

Patriot Energy Systems

Transportable model owner's manual

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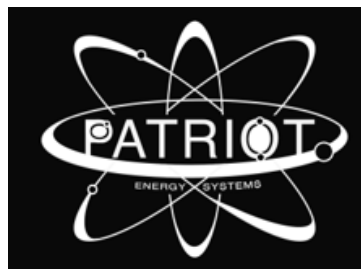
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Disclaimer

UNLESS SPECIFICALLY AGREED TO IN WRITING, PATRIOT ENERGY SYSTEMS (hereafter “PES”):

(a) MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN ITS MANUALS OR OTHER DOCUMENTATION.

(b) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSS OR DAMAGE, WHETHER DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION. THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER’S RISK.

PES cannot be responsible for system failure, damages, or injury resulting from improper installation of their products.

Information included in the manual is subject to change without notice.

PES generators should have any maintenance performed by qualified persons only.

The following symbols are used throughout this operating manual:



Indicates a hazardous situation which, if not avoided will result in death or serious injury.



Indicates a hazardous situation which, if not avoided could result in death or serious injury.



Indicates a hazardous situation which, if not avoided could result in minor or moderate injury.



Addresses practices not related to personal injury.



WARNING marking concerning risk of fire.



WARNING marking concerning risk of eye injury. Wear ANSI-approved splash-resistant safety goggles.



Do Not perform any maintenance unless in the presence of qualified technicians.

Do Not Expose electrical nor electronic components to moisture.

All Systems Employing EMP Protection Must employ Earth Ground.

Solar PV+/PV- are Ungrounded.

Correct Polarity is Critical on the Charge Controller, Battery & Solar Panels.

Any unauthorized work on the system will void overall and/or individual warranties.

The system must be properly earth grounded to avoid the dangers of floating grounds.

Product Inspection – Any damage must be noted at the time of purchase.

If damaged, contact us immediately at 208-715-6993

General Safety Instructions – SAVE THESE INSTRUCTIONS



Batteries/Storage Systems

1. This manual contains important safety and operating instructions for the Patriot system.
2. Do not expose batteries nor electrical components to rain or snow.
3. Use of any attachments not recommended by PES or sold by a specific component manufacturer may result in a risk of fire, electric shock, or injury to persons.
4. To reduce risk of damage to any electric plug connections and associated cords, always pull by plug rather than cord when disconnecting.
5. An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:

- a. That pins on plug of extension cord are the same number, size, and shape as those of plug on the system.
- b. That the extension cord is properly wired and in good electrical condition.
- c. That wire size is large enough for AC ampere rating of charger as specified in Table A below.

AC Input Rating, amperes ¹		AWG size of cord/Length of cord, ft			
Equal to or greater than	But less than	25	50	100	150
0	2	18	18	18	16
2	3	18	18	16	14
3	4	18	18	16	14
4	5	18	18	14	12
5	6	18	16	14	12
6	8	18	16	12	10
8	10	18	14	12	10
10	12	16	14	10	8
12	14	16	12	10	8
14	16	16	12	10	8
16	18	14	12	8	8
18	20	14	12	8	6

¹ If the input rating on a component is given in watts rather than in amperes, the corresponding ampere rating is determined by dividing the wattage rating by the voltage rating – for example: 2,500 watts/125 volts = 20 amperes.



6. Never operate electrical systems nor components with damage cord or plug – replace the cord or plug immediately.
7. Do not operate batteries nor any electrical system nor component if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
8. Do not disassemble any part of a battery; seek out a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire in addition to voiding warranties.
9. To reduce risk of electric shock, unplug loads from the system outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.



10. **WARNING – RISK OF EXPLOSIVE GASES WHEN WORKING WITH CERTAIN BATTERIES.**
 - a. **WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU FOLLOW THE INSTRUCTIONS EACH TIME YOU PERFORM ROUTINE MAINTANENCE OR REPLACE BATTERIES.**

- b. To reduce risk of battery explosion, follow these instructions and those published by battery manufacturer and manufacturer of any equipment you intend to use in vicinity of the batteries. Review cautionary marking on these products.

11. PERSONAL PRECAUTIONS

- a. Consider having someone close enough by to come to your aid when you work near a lead-acid battery.
- b. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.



- c. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- d. If *any* battery acid contacts skin or clothing, wash immediately with soap and water.



- e. If acid enters eye, *immediately* flood eye with running cold water for at least 10 minutes and get medical attention immediately.
- f. NEVER smoke or allow a spark or flame in vicinity of battery.
- g. Be extra cautious to reduce risk of dropping a metal tool onto a battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
- h. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery and other battery technologies. Battery are capable of producing a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.



- i. If charging batteries that have been removed from the system, it is important to use the correct battery charger type designed for your battery type (i.e., flooded lead acid versus gel versus lithium batteries). NEVER charge dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
- j. If charging a battery that has been disconnected from the system, NEVER charge a frozen battery.

IMPORTANT NOTICE

12. PREPARING TO CHARGE FLOODED LEAD ACID BATTERIES (“FLA”)

- a. If it becomes necessary to remove battery from the system to charge, always remove grounded terminal from battery first. Make sure there is no load on the battery so as not to cause an arc.
- b. Be sure area around battery is well ventilated while battery is being charged.
- c. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- d. Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries, carefully follow manufacturer’s recharging

instructions.

- e. Study all battery manufacturer's specific precautions while charging and recommended rates of charge.
- f. Determine voltage of battery by either a) referring to battery owner's manual and make sure it matches output rating of battery charger or b) check the voltage output with a voltmeter. If charger has adjustable charge rate, charge battery initially at lowest rate.

13. CHARGER LOCATION

- a. Locate charger as far away from battery as DC cables permit.
- b. Never place charger directly above battery being charged; gases from battery will corrode and damage a charger.
- c. Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.
- d. Do not operate charger in a closed-in area or restrict ventilation in any way.
- e. Do not set a battery on top of charger.



14. DC CONNECTION PRECAUTIONS

- a. Connect and disconnect DC output clips only after setting any charger switches to "off" position and removing AC cord from electrical source. Never allow clips to touch each other.
- b. Attach clips to battery and chassis as indicated in 15(e), 15(f), and 16(b) through 16(d).



15. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN THE SYSTEM. A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

- a. Ensure all system breakers (solar/wind/hydro) are in the "off" position; this includes the output breakers, battery breakers and all breakers in the breaker box.
- b. Stay clear of parts that can cause injury to persons.
- c. Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N,-) post. Most batteries have clear "+" and "-" markings on the top.
- d. Determine which post of battery is grounded (connected) to the chassis of the system (the system is a negative ground). If negative post is grounded to chassis (as in most vehicles), see (e). If positive post is grounded to the chassis:
 - i. Connect POSITIVE (RED) clip from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (BLACK) clip to the system chassis from any battery. Connect to a heavy gauge metal part of the metal frame.
- e. When disconnecting charger, disconnect AC cord, remove clip from system chassis, and then remove clip from battery terminal.
- f. Always review charger manufacturer's operating instructions for length of charge information.



16. FOLLOW THESE STEPS WHEN A BATTERY TO BE CHARGED IS OUTSIDE & SEPARATED FROM THE SYSTEM. A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:
- Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
 - Attach at least a 24-inch-long 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
 - Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
 - Position yourself and free end of cable as far away from battery as possible – then connect NEGATIVE (BLACK) charger clip to free end of cable.
 - Do not face battery when making final connection.
 - Do not face battery when making final connection.
 - When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.



17. Wear ANSI-approved splash-resistant safety goggles and heavy-duty rubber work gloves whenever connecting, disconnecting, or working near battery. Battery acid can cause permanent blindness.
18. 18. Maintain labels and nameplates on the system and any components of the system. These carry important safety information. If any system nameplate becomes unreadable or missing, contact PES for a replacement.
19. This product is not a toy. Keep it out of reach of children.
20. Unplug any battery charger from its electrical outlet before connecting its cables to a battery, or performing any inspection, maintenance, or cleaning procedures.
21. Use the proper charger that will be dependent on the battery type you purchase. Do not overcharge a maintenance-free battery.
22. Do not attempt to charge non-rechargeable or defective batteries.
23. Do not charge more than one battery at one time.
24. If using a backup charger, always have it serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the charger is maintained.
25. NEVER use nor maintain any part of the charging or discharging system while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating charger may result in serious personal injury.
26. Before moving a backup charger, disconnect from the system inverter and battery, then allow charger to cool.
- IMPORTANT NOTICE**
27. People with pacemakers should consult their physician(s) before use. Electromagnetic fields in close proximity to heart pacemaker could cause pacemaker interference or pacemaker failure. In addition, people with pacemakers should:
- Avoid operating alone.
 - Properly maintain and inspect to avoid electrical shock.
 - Properly ground power cord. Ground Fault Circuit Interrupter (GFCI) should also be

implemented – it prevents sustained electrical shock.

28. The warnings, precautions, and instructions discussed in this operating manual cannot cover all possible conditions and situations that may occur with the batteries or any part of the charging of the system. It must be understood by the operator that common sense and caution are factors which cannot be built into this product but must be supplied by the operator.

Inverters/Discharging Systems



1. **CAUTION** Only qualified service professionals may perform the maintenance work described in this manual.
2. Before using the system, read all instructions and cautionary markings on the unit and all appropriate sections of this manual.
3. **CAUTION** Do not disassemble the inverter component, doing so may cause damage to the unit, personal injury and leads to a total loss of warranty. Contact PES when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, **disconnect all wirings before attempting any maintenance or cleaning**. Simply turning off the unit will not reduce this risk.



5. **CAUTION** For optimum operation of this unit, please follow the required specification to select appropriate cable sizes for appliances being connected to the system. Failure to do so may cause damage to the system and appliances



6. **WARNING** Ensure that all cables, particularly the AC input, AC output, photovoltaic (PV) and battery cables are seated properly in their contacts and tightened correctly. No cable insulation may protrude into the corresponding cable terminals. Any materials other than the cable /cable lug /ring terminal inserted into the terminals could cause excessive heating, damage and /or fire.



7. **CAUTION** Make sure to maintain the separate battery breaker as close as possible to the battery terminal with a rating of 250 to 300 A DC as over-current protection for the battery and battery cables. The fuse must be able to reliably protect the battery cables from short-circuit or overload.



8. **WARNING** The inverter is required to be connected to a permanent grounded wiring system via the appropriate terminals. Failure to do so may cause serious personal injury. Be sure to comply with local requirements and regulations when using this inverter

based system.

9. Never allow the AC output and DC input to be short-circuited. Do NOT connect to the AC mains when the DC input short circuits.



10. If one of the following components is damaged immediately take the device out of operation and disconnect it from the AC mains, battery and PV modules: The device itself (not functioning, visible damage, smoke, penetration of liquid etc.), connected cables or solar modules.
 - a. Do not switch the system on again before the device has been repaired by a dealer, the manufacturer or other qualified personnel, and the damaged cables or solar modules have been repaired by a technical specialist.
11. Any use of this product aside from its intended purpose as described in this manual could lead to damage and/or serious personal injury. Opening any part of the device apart from the customer work area as described in this manual will void the warranty and can lead to damage and/or serious personal injury.
12. Only for outdoor use, not for use in workshops or other high-dust environments without counter-measures.
13. CAUTION Heavy device. Take care when moving or otherwise relocating the system to avoid injury or system damage.

Solar Panels/Charging Systems

IMPORTANT NOTICE

1. Installing solar photovoltaic systems may require specialized skills and knowledge. Installation should be performed only by qualified persons.
2. If a panel is either installed or replaced on the system by non-qualified installers, then warranty is void.
3. One individual module may generate DC voltages greater than 30 volts when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.
4. Do not disconnect under load.
5. Photovoltaic solar modules change light energy to direct-current electrical energy. They are designed for outdoor use.
6. Do not attempt to disassemble the modules, and do not remove any attached nameplates or components from the modules.
7. Do not apply paint or adhesive to module top surface.



8. Do not use mirrors or other magnifiers to artificially concentrate sunlight on the modules. Do not expose backsheet foils directly to sunlight.
9. When operating the system, abide with all local, regional and national statutory regulations. Obtain a building permit where necessary.

Safety precautions for maintain solar panels

**IMPORTANT
NOTICE**

10. Solar modules produce electrical energy when light shines on their front surface. The DC voltage may exceed 30V. If modules are connected in series, the total voltage is equal to the sum of the individual module voltages. If modules are connected in parallel, the total current is equal to the sum of individual module currents.



11. Keep children well away from the system while operating or maintaining mechanical and electrical components.
12. Completely cover the module with an opaque material during routine maintenance to keep electricity from being generated.
13. Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic devices while installing or troubleshooting photovoltaic systems.
14. Use only insulated tools that are approved for working on electrical installations.



15. Abide with the safety regulations for all other components used in the system, including wiring and cables, connectors, charging regulators, inverters, storage batteries and rechargeable batteries, etc. NEVER replace any components of a system without first contacting PES. Failure to do so will void all warranties.
16. Use only equipment, connectors, wiring and support frames suitable for a solar electric system. Always use the same type of module within a particular photovoltaic system.
17. Electrical characteristics should be within ± 10 percent of the indicated values of short circuit current (I_{sc}), the open circuit voltage (V_{oc}) and the maximum power (P_{max}) under standard test conditions (irradiance of 100mW/ AM 1.5 spectrums, and a cell temperature of 25°C (77°F)).
18. Under normal outdoor conditions modules will produce current and voltages that are different than those listed in the data sheet. Data sheet values are values expected at standard test conditions. This is why when designing any system, values of short-circuit current and open-circuit voltage should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacity, fuse ratings and size of controls connected to the modules or system output.
19. Refer to section 690-8 of the National Electrical Code for an additional multiplying factor of 125 percent (80 Percent derating) which may be applicable.

System Guide

**IMPORTANT
NOTICE**

The basic Patriot system includes steel superstructure with a transportable mobile capability. The basic system also includes a fully assembled and operating charging system. These charging systems can be sourced from solar (via the utilization of solar panels), wind (through the use of wind generators) and hydro sources (via hydro generators) as well as hydrocarbon backup systems that use a multiple sources such as gasoline, diesel and propane.

The basic system also includes a fully assembled and operating integrated electrical system that includes charge controllers, inverters and safety backup options along with output circuitry that includes 110 and 220 output options.

The electrical system includes a wide array of monitoring capabilities and can provide power outputs of 12,000 watts up to 120,000 watts.

When energy storage systems are selected by customers, the resulting integration can be sourced from a number of different battery technologies such as Flooded Lead Acid (FLA), Absorbed Glass Mat (AGM), Partial Charged Carbon (PCC) as well as Lithium technologies. Systems with batteries are delivered in a fully charged state.

IMPORTANT SAFETY INSTRUCTIONS. To avoid personal injury or damage to the solar generator or any connected products, carefully read, understand, and comply with all instructions before use. Keep this manual for future reference.

Observe all Input/Output watt ratings: To avoid fire or electrical shock hazard, observe all ratings on unit, and products you intend to use; check the individual component's manuals for more information.

The systems should be used in areas that maximize power sources. For example, solar systems should avoid shaded areas, wind systems should utilize areas that maximize wind assistance, and hydro sources should provide minimum "head".

Additionally, whether the system is in a deployed or undeployed position, do not stack anything on top of the unit in storage (if undeployed) or in use (deployed). Inadequate ventilation and/or improper storing may cause damage to the inverter system.



NEVER expose any of the electrical components during wet conditions. In order to avoid short circuits or electric shock do not allow unit to get wet. Let unit dry completely before using. In order to avoid floating ground shorts, always maintain a proper earth ground.

Keep the reasonably clean from debris. Inspect the unit for dirt, dust, or moisture (particularly around the inverter/electrical system) on a regular basis.

Shock or Fire Hazard: This solar generator produces the same potentially lethal AC power as a normally provided from the utility companies. Please use caution when operating, just like you would when working around grid-provided electrical sources.



Any maintenance should only be done by qualified personnel and PES accepts no liability for improper use of the system.

DO NOT insert foreign objects into outputs.

DO NOT open the Patriot solar generator inverter components system; there are no user serviceable parts inside. Any manipulation to the unit or its components will void all warranties.

General Information

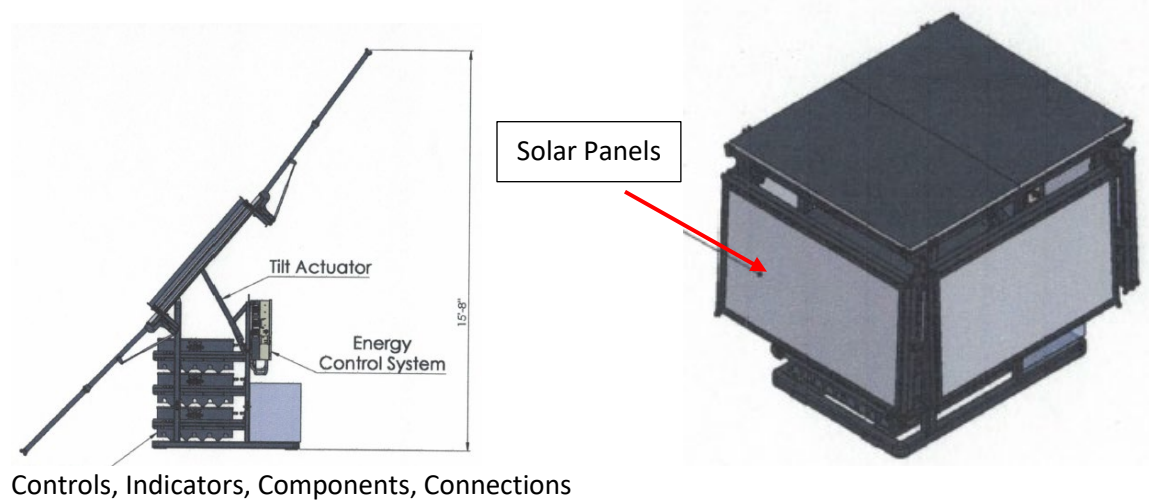
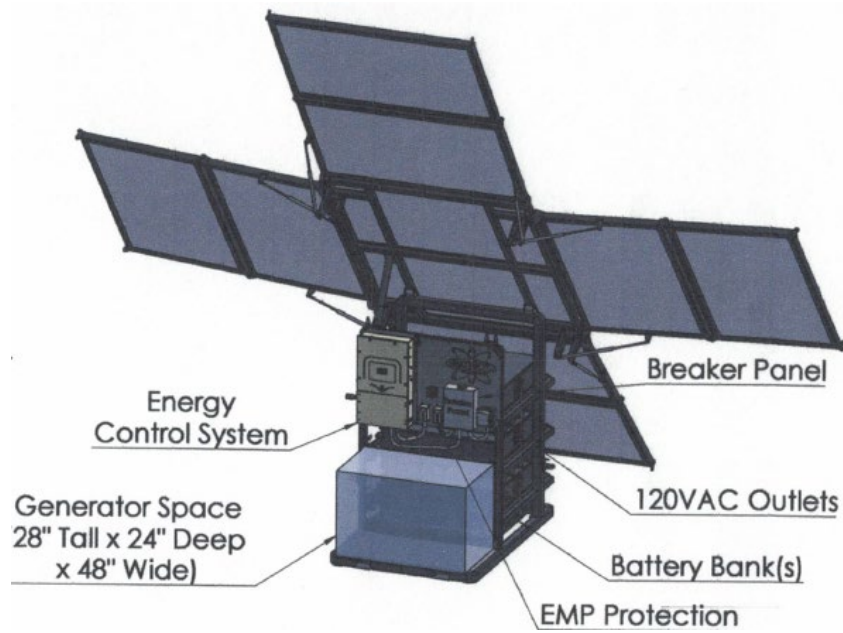




Figure 1 Fully Deployed Front View



Figure 2 Undeployed



Figure 3 Fully Deployed Rear View Showing Discharging Components

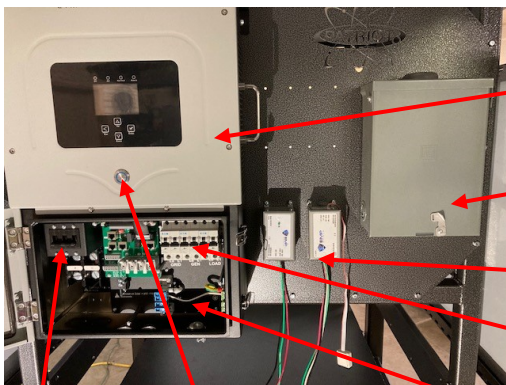


Figure 4 Owner Work Area

Inverter/Charge Controller Discharging Components

Breaker box

EMP Filters (AC & DC circuits)

Grid/Load Breakers

Owner access work area

Sol-Ark on/off button

Battery Breakers

Technical Specifications

Gross Weight (no batteries)	1700 lbs. system weight
Dimensions (Undeployed)	4' Long X 5' 9" Wide X 7' 11" High
Dimensions (Deployed)	19' 9" Long X 19' 9" Wide X 15' 8" High
Electrical Specifications	
Solar Max Input Voltage ¹	10 panel Voltage: up to 339 VDC Watts: Up to 3,300 watts
Output Voltages ²	110 and 220 VAC pure sine wave
Power Output	Standard systems start at 12,000 watts
System Input Voltage	48 VDC
Outlets	(2) 110 VAC and (1) 220 VAC
EMP Protection	
	DC and AC circuits protected
System Exterior Coating	
	All exposed framing powder coated
Batteries³	
	Depending on battery chemistry selection, up to 3 years (GEL and PCC) to 10 years (Lithium); 500 cycles (GEL), 3,000 cycles (PCC) to 9,000 to 13,000 cycles (Lithium); assumes batteries are not discharged below 50% ⁴ .
Warranty	
	See Warranty section below as each major component has its own warranty.

¹ See Panel Manufacturer Owner's Manual

² See Inverter Manufacturer Owner's Manual

³ See Battery Manufacturer Owner's Manual

⁴ Maximum life span of battery based on ideal conditions. Actual life span will depend on factors such as charge rate, discharge rate, cycle depth of discharge, and usage and storage conditions.

CHARGING THE PATRIOT SOLAR GENERATOR

There are two ways to charge the stand-alone (i.e., off-grid) solar sourced generator: a) from solar and b) using a backup generator). The System is capable of charging from both sources at the same time.

***It's critical to ensure that ALL SOURCES OF CHARGING COMBINED do NOT EXCEED the maximum watts PER BATTERY. Check the battery's specifications sheets for each battery technology.**

Charging from Solar

Each system is capable of charging up to 13,000 watts and uses from 10 (standard) to 40 (optional) 230 watt panels.

*** DO NOT EXCEED 145V of SOLAR INPUT.**

If you purchase extra solar panels from PES, follow the diagrams contained in this user manual. If you purchase solar panels from another source, make sure it is configured to keep the open circuit voltage under 400V.

System automatically places solar at first choice source. If solar is insufficient to charge batteries, system then reprioritizes wind (if installed), hydro (if installed) and then a hydrocarbon (gas or propane) backup generator.

SAFETY MODE

When the system senses a battery voltage below a predetermined setting (set by owner), the system will automatically seek other sources of energy. If no other source is available, the system will perform a soft shutdown, and then test the system every 15 minutes. Once an alternative source becomes available, the system will turn back on.

OPERATING INSTRUCTIONS

GENERAL OPERATING AND SAFETY INSTRUCTIONS

- For optimal performance, use your Patriot solar generator in an unobstructed space that has direct sunlight.
- Keep well ventilated, away from any combustible materials or gases.
- Do not open the Patriot solar generator under any circumstances; there are no other user serviceable parts inside.

INITIAL SET-UP

Because of its design, there is a specific way to initially setup the Patriot solar generator.

PLEASE FOLLOW INSTRUCTIONS CAREFULLY to keep the system functioning properly.

Testing and powering up the system should occur in the following order (see page 12 of the Sol-Ark Owner's Manual). Ensure that the batteries are fully charged.

Also ensure that before starting up the system, the battery breakers and solar panel breakers are in the off position (both of these items are in the owner work area, see figure 4 above). Check and confirm that all breakers in the breaker box (see figure 4 above) are in the off position. Finally, make sure the Sol-Ark on/off button is pushed out (i.e., in the off position).



Always ensure the earth ground is connected before starting up the system. Failure to set up the earth ground could result in serious injury.

IMPORTANT NOTICE

Startup order of procedure:

- 1) Turn on built in (1) and located in the owner work area and external battery disconnects (1). Note the voltage should be 45 VDC – 60 VDC.
- 2) Turn on the built in grid power breakers in the owner work area (located in the owner work area, see fig. 4) if the system is grid tied. If not grid tied, ignore this step.
- 3) Press the power button on the front of the Sol-Ark unit.
- 4) Turn the built in PV Disconnect knob to “On”.
- 5) Turn on the breakers inside the breaker box (see fig. 4).
- 6) Turn on the external breakers in the breaker box (see fig. 4).

ADDING MULTIPLE BATTERY BRANCHES

***IMPORTANT:** When adding multiple battery packs, it’s **critical that you follow the instructions listed in the Sol-Ark manual starting on page 8.**

1. Ensure that all new batteries are equalized and balanced *BEFORE* connecting them together with the solar generator.

***CONNECTING UNBALANCED BATTERIES TOGETHER IN A SYSTEM WILL DAMAGE ONE OR MORE OF THE BATTERIES.**

Fully charge the battery (or batteries) using a battery charger designed to charge Gel or Lithium batteries (depending on the battery technology purchased).

***This process of ADDING MULTIPLE BATTERY PACKS will need to be followed every time the battery configuration is changed.**

USING YOUR PATRIOT SOLAR GENERATOR

After initial setup, your Patriot solar generator is ready to use. All outputs should be simultaneously working. If the system is “stand-alone” or off-grid, you’ll simply use the provided 110 or 220 plugs.

WHAT CAN I POWER?

The Patriot solar generator can power virtually any appliances such as refrigerators, freezers, microwave ovens, and cooking appliances. It has a pure sine wave, so electronics should run well; such is also the case for power tools, and medical equipment such as CPAP machines.

When using large amounts of AC power when the battery is low, the inverter may turn off earlier than normal with useable battery capacity still remaining (this is predetermined in the settings of the Sol-Ark unit).

STORING YOUR PATRIOT SOLAR GENERATOR

The Patriot solar generator batteries tend to self-discharge at a rate of 5% per month, so when storing the unit long term, the batteries should be periodically charged. For optimal battery life, you should use 10% of the battery once per year. Make sure batteries are charged to at least 50% capacity and the POWER SWITCH is turned to OFF **before storing.**

Store your Patriot solar generator in cool, dry environments and away from any combustible materials or gases.

***FAILURE TO STORE AND MAINTAIN YOUR SOLAR GENERATOR PROPERLY WILL VOID THE PRODUCT WARRANTY.**

Troubleshooting

For troubleshooting, please refer to the Sol-Ark owner's manual, pages 37 – 39.

FAQs

HOW MUCH SOLAR CAN I ADD TO THE PATRIOT? Up to 13,000 watts of solar (no more than 500V).

CAN I USE ANY SOLAR PANELS WITH THE PATRIOT OR DO I HAVE TO PURCHASE PANELS FROM PATRIOT ENERGY SYSTEMS? The panels should be properly sized that includes using the same wattage as well as manufacturer.

WHAT TYPE OF OUTPUT POWER IS THE PATRIOT? 110 volt 60 HZ, 220 volt, 60 HZ, up to 12,000 watts.

WHAT TYPE OF BATTERIES COME WITH MY PATRIOT SOLAR GENERATOR? Batteries are selected by the customer. Batteries can range from Flooded Lead Acid (FLA), Absorbent Glass Mat or GEL (AGM), partial charged carbon (PCC) or Lithium based batteries (typically LiFePO4 Lithium Iron Phosphate batteries).

HOW MANY BATTERIES CAN I ADD TO THE PATRIOT? Technically speaking there is no limit to the amount of batteries you can add to the Patriot. However, note that the larger battery banks will lead to longer charging times. Systems are typically sized from 3 to 5 days of autonomy.

CAN I REPLACE THE BATTERIES? Yes, you can easily add or replace the batteries by adding or replacing battery packs. Follow the guidelines in the Sol-Ark owner's manual, particularly pages 8, 13-21 and 28.

CAN I CHARGE MY PATRIOT WITH A BACKUP CHARGER AND SOLAR AT THE SAME TIME? Yes, you can use your wall charger and charge with solar at the same time. This is managed by the inverter system.

CAN I CONNECT MY PATRIOT TO MY HOME CIRCUIT BREAKER BOX OR OTHER "GRID-TIE" METHOD? Yes, but you will typically need to install a transfer switch.

IMPORTANT NOTICE This, as well as with any associated wiring needed to connect the system to the grid, should only be performed by qualified electrical personnel.

WARRANTY

LIMITED WARRANTY

PES warrants to the original consumer purchaser this Patriot solar generator to be free from defects in workmanship and material under normal consumer use during the applicable warranty period identified in Paragraph 2 below, subject to the exclusions set forth in Paragraph 4. This warranty

statement sets forth PES's warranty obligation. We will not assume, nor authorize any person to assume for us, any other liability in connection with the sales of our products.

LIMITED WARRANTY PERIOD

The warranties for components are covered by each manufacturer as follows:

- Sol-Ark unit -see page 53.
- Heliene 320 watt solar panels -25 year limited warranty
- Superstructure including steel, welding integrity and associated wiring -3 year limited warranty from original purchase date.
- The warranty period for the batteries will be based on the manufacturer's warranty; for example, the PCC batteries have a 3 year straight warranty, while many Lithium batteries will have 7 year limited warranties.

These warranties are **NOT** transferable and is **only valid for the original consumer**. The sales receipt from the original consumer purchase, or other reasonable documentary proof, is required in order to establish the start date of the warranty period.

With the exception of the 30 Day No-Fault Warranty, the buyer is responsible for any initial shipping charges required to ship the product for warranty service. PES will pay the return shipping charges if the product is repaired or replaced under warranty.

30 DAY NO-FAULT WARRANTY

This 30 Day No-Fault Warranty is supplemental to the Limited Warranties, and is not a warranty in itself, nor does it waive or modify any exclusions or limitations in the Limited Warranties.

The 30 Day No-Fault Warranty states that within 30 days of date of delivery of original purchase, PES guarantees the Patriot power module and/or battery packs to be free of any defects in workmanship or material. If not, PES will repair or replace any defective parts with new or reconditioned parts, at PES's discretion, without charge to the original purchaser.

EXCLUSIONS

The above stated limited warranties DO NOT APPLY to damage from misuse, alterations, abuse, normal wear and tear, lack of maintenance, accidents, or repairs made or attempted by anyone other than an authorized service technician. This warranty does not cover repair if:

- Normal use has exhausted the useful life of the generator and wear and tear items (including batteries, control panels including digital displays, outlet plugs, switches, and cords if applicable).
- The customer fails to install, maintain, and operate the product in accordance with the instructions and recommendations of the company set forth in the Patriot solar generator user manual or other manufacturers' manuals.
- Damage occurs due to freezing, heat exposure, water exposure, rust, corrosion, thermal expansion, fire, dropping, misapplication or any other improper use, storage, and maintenance.
- Any product or part has been modified without the written permission of PES.
- In the event of high winds exceeding 50 mph, the system should be undeployed.

The above limited warranties DO NOT COVER shipping or labor charges associated with the inspection and testing of generators.

PES is not liable for any loss, cost, expense, inconvenience or damage that may result from use, misuse, or inability to use this product. Under no circumstances shall PES be liable for any loss, cost, expense, inconvenience, or damage exceeding the purchase price of the product.

The warranty and remedies set forth are exclusive and in lieu of all others, oral or written, expressed or implied. No reseller, distributor, agent, or employee is authorized to make any modification, extension, or addition to this warranty.

HOW TO RECEIVE SERVICE

To obtain warranty service, you must contact us at (208) 715-6993 or info@patriotenergysystems.com prior to returning any product to receive an RMA form.

UNAUTHORIZED RETURNS WILL NOT BE ACCEPTED AND WILL BE REFUSED. CUSTOMER IS RESPONSIBLE FOR ALL SHIPPING COSTS ON UNAUTHORIZED RETURNS.