

***PORTAWATTZ***<sup>TM</sup>  
***1000***  
*12 Volt*

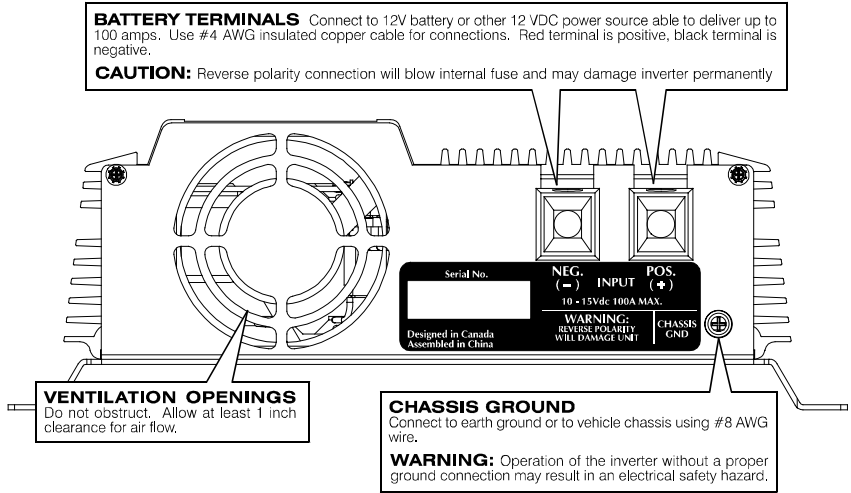
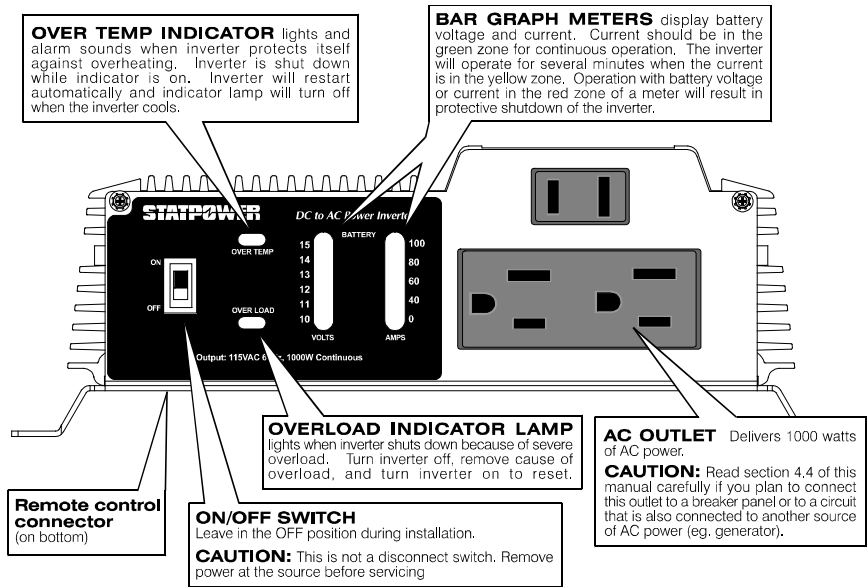
**DC to AC  
POWER INVERTER**

**OWNER'S MANUAL**



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## 1. Introduction

Your new Portawattz 1000 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 1000, it must be installed and used properly. Please read the installation and operating instructions in this manual carefully before installing and using your Portawattz 1000. Pay special attention to the **CAUTION** and **WARNING** statements in this manual and on the Portawattz 1000. **CAUTION** statements identify conditions or practices that could result in damage to your Portawattz 1000 or to other equipment. **WARNING** statements identify conditions or practices that could result in personal injury or loss of life.

## 2. How Your Portawattz 1000 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 1000, 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.

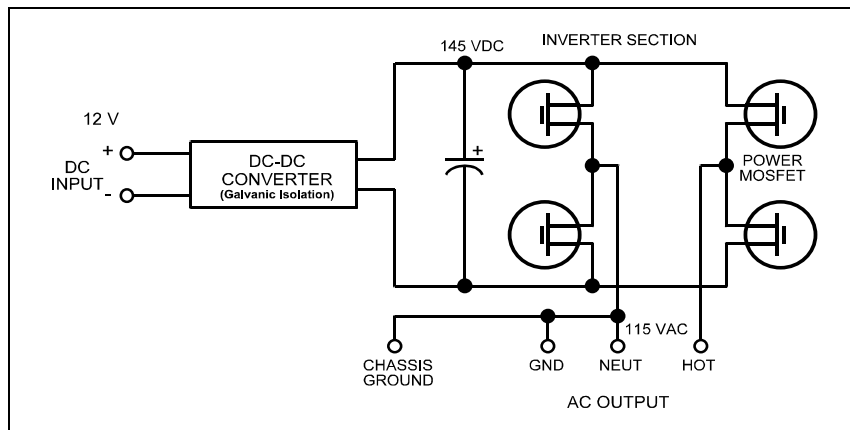


Figure 1. Principle of Operation

## 2.1 Principle of Operation

The Portawattz 1000 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 1000 Output Waveform

The AC output waveform of the Portawattz 1000 is called a "quasi-sine wave" or a "modified sine wave". 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 some other DC to AC inverters.

### **CAUTION: RECHARGEABLE APPLIANCES**

**Certain rechargers for small nickel cadmium batteries can be damaged if connected to the Portawattz.** 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 have a **WARNING** label stating that dangerous voltages are present at the battery terminals.

**Do NOT use the Portawattz with the above equipment.**

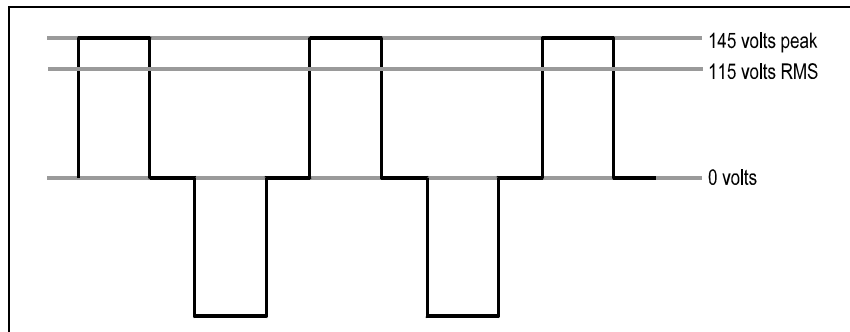


Figure 2. Modified Sine Wave

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.

The modified sine wave produced by the Portawattz 1000 is designed to have an RMS (root mean square) 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 1000. For accurate measurement of the output voltage of the Portawattz 1000, a **true RMS** reading voltmeter, such as a Fluke 87, Fluke 27, Tektronix DMM249, or B&K Precision Model must be used.

### 3. Quick Checkout

This section will give you the information you need to quickly hook-up your Portawattz 1000 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 power source to the Portawattz 1000
- c) a test load that can be plugged into the AC receptacle on the Portawattz 1000.

### 3.1 Power Source

For optimum performance, 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 guideline, divide the wattage of the test load by 10 to obtain the current (in amperes) the power source must deliver.

**Example:**

**Test load is rated at 250 watts.  
Power source must be able to deliver  
 $250 \div 10 = 25$  amperes.**

#### 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.

#### 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.

### 3.2 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 current 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.



We recommend #4 AWG stranded copper cable that is no longer than 4 ft (1.5 m) if you want to test the Portawattz 1000 to its maximum ratings. For short term testing at reduced power levels, the guidelines below should be followed:

Power Consumed (Watts)	Min. Copper Cable Size (AWG)
100	16
250	12
500	8

Table 1 - Test Load Power Consumption For Short Term Test

Ideally, the cable should be no more than 4 ft (1.5 m) long.

The end of the cable to be connected to the inverter must have its insulation stripped for about 1/2 inch (1.25 cm) back from the end, exposing the bare copper conductor. The other end of the cable, which is connected to the power source, must be terminated with a lug or other connector that allows a secure, low resistance connection to be made to the power source. For instance, if the power source is a battery, the cable must be terminated with a battery terminal that clamps to the post on the battery.

**A SOLID, LOW RESISTANCE CONNECTION TO THE POWER SOURCE IS ESSENTIAL FOR PROPER OPERATION OF THE PORTAWATTZ 1000.**

**3.3 Test Loads**

Use only equipment rated for 110-120 volt, 60 Hz AC operation that has a power consumption of 1000 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.

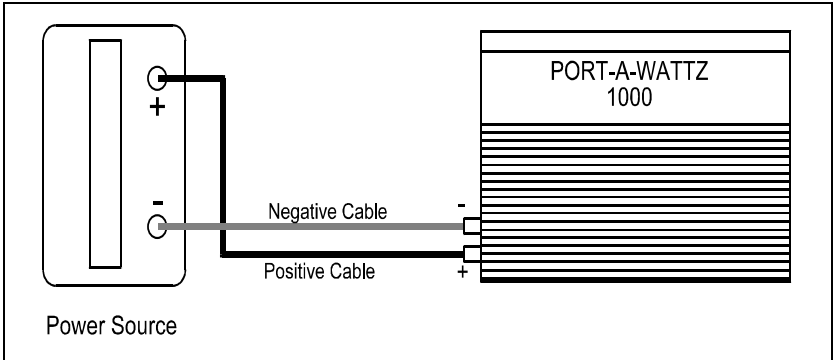


Figure 3. Connections to the Portawattz

### 3.4 Connections

Follow the connection sequence described below.

**STEP 1** Ensure that the ON/OFF switch on the Portawattz 1000 is in the OFF position. If the power source is a DC power supply, switch it off as well.

**STEP 2** Connect the cables to the power input terminals on the rear panel of the Portawattz 1000. The red terminal is positive (+) and the black terminal is negative (-). Insert the bare ends of the cables into the terminals and tighten the screws to clamp the wires securely.

**STEP 3** Connect the cable from the negative (black) terminal of the Portawattz 1000 to the negative terminal of the power source. Make a secure connection.

**CAUTION! LOOSELY TIGHTENED 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 connected connects the negative terminal of the Portawattz 1000 to the negative output terminal of the power source. Power connections to the Portawattz 1000 must be positive to positive and negative to negative.

**CAUTION! REVERSE POLARITY CONNECTION (POSITIVE TO NEGATIVE) WILL BLOW THE FUSES IN THE PORTAWATTZ 1000 AND MAY PERMANENTLY DAMAGE THE PORTAWATTZ 1000. DAMAGE CAUSED BY REVERSE POLARITY CONNECTION IS NOT COVERED BY YOUR WARRANTY.**

**STEP 5** Connect the cable from the positive (red) terminal of the Portawattz 1000 to the positive terminal of the power source. Make a secure connection.

**WARNING!** You may observe a spark when you make this connection since current may flow to charge capacitors in the Portawattz 1000. **DO NOT MAKE THIS CONNECTION IN THE PRESENCE OF FLAMMABLE FUMES. EXPLOSION OR FIRE MAY RESULT.**

**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 1000 to the ON position. Check the meters and indicators on the front panel of the Portawattz

1000. The voltage bar graph 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 1000. The other indicators should be off.

**STEP 7** Set the Portawattz 1000 ON/OFF switch to the OFF position. The indicator lights may blink and the internal alarm may sound momentarily. This is normal. Plug the test load into the AC receptacle on the front panel of the Portawattz 1000. Leave the test load switched off.

**STEP 8** Set the Portawattz 1000 ON/OFF switch to the ON position and turn the test load on. The Portawattz 1000 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 1000, refer to Section 2.2 of this manual.

## 4. Installation

### 4.1 Where to Install

The Portawattz 1000 should be installed in a location that meets the following requirements:

- a) **Dry** - do not allow water to drip or splash on the Portawattz 1000.
- b) **Cool** - ambient air temperature should be between 0° C and 40° C (30° F and 105° F) - the cooler the better.
- c) **Ventilated** - allow at least 1 inch (3cm) of clearance around the Portawattz 1000 for air flow. Ensure that ventilation openings on the rear and bottom of the unit are not obstructed.
- d) **Safe** - do not install the Portawattz in the same compartment as batteries or in any compartment capable of storing flammable liquids such as gasoline.
- e) **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. It is better and cheaper to run longer AC wires than longer DC cables.

**CAUTION! TO PREVENT FIRE, DO NOT COVER OR OBSTRUCT VENTILATION OPENINGS. DO NOT INSTALL THE PORTAWATTZ 1000 IN A ZERO-CLEARANCE COMPARTMENT. OVERHEATING MAY RESULT.**

**WARNING! THIS EQUIPMENT CONTAINS COMPONENTS WHICH TEND TO PRODUCE ARCS OR SPARKS. TO PREVENT 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 bracket on the bottom. Mounting hardware should be corrosion resistant and #10 or larger. The Portawattz may be mounted horizontally or vertically.

#### **4.2 Battery**

The battery you use strongly affects the performance you can expect from your Portawattz 1000. It is important to connect the Portawattz 1000 to the correct size and type of battery. The following information will help you select the appropriate batteries for your application.

##### 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.

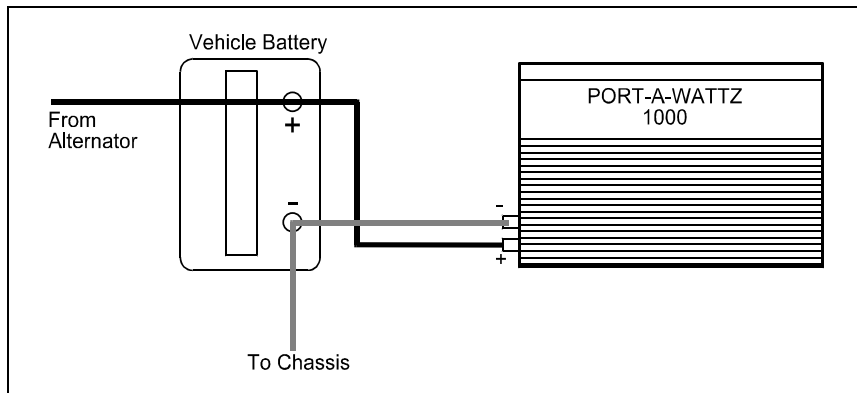


Figure 4. Portawattz Connected Directly to Engine Battery for Light-Duty Applications

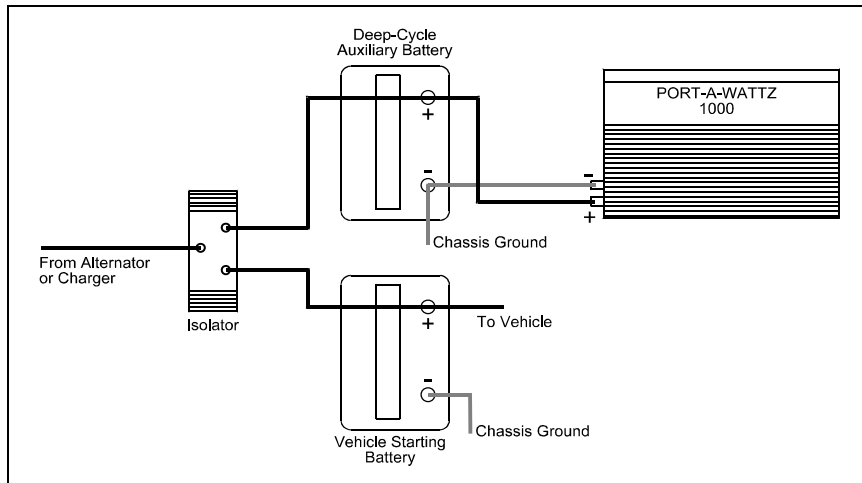


Figure 5. Recommended Battery Configuration for Medium-Duty Application

For most applications of the Portawattz 1000, 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 (as shown in Figure 5). A battery isolator is a solid-state electronic circuit that 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 1000 directly to the vehicle starting battery.

**CAUTION! THE PORTAWATTZ 1000 MUST BE CONNECTED ONLY TO BATTERIES WITH A NOMINAL OUTPUT VOLTAGE OF 12 VOLTS . THE PORTAWATTZ 1000 WILL NOT OPERATE FROM A 6 VOLT BATTERY, AND WILL BE DAMAGED IF IT IS CONNECTED TO A 24 VOLT BATTERY.**

### Battery Sizing

Unfortunately, there are a number of different standards for rating battery energy storage capacity. 12 volt 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:

$$180 \text{ min.} \div 60 = 3 \text{ hr.}, 3 \text{ hr.} \times 25 \text{ amps} = 75 \text{ amp-hrs}$$

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:

**STEP 1** For each piece of equipment you will be operating from the Portawattz 1000, 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 1000, 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:

<u>Equipment</u>	<u>Power Consumption</u>	<u>Operating Time</u>	<u>Watt-Hours (Power x Operating Time)</u>
TV & VCR	115 watts	3 hours	345
Sewing Machine	150 watts	1 hour	150
Waterpik	90 watts	0.25 hour	22.5
Blender	300 watts	0.25 hour	75
Coffee Maker	750 watts	0.3 hour	225
Coffee Grinder	100 watts	0.1 hour	10
<u>Microwave Oven</u>	<u>800 watts</u>	<u>0.5 hour</u>	<u>400</u>
Totals		5.4 hours	1227.5 watt-hours

Average Power Consumption =  $1227.5 \text{ watt-hours} \div 5.4 \text{ hours} = 227 \text{ watts}$

12 volt Ampere-Hours Consumed =  $\text{Watt-hours} \div 10 = 1227 \div 10 = 123 \text{ ampere-hours}$

**Step 4** Using the chart below (figure 6), find the battery size that will give you the required operating time at the calculated average power consumption. For instance, from the example above, the required operating time is 5.4 hours and the average power consumption is 227 watts. From the chart, the smallest battery size which will give more than 5 hours of operation at a power level between 200 and 300 watts is the 200 amp-hr. battery, which offers between 6 and 10 hours of operating time.

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.

Operating Time With Your Batteries								
Inverter Output Power (Watts)	Typical Load	12V Amp Draw from Battery	BATTERY					
			BCI Group Size	22NF	24	27	8D	Dual 8D's
			Reserve Capacity (min.)	90	140	180	400	900
			AMP Hours	50	75	100	200	400
100	19" Colour TV	10	OPERATING TIME (hrs)	4	6	10	20	40
300	Computer System	30	OPERATING TIME (hrs)	1.3	2.2	3	6	12
400	Power Drill	40	OPERATING TIME (hrs)	1	1.5	2	4.5	10
800	Small Microwave Oven	80	OPERATING TIME (hrs)	**	**	**	1.5	4
1000	Toaster	100	OPERATING TIME (hrs)	**	**	**	1	3

\*\* Not Recommended

Figure 6. 12 Volt Battery Sizing Chart

### 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 (see below) 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.

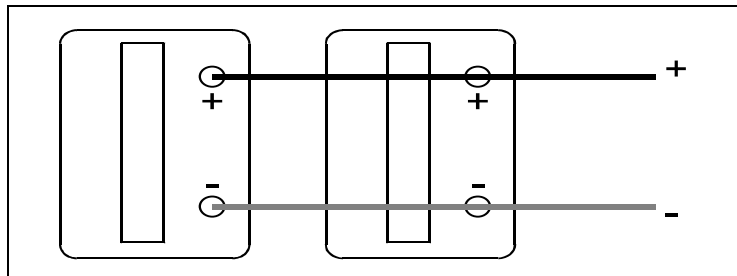


Figure 7. Parallel Connection of Two Batteries

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 that allow



you to select between two banks of batteries, or use both in parallel, or disconnect both from the load. (See Figure 8 below.)

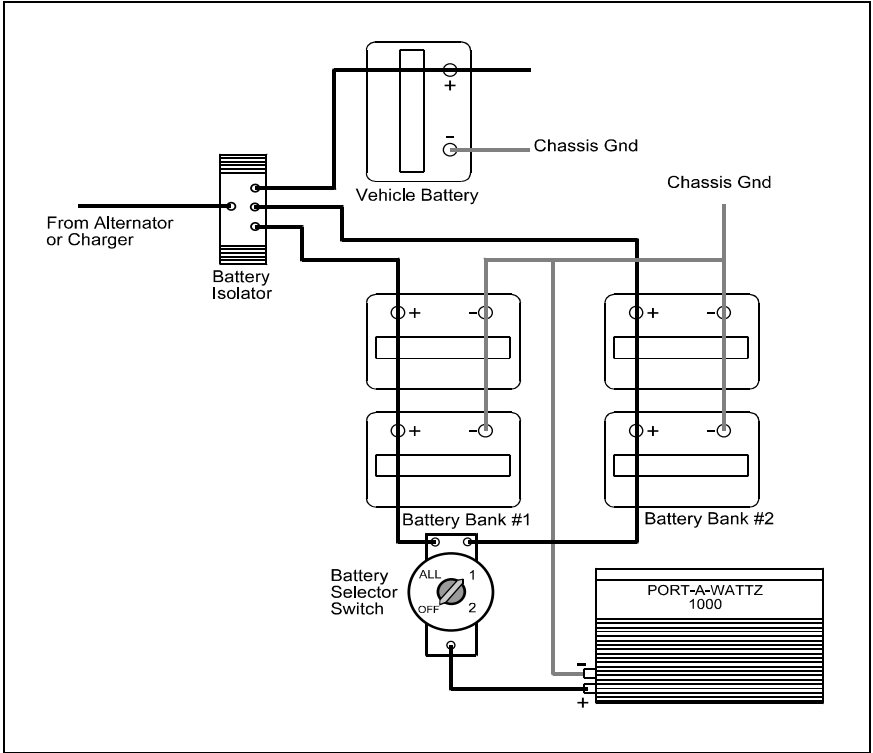


Figure 8. Recommended Battery Configuration for Heavy-Duty Applications

Battery Tips

1. Lead-acid batteries may 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 that can permanently damage the battery. 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), the following table may be used.

<b>Battery Voltage</b>	<b>State of Charge</b>
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%

#### 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 Statpower *TRUECHARGE* family of battery chargers are designed to maximize your batteries' 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, such as the Statpower TRUEcharge series, 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 1000 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.

### 4.3 Cables

Proper wire and wiring is very important to the proper operation of the Portawattz 1000. Because the Portawattz 1000 has a low voltage, high current input, low resistance wiring between the battery and the Portawattz 1000 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 good, low-resistance connections to aluminum wire.

We recommend #4 AWG copper cable (90° C. insulation rating) as the minimum size for connections between the battery and the Portawattz 1000. Keep the cable length as short as possible, ideally no longer than 4 ft (1.5 m). This will keep the voltage drop between the battery and the Portawattz to a minimum. 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. If you must use longer cables, then choose larger cable, such as #2 AWG, and trim the ends of the cable to fit the terminals.

The end of the cable to be connected to the inverter must have its insulation stripped for about 1/2 inch (1.25 cm) back from the end, exposing the bare copper conductor. The other end of the cable, which is connected to the battery post to a battery switch, or to a fuse block (see Section 4.4), must be terminated with a connector that makes a permanent, low resistance connection.

**A SOLID, LOW RESISTANCE CONNECTION TO THE BATTERY IS ESSENTIAL FOR PROPER OPERATION OF THE PORTAWATTZ 1000.**

### 4.4 Connections

#### AC Connections

**WARNING!** If making a permanent AC connection to the Portawattz 1000, ensure that the following AC wiring steps are performed **before any DC wiring is done**. DC hook-up energizes internal components, regardless of the position of the ON/OFF switch. Working on AC connections in such a circumstance may result in electrical shock.

**WARNING!** 115 Volt AC power is potentially lethal. Do not work on AC wiring while the wiring is connected to the Portawattz 1000 (even if it is switched off) unless the DC power source is physically disconnected from the inverter. Also do not work on AC wiring if it is connected to another AC power source such as a generator or the utility line.

**CAUTION!** Electrical installations must meet local and national wiring codes, and should be done by a qualified electrician.

Do not attempt your own AC wiring unless you have the knowledge and experience to do a safe job. Your RV or boat dealer, or a licensed electrician can do the job for you if you do not wish to do your own wiring.

In many cases you can plug your AC loads directly into the AC receptacle on the front panel of the Portawattz 1000. In other installations you may wish to manually connect the output of the Portawattz 1000 to existing AC wiring, as is shown in Figure 9.

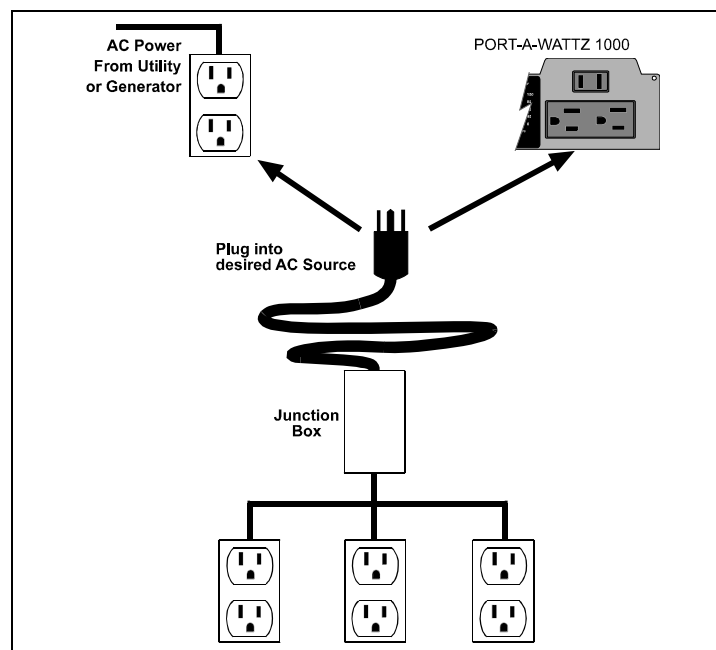


Figure 9. Simple Transfer Switching

**CAUTION! DO NOT CONNECT THE PORTAWATTZ 1000 AND ANOTHER AC SOURCE (SUCH AS A GENERATOR OR UTILITY POWER) TO THE AC WIRING AT THE SAME TIME.** The Portawattz 1000 will not operate if its output is connected to AC voltage from another source and potentially hazardous or damaging conditions may occur. These conditions can occur even if the Portawattz is switched off.

When installing the Portawattz 1000 into an electrical system that also uses power from a generator or the utility line, you must include a means of switching between the Portawattz and the other power source that never allows both to be connected to the AC distribution system at the same time. This can be as simple as a plug that is plugged into the desired AC power source (see Figure 9).

**CAUTION! DO NOT CONNECT THE PORTAWATTZ 1000 TO AN AC BRANCH CIRCUIT THAT HAS HIGH-POWER CONSUMPTION LOADS.** The Portawattz 1000 will not operate electric heaters, air conditioners, stoves, and other electrical appliances that consume more than 1000 watts.

Ground Wiring

The Portawattz 1000 has a screw on the rear panel labeled Chassis Ground. This is to connect the chassis of the Portawattz 1000 to ground. The ground terminal in the dual AC outlet on the front panel of the Portawattz 1000 is connected to the chassis.

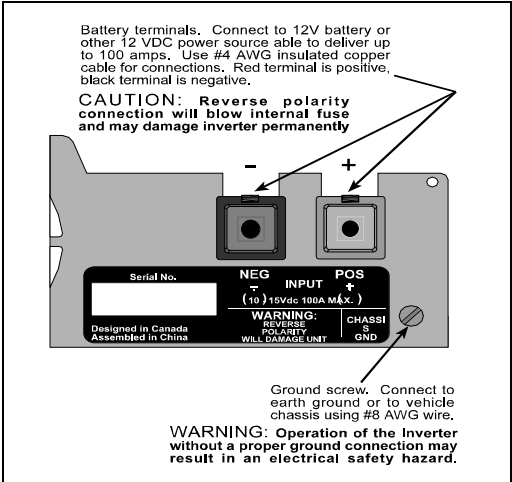


Figure 10. Rear Panel Connections to Portawattz

The chassis ground screw must be connected to a grounding point, which will vary depending on where the Portawattz 1000 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 screw 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 copper wire (preferably with green/yellow insulation) to connect the chassis ground screw to the grounding point.

The neutral (common) conductor of the Portawattz 1000 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 1000 WITHOUT CONNECTING IT TO GROUND. ELECTRICAL SHOCK HAZARD MAY RESULT.**

#### DC Wiring

**CAUTION! WE RECOMMEND A MAIN FUSE IN THE CABLE BETWEEN BATTERY POSITIVE AND THE INVERTER TO PROTECT AGAINST DC WIRING SHORT CIRCUITS (EXTERNAL TO THE INVERTER). THE FUSE SHOULD BE AS CLOSE TO THE BATTERY AS POSSIBLE. THE SPECIFIC FUSE AMPERE RATING SHOULD BE SIZED TO ALLOW OPERATION OF ALL EQUIPMENT CONNECTED TO THE CABLE AND TO PROTECT THE CABLE IN THE EVENT OF A FAULT. FOR A PORTAWATTZ 1000 CONNECTED TO A BATTERY WITH THE RECOMMENDED CABLE SIZE, WE RECOMMEND A 150 AMPERE FUSE RATED FOR 12 VOLT DC USE SUCH AS A BUSS FUSE ANL-150.**

**STEP 1** Ensure that the ON/OFF switch on the Portawattz 1000 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 1000. The red terminal is positive (+) and the black terminal is negative (-). Insert the bare ends of the cables into the terminals and tighten the screws to clamp the wires securely.

**STEP 3** Connect the cable from the negative (black) terminal of the Portawattz 1000 to the negative terminal of the battery. Make a secure connection.

**CAUTION! LOOSELY TIGHTENED 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 connected connects the negative terminal of the Portawattz 1000 to the negative terminal of the battery. Power connections to the Portawattz 1000 must be positive to positive and negative to negative.

**CAUTION! REVERSE POLARITY CONNECTION (POSITIVE TO NEGATIVE) WILL BLOW INTERNAL FUSES IN THE PORTAWATTZ 1000 AND MAY PERMANENTLY DAMAGE THE PORTAWATTZ 1000. DAMAGE CAUSED BY REVERSE POLARITY CONNECTION IS NOT COVERED BY YOUR WARRANTY.**

**STEP 5** Connect the cable from the positive (red) terminal of the Portawattz 1000 to the positive terminal of the battery Main Fuse, or to the battery selector switch, if you are using one. Make a secure connection.

You may observe a spark when you make this connection since current may flow to charge capacitors in the Portawattz 1000.

**WARNING! DO NOT MAKE THIS CONNECTION IN THE PRESENCE OF FLAMMABLE FUMES. EXPLOSION OR FIRE MAY RESULT. THOROUGHLY VENTILATE THE BATTERY COMPARTMENT BEFORE MAKING THIS 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 1000 to the ON position. Check the meters and indicators on the front panel of the Portawattz 1000. The voltage bar graph 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 1000. The other indicators should be off.



## 5. Operation

To operate the Portawattz 1000, turn it on using the ON/OFF switch on the front panel. The Portawattz 1000 is now ready to deliver AC power to your loads. If you are operating several loads from the Portawattz 1000, turn them on separately after the Portawattz has been turned on. This will ensure that the Portawattz does not have to deliver the starting currents for all the loads at once.

### 5.1 Controls and Indicators

**ON/OFF Switch** The ON/OFF switch turns the control circuit in the Portawattz 1000 on and off. It does not disconnect power from the Portawattz.

When the switch is in the OFF position, the Portawattz 1000 draws no current from the battery. When the switch is in the ON position but no power is being supplied to the load, the Portawattz 1000 draws less than 300 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 1000 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.

**Remote Panel (Optional)** The Portawattz also has a jack located on the bottom of the unit which interfaces with the optional remote panel. The remote panel allows you to mount your Portawattz out of sight and turn your Portawattz ON/OFF from a conveniently located panel. The remote panel has a button and indicator light showing the inverter is ON or OFF (see your Statpower dealer for more details on the Statpower remote panel).

**Battery Voltage Indicator** The battery voltage bar graph indicates the voltage at the input terminals of the Portawattz 1000. 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 cable and connections.

Ideally, the voltage should remain in the green area of the bar graph. If the voltage goes into the red areas at the top and bottom of the graph, the Portawattz may shut down.

**Battery Current Indicator** The battery current bar graph indicates the current drawn from the battery by the Portawattz 1000. 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 bar graph. 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.

**OVERTEMP Indicator** The OVERTEMP indicator light and alarm sound indicates that the Portawattz 1000 has shut itself down because it has become overheated. The Portawattz may overheat because it has been operated at power levels above its 1000 watt continuous output rating, or because it has been installed in a location which does not allow it to dissipate heat properly. The Portawattz 1000 will restart automatically once it has cooled off.

**OVERLOAD Indicator** The OVERLOAD indicator indicates that the Portawattz 1000 has shut itself down because of severe overload, an AC wiring fault, or the presence of another AC power source. Switch the ON/OFF switch to OFF, correct the fault condition, and then switch the ON/OFF switch back to ON. Do not turn the Portawattz 1000 back on unless the fault condition is corrected (load removed/unplugged, wiring repaired, etc.).

## 5.2 Operating Limits

### Power Output

The Portawattz 1000 will deliver up to 1000 watts or about 8 amperes continuously, depending on the battery voltage and the ambient temperature. The wattage rating applies to resistive loads while the current rating applies to reactive loads such as motors.

The Portawattz 1000 will operate most AC loads within its power rating. Some induction motors used in freezers, pumps, and other motor operated equipment require very high surge currents to start. The Portawattz 1000 may not be able to start some of these motors even though their rated current draw is within the Portawattz's limits. The Portawattz 1000 will normally start single phase induction motors rated at 1/2 HP 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 1000 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 11 volts, you may need to use a larger battery.

### Input Voltage

The Portawattz 1000 will operate from input voltage ranging from 10 volts to 15 volts. It operates best when the voltage is in the range from 12 volts to 14.0 volts. If the voltage drops below 10.7 volts, an audible low battery warning will sound and the voltage indicator will be in the lower red zone. The Portawattz 1000 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 1000 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 1000 incorporates protection against overvoltage, it may still be damaged if the input voltage exceeds 16 volts.

## **6. Troubleshooting**

### **6.1 Common Problems**

#### Buzz in Audio Systems

Some inexpensive stereo systems and "boom boxes" will emit a buzzing noise from their loudspeakers when operated from the Portawattz 1000. This is because the power supply in the device does not adequately filter the modified sine wave produced by the Portawattz 1000. The only solution is to use a sound system that incorporates a higher quality power supply.

#### Television Interference

Operation of the Portawattz 1000 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 back of the Portawattz 1000 is solidly connected to the ground system of your vehicle, boat, or home.
2. Do not operate high power loads with the Portawattz 1000 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 1000 as possible.
5. Keep the cables between the battery and the Portawattz 1000 as short as possible and twist them together with about 2 to 3 twists per foot. This minimizes radiated interference from the cables.

## 6.2 Troubleshooting Guide

<u>Problem and Symptoms</u>	<u>Possible Cause</u>	<u>Solution</u>
Low output voltage (96 VAC to 104 VAC)	Using 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.	Inverter switched off No power to inverter Internal fuse open	Turn inverter on. Check wiring to inverter. Have qualified service technician check and replace.
	Reverse DC polarity	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 that Portawattz is connected to 12V battery, check regulation of charging system.
Low battery alarm on all the time, voltage indicator below 11 V.	Poor DC wiring, poor battery condition	Use proper cable and make solid connections, Use new battery.
No output voltage, OVERTEMP indicator on, load in excess of 1000 watts/100 ampere input current.	Thermal shutdown	Allow Portawattz to cool off. Reduce load if continuous operation required.

<u>Problem and Symptoms</u>	<u>Possible Cause</u>	<u>Solution</u>
No output voltage, OVERTEMP indicator on, load less than 1000 watts/100 ampere input current.	Thermal shutdown	Improve ventilation, make sure ventilation openings in Portawattz aren't obstructed, reduce ambient temperature.
No output voltage, OVERLOAD indicator on.	Short circuit or wiring error.	Check AC wiring for short circuit, improper polarity (hot and neutral reversed), or connection to another AC power source.
	Very high power load	Remove load.

## **7. Maintenance**

Very little maintenance is required to keep your Portawattz 1000 operating properly. You should clean the exterior of the unit periodically with a damp cloth to prevent accumulation of dust and dirt. At the same time, tighten the screws on the DC input terminals.

## **8. Limited Warranty (USA and Canada only)**

**What Does This Warranty Cover?** Statpower manufactures its products from parts and components that are new or equivalent to new, in accordance with industry standard practices. This warranty covers any defects in workmanship or materials.

**How Long Does The Coverage Last?** This warranty lasts for 6 months from the date of purchase. Implied warranties of merchantability and fitness for a particular purpose are limited to six months from date of purchase. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

**What Does This Warranty Not Cover?** This warranty will not apply where the product has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment. Statpower does not warrant uninterrupted operations of its products. Statpower shall not be liable for damages, whether direct, incidental, special, or consequential, or economic loss even though caused by the negligence or fault of Statpower. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

**What Will Statpower Do?** Statpower will, at its option, repair or replace the defective product free of charge. Statpower will, at its own option, use new and/or reconditioned parts made by various manufacturers in performing warranty repair and building replacement products. If Statpower repairs or replaces a product, its warranty term is not extended. Statpower owns all parts removed from repaired products.

**How Do You Get Service?** In order to qualify for the warranty, dated proof of purchase must be provided and the product must not be disassembled or modified without prior authorization by Statpower. If your product requires warranty service, please return it to the place of purchase along with a copy of your dated proof 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 EMAIL: [customerservice@statpower.com](mailto:customerservice@statpower.com)  
BY MAIL: Statpower Technologies Corporation  
7725 Lougheed Highway  
Burnaby, BC V5A 4V8  
CANADA

You must obtain a Return Authorization Number from Statpower before returning a product directly to Statpower. Do not return a product to Statpower without first obtaining a Return Authorization Number. When you contact Statpower to obtain service, be prepared to supply the serial number of your product and its date of purchase.

*If you are returning a product 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 copy of your dated proof of purchase, a return address where the repaired unit can be shipped, a contact telephone numbers, 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  
#8 – 14<sup>th</sup> Street  
Blaine, WA 98230 USA

*If you are returning a product from Canada, follow steps 1 & 2 above and ship the unit, freight prepaid, to the following address:*

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

**How Other Laws Apply?** This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

**For our Canadian Customers:** When used herein “implied warranties of merchantability and fitness for a particular purpose” includes all warranties and conditions, express or implied, statutory or otherwise, including without limitation implied warranties and conditions of merchantability and fitness for a particular purpose.



## 9 Product Specifications

### 9.1 Electrical Performance

Output Power

Max continuous: 1000watts

Output voltage: 115 VAC RMS  $\pm$  5%

Output waveform: Modified sine wave, phase corrected

Output frequency: 60 Hz  $\pm$  0.01%

Input voltage: 10 to 15 VDC

Low battery alarm: audible, 10.7 volts

Low battery cutout: 10 volts

Efficiency: approx. 85-90%

No-load current draw:  $<$  0.3 A

### 9.2 Dimensions

Height: 3.25" (8cm)

Width: 9.5" (24cm)

Length: 10.25" (26cm)

Weight: 5.2 lb (2.4Kg)

Specifications subject to change without notification.

## **10 Other Products From Statpower Technologies**

Statpower Technologies 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 packs, battery chargers, backup power supplies and other products associated with mobile or power backup applications.

**Portawattz Inverters** Value priced quasi-sinewave DC to AC inverters with power ratings from 140 watts to 3000 watts.

**TRUEcharge Battery Chargers** Top quality smart battery chargers for deep-cycle batteries with charging current ratings from 10 amperes to 40 amperes.

**PROsine Inverters** Premium true sinewave DC to AC inverters for demanding applications. 1000 watt and 1800 watt models available.

**PROsine Inverter/Chargers** Advanced power converters offering an integrated combination of a true sinewave inverter and a smart battery charger. 2500 and 3000 watt models available.

Contact your Statpower dealer for more information or check out our web-site – **[www.statpower.com](http://www.statpower.com)**





The Power to Make it Happen™

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