

POWER UP: GO OFF-GRID WITH THE XANTREX FREEDOM SW SYSTEM

MotorHome

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By Chris Dougherty

UPPING THE POWER ANTE

Upgrading a legacy inverter system and adding solar panels enhances any boondocking experience.

There are many motorhomes from the 2000s that remain in service, built by companies like Monaco, Holiday Rambler, Beaver, Fleetwood, Winnebago and Country Coach, and that are still in prime condition. Still maintained and driven on the highways across America, many owners will not consider upgrading the inverter/charger system in these motorhomes unless it fails. Rather than fix it properly, some folks will even bypass the inverter with the use of a charger, thinking that the difficulty in making the repairs isn't worth the benefit.

However, as RVers look to enjoy more frequent remote camping and are traveling with sensitive electronics, the need for quiet, dependable, clean and renewable energy becomes paramount. Moreover, a motorhome with an older Trace, Heart or Xantrex

inverter can be updated with a modern Xantrex Freedom SW system — often fairly easily — providing the best inverter/charger technology available today and offering 2,000 to 6,000 watts of pure-sine-wave power that's kind to sensitive electronics and computers.

A number of motorhomes were equipped with basic solar charging units or systems, (basic, at least, when compared to what's available today). Many were attached to air conditioners or were simply small panels mounted to the roof and earmarked as a battery maintainer. Modern solar equipment is far more efficient than those basic systems, not to mention that many older panels had a finite lifespan and may have started to degrade years ago.

Lastly, modern RVers appreciate remote-control convenience of many RV components, including slideouts, awnings and climate control. The Xantrex system makes it possible to monitor the motorhome's power system via a remote smart-device app and control many other functions as well. With an internet connection, these functions can be controlled from just about anywhere, giving owners peace of mind knowing that their pet(s) are safe and comfortable, and that the motorhome systems are functioning properly.

Difficulty.....5/5
Cost of equipment.....\$4,170
Time for completion.....15 hours

Breakdown of component MSRPs

Freedom SW2012.....\$2,075
Freedom SW Panel.....\$255
AGS module.....\$207
ComBox.....\$385
Cable adaptor.....\$18
80W Solar Max Flex Kit.....\$700
80W expansion kit.....\$530

The Power System

When considering building an off-the-grid power system, the process starts with the foundation, which is the battery bank. In many motorhomes, the foundation is already there, and if the batteries are up to snuff, then they can be utilized in an upgraded system. However, there's always the option of upgrading to lithium, and Xantrex's new 125AH batteries look very promising. Since the battery bank in the test 2005 Newmar Kountry Star was just replaced recently with 6-volt flooded lead-acid batteries, we decided to focus only on upgrading the inverter/charger and adding new solar capabilities.

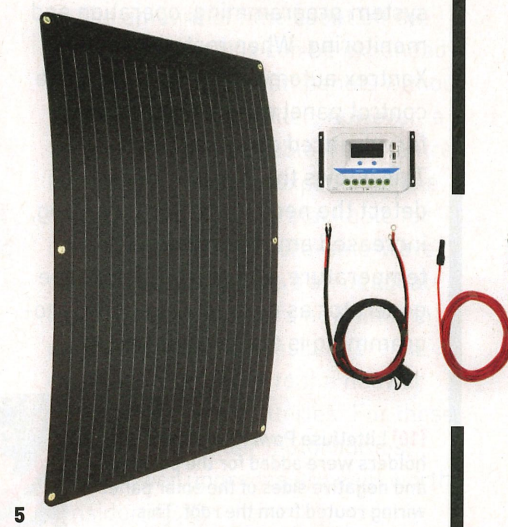
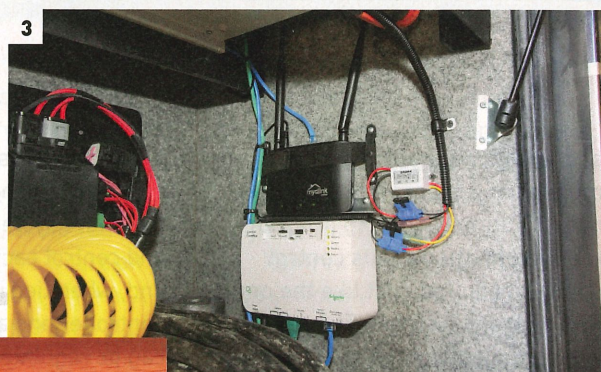
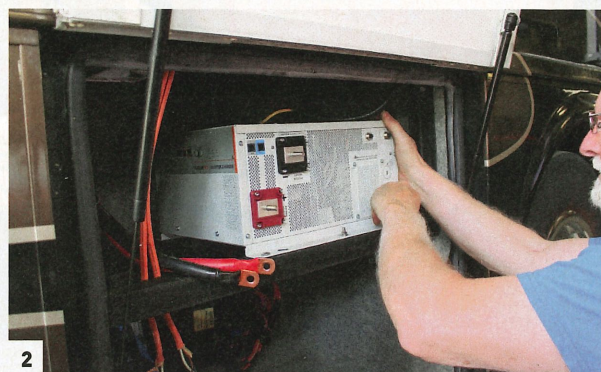
The new Freedom SW inverter chargers from Xantrex are the pinnacles of RV, marine and heavy-truck quiet power, and although not necessarily the cheapest, the additional expense can easily be justified based on Xantrex's product quality and customer service.

The Freedom SW new generation inverter/charger is

[1] The essential components of the power system (without the solar system) include the next generation Freedom SW2012 inverter/charger, wireless router, Xantrex AGS module, Xanbus system control panel, Conext ComBox, cable and adaptors. **[2]** After the original unit is removed, the new inverter/charger is installed, which required some slight modification of the brackets and wiring. **[3]** Xantrex Conext ComBox, wireless router and 12-volt DC power supply are installed under the inverter in a protected compartment.

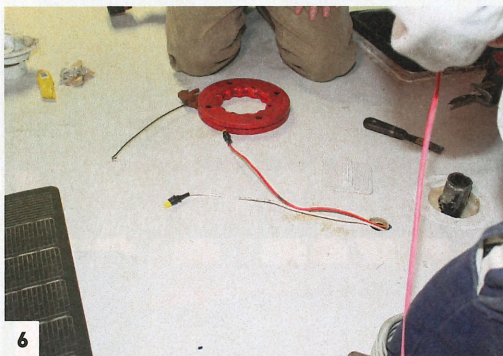
[4] The Xanbus system control panel (SCP) is installed in place of the existing panel. The opening for the new panel was modified; a new cabinet panel can be fabricated if desired. **[5]** Solar Max Flex kits include almost everything required for installation. Expansion kits add a panel and wiring.

a huge step forward from the old-school way of thinking. Two SW inverters are available: the 2,000-watt model 2012 with a 100-amp charger, and the 3,000-watt 3012 with a 150-amp charger. Freedom SW inverters are available in 12- and 24-volt DC configurations, and are stackable, which allows two units to be combined for an increase in output, as well as 120/240-volt AC split-phase power. Of course, for this to be practical, a substantial battery bank would be required, along with heavier-gauge rewiring of the motorhome, which wasn't in the cards for this project. The loss of storage space, not to mention the weight of the batteries, was a major consideration here, which made the case for



upgrading to equivalent-capacity lithium batteries in the future. Lithium batteries weigh about half of their lead-acid counterparts, which is one of many benefits of upgrading to the newer battery technology.

The Freedom SW's controls and charger system are fully programmable for different battery chemistries



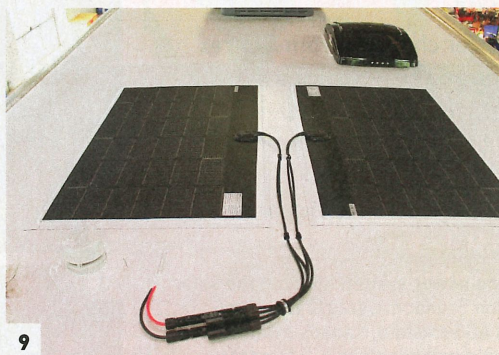
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[6] The existing 10-gauge wiring for the solar panel was hidden next to a stack vent after a roof replacement but was easy to find. A 1½-inch hole saw was used for making an opening for the wiring through the roof; it was later covered with a solar wiring clamshell. The panels were laid out carefully, and the roof prepped with alcohol. [7] The self-stick panels were carefully applied to the roof. [8] The panels require pressure, especially around the edges, to adhere properly to the roof. Hand rubbing was followed by working an Eternabond roller around the edges. Xantrex recommends sealing around the outside of the panel with a roof-compatible sealant. Eternabond tape was used here for a permanent seal. [9] Once the installed panels are connected, the clamshell and stack vents are reinstalled and sealed.

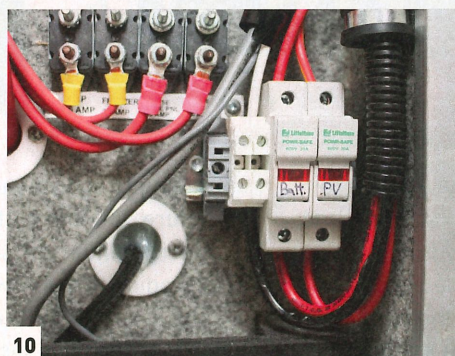
and, with temperature sensing, can monitor and change the charge output appropriately. To program the system, the Xanbus control panel is required, just like the one in the legacy systems. The panel, which mounts in roughly the same space as earlier versions, allows full system programming, operation and monitoring. When mated with the Xantrex automatic start module, the control panel can be programmed for advanced generator starting. This allows the inverter system to detect the need for battery charging, increased amp load and interior temperature, and start and stop the generator as needed. Quiet time programming is also available.

The new system uses a can-bus communication system, which means the entire system can communicate and control each smart accessory and, when tied into the Xanbus controller and a wireless router, can be regulated by a smart device. This is an important factor for RV pet owners.

Xantrex's new Solar Max Flex kit was employed for the test motorhome. These panels have peel-and-stick provisions, simplifying installation and resulting in fewer roof holes. However, unlike older offerings on the market, Xantrex has designed a much stouter panel with a custom grid technology that makes 2,000 points

of contact with each cell, making it 50 times more durable than a standard flex panel, according to Xantrex. Also, the design is said to provide up to 20% more low-light (shaded) energy harvesting when compared to other panels. The panels, which are flexible to 180-degrees, can be mounted on any curved roof surface. The kits are available in basic and expansion iterations with 80-, 165- or 220-watt capacities. The basic kits include just about everything needed, including a 30-amp controller, cabling, connectors, wire clamps and battery connector cables. The expansion kits include the necessary cables and connectors for adding to the system.

[10] Littelfuse Powr-Gard fuse holders were added for the positive and negative sides of the solar panel wiring routed from the roof. This protects the wiring and also acts as a disconnect switch for the panels. [11] The Solar Max kit comes with a 30-amp programmable controller. All the kit cables have tinned ends, facilitating connection to the controller. The controller has two USB charging ports for solar direct device charging, if desired.



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POWER APP

Once employed, the Xantrex Android app, (iOS soon to be released as of press time) has numerous screens which show the status of the system and allow remote operation.

The Installation

Although using the existing wiring made the install as straightforward as possible, there are many steps that could not be covered here due to space limitations. Do-it-yourselfers should be comfortable with low- and high-voltage wiring. New battery and Romex cables may need to be fabricated or extended, depending on the installation, and installers should be prepared to change component mounting locations and running appropriate wiring through the motorhome. Cable polarity is important, since any miswiring can damage an expensive piece of hardware. Even the most careful and experienced technicians can mix something up; check and double check every wire and connection.

The inverter swap, on paper, looked very straightforward, however, the existing inverter/charger had connections on the opposite side from the Xantrex unit, which created wiring headaches. The new digital control panel uses a different cable, but Xantrex has made converter cables that are plug and play, so there was no need to run a new 40-foot cable, which was a big help. The owner of the test motorhome had recently replaced the roof, decking and insulation, and had discarded the original solar panels, but he kept the wiring coiled up around one of the stack vents for later use. The 10-gauge original wiring met the requirements of the new system; expansion to the full 30-amp rating of the controller is possible without rewiring. Littelfuse Powr-Gard fuse packs were added to the system by the technician, which made the installation cleaner and safer.

The automatic generator start (AGS) system required some pretty

intense wiring inside the dashboard. Opening up the dash to access the genset remote switch wiring revealed a rat's nest of cobbled wiring from the original owner's tinkering. Cleaning and sorting the wiring, as well as finding schematics for the Guardian genset, took a fair amount of time. A cable had to be routed from the digital control panel to the dashboard. The AGS module has a temperature-sense option for starting the generator when air conditioning is needed; however, the original owner had opted out of that project, so installing the AGS was probably the most challenging part of the installation, and required a lot of testing and some trial and error to get it working correctly. If the motorhome had already been equipped with AGS, then this would have been a more straightforward install, but even so, it wasn't a deal-breaker, and the motorhome will benefit from having the system.

The Final Word

While the Newmar's owners haven't done much dry camping, they're looking forward to being able to enjoy many of the state parks and national forests in the Northeast, and now have the quiet energy that makes hook-up-free habitation possible. The Xantrex inverter/charger is a monumental step

forward from the original modified-sine-wave unit. The addition of the AGS, programmability and remote access makes RV energy control much more accessible and reassuring, especially for pet owners.

Xantrex's new Solar Max system has seriously raised the technology bar with solar technology, and the 160-watt system can easily be expanded — a scalable decision based on the amount of time spent off the grid. The Solar Max can be expanded by adding two 220-watt panels without upgrading the controller; however, a larger model is available from Xantrex for a more extensive expansion. The inverter/chargers are stackable for up to 6,000 watts of pure-sine-wave power, provided there's an adequate battery bank. Xantrex's new lithium packs (also app-accessible) are an excellent alternative to the heavier flooded lead-acid batteries. For those who still enjoy their motorhomes, these power upgrades are well worth considering. 

Special Thanks to Tim's RV in Erving, Massachusetts, www.timsrvinc.com

Source

Xantrex
800-670-0707, www.xantrex.com

