

PORTAWATTZ™
3000

DC to AC
POWER INVERTER

OWNER'S MANUAL

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1 Introduction

Your new Portawattz 3000 inverter is a member of the most advanced line of DC to AC inverters available today. It will give you years of dependable service in your boat, RV, service vehicle or remote home.

To get the most out of your Portawattz 3000, it must be installed and used properly. Please read the installation and operating instructions in this manual carefully before installing and using your Portawattz 3000. Pay special attention to the CAUTION and WARNING statements in this manual and on the unit. CAUTION statements identify conditions or practices which could result in damage to your unit or to other equipment. WARNING statements identify conditions or practices that could result in personal injury or loss of life.

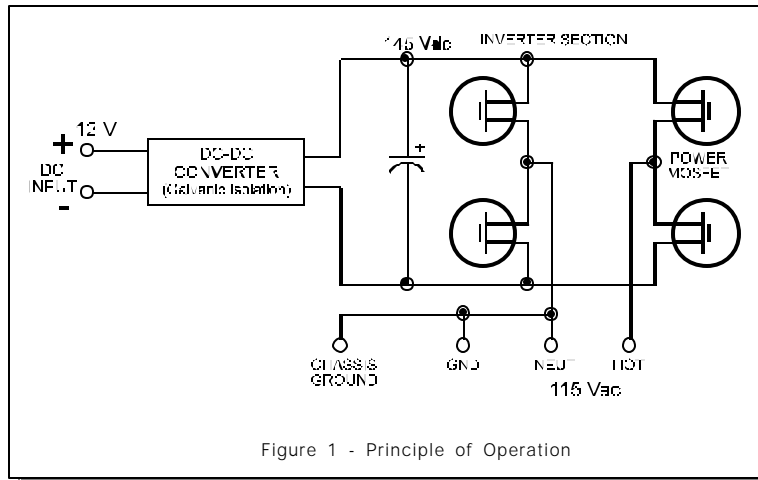
2 How Your Portawattz™ 3000 Inverter Works

An inverter is an electronic device that converts low voltage DC (direct current) electricity from a battery or other power source to standard 115 volt AC (alternating current) household power. In designing the Portawattz 3000, Statpower has used power conversion technology previously employed in computer power supplies to give you an inverter that is smaller, lighter, and easier to use than inverters based on older technology.

2.1 Principle of Operation

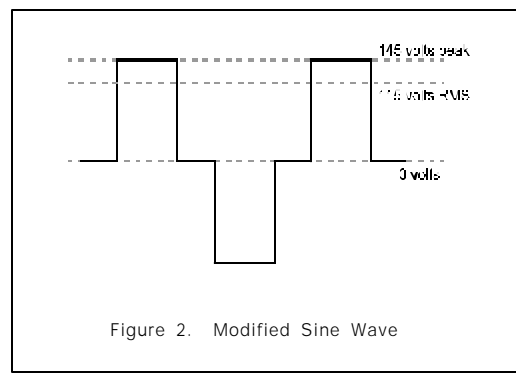
The Portawattz 3000 converts power in two stages. The first stage is a DC-to-DC converter which raises the low voltage DC at the inverter input to 145 volts DC. The second stage is the actual inverter stage. It converts the high voltage DC into 115 volts, 60 Hz AC.

The DC-to-DC converter stage uses modern high frequency power conversion techniques that eliminate the bulky transformers found in inverters based on older technology. The inverter stage uses advanced power MOSFET transistors in a full bridge configuration. This gives you excellent overload capability and the ability to operate tough reactive loads like lamp ballasts and induction motors.



2.2 Portawattz™ 3000 Inverter Output Waveform

The AC output waveform of the Portawattz 3000 is called a “quasi-sine wave” or a “modified sine wave”(see Figure 2). It is a stepped waveform that is designed to have characteristics similar to the sine wave shape of utility power. A waveform of this type is suitable for most AC loads, including linear and switching power supplies used in electronic equipment, transformers, and motors. This waveform is much superior to the square wave produced by many other DC to AC inverters.



The modified sine wave produced by the Portawattz 3000 is designed to have an RMS voltage of 115 volts, the same as standard household power. Most AC voltmeters (both digital and analog), are sensitive to the average value of the waveform rather than the RMS value. They are calibrated for RMS voltage under the assumption that the

waveform measured will be a pure sine wave. These meters will not read the RMS voltage of a modified sine wave correctly. They will read about 2 to 20 volts low when measuring the output of the Portawattz 3000. For accurate measurement of the output voltage, a true RMS reading voltmeter, such as a Fluke 87, Fluke 27, Tektronix DMM 249, or B&K Precision Model 391, must be used.

CAUTION!

RECHARGEABLE APPLIANCES. DO NOT USE THE PORTAWATTZ™ 3000 WITH THE EQUIPMENT LISTED BELOW.

Certain rechargers for small nickel cadmium batteries can be damaged if connected to the unit. Two particular types of equipment are prone to this problem:

- 1) small battery operated appliances such as flashlights, razors, and night lights that can be plugged directly into an AC receptacle to recharge.
- 2) certain battery chargers for battery packs used in hand power tools. These chargers will have a warning label stating dangerous voltages are present at the battery terminals.

This problem does not occur with the vast majority of battery operated equipment. Most of this equipment uses a separate charger or transformer that is plugged into the AC receptacle and produces a low voltage output. If the label on the AC adapter or charger states that the adapter or charger produces a low voltage AC or DC output (less than 30 volts), the Portawattz will have no trouble powering this charger or adapter safely.

3 Physical Layout of the Portawattz™ 3000 Inverter

Your inverter was designed with a logical and efficient back to front flow in mind. Battery power is applied to the large terminals on the rear of the unit and flows forward to the AC receptacles on the front panel. All of the indicators, controls, and output connections that you will need to access after a permanent installation are conveniently located on the front panel (see Figure 3). See Section 6.1, Front Panel Controls and Indicators, for a detailed explanation of the functions of the various controls and indicators on your Portawattz 3000.

Forced air cooling also flows in the same direction, with the fan drawing air in from the rear and blowing it out through the vents on the front panel.



NOTE: It is important to provide an adequate airspace around these surfaces to allow for convection cooling. See Section 5.1 for installation notes.

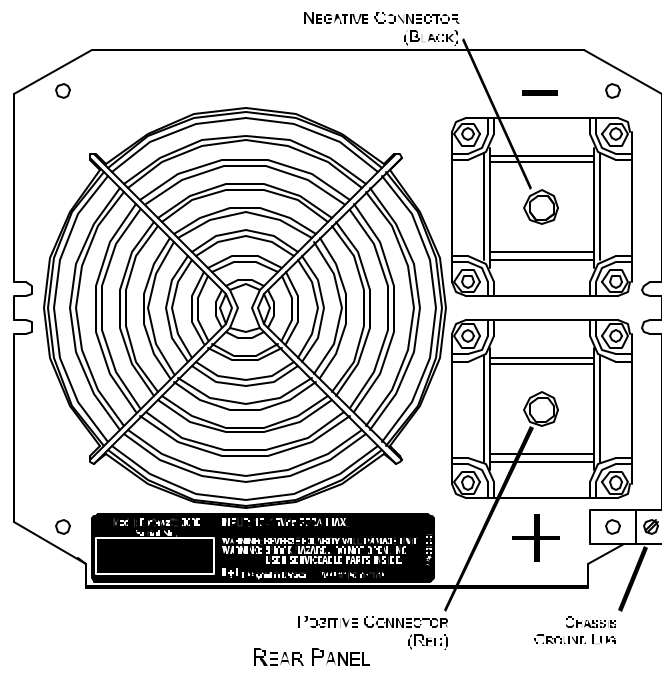
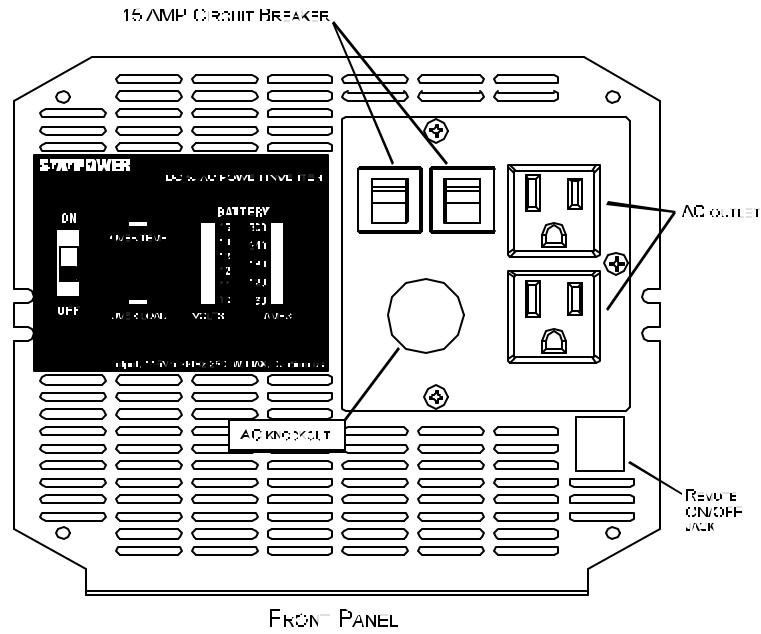


Figure 3 - Front and Rear panel

4 Quick Operational Check (optional)

This section will give you the information you need if you wish to quickly hook-up your Portawattz 3000 and check its performance before going ahead with permanent installation. You will need the following:

- a) a 12 volt DC power source
- b) two cables to connect the DC power source to the Portawattz 3000
- c) a test load of 100 - 1000 Watts.
- d) a line cord to connect the test load to the AC receptacle.

4.1 DC Power Source

The power source must provide between 11 and 15 volts DC and must be able to supply sufficient current to operate the test load. As a rough guide, divide the wattage of the test load by 10 to obtain the current (Amps) the power source must deliver (see example).

4.1.1. Battery

Use a fully-charged 12 volt (nominal) battery that can deliver the required current while maintaining its voltage above 11 volts. A fully-charged 12 volt automobile battery is capable of delivering up to 50 amperes without an excessive voltage drop.

<p>Example: Test load is rated at 250 watts. Power supply must be able to deliver $250 \div 10 = 25$ Amps</p>
--

4.1.2. DC Power Supply

Use a well regulated DC power supply that has an output voltage between 11 volts and 15 volts and can deliver the required current. If the supply is adjustable, make sure that the output voltage is adjusted to be between 11 volts and 15 volts. The inverter may shut down if the voltage is outside these limits and may be damaged if the voltage is above 16 volts. Also ensure that any current limit control is set so that the power supply can deliver the required current.

4.2 DC Cables

Your cables must be as short as possible and large enough to handle the required current. This is to minimize the voltage drop between the power source and the inverter when the inverter is drawing large currents from the power source. If the cables introduce an excessive voltage drop, the inverter may shut down when drawing higher currents because the voltage at the inverter drops below 10 volts.

Also, longer and/or thinner cables will reduce the efficiency of the overall system, since excessive power will be dissipated in the cabling.

For temporary operation at reduced power levels, the guidelines listed in Table 1 may be followed, or you can use the cable sizes in Table 6.

Ideally, the cables should be no more than 4 ft (1.5m) long. See table 2 for a pictorial representation of the wire gauges.

Max. Test Load Power Consumption for Short Term Test	Min. Cable Size (Copper material only)
100 Watts	#16 AWG
250 Watts	#12 AWG
500 Watts	#8 AWG


Table 1 - Temporary Load Wire Gauge Chart

CAUTION!
DO NOT operate your inverter for more than 5 minutes or at a higher power using these cable sizes. Refer to table 6.

Strip approximately 1/2" (1.25cm) of insulation from the ends of the cables being connected to the inverter. Attach 5/16" ring terminals to the ends of the wires to be attached to the DC terminals on the Portawattz 3000. The ring terminals should be crimped with a proper crimping tool.

Another option is to use IlSCO, or equivalent, box-lug terminals (available at electrical parts suppliers). The bare cable end can then be inserted into the lug terminal.

The other ends of the cables, which are connected to the power source, must be terminated with lugs or other connectors that allow a secure, low resistance connection to be made to the power source. For instance, if the power source is a battery, the cables must be terminated with battery terminals that clamp to the posts on the battery.

 *A solid, low resistance connection to the DC power source is essential for proper operation.*

4.3 Test Loads

Use only equipment rated for 110 - 120 volt, 60 Hz AC operation that has a power consumption of 500 watts or less. We recommend that you start with a relatively low power load, such as a 100 watt lamp, to verify your test set-up before trying high power loads.

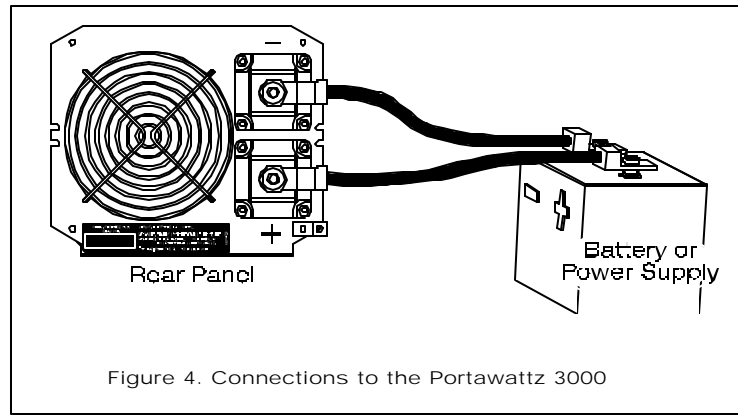
4.4 Connections

Follow the connection sequence described below:

- STEP 1 - Ensure the ON/OFF switch on the Portawattz 3000 is in the OFF position. If the power source is a DC power supply, switch it off as well.

ALPHA Neoprene Welding Cable	
Wire Size (AWG)	Overall Outside Diameter (inches/mm)
#6	0.35/8.89
#4	0.42/10.70
#2	0.48/12.19
#1	0.52/13.21
#1/0	0.58/14.77
#2/0	0.64/16.26
#3/0	0.70/17.78
#4/0	0.82/20.83

Table 2 - Wire size Chart



- STEP 2 - Connect the DC cables to the power input terminals on the rear panel of the Portawattz 3000. The Red terminal is positive (+) and the Black terminal is negative (-). Tighten the wire connections securely. (see figure 4).
- STEP 3- Connect the cable from the negative (Black) terminal of the Portawattz 3000 to the negative terminal of the power source (battery or power supply). Make a secure connection.

CAUTION!
Loose connectors result in excessive voltage drop and may cause overheated wires and melted insulation.

STEP 4 - Before proceeding further, carefully check that the cable you have just attached connects the negative terminal of the Portawattz 3000 to the negative output terminal of the power source. Power connections to the Portawattz 3000 must be positive to positive and negative to negative.

CAUTION!

Reverse polarity connection (positive to negative) will blow the fuses in the Portawattz 3000 and may permanently damage the unit. Damage caused by reverse polarity connection is not covered by your warranty.

WARNING!

You may observe a spark when you make the following connection since current may flow to charge capacitors in the Portawattz 3000. Do not make this connection in the presence of flammable fumes. Explosion or fire may result.

STEP 5 - Connect the cable from the positive (Red) terminal of the Portawattz 3000 to the positive terminal of the power source. Make a secure connection.

STEP 6 - If you are using a DC power supply as the power source, switch it on. Set the ON/OFF switch on the Portawattz 3000 to the ON position. Check the meters and indicators on the front panel of the Portawattz 3000. The battery voltage indicator should indicate 11 to 14 volts, depending on the voltage of the power source. If it does not, check your power source and the connections to the Portawattz 3000. The other indicators should be off.

STEP 7 - Set the Portawattz 3000 ON/OFF switch to the OFF position. The indicator lights may blink and the internal alarm may sound momentarily. This is normal. Plug in the test load now, but make sure that it is first switched off.

STEP 8 - Set the Portawattz 3000 ON/OFF switch to the ON position and turn the test load on. The Portawattz 3000 should supply power to the load. If it does not, refer to the troubleshooting section of this manual. If you plan to measure the output voltage of the Portawattz 3000, refer to Section 2.2 of this manual.

5 Permanent Installation

5.1 Where to Install

The Portawattz 3000 should be installed in a location that meets the following requirements:

- Dry - Do not allow water to drip or splash on the Portawattz 3000.
- Cool - Ambient air temperature should be between 0°C and 25°C (32°F and 77°F). The cooler the better.
- Ventilated - Ensure that the unit is in a compartment that is ventilated, and that you allow at least 1 inch (2.5cm) of clearance around the Portawattz 3000 for air flow. Ensure that ventilation openings on the front and rear of the unit are not obstructed.
- Safe - Do not install the Portawattz in the same compartment as batteries or in any compartment capable of storing flammable liquids such as gasoline (see warning below).
- Close to Battery - Install as close to the battery as possible in order to minimize the length of cable required to connect the inverter to the battery, but not in the same compartment. It is better and cheaper to run longer AC wires than longer DC cables, because of the much lower currents in the AC wires.

CAUTION!

To reduce fire hazard, do not cover or obstruct ventilation openings. Do not install the Portawattz 3000 in a zero-clearance compartment. Overheating may result.

WARNING!

This equipment contains components which tend to produce arcs or sparks. To reduce risk of fire or explosion do not install in compartments containing batteries or flammable materials or in locations which require ignition protected equipment.

Mount the Portawattz on a flat surface using the mounting flanges on the front and rear panels. Mounting hardware should be corrosion resistant and #10 or larger. The Portawattz may be mounted horizontally or vertically.

5.2 Battery

The battery you use strongly affects the performance you can expect from your Portawattz 3000. It is important to connect the Portawattz 3000 to the correct size and type of battery. The following information will help you select the appropriate batteries for your application.

5.2.1 Battery type

The lead-acid battery which is probably most familiar is the starting battery in your automobile. An automotive starting battery is designed to deliver a large amount of current for a short period of time (so it can start your engine). Only a small portion of the battery's capacity is used when starting the engine and it is quickly recharged by the running engine. It is not designed for repeated charge-discharge cycles where the battery is almost completely discharged and then recharged. If it is used in this kind of deep discharge service, it will wear out very rapidly.

Deep-cycle lead-acid batteries are designed for deep discharge service where they will be repeatedly discharged and recharged. They are marketed for use in recreational vehicles, boats, and electric golf carts so you may see them referred to as RV batteries, marine batteries, or golf cart batteries.

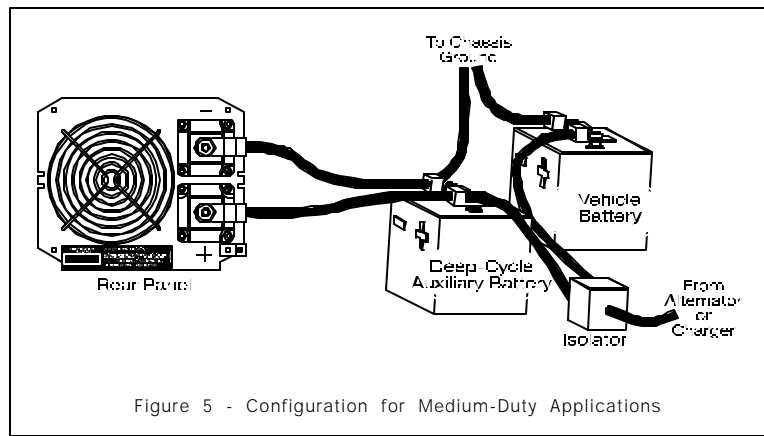


Figure 5 - Configuration for Medium-Duty Applications

For most applications of the Portawattz 3000, Statpower recommends that you use one or more deep-cycle batteries that are separated from the starting battery in your vehicle by a battery isolator. A battery isolator is a solid-state electronic circuit which allows equipment to be operated from an auxiliary battery without danger of discharging the vehicle's starting battery. During vehicle operation, the battery isolator automatically directs the charge from the alternator to the battery requiring

the charge. Battery isolators can be obtained at marine and RV dealers and most auto parts stores.

If your application involves relatively low power loads (i.e. power consumption of 300 watts or less) and relatively short operating times before recharging (one hour or less), you may connect the Portawattz 3000 directly to the vehicle starting battery.

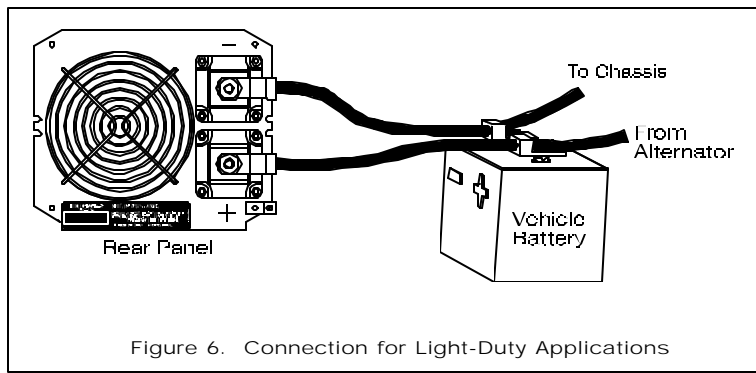


Figure 6. Connection for Light-Duty Applications

CAUTION!

The Portawattz 3000 must be connected only to batteries with a nominal output voltage of 12 volts. The Portawattz 3000 will not operate from a 6 volt battery, and will be damaged if it is connected to a 24 volt battery.

5.2.2. Battery Sizing

There are a number of different standards for rating battery energy storage capacity. Automotive starting batteries are normally rated by cranking amps. This is not a relevant rating, for continuous use. Deep-cycle batteries are rated either by reserve capacity in minutes or by ampere-hour capacity.

Battery reserve capacity is a measure of how long a battery can deliver a certain amount of current - usually 25 amperes. For instance, a battery with a reserve capacity of 180 minutes can deliver 25 amperes for 180 minutes before it is completely discharged.

Ampere-hour capacity is a measure of how many amperes a battery can deliver for a specified length of time - usually 20 hours. For example, a typical marine or RV battery rated for 100 ampere-hours can deliver 5 amperes for 20 hours (5 amperes x 20 hours = 100 amp-hrs).

Actual battery capacity decreases as discharge current increases. A battery rated at 100 ampere-hours which can deliver 5 amperes for 20 hours, may deliver 20 amperes for

only 4 hours, resulting in an actual capacity of 80 ampere-hours. For this reason, it is difficult to compare rated ampere-hour capacity with battery reserve capacity. For example a battery with a reserve capacity of 180 minutes has the following calculated ampere-hour capacity:

However its actual ampere-hour rating will be closer to 100 ampere-hours because it is rated at the discharge current required to get 20 hours of operation (about 5 amperes). To determine the battery capacity you require, follow these steps:

$180 \text{ min.} \div 60 = 3 \text{ hrs}$ <p>Therefore...</p> $3 \text{ hr.} \times 25 \text{ amps} = 75 \text{ amp-hrs}$
--

- STEP 1 - For each piece of equipment you will be operating from the Portawattz 3000, determine how many watts it consumes. This can normally be found on a label on the product. If only the current draw is given, multiply the current draw by 115 to get the power consumption in watts.
- STEP 2 - For each piece of equipment you will be operating from the Portawattz 3000, estimate how many hours it will operate between battery charging cycles.
- STEP 3 - Calculate total watt-hours of energy consumption, total hours running time, and average power consumption as in the following example:

Equipment	Power Consumption (Watts)	Operating time	Watt Hours (Power x Operating Time)
TV & VCR	115	3 Hrs.	345
Sewing Machine	150	1 Hr.	150
Waterpik	90	0.25 Hrs. (15 Min.)	22.5
Blender	300	0.25 Hrs. (15 Min.)	75
Coffee Maker	750	0.3 Hrs. (18 Min.)	225
Coffee Grinder	100	0.2 Hrs. (12 Min.)	20
Microwave Oven	1500	0.5 Hrs. (30 Min.)	750
Washing Machine	1500	0.5 Hrs. (30 Min.)	750
TOTAL		6.0Hrs.	2337.5 watt-hours

Table 3

- STEP 4 - Using Table 3, find the battery size that will give you the required operating time at the calculated average power consumption. For instance, from the example below, the required operating time is 6 hours and the average power consumption is

387 watts. From the chart, the smallest battery size which will give more than 6 hours of operation at a power level between 300 and 400 watts are two 400 amp-hr. batteries in parallel, which offers between 10 and 12 hours of operating time.

Average Power Consumption	= 2337 watt-hrs ÷ 6 hours
	= 390 watts

12 volt Ampere-Hours Consumed	= Watt-hours ÷ 10
	= 2337 ÷ 10
	= 234 ampere-hours

Inverter Output Power (Watts)	Typical Load	BCI Group Size	Battery Size				
			22NF	24	27	8D	Dual 8D's
			Reserve Capacity	90 min.	140 min.	180 min.	400 min.
		AMP-Hrs.	50	75	100	200	400
50	Stereo System	Operating Time	9 Hrs.	14 Hrs.	20 Hrs.	40 Hrs.	80 Hrs.
100	19" Colour TV	Operating Time	4 Hrs.	6 Hrs.	10 Hrs.	20 Hrs.	40 Hrs.
200	Computer System	Operating Time	2 Hrs.	3 Hrs.	4.5 Hrs.	10 Hrs.	20 Hrs.
300	Blender	Operating Time	1.3 Hrs.	2.2 Hrs.	3 Hrs.	6 Hrs.	12 Hrs.
400	Power Drill	Operating Time	1 Hr.	1.5 Hrs.	2 Hrs.	4.5 Hrs.	10 Hrs.
600	Small Coffee Maker	Operating Time	N.R.	N.R.	1 Hr.	2.5 Hrs.	6 Hrs.
800	Small Microwave	Operating Time	N.R.	N.R.	N.R.	1.5 Hrs.	4 Hrs.
1000	Toaster	Operating Time	N.R.	N.R.	N.R.	1 Hr.	3 Hrs.
1500	Full Size Microwave	Operating Time	N.R.	N.R.	N.R.	0.5 Hrs.	2 Hrs.
2500	Hair Dryer & Washing Machine	Operating Time	N.R.	N.R.	N.R.	0.2 Hrs.	0.8 Hrs.

Table 4 - 12 Volt Battery Sizing Chart

When sizing your battery, be conservative. More capacity is better since you will have more reserve capacity, and your battery won't be discharged as deeply. Battery life is directly dependent on how deeply the battery is discharged. The deeper the discharge, the shorter the battery life. Ideally, the number of ampere-hours consumed by your loads before recharging the battery should be no more than 50% of the battery's rated capacity.

5.2.3. Using Multiple Batteries

To obtain sufficient battery capacity you may need to use more than one battery. Two identical batteries can be connected + to + and - to - in a parallel system that doubles capacity and maintains the voltage of a single battery. Do not connect batteries from different manufacturers, or with different amp-hr ratings, in parallel - decreased battery life may result (see Figure 7).

If you are using different batteries, or need to use more than two batteries, we recommend that you set up two separate battery banks and use them alternately. Battery selector switches are available from marine and RV dealers which allow you to select between two banks of batteries, or use both in parallel, or disconnect both from the load (see Figure 8).

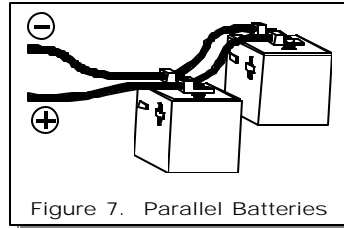


Figure 7. Parallel Batteries

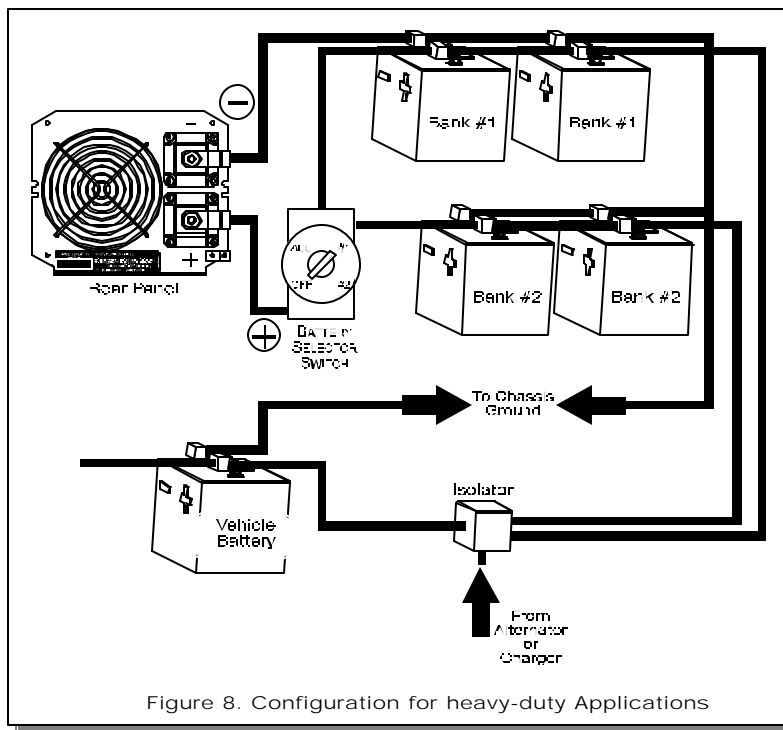


Figure 8. Configuration for heavy-duty Applications

5.2.4. Battery Tips

1. With the exception of sealed batteries, lead-acid batteries emit hydrogen and oxygen gases, and sulfuric acid fumes when recharging. Vent the battery compartment to prevent accumulation of these gases, and do not install electronic or electrical equipment in the battery compartment. Do not smoke or carry an open flame when working around batteries.

2. The capacity of lead-acid batteries is temperature sensitive. Battery capacity is rated at 25°C (77°F). At -20°C (0°F) the ampere-hour capacity will be about half the rated capacity.
3. Do not leave batteries in a discharged state for more than a day or two. They will undergo a chemical process called sulfation which can permanently damage the batteries. Also, batteries will self-discharge over a period of 3 to 6 months, so they should be periodically recharged even if they are not being used.
4. If your batteries are not the “maintenance-free” type, check the electrolyte fluid level at least once a month. Use only distilled water to replenish the electrolyte fluid. Excessive fluid loss is a sign of overcharging.
5. Connections to battery posts must be made with permanent connectors that provide a reliable, low resistance connection. Do not use “alligator” clips. Clean the connections regularly and prevent corrosion by using an insulating spray coating or Vaseline.
6. Battery state of charge can be measured with a hydrometer or, more easily, with a voltmeter. Use a digital voltmeter that can display tenths or hundredths of a volt when measuring 10 to 30 volts. Make your measurements after the (12 volt) battery has not been charged or discharged for several hours. For a deep-cycle battery at 25°C (77°F), refer to table 5.

Battery Voltage	State of Charge
12.7-12.9	100%
12.5-12.6	80%
12.3-12.4	60%
12.1-12.2	40%
11.9-12.0	20%

Table 5 - Battery Charge State.

5.2.5. Alternators and Charging Systems

A good charging system is important for the health of your batteries. Poor recharging methods can quickly damage your batteries. When possible, recharge your batteries when they are about 50% discharged. This will give you much longer battery cycle life than recharging when the batteries are almost completely discharged. The StatpowerTRUECHARGE™ family of battery chargers are designed to maximize your battery's performance and useful life (see your Statpower dealer for more details).

The charging system should be capable of delivering a charging current equal to 25% of the ampere-hour capacity of your battery. For instance, if you have a 200 ampere-hour battery, the charging system should be able to deliver 50 amperes. The charging system must also be able to charge each 12 volt

battery up to approximately 14.4 volts and then drop back to a "float" voltage of 13.5 to 14 volts (or shut off).

A typical engine alternator may not be able to meet these requirements if large capacity batteries are used. Alternators are typically rated for the current they can deliver when they are cold. In actual use, alternators heat up and their output current capability drops by as much as 25%. Thus standard alternators with ratings of 40 amperes to 105 amperes will only deliver a maximum of 30 to 80 amperes in actual use and will deliver even less as battery voltage rises. Many alternators cannot produce more than 13.6 volts when they are hot. As a result, a standard alternator may not be able to charge a large battery quickly and completely.

One solution is to install an alternator controller that will bypass the voltage regulator and boost the alternator's output voltage during charging. This will increase the alternator's charging rate at higher battery voltages and ensure more rapid and complete charging. Alternator controllers are available from marine product dealers.

Another solution is to install a high-output alternator. Heavy-duty alternators rated from 100 amperes to 140 amperes are available from RV and marine dealers, and auto parts suppliers. These alternators are designed to directly replace standard alternators but produce the higher current and higher voltage required to charge multiple battery systems.

When recharging from AC power, use a good quality marine battery charger or RV converter that meets the requirements specified above. Do not use chargers intended for occasional recharging of automotive starting batteries; these chargers are not intended for continuous use.

Your batteries may also be recharged from alternative energy sources such as solar panels, wind, or hydro systems. Make sure that you use the appropriate battery charge controller for your energy source.

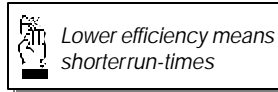
Do not operate the Portawattz 3000 directly from a charging source such as an alternator or solar panel. The Portawattz must be connected to a battery or a well-regulated, high-current DC power supply to work properly.

5.3 Battery Cables

Proper wire and wiring is very important for the safe and proper operation of the Portawattz 3000. Because the Portawattz 3000 has a low voltage, high current input, low resistance wiring between the

battery and the Portawattz 3000 is essential to deliver the maximum amount of usable energy to your load. Don't waste the investment you have made in batteries and a highly efficient inverter by using undersized wires.

Use only copper wire. Aluminum wire has about 1/3 more resistance than copper wire of the same size and it is more difficult to make a good, low-resistance connection. We recommend 2 x #1AWG or 1 x 3/0AWG copper cable (90°C insulation rating), as the minimum size for connecting between the battery and the Portawattz 3000. Keep the cable as short as possible, (Max. 10 ft./3 m). This will keep the overall system running at peak efficiency, and will keep the voltage drop between the battery and the unit to a minimum.



If the battery cables introduce an excessive voltage drop, the inverter may shut down when drawing higher currents because the voltage at the inverter drops below 10 volts. If you must use longer cables, then refer to Table 6 to decide on the next best size.

Max. Length of Cable (ft./m)	Min. Cable Size if using Single Cables	Min. Cable Size if using Double Cables
10/3	No. 3/0 AWG	2 x No. 1 AWG
15/4.6	250 MCM	2 x No. 2/0 AWG
20/6.1	400 MCM	2 x No. 3/0 AWG

Table 6: DC Cable Sizes (for voltage drop less than 0.5Vdc total - based on 90°C cable)

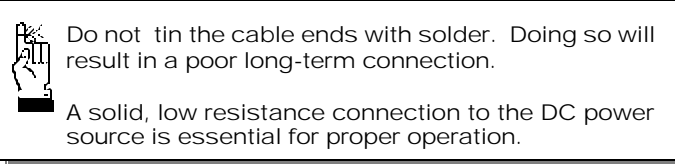
CAUTION!

Use cable rated at 90°C. For cable rated below 90°C or run in conduit, refer to applicable codes or standards for your application. Based on Table 1 of the Canadian Electrical Code, Part 1, and on Table 310-17 of the U.S. National Electrical Code (NFPA 70), 1993.

Strip approximately 1/2" (12.5mm) of insulation from the ends of the DC cables being connected to the inverter. Attach 5/16" ring terminals to the ends of the wires to be attached to the DC terminals on the Portawattz 3000. The ring terminals should be crimped with a proper crimping tool.

Another option is to use IIsco or equivalent box-lug terminals, (available at electrical parts suppliers). The bare cable end can then be inserted into the lug terminal.

The other ends of the cables, which are connected to the battery, must be terminated with battery terminals that clamp to the posts on the battery.



5.4 Connections

5.4.1 AC Wiring

You can plug your AC loads directly into the receptacles on the inverter front panel. Output power to each receptacle is limited by a circuit breaker, to 1500 Watts (15A).

You may also make a permanent AC connection via the AC knockout. This connection must be made in accordance with applicable electrical codes. If you are not familiar with the applicable electrical codes and wiring practices, we recommend you have the inverter installed by a qualified electrician.

5.4.2 Ground Wiring

The Portawattz 3000 has a lug on the rear panel. This is to connect the chassis of the Portawattz 3000, and therefore the inverter's AC output ground, to your AC distribution system ground. The ground wire in the AC junction box on the front panel of the Portawattz 3000 is connected to the chassis.

The chassis ground lug must be connected to a grounding point, which will vary depending on where the Portawattz 3000 is installed. In a vehicle, connect the chassis ground to the chassis of the vehicle. In a boat, connect to the boat's grounding system. In a fixed location, connect the chassis ground lug to earth ground by connecting to a ground rod (a metal rod pounded into the earth), or other proper service entrance ground. Use a #8 AWG or larger copper wire (preferably with green/yellow insulation) to connect the chassis ground lug to the grounding point.

The neutral (common) conductor of the Portawattz 3000 AC output circuit is connected to chassis ground. Therefore, when the chassis is connected to ground, the neutral conductor will also be grounded. This conforms to National Electrical Code requirements that separately derived AC sources (such as inverters and generators) have their neutral conductors tied to

ground in the same way that the neutral conductor from the utility line is tied to ground at the AC breaker panel.

WARNING!

Do not operate the Portawattz 3000 without connecting it to ground. Electrical shock may result.

5.4.3 DC Wiring

- STEP 1 - Ensure the ON/OFF switch on the Portawattz 3000 is in the OFF position. If you are using a battery selector switch, switch it off as well.
- STEP 2 - Connect the cables to the power input terminals on the rear panel of the Portawattz 3000. The red terminal is positive (+) and the black terminal is negative (-). Tighten the wire connections securely.
- STEP 3 - Connect the cable from the negative (black) terminal of the Portawattz 3000 to the negative terminal of the battery. Make a secure connection.

CAUTION!

Loose connectors result in excessive voltage drop and may cause overheated wires and melted insulation.

- STEP 4 - Before proceeding further, carefully check that the cable you have just attached connects the negative terminal of the Portawattz 3000 to the negative terminal of the battery. Power connections to the Portawattz 3000 must be positive to positive and negative to negative.

CAUTION!

We recommend a Main Fuse in the battery positive cable to protect against DC wiring short circuits (external to the inverter). The fuse should be as close to the battery as possible. We recommend an approved class R or class J fuse, such as Bussman JJN or FRN, Littelfuse JLLN or FLN or equivalent. The specific fuse ampere rating should be sized to allow operation of all your DC powered equipment and to properly protect your battery cables.

WARNING!

You may observe a spark when you make the following connection since current may flow to charge capacitors in the Portawattz 3000. Do not make this connection in the presence of flammable fumes. Explosion or fire may result.

STEP 5 - Connect the cable from the positive (red) terminal of the Portawattz 3000 to the positive terminal of the battery Main Fuse, or to the battery selector switch, if you are using one. Make a secure connection.

STEP 6 - If you are using a battery selector switch, switch it to select one of the batteries. Set the ON/OFF switch on the Portawattz 3000 to the ON position. Check the meters and indicators on the front panel of the Portawattz 3000. The battery voltage indicator should indicate 12 to 13 volts, depending on the voltage of the battery. If it does not, check your battery and the connections to the Portawattz 3000. The other indicators should be OFF.

6 Operation

To operate the Portawattz 3000, turn it on using the ON/OFF switch on the front panel. The Portawattz 3000 is now ready to deliver AC power to your loads. If you are operating several loads from the Portawattz 3000, turn them on separately after the unit has been turned ON. This will ensure that the Portawattz does not have to deliver the starting currents for all the loads at once.

6.1 Front Panel Controls and Indicators

6.1.1. ON/OFF Switch

The ON/OFF switch turns the control circuit in the Portawattz 3000 on and off. It does not disconnect power from the Portawattz 3000.

When the switch is in the OFF position, the Portawattz 3000 draws less than 0.2mA of current from the battery. When the switch is in the ON position but no power is being supplied to the load, the Portawattz 3000 draws less than 600 milliamperes from the battery. This is a low current draw. It would take more than a week to discharge a 100 ampere-hour battery at this current, so you don't have to worry about excessive drain on your battery if you leave the Portawattz 3000 switched on for a few days. Do switch the Portawattz OFF if you are not planning to recharge your battery within a week or so.

6.1.2. Remote ON/OFF Jack

The Portawattz 3000 has a jack which interfaces with the optional remote ON/OFF switch. The remote switch allows you to mount

your Portawattz out of sight and turn your Portawattz ON or OFF from a conveniently located panel. The remote switch has a push-button and indicator light showing that the inverter is ON or OFF (see your Statpower dealer for more details on the Portawattz Remote ON/OFF switch).

6.1.3. Battery Voltage Indicator

The battery voltage indicator displays the voltage at the input terminals of the Portawattz 3000. At low input currents, this voltage is very close to the battery voltage. At high input currents, this voltage will be lower than the battery voltage because of the voltage drop across the cables and connections.

Ideally, the voltage should remain in the green area of the indicator. If the voltage goes into the red area at the top or bottom of the indicator, the Portawattz 3000 may shut down.

6.1.4. Battery Current Indicator

The battery current indicator displays the current drawn from the battery by the Portawattz 3000. It will not indicate current drawn by other loads also connected to the battery.

For long term operation, the current should remain in the green area of the indicator. Short term operation is possible with current in the yellow area. If the current rises to the red area, the Portawattz will reduce its output voltage to protect itself.

6.1.5. OVERTEMP Indicator

The OVERTEMP indicator illuminates and the alarm indicator sounds when the Portawattz 3000 has overheated and shut itself down. The Portawattz may overheat because it has been operated at power levels above its 2500 watt continuous output rating, or because it has been installed in a location which does not allow it to dissipate heat properly. The Portawattz 3000 will restart automatically once it has cooled.

6.1.6. OVERLOAD Indicator

The OVERLOAD indicator illuminates when the Portawattz 3000 has shut itself down because of a severe overload. To Restart the Portawattz 3000 switch the ON/OFF switch to OFF, correct the fault condition (disconnect the load), and then switch the ON/OFF switch back to ON.

6.1.7 ALARM Indicator

An audible alarm will sound when any of the following conditions occur:

- OVERTEMP condition
- Low Battery Voltage (<10.7V)
- Low Voltage Shutdown (<10.0V)

6.2 Operating Limits

6.2.1. Power Output

The Portawattz 3000 will deliver up to 2500 watts or 22 amperes continuously. It will deliver 3000 watts or 27 amperes for approximately 5 minutes. The Portawattz must cool for 15 minutes before it can resume operation at 3000 watts. The wattage rating applies to resistive loads such as heaters while the current rating applies to reactive loads such as motors.

The Portawattz 3000 will operate most AC loads within these ratings. Some induction motors require very high surge currents to start. The Portawattz 3000 may not be able to start some of these motors even though their rated current draw is within the PROwatt's limits. The Portawattz 3000 will normally start single phase induction motors rated at 1HP or less.

If a motor refuses to start, observe the battery voltage indicator while trying to start the motor. If the battery voltage indicator drops below 11 volts while the Portawattz 3000 is attempting to start the motor, this may be why the motor won't start. Make sure that the battery connections are good and that the battery is fully charged. If the connections are good and the battery is charged, but the voltage still drops below 11volts, you may need to use a larger battery. See Battery Sizing notes in Section 4.2.

6.2.2. Input Voltage

The Portawattz 3000 will operate from input voltages between 10 volts and 15 volts. However, optimum performance is achieved with input voltages between 12.0 volts and 14.0 volts. If the voltage drops below 10.7 volts, the low battery warning will sound and the voltage indicator will be in the lower red zone. The Portawattz 3000 will shut down if the input voltage drops below 10 volts. This protects your battery from being over-discharged. The Portawattz will not restart unless the input voltage exceeds 11 volts.

The Portawattz 3000 will also shut down if the input voltage exceeds 15 volts. This protects the inverter against excessive input voltage. The voltage indicator will be in the upper red zone. Although the Portawattz 3000 incorporates protection against overvoltage, it may still be damaged if the input voltage exceeds 16 volts.

7 Accessories

7.1 Remote ON/OFF switch option

With this Statpower option installed, the Portawattz 3000 can be turned on and off from a remote location. The remote ON/OFF switch is equipped with a cable which allows the switch to be positioned as far as 20 ft. (6.1 m) away from the Portawattz 3000. The remote switch has a push-button and indicator light showing that the inverter is ON or OFF (see your Statpower dealer for more details on the PROwatt Remote ON/OFF switch).

7.2 DC Box-Lug connectors

These connectors are often used when it is not desirable or practical to attach ring terminals to wires. They are available at electrical parts suppliers.

8 Troubleshooting

8.1 Common Problems

8.1.1. *Buzz in Audio Systems*

Some inexpensive and/or portable stereo systems will emit a buzzing noise from their loudspeakers when operated from the Portawattz 3000. This is because the power supply in the stereo amplifier does not adequately filter the modified sine wave produced by the Portawattz 3000. The solution is to use a sound system that incorporates a higher quality power supply.

8.1.1. *Television Interference*

Operation of the Portawattz 3000 can interfere with television reception on some channels. If this situation occurs, the following steps may help to alleviate the problem:

1. Make sure that the chassis ground lug on the rear panel of the Portawattz 3000 is solidly connected to the ground system of your vehicle, boat, or home.
2. Do not operate high power loads with the Portawattz 3000 while watching television.
3. Make sure that the antenna feeding your television provides an adequate ("snow free") signal and that you are using good quality cable between the antenna and the television.
4. Move the television as far away from the Portawattz 3000 as possible.
5. Keep the cables between the battery and the Portawattz 3000 as short as possible and twist them together with as many twists per foot as is possible. This minimizes radiated interference from the cables.

8.2 Troubleshooting Guide

Problem and symptoms	Possible Cause	Solution
Low output voltage (96Vac to 104Vac)	Using an average reading voltmeter	Use true RMS reading meter. See section 2.2 of manual
Low output voltage and current indicator in red zone	Overload	Reduce load
No output voltage and voltage indicator in lower red zone	Low input voltage	Recharge battery, check connections and cable
No output voltage, no voltage indication	<ol style="list-style-type: none"> 1. Inverter switched OFF 2. No power to inverter 3. Internal fuse open 4. Reverse DC polarity 	<ol style="list-style-type: none"> 1. Turn inverter ON 2. Check wiring to inverter. Check battery fuse. 3. Have qualified service technician check and replace. 4. Have qualified service technician check and replace fuse, observe correct polarity.
No output voltage, voltage indicator in upper red zone	High input voltage	Make sure unit is connected to 12V battery, check regulation of charging system.
Low battery alarm on all the time, voltage indicator below 11 volts	Poor DC wiring, poor batter condition	Use proper cable and make solid connections. Charge battery or use new battery
No output voltage, OVERTEMP indicator ON, load in excess of 2500 Watts/250 ampere input current	Thermal shutdown	Allow unit to cool down. Reduce load if continuous operation required.
No output voltage, OVERTEMP indicator ON, load less than 2500 Watts/250 ampere input current	Thermal shutdown	Improve ventilation, make sure ventilation openings in unit are not obstructed, reduce ambient temperature.
No output voltage, OVERLOAD indicator ON	<ol style="list-style-type: none"> 1. Short circuit or wiring error 2. Very high power load 	<ol style="list-style-type: none"> 1. Check AC wiring for short circuit or improper polarity (hot and neutral reversed) 2. Remove or reduce load.

9 Maintenance

Very little maintenance is required to keep your Portawattz 3000 operating properly. You should clean the exterior of the unit periodically with a damp cloth to prevent accumulation of dust and dirt. The air intake on the rear panel and air exhaust slots on the front panel are especially prone to dust and dirt accumulation. A regular maintenance check is recommended, and the nuts on the DC input terminals should be tightened periodically.

10 Warranty

10.1 Warranty Terms

Statpower manufactures its hardware products from parts and components that are new or equivalent to new, in accordance with industry-standard practices. Statpower warrants the Portawattz 3000 to be free from defects in workmanship or materials for 6 months from the date of purchase. During this period, Statpower will, at its option, repair or replace the defective product free of charge. This warranty will be considered void if the unit has suffered any physical damage or alteration, either internally or externally, and does not cover damage arising from improper use, attempting to operate products with excessive power consumption requirements, or from use in an unsuitable environment. This warranty will not apply where the product has been misused, neglected, improperly installed, or repaired by anyone other than Statpower. In order to qualify for the warranty, the product must not be disassembled or modified without prior authorization by Statpower.

Repair or replacement is your sole remedy and Statpower shall not be liable for damages, whether direct, incidental, special, or consequential, even though caused by negligence or fault.

Statpower owns all parts removed from repaired products. Statpower uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Statpower repairs or replaces a product, its warranty term is not extended.

This is Statpower's only warranty, and The Company makes no warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

10.2 To Obtain Warranty Service

If your Portawattz 3000 requires service, please return it to the place of purchase. If you are unable to contact your merchant, or the merchant is unable to provide service, contact Statpower directly.

BY PHONE: (604) 420-1585

BY FAX: (604) 420-1591

BY MAIL: Statpower Technologies Corporation
7725 Lougheed Highway
Burnaby, BC V5A 4V8
CANADA

BY EMAIL: support@statpower.com

WEBSITE: www.statpower.com

You must obtain a Return Authorization Number from Statpower before returning a Portawattz 3000 directly to Statpower. Do not return a Portawattz 3000 to Statpower without first obtaining a Return Authorization Number. When you contact Statpower to obtain service, be prepared to supply

- a description of the problem;
- the serial number of the unit (serial number can be located on the back panel of the unit);
- and the name and address of the dealer, where you purchased the unit, and the date of purchase.

If you are returning a Portawattz 3000 to Statpower from the USA, follow this procedure:

1. Obtain a Return Authorization Number from Statpower.
2. Package the unit safely, preferably using the original box and packing materials. Include the Return Authorization Number, a return address where the repaired unit can be shipped, a contact telephone number, and a brief description of the problem.
3. Ship the unit to the following address, freight prepaid.

Statpower Technologies Corporation
C/O International Parcel Service Warehouse
(P.O. Box 1850) #200 - 14th Street
Blaine, WA 98230

If you are returning a Portawattz 3000 from Canada, follow the procedure above but ship the unit, freight prepaid, to the following address:

Statpower Technologies Corporation
7725 Lougheed Highway
Burnaby, B.C. V5A 4V8

11 Specifications

11.1 Electrical Performance

Output Power (5 minutes)	3000Watts
Output Power (Max. continuous)	2500 watts
Output voltage	115 VAC RMS +/- 5%
Output waveform	Modified sine wave, phase corrected
Output frequency	60 Hz +/- 0.01Hz.
Input voltage	10 to 15 VDC
Low battery alarm	audible, 10.7 VDC
Low battery cutout	10VDC
Efficiency.	85-90%
No-load current draw (Switch ON)	< 0.6 ADC
No-load current draw (Switch OFF)	< 0.2 mADC

11.2 Dimensions

Height	6.25" (159mm)
Width	8.0" (203mm)
Length	18.5" (470mm)
Weight	20lbs. (9kg)

All specifications subject to change without notice

12. Other Products from Statpower

Statpower Technologies Corporation develops, manufactures and markets power electronic products. Our goal is to offer you top quality products that convert and control electric power. We specialize in DC to AC inverters, battery chargers, backup power supplies and other products associated with mobile or power backup applications.

Portawattz™ Inverters

These compact and economical DC to AC inverters range from 140 Watts to 3000 Watts. They provide a well regulated quasi-sine wave output suitable for general applications.

NOTEpower™ Inverters

These compact, easy to use and affordable DC to AC inverters are ideal for low power applications (recharging camcorders, cell phones, laptop computers, etc.) These inverters are offered in the 50 Watt and 75 Watt range.

PROsine™ Inverters

Superior performance for those demanding applications. These true sinewave DC to AC inverters can deliver as much as 1800 Watts continuous and are ideal for those applications that are sensitive to AC power quality.

PROsine™ Inverter•Chargers

A combined package offering a true sine wave DC to AC inverter and battery charger. Delivers superior performance for those demanding applications. These DC to AC inverter•chargers are designed to deliver as much as 3000 Watts of continuous AC power and 120 amperes of battery charging current.

TRUECHARGE™ Battery Chargers

These microprocessor controlled, multi-step automatic battery chargers are ideal for deep cycle marine, RV, and industrial batteries.

To get more information on our products or to just find out more about us, give us a call at (604) 420-1585 or visit us on the world wide web at www.statpower.com.



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