

Things That Work

Tested by Home Power

RV Power Products' Solar Boost™ 2000

Tested by Sam Coleman,
with help from Joe Schwartz

©1999 Sam Coleman

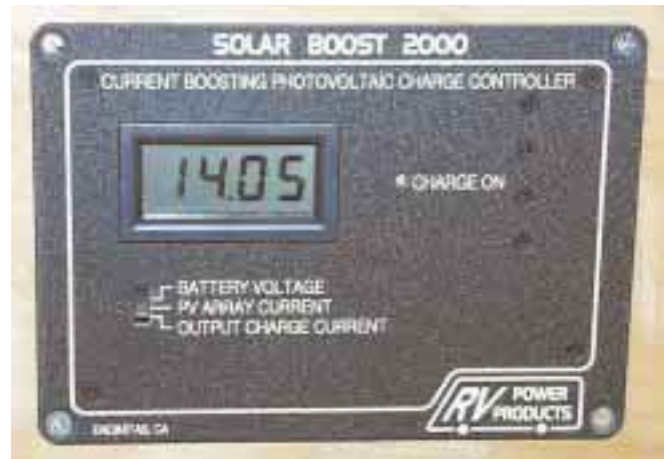
The Solar Boost 2000 is a 20 ampere, 12 volt, temperature-compensated, pulse width modulated charge controller for use in any small PV system. It has a special current boosting function, which uses peak power point tracking to give you more current into your batteries without adding additional panels.

Other features include an output current limit of approximately 21 amperes (even if the input is overloaded), a relay instead of a blocking diode, and reverse polarity protection on the battery and PV connections.

RV Power Products, as their name implies, has primarily focused on the recreational vehicle market. But with this product, they are moving into the renewable energy field as well. A similar controller for larger systems has just been introduced. It will handle 12 and 24 volt systems of up to 50 amps maximum charge rate.

Installation & Setup

This controller has an open frame construction and is meant to be flush mounted in a box or in the front of an enclosure. Open frame means that there is no back cover, and the electronics are exposed. There are four mounting holes for screws on the unit. When installing, make sure that you have easy access to the dip switches and adjustment potentiometers, since fine-tuning will be necessary after the initial installation. RV Power Products also offers an optional US\$25 surface mounting box.



The Solar Boost 2000 faceplate.

The installation and initial setup are fairly simple. The instruction booklet is clear and informative. There are only five wires to connect—two to the PVs, two to the batteries, and the temperature compensation lug, which is connected to a battery terminal. To set up the unit, you use eight dip switches, a battery setpoint potentiometer, and a peak power point potentiometer. The instructions for installation, initial setup, and fine-tuning are relatively easy to follow. Our test system was fine-tuned twice before actual data was taken.

Testing

The Solar Boost 2000 was tested in a system with approximately 165 watts of PV and a 210 ampere-hour sealed 12 volt battery pack. The PV array consisted of three different type modules with widely varying peak power points. One of the peak power points was rather low, with a less than ideal temperature response. This configuration is the worst case scenario, since the peak power point of the combination was closest to the lowest individual value.

The percentage of current boost is affected by a variety of factors. The most important factors are temperature and battery voltage. The lower the temperature of the panels or the voltage of the batteries, the higher the boost. At the same ambient temperature, panel temperature can be affected by solar insolation, wind and breezes, moisture, clouds and cloud effects, and the length of the solar day. Another factor is wiring—both wire size and connections. To maximize the unit's current boost capability, voltage drop between the PVs and batteries should be kept to a minimum.

The graph shows the percentage of current boost versus ambient temperature. Variations at the same or similar temperatures are due to the battery voltage and the other factors cited above. The battery voltage range during data acquisition was between 12.78 and 14.17

VDC. Maximum boost was 21.1 percent and occurred at a temperature of 32°F (0°C) with a battery voltage of 12.97 VDC. The peak power point varied from 13.41 VDC at 85°F (29°C) to 16.65 VDC at 40°F (4°C).

At the lowest battery voltage, current boost was 19.0 percent at of 36°F (2°C). At the highest battery voltage, current boost was 9.6 percent at 66°F (19°C). The average power transfer efficiency between input and output was 95.9 percent.

At high temperatures and battery voltages, the boost percentage can go slightly negative since power transfer is never 100 percent efficient and the device itself uses some current. But when the batteries are full and there is plenty of sunshine, this is not really a disadvantage, since the systems are running a surplus anyway.

Conclusions

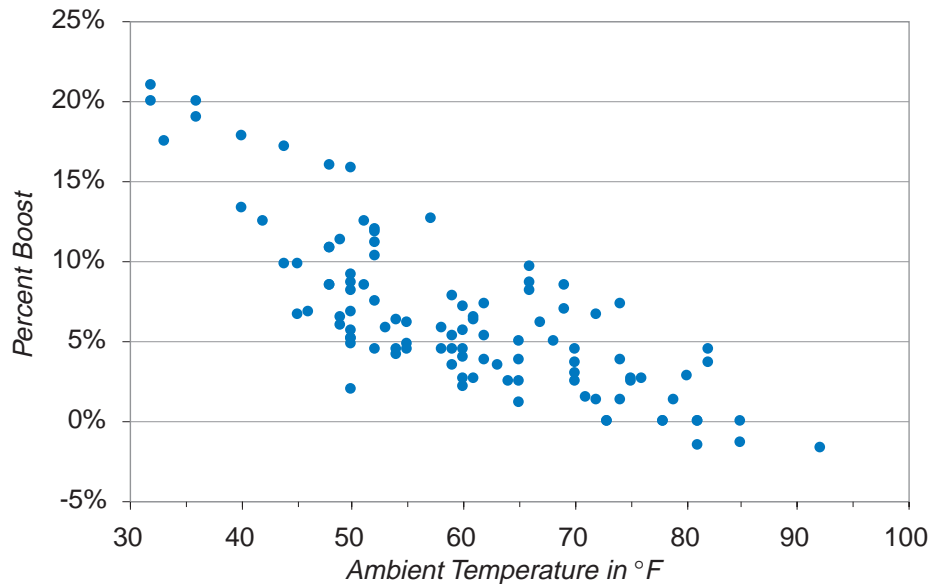
The manual for the Solar Boost 2000 says that you may get up to 30 percent or more current boost. Even with a much less than ideal set of PVs, I measured a maximum boost of 21.1 percent. Also, the wiring in the test system was smaller than it should have been. Without these drawbacks, it is highly probable that I could have measured 30 percent boost at even lower temperatures and voltages. With a set of PV panels of similar type and consistently higher peak power point, along with better wiring, this 30 percent figure probably could have been achieved.

Typical power conversion efficiency is rated at 94 percent at 15 amps. The average measured during the test exceeded this value, although current was somewhat lower.

The Solar Boost 2000 is not only an effective maximum power point tracker, it is also an excellent charge controller. The temperature compensation for maximum charging voltage works perfectly, both below and above the reference temperature of 80°F (27°C). There is also a display which can show battery voltage, PV current in, or current to the battery.

This charge controller and current booster is an ideal match for PV systems. During times of lowest temperature (like in winter when the sun shines least) and lowest battery voltage, the current is boosted the most. This is when it is most needed in PV systems. If you need a charge controller for a PV array of 20 amps

Boost vs Ambient Temperature



or less, the Solar Boost 2000 is a good choice. The price for this controller is US\$225. We are looking forward to testing Solar Boost 2000's big brother, the Solar Boost 50.

Access

Reviewer: Sam Coleman, Home Power, PO Box 520, Ashland, OR 97520 • sam.coleman@homepower.com

Joe Schwartz, Home Power, PO Box 520, Ashland, OR 97520 • 530-475-3179 • Fax: 530-475-0836
joe.schwartz@homepower.com • www.homepower.com

RV Power Products, 1058 Monterey Vista Way, Encinitas, CA 92024 • 800-493-7877 or 760-944-8882
Fax: 760-944-8882 • info@rvpowerproducts.com
www.rvpowerproducts.com

