A large sunny area is obviously ideal.

Step 2; *Right*, Open the cabinet door, flip on the Hoist/jack system power switch (circled), and run the front jacks down to lift the trailer pole up off the hitch-ball, and unhitch the unit from the towing vehicle.
(Note the red LED is lit, indicating the rear stabilizers have not been deployed).

Step 3; *Right and Below*, Once the unit is free from the towing vehicle, lower the front jacks until the unit is slightly nose-down. Retract the lock-pins on the rear stabilizers and pull out the rear stabilizer arms.

Right; Unpin and drop the rear pads to the ground and re-pin them in place.

Right; Note the green status indicator light is now lit

Step 4; Using the front jacks, jack up the front of the unit, pivoting it on it's axle and putting pressure on the rear stabilizers. The jacks are powerful enough to raise the wheels off the ground, but unless changing the tires, this is not needed, in fact, having six points of contact imbues greater stability to the unit.

Step 5; *Below,* Undo the strap securing the array to it's holder, and using the center switch on the control panel, raise the array until it is vertical. There is a limit switch that automatically stops the hoist at it's maximum extension.

Step 6; *Below,* Unfold the arrays as shown. Each swing-out panel is secured in the closed position with a rubber latch, and secured in the open position with a lynch-pin on the bottom, and a spring-loaded pin latch at the top.

To open, unlatch the passenger-side rubber catch, and swing the panel around; unlatch and pull out the lower pin, and pull down on the lanyard securing the lower pin to the machine to retract the spring-loaded pin at the top. Pull the panel into the fully open position and release the lanyard. The top pin should go into position with an audible click. Replace and secure the lower pin. *(Right)*

(Above) First panel shown secured in the open position.

Repeat for the other panel. Rubber latch for the second panel shown to the right

(Above) Both panels shown secured in the open position.

Step 7; *Right*, If you have not already done so, turn the main switch to the #1 position. You will note that the display meter turns on, and the Outback charge controller initializes. After a few seconds, it finishes it's self-diagnostic routine, and powers on. *Only at this point may you safely close the array disconnect switch, allowing power to flow from the panels to the charge controller, and then to the batteries!*

(Above, Main switch turned "on" to position #1)

Right, Array disconnect switch in the open position, preventing power from the panels from reaching the charge controller. The switch should be kept in this position at all times unless the main switch is on, and the panels are deployed!

Right, Array disconnect switch in the closed position, allowing power from the panels to flow to the charge controller. It should only be in this position when the main switch is "on" and the panels are deployed!

Step 8; *Below,* With the main switch “on” and the array disconnect switch in the closed (on) position, the panels may be raised to the proper angle with the array hoist. Watch the blue numerals on the panel meter to find the position supplying the highest amp reading. At this point, the inverter may be switched on, and any cords and loads connected.

Above, Array positioned at the 45° position, achieving the highest amp reading on the panel meter for this latitude and time of day.

Note that it is generally not necessary to constantly adjust the panels throughout the day if the array is facing South, and the panels are angled between approximately 30° and 45°, depending on your location's latitude. The panels may be safely operated at any angle, from straight up to fully horizontal.

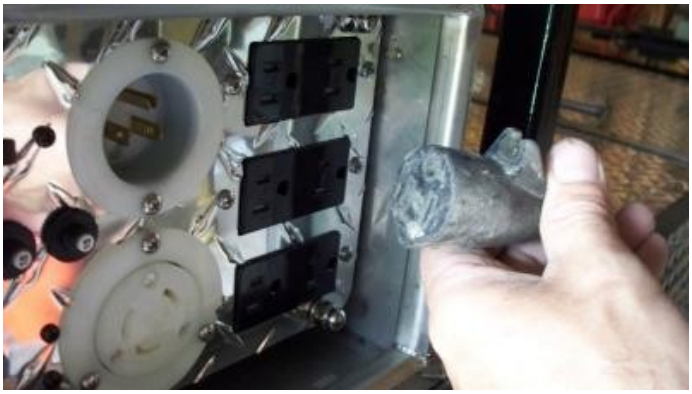
Also, note that it is not necessary to have the solar panels deployed in order to use the power station, but if they are not deployed (and in direct sunlight), you will only have what power is in the batteries. There is no easy way to tell exactly how much charge remains in the batteries, so the best measure we have is to watch the battery bank voltage, which is shown on the control panel's digital display.

Battery voltage gradients change over time as the batteries age, but a good rule of thumb is that anything higher than about 25.6 volts is a reading for a battery bank pretty much fully charged. When the voltage drops to 25.2 to 24.8 volts, the batteries are usually about one half to two-thirds discharged. Voltage of 24.5 to 24.1 mean that the battery is pretty much exhausted, and voltages below 24 will cause the inverter to shut off. These numbers are only approximate, experience is still the best teacher!

Please be aware that the voltage readings, to be accurate, must be read under a no-load condition. The voltage will be lower when the batteries are under load.

Section 4B: AC Charger

For medium and long term storage, or for those situations where there is insufficient sunlight, and an alternate source of AC power is available, the dedicated AC charger may be used to charge and/or maintain the batteries. To use the AC charger, plug a regular AC extension cord into the appropriate socket in the AC connector box, and switch on the circuit-breaker to the immediate left of the socket. Note that the main switch may be OFF. The AC charger will automatically charge and maintain the batteries at the optimum voltage as long as it is plugged in. There is no need for further intervention.



Please note that the AC charger will charge the batteries even if the main switch is off, but in order to use the inverter or other power outlets, the main switch MUST be switched to position #1!

Section 4C: Inverter

Like the Model 5000, the Model 6000 uses the excellent, marine-grade AIMS 6000 watt, True sine-wave, Split-phase 24 volt inverter. This machine is what converts the 24 volts DC power from the batteries into the 240/120 volt AC power identical to what you get from the grid (only cleaner!). This inverter has many built-in features detailed in the manual that comes with it. It is beyond the scope of this manual to detail them all here, except to note that the inverter has an AC charger function built in to it. I have elected to not use this feature because I wanted the inverter completely isolated from any contact with grid power in the event of an EMP. In the event that an EMP event has damaged the dedicated AC charger detailed above, the input cord for that unit may be connected to the inverter, if desired. The hookup and operating instructions for that are found in the inverter's manual.

The operation of the inverter is very simple; simply turn the main switch on, and switch on the inverter's start switch on the control panel.

Right; The inverter start switch is on the left of the control panel. Note that there are 2 positions: The power-saver mode puts the inverter in standby mode, conserving power. When the control circuitry senses a load greater than 20 watts or so, the inverter switches fully on, supplying power until the load is removed, at which point, the inverter reverts to standby mode. The power-saver off mode disables this feature, and the causes the inverter to stay fully on.

Section 4D: Outback charge controller

The charge controller's job is to convert electricity from the solar panels into a form that is safe for the batteries, and also to cycle through 3 different voltage parameters in order to keep the batteries optimally charged and maintained.

The Model 6000 uses the excellent Outback 80 amp MPPT solar charge controller. This controller is internally protected from overheating, and externally protected from over-current situations by a 70 amp switchable circuit breaker between the array and controller, and by an 80 amp MaxiFuse between the controller and the battery bank.

This unit can accept array voltage up to 150 volts DC, and convert it to up to 80 amps at battery-bank voltage, in this case, 24 volts nominal. The arrays on the Model 6000 are electrically grouped into 3 banks of 2 panels each, connected in series, to provide a nominal 48 volts to the controller. Please note that while not dangerous to a person or animal in reasonable health, nonetheless, this is sufficient voltage to give an unpleasant jolt, especially with wet hands. However, in normal operation, there is no easy way to get in contact with this current.

Like the AIMS inverter, this premium-quality unit has many features and capabilities which are beyond the scope of this manual, but are detailed in the Outback manual included. The controller is already preprogrammed with the necessary data to perform it's job, and no further user intervention is necessary.

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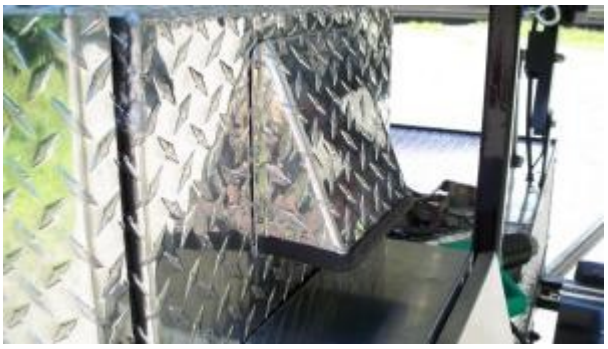
Right, detail of the Outback solar charge controller. Note the fuse (circled in blue) and the array disconnect/circuit-breaker (circled in green)

Section 4E: Cabinet ventilation system

Unlike our other units, the Model 6000 must, by virtue of it's size, be operated outside, possibly in adverse weather conditions, therefore, again, unlike our other units, the Model 6000 may be used with the cabinet door sealed closed to protect the contents from the elements. To obtain the proper cooling for the components, an automatic ventilation system is installed that automatically comes on when cabinet temperatures exceed 100° F, and goes off when temperatures drop below 85° F. The ventilation openings are protected from EMP ingress and animal intrusions by an electrically bonded stainless steel screen, and from water intrusion by aluminum downward-facing vents on the exterior.

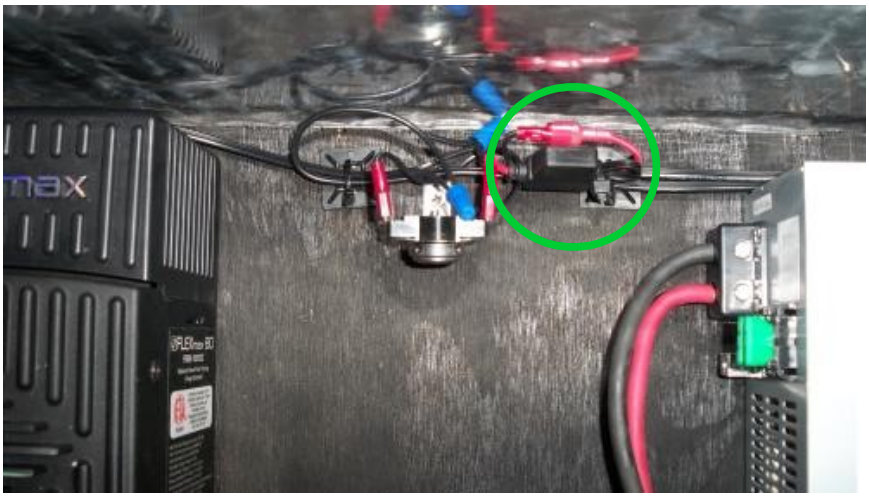
The fans are controlled by a small thermostat located to the upper right of the charge controller, and operate independently of the other systems, meaning that no switches need be on, and no intervention by the user is needed, other than being sure the ducts on the outside remain unobstructed. The fans are protected by a 5 amp automotive-type fuse adjacent to the thermostat.

Detail of left intake fan. (The exhaust fan is located on the other side of the cabinet.)



Detail of driver's side vent. It is important to keep the vents free of obstructions.

Right, detail of thermostat and 5 amp fuse (circled in green).



Section 4F: Auxiliary battery system

All of Quantum Harvest's power stations from the Model 1500 on up have a system to accommodate additional, external batteries. The Model 6000 is no exception. The system consists of a dual-position main switch, and a connector. To use the feature, a cable with the appropriate ends is connected to the external batteries on one end, and the other plugs into the red Anderson connector to the left of the control panel. Then, the main switch may be turned to position #1&2 to use or charge with solar power both the internal and external batteries, position #1 to use/charge only the internal batteries, or position #2 to use/charge only the external batteries. ***(Please note that in order to use the <u>AC charger</u> to charge the external batteries, it must be plugged in, it's breaker on, and the main switch must be in position #1&2 No other combination will work)***

Right, detail of the 350 amp Anderson connector used to connect external batteries to the Model 6000. The heavy (2/0 Ga. Cable needed is a custom-ordered item)

!While Quantum Harvest's smaller power stations may be used to boost an automobile's battery to start the engine, the Model 5000 and Model 6000 use 24 volt battery banks. The use of these more powerful units to boost a car will severely damage the very expensive electronic control systems in the car!

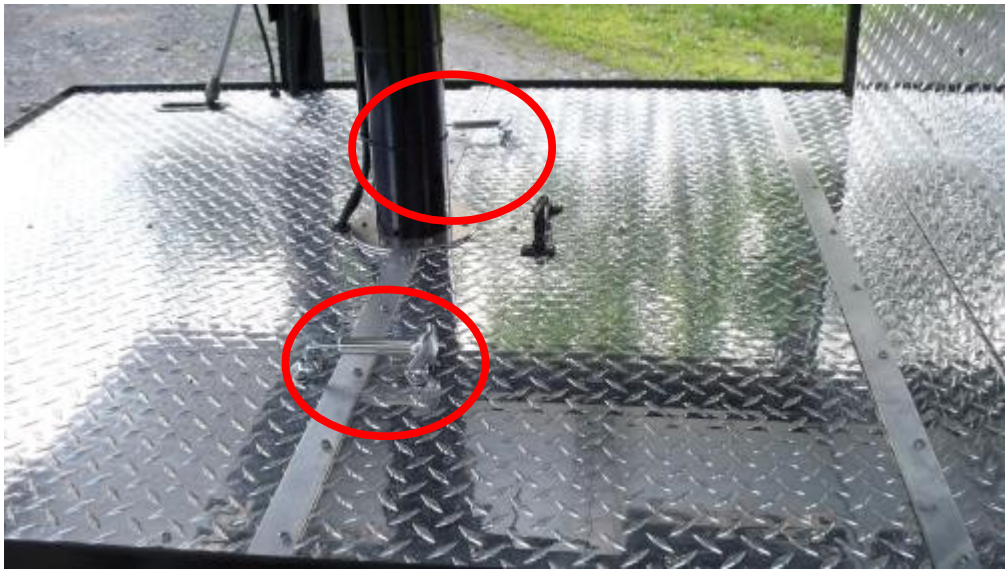
Maintenance and Repair Section

Like all Quantum Harvest power stations, the Model 6000 is constructed in such a way that faulty components may be quite easily removed for purposes of repair or replacement.

The only routine maintenance required on the Model 6000 other than keeping the batteries charged and the trailer axles properly lubricated and the tires inflated is to periodically clean the solar panels and be sure that the air vents o the sides of the main cabinet remain unobstructed.

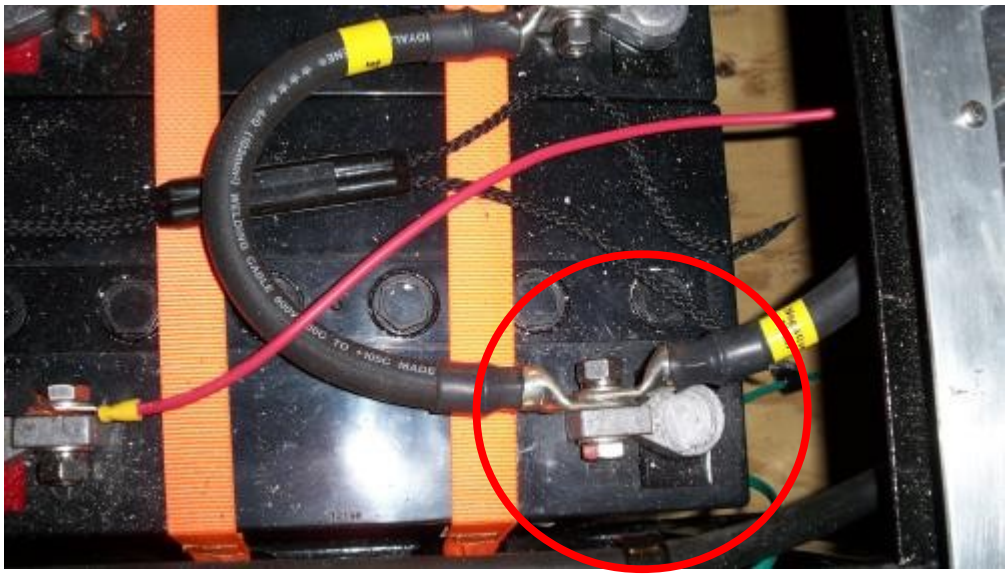
!!THIS CANNOT BE STRESSED ENOUGH: THE BATTERY BANK ON THIS MACHINE IS VERY LARGE, AND STORES A MASSIVE AMOUNT OF ENERGY. WHILE THE RELATIVELY LOW VOLTAGE MAKES SHOCK HAZARDS LOW, THE VIRTUALLY UNLIMITED AMPERAGE RELEASED IN ANY KIND OF DEAD SHORT WILL NOT ONLY INSTANTLY MELT A WRENCH OR OTHER METALLIC TOOL, AND WILL INSTANTLY MELT ANY METALLIC JEWELRY OR OTHER OBJECTS INTO YOUR SKIN, BUT THE FORCE OF THE DISCHARGE WILL BLAST MOLTEN METAL IN ALL DIRECTIONS, CAUSING SEVERE PERSONAL INJURIES AND/OR PROPERTY DAMAGE! TO PREVENT THIS FROM HAPPENING, IT IS ABSOLUTELY IMPERATIVE THAT THE MAIN NEGATIVE CABLE BE DISCONNECTED AND SEPARATED FROM THE BATTERY BANK BEFORE ANY ATTEMPT IS MADE TO REMOVE OR REPAIR ANY ITEM IN THE MAIN CABINET, OR TO PERFORM ANY WORK ON THE BATTERY BANK. THE PROCEDURE IS OUTLINED ON THE NEXT PAGE.

Before starting any repair or removal procedure, disconnect the main fuse in the cabinet, and most important, remove the main negative (black) cable from the battery bank, and secure it such that it cannot come into contact with any part of the battery bank. To do so, first remove the top cover from the lower assembly as shown below:

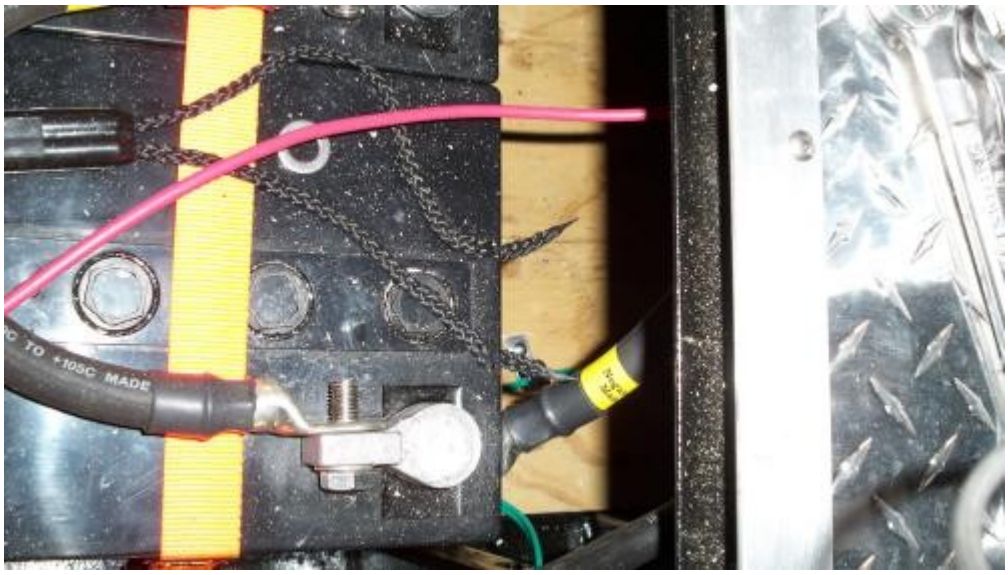


Right, Undo the two latches indicated, and, using the handle, pull the rear of the cover up as shown in the picture below.

Right, pull the cover all the way up and slide it back slightly to clear the trim piece on the right. Lift it up and pull it towards you out of the way and set it aside.



Right: The main negative cable connection is located on the passenger-side, immediately behind the main cabinet. The cable is labelled "Negative Main". Using a pair of 5/8" wrenches, being very careful to avoid touching the red terminal to the left, remove the nut, lock washer, and flat washer, and remove the cable from the bolt, and tuck the cable down beside the battery as shown in the picture below.

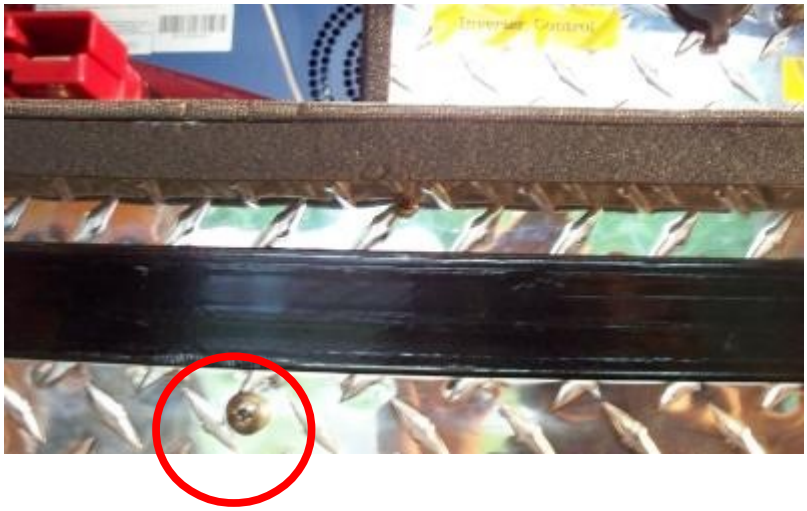


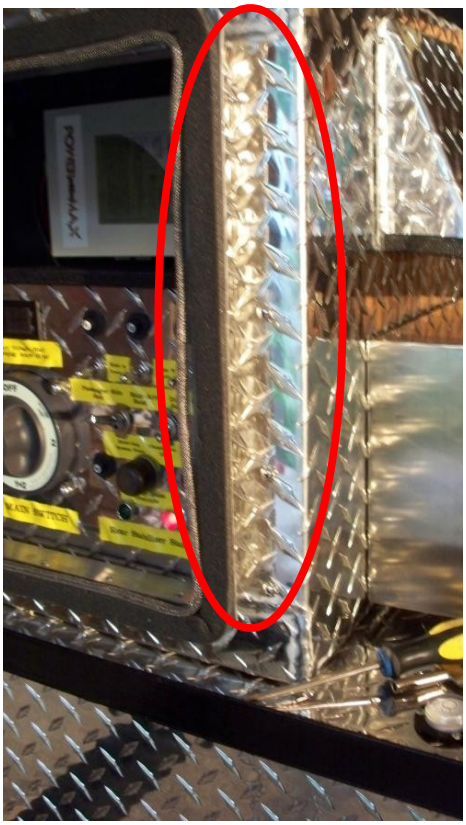
Section 5A: Control Panel Removal and Re-installation

Tools Required: 3/4” socket or wrench, 9/16” wrench and #2 Phillips screwdriver

Step 1: Remove the main fuse, and disconnect the main negative (black) cable from the battery bank. (Previous page)

Step 2: *Below and Right;* Remove the 4 screws (circled in red) securing the control panel to the main cabinet.





Step 3: *Below;* Pull the control panel slightly to the left to clear the cabinet side, lift it up and tilt it forward to expose the connections on the back.

Step 4: *Below*, There are a total of 10 connections tying the control panel to the main unit that must be disconnected: A 6-pin female connector to the jacks and hoist motors, a 4-pin female connector to the remote sensor switches, a 2-pin female connector for the jack/hoist illumination lights, a 2-pin male connector for the ventilation system power supply, a telephone-type connection to the inverter, a 10 Ga. Red wire that supplies power to the jacks, hoist, and 12 volt accessories on the control panel, and a heavy green cable that connects the charging system to the batteries after it goes through the meter shunt. There are also 3 heavy red cables connecting to the back of the main switch.

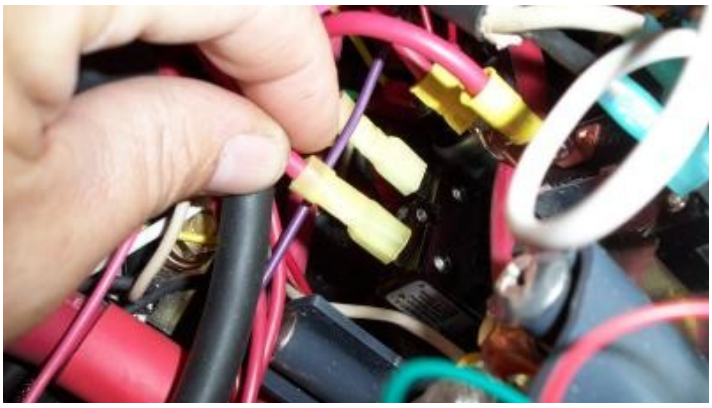
Above, the 6-pin, 4-pin, and two, 2-pin connectors.

Above, To release the 6-pin connector, gently lift the tab as shown, and separate the 2 halves; 2-pin and 4-pin connectors are similar.

Right, The green wire connecting the charging system; remove the nut securing the cables to the post, and remove the green wire.

Above, The wire connecting the control panel to the inverter uses a phone-type jack connector, depress the tab and lift it out of the socket.

Right, The 10 Ga. Red wire connection to the 40 amp circuit-breaker.

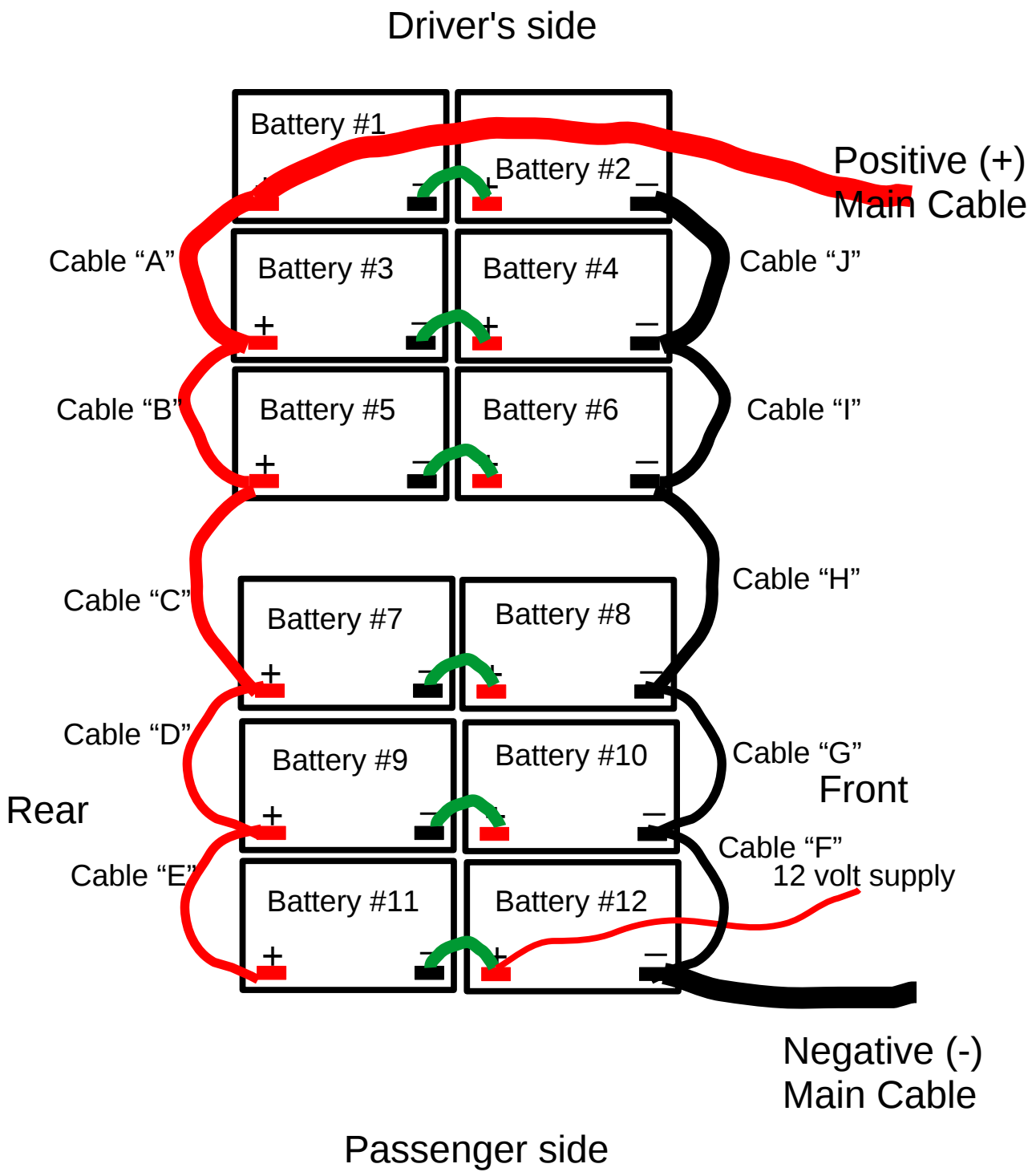


Right; The 3 wires connected to the back of the main switch. Remove the nuts with a 3/4" socket or wrench. The wires are labeled to correspond to the markings on the switch. The ends must be oriented as shown in order for the wires to reach their terminations on the other end.

Reverse the above steps to re-install.

Section 5B: Battery Removal and Installation

Battery and cable numbering schematic



Tools Required: 5/8” socket or wrench, pair of pliers or 2nd 5/8” wrench.

Be very careful that freed ends as well as any tools do not short across adjacent terminals! Also, the individual batteries are heavy, weighing around 70 lbs each. Some assistance in lifting them from the chassis would doubtlessly be appreciated!

Step 1: Remove the top cover (page 25).

Step 2: Remove the nuts, flat washers, lock washers and bolts from batteries 2 through 12, freeing cables F through J, as well as the remaining green wire connections. Loosen the 4 retaining straps, and unhook the straps over batteries 2 through 12.

Step 3. Remove batteries 2 through 12, and slide batteries 1 through 11 toward the front until the remaining 6 connections are accessible, and remove the remaining fasteners, as well as cables A through E. Batteries 1 through 11 may now be removed.

Re-installation is essentially the reverse of removal. Note that the 6 green wires are identical and unlabeled, as it makes no difference in which order they are installed; their purpose is to join a the 12, 12 volt batteries into six 24 volt units. Cables A through J, however, must be reinstalled in the correct places to ensure optimal battery bank performance.

Battery cable placement chart

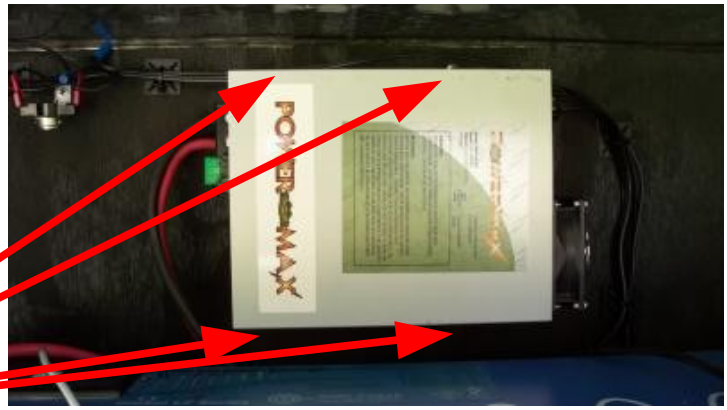
Cable letter	cable color	goes between battery terminals
A	Red	Battery #1 (+) to Battery #3 (+)
B	Red	Battery #3 (+) to Battery #5 (+)
C	Red	Battery #5 (+) to Battery #7 (+)
D	Red	Battery #7 (+) to Battery #9 (+)
E	Red	Battery #9 (+) to Battery #11 (+)
F	Black	Battery #12 (-) to Battery #10 (-)
G	Black	Battery #10 (-) to Battery #8 (-)
H	Black	Battery #8(-) to Battery #6 (-)
I	Black	Battery #6 (-) to Battery #4 (-)
J	Black	Battery #4 (-) to Battery #2 (-)

Section 5C: Inverter, AC charger and Outback charge controller Removal and Installation

Tools needed: #2 Phillips screwdriver with long blade for Outback controller removal/reinstallation. #3 Phillips screwdriver with long blade for AC charger removal/reinstallation. 9/16” and 1/2” wrench or socket, #2 Phillips screwdriver, flat-bladed screwdriver for inverter removal/reinstallation

To remove the Outback controller, remove screw securing the top cover, lightly squeeze the sides to release the side catches, and remove the top cover. Remove the 2 screws securing the bottom cover, and remove it. There are 4 screws securing the controller to the cabinet, 2 in the top, and 2 at the bottom. Unplug the yellow and red connectors and remove the controller from the cabinet. Reverse the above steps to reinstall.

To remove the AC charger, remove the top 2 screws, and loosen the bottom 2 screws securing the unit to the cabinet. Unplug the black connector and the 3-pin connector and remove the unit from the cabinet. Reverse the above steps to reinstall.



Mounting screws

The inverter is a bit more involved, due to the nature of the connections to it, as well as it's weight (90 lbs.) Follow the steps below to remove it.

Step 1, Remove the main fuse and the main negative cable as outlined on page 25.

Step 2, Remove the control panel as outlined on pages 27 through 29.

Step 3, Remove the 10 screws securing the front panel of the battery compartment, and remove the panel.

Step 4, Remove the 4 nuts and washers at the corners of the inverter base board, and push the bolts down and remove them from the bottom, accessing them from the front of the battery compartment.

Right, The bolt at the left rear of the inverter. There is a bolt at all 4 corners of the inverter base-board

Step 5, Disconnect the heavy cables from the rear of the inverter, and pivot the inverter clockwise to access the cover over the AC connections. Remove the 2 screws securing the AC connection cover, and using a flat-bladed screwdriver, loosen the screws securing the gray AC line connecting the inverter to the AC outlets. Label the wires as they are removed, as it is VERY important that the middle wire of the gray lead goes to the inverter terminal marked “neutral”; the other 2 wires go to the terminals marked “hot line 1” and “hot line 2”.

Reverse the above steps to reinstall, being absolutely sure not to cross-connect the red and black DC cables on the back of the inverter. The red cable should not be able to reach the black terminal anyway.

Contact Information

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Athens, ME 04912

Email: support@quantumharvest.net

Warranty Information

All Quantum Harvest power station base units and mobile solar panel units are warranted to be free of defects in materials and workmanship for:

Batteries, if provided by us.....1 year
Inverters, AC chargers and solar charger/controllers.....3 years
Everything else, including solar panels.....5 years

To obtain warranty service, contact us at: support@quantumharvest.net for instructions. We will assist in diagnosing the affected component(s), and/or furnish an RMA. Shipping both ways is on us. You won't pay a cent for warranty service.

In addition to the above warranty, we are so confident of our products, we will never, as long as you own it, charge you labor for repairs. Even after the warranty period, if a component fails or gets damaged, just contact us at the above email address, and we will assist in diagnosing the problem and either arrange to send you the part at cost, or have you ship us the affected module, where we will diagnose the problem and contact you with the cost of the replacement part(s). You will pay what we pay, no more.

What is NOT COVERED under the warranty:

Physical damage to the solar panels, including, but not limited to; broken glass or broken or bent parts.

Physical damage to the power station itself.

Water damage to the internal components of the power station.