PROwatt™ 150i
POWER INVERTER

OWNER'S MANUAL

STATPOWER TECHNOLOGIES CORPORATION

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1. Introduction

Your new PROwatt 150i 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 vehicle, boat, RV, or remote home.

To get the most out of your PROwatt 150i it must be installed and used properly. Please read the installation and operating instructions in this manual carefully before installing and using your PROwatt 150i. Pay special attention to the **CAUTION** and **WARNING** statements in this manual and on the PROwatt 150i. **CAUTION** statements identify conditions or practices that could result in damage to your PROwatt 150i or to other equipment. **WARNING** statements identify conditions or practices that could result in personal injury or loss of life.

2. How Your PROwatt 150i Works

An inverter is an electronic device that converts low voltage DC (direct current) electricity from a battery or other power source to standard 230 volt AC (alternating current) household power. In designing the PROwatt 150i, Statpower has used design techniques previously employed in computer power supplies. This advanced design gives you an inverter that is smaller, lighter, and easier to use than any other inverter with a similar power rating.

2.1 Principle of Operation

The PROwatt 150i converts power in two stages. The first stage is a DC-to-DC converter that raises the low voltage DC at the inverter input to 265 volts DC. The second stage is the actual inverter stage. It converts the high voltage DC into 230 volts, 50 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 ballast's and small induction motors.

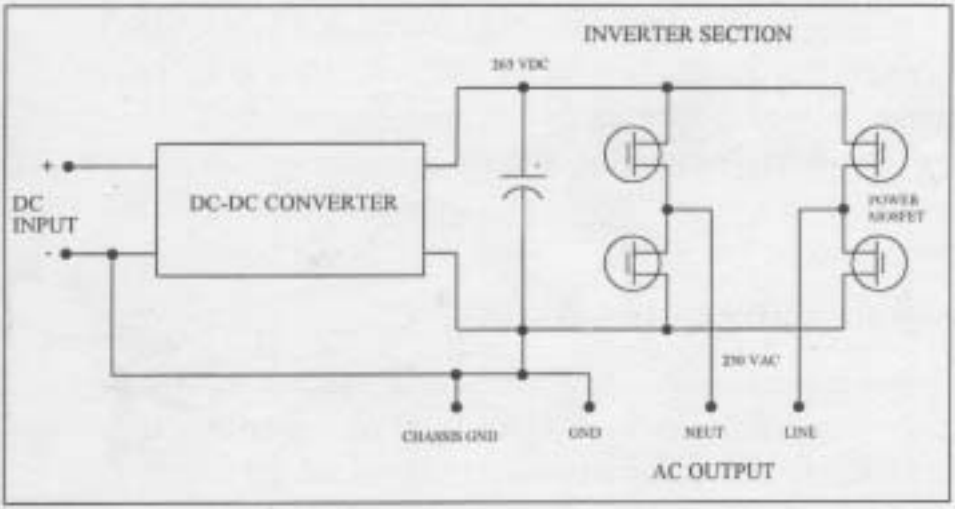

Figure 1. PROwatt 150i - Principle of Operation

2.2 PROwatt 150i Output Waveform

The AC output waveform of the PROwatt 150i 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 many other dc to ac inverters.

The modified sine wave produced by the PROwatt 150i is designed to have an RMS (root mean square) voltage of 230 volts, the same as standard household power. Most AC voltmeters (both digital and analog) are sensitive to the average value of the wave form 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 25 to 35 volts low (i.e. about 200 V) when measuring the output of the PROwatt 150i. For accurate measurement of the output voltage of the PROwatt 150i, a **true RMS** reading voltmeter such as a Fluke 87, Fluke 8060A, Beckman 4410, or Triplett 4200 must be used.

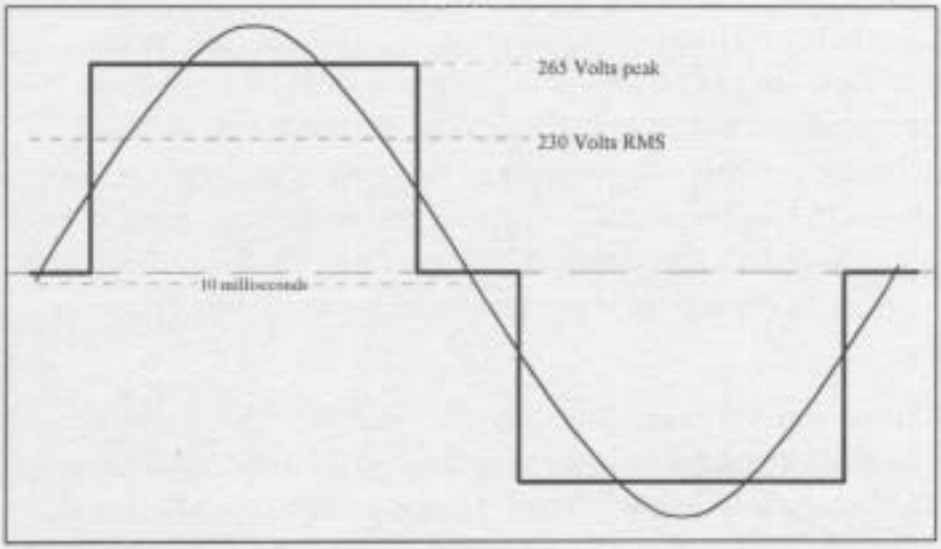

Figure 2. PROwatt 150i Modified Sine Wave

3. Installation

3.1 Power Source

The power source must provide between 10 and 15 volts DC and must be able to supply sufficient current to operate the load. The power source may be a battery or a well-regulated DC power supply. As a rough guideline, divide the power consumption of the load (in watts) by 10 to obtain the current (in amperes) the power source must deliver.

Example: Load is rated at 100 watts. Power source must be able to deliver

$$100 \div 10 = 10 \text{ amperes}$$

CAUTION The PROwatt 150i must be connected only to batteries with a nominal output voltage of 12 volts. The PROwatt 150i will not operate from a 6 volt battery and will be damaged if it is connected to a 24 volt battery.

3.2 Connecting to power source

The PROwatt 150i is equipped with a cigarette lighter plug for connection to the power source. The tip of the plug is positive and the side contact is negative. Connect the plug to the cigarette lighter socket in a vehicle or to the cigarette lighter socket on a battery pack.

CAUTION - REVERSE POLARITY CONNECTION WILL DAMAGE INVERTER

If the inverter is connected to the incorrect polarity, an internal fuse will open and the inverter will not function. The unit must be returned to Statpower for repair. Repair costs for this type of damage are not covered by your warranty.

CAUTION: DO NOT USE WITH POSITIVE GROUND ELECTRICAL SYSTEMS

The PROwatt 150i is designed for use with negative ground vehicle electrical systems. The case of the inverter is connected to ground conductor of the ac output cord and to the negative side of the dc input. The PROwatt 150i should not be used with positive ground vehicle electrical systems.

3.3 Connection to load

The PROwatt 150i is equipped with an ac output socket (IEC 320) and adapter cord terminated with an IEC 320 plug. This plug mates

to the ac power inlet connector on electrical and electronic equipment designed to use detachable ac power cords.

CAUTION: DO NOT CONNECT TO AC DISTRIBUTION WIRING

The PROwatt 150i is designed to be directly connected to standard electrical and electronic equipment in the fashion described above. Do not connect the PROwatt 150i to household or RV ac distribution wiring. Do not connect the PROwatt 150i to any ac load circuit in which the neutral conductor is connected to ground (earth) or to the negative of the dc (battery) source.

CAUTION: RECHARGEABLE APPLIANCES

Certain rechargers for small nickel cadmium batteries can be damaged if connected to the PROwatt 150i. 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 that dangerous voltages are present at the battery terminals.

Do NOT use the PROwatt 150i with the above equipment.

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 PROwatt 150i will have no trouble powering this charger or adapter safely.

3.4 Placement of inverter

For best operating results, the inverter should be placed on a flat surface, such as the floor or seat of a vehicle. Approximately 0.6 m (2 feet) of cord have been provided for this purpose. The inverter should only be used in locations that meet the following requirements:

a) Dry - do not allow water to drip or splash on the PROwatt 150i.

b) Cool - ambient air temperature should be between 0° C and 40° C - ideally between 15° C and 25° C. Do not place the inverter on or near a heating vent or any piece of equipment that is generating heat above room temperature. Do not place the inverter in direct sunlight if avoidable.

c) Ventilated - allow at least one inch of clearance around the PROwatt 150i for air flow. Do not place items on or over the inverter during operation. Make sure that air is allowed to circulate freely around the unit. A fan is helpful in cases where the inverter is operating at maximum power output for extended periods.

The unit will shut down if the internal temperature exceeds 90° C. It will restart once it cools off.

CAUTION - PROwatt 150i CASE GETS HOT

The case of the PROwatt 150i acts as a heat sink, dispersing internally generated heat. When the PROwatt 150i is operating at high power levels (above 100 watts) for extended periods, the case will get hot. Surface temperatures may approach 60° C (140° F) on

some parts of the case. When operating at high power levels, do not place the PROwatt on or near materials that may be affected by these temperatures. Use caution when handling the PROwatt if it is operating at high power levels.

d) Safe - do not use the PROwatt 150i near flammable materials or in any location that may accumulate flammable fumes or gases.

4. Operating Tips

4.1 Rated versus actual current draw of equipment

Manufacturers of electrical and electronic equipment often overrate the current drawn by their products. If a piece of electrical or electronic equipment is rated at 250 watts (1 A) or less, the PROwatt 150i will probably operate it. The inverter has overload protection, so it is safe to try it with equipment rated at 250 watts or less. The inverter will shut down if it is overloaded, and will restart once the overload is removed.

The PROwatt 150i will NOT operate appliances that produce heat, such as hair dryers, microwave ovens and toasters.

4.2 Battery Operating Time

With a typical vehicle battery, a minimum operating time of 5 hours can be expected. In most cases, 5 to 10 hours of operating time is achievable. Statpower recommends that the operator start the vehicle every 2 - 3 hours to recharge the battery system. This will prevent any unexpected shut-downs of the equipment and will ensure that there is always sufficient battery capacity to start the vehicle engine.

The inverter may be used either while the engine is running or turned off. However, the inverter may not operate while the engine is starting since the battery voltage can drop substantially during cranking.

The PROwatt 150i draws less than 0.12 ampere from the battery when it is not supplying power to a load. In most cases the PROwatt 150i may be left connected to the battery when it is not in use since it draws so little current. If the vehicle will not be used for several days, disconnect the PROwatt 150i from the battery.

5. Troubleshooting

5.1 Common problems

Buzz in audio systems Some inexpensive stereo systems and "boom boxes" will emit a buzzing sound from their loudspeakers when operated from the PROwatt 150i. This is because the power supply in the device does not adequately filter the modified sine wave produced by the PROwatt 150i. The only solution is to use a sound system that incorporates a higher quality power supply.

Television interference The PROwatt 150i is shielded and filtered to minimize interference with TV signals. In some cases, particularly with weak TV signals, some interference may still be visible. Try the following corrective measures:

a) Position the PROwatt 150i as far as possible from the television, the antenna and the antenna cables. Use an extension cord to move the PROwatt away from the television.

b) Adjust the orientation of the PROwatt 150i, the antenna cables, and the TV power cord to minimize interference.

c) Make sure that the antenna feeding the television provides an adequate ("snow free") signal and that high quality, shielded antenna cable is used.

These measures will usually improve the situation. If they do not, you may wish to try a different make of TV set or an antenna that can provide a stronger signal. Experience has shown that different models of TV sets vary in their susceptibility to interference.

5.2 Troubleshooting Guide

Problem: Lack of power output

Possible cause	Suggested remedy
Poor contact with lighter outlet.	Clean out thoroughly. Replace if necessary. Spread contacts on lighter plug.
Automotive electrical system requires ignition to be on.	Turn ignition key to accessory position.
Cigarette lighter circuit fuse open (blown).	Check vehicle fuses, replace damaged fuse.
Poor connection or inadequate wiring between battery and cigarette lighter	Repair connections and use heavier gauge wire (14 AWG suggested).
Battery voltage below 10 volts.	Recharge or replace battery.

Possible cause	Suggested remedy
Load draws too much power.	Reduce load to 200 watts max.
Inverter in thermal shutdown.	Allow inverter to cool. Ensure there is adequate ventilation. Ensure that load is no more than 150i watts for continuous operation.
Fusible link in inverter open.	Return for service. Ensure that inverter is connected to power source with correct voltage and polarity.

Problem: Low output voltage

Possible cause	Suggested remedy
Using average reading volt-meter.	Use true RMS reading meter. See section 2.2 of manual.
Inverter is overloaded.	Reduce load to 150 watts max-imum to maintain regulation.
Power source voltage below 11.5 volts.	Keep power source voltage above 11.5 volts to maintain full output voltage under load.

6 Warranty

6.1 Warranty terms

Statpower warrants the PROwatt 150i to be free from defects in workmanship or materials for 12 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 reverse polarity connection or \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 are your sole remedies and Statpower shall not be liable for damages, whether direct, incidental, special, or consequential, even though caused by negligence or fault.

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

6.2 To obtain warranty service

If your PROwatt 150i requires service, **please return it to your place of purchase.** If you are unable to contact your merchant, or the merchant is unable to provide service, contact the Statpower Technologies Customer Service Department directly.

BY PHONE: (604) 420-1585

BY FAX: (604) 420-1591

BY MAIL: **Statpower Technologies Corporation**

Customer Service Dept.

7725 Lougheed Hwy.

Burnaby, B.C. V5A 4V8

CANADA

In order to assist you, the customer service representative will need the following information:

- a description of the problem,
- serial number of the unit,
- name and address of the dealer where you purchased the unit,
- date of purchase.

If your PROwatt 150i requires service by Statpower, the customer service representative will issue you a RETURN AUTHORIZATION NUMBER. **DO NOT RETURN ANY PRODUCT TO STATPOWER WITHOUT A RETURN**

AUTHORIZATION NUMBER. If you are returning a PROwatt 150i to Statpower from Canada, 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
7725 Lougheed Hwy.
Burnaby, B.C. V5A 4V8

If you are returning a PROwatt 150i from the USA, follow the above procedure but ship the unit, freight prepaid, to the following address:

Statpower Technologies Corporation
C/O International Parcel Service Warehouse
#200 - 14TH Street
Blaine, WA 98230

PROwatt 150i Inverter
Product Specifications

Output power	
continuous	140 watts
5 minutes	200 watts
surge	400 watts
Output voltage	230 VAC RMS± 5%
Output frequency	50 Hz ± 0.05Hz.
Output waveform	modified sinewave
Input voltage	10 - 15 VDC
Efficiency	90%
No-load current draw:	<0.12 A
Low battery shutdown	10 V
Dimensions	40 x 115 x 115 mm
Weight	520 g

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.

PROwatt™ 250i Inverter A higher power product than PROwatt 150i, the PROwatt 250i delivers 250 watts of ac power yet is still small enough to hold in the palm of a hand. Ideal for medium size power tools, large screen TV sets, desktop computers and other applications that are beyond the power capacity of the PROwatt 150i.

PROwatt™ 800i Inverter and PROwatt 1500i Inverters Compact 800i and 1500i watt dc to ac inverters designed for permanent installation in a boat, vehicle, or remote home. These inverters operate power tools, kitchen appliances, and a wide range of other electrical and electronic equipment.

TRUE*CHARGE*™ Battery Chargers Microprocessor controlled, multi-step automatic battery chargers. Ideal for deep cycle marine, RV and industrial batteries.

For more information on these products, and other soon to be introduced products, contact your dealer or Statpower directly.

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