

# Xantrex



## Powering a great boater experience

Xantrex is probably best known for its high-quality battery chargers, inverter/chargers and solar charge controllers for the mobile market, which includes boats, recreational vehicles, heavy-duty trucks, military, buses and specialty vehicles.

**R**ecently, Xantrex expanded its footprint in the solar market by developing a broad range of solar panels, including revolutionary flexible and peel-and-stick products. They now manufacture their own line

BY PETER A. ROBSON

of lithium-ion batteries. Combined with their chargers, inverters and solar charge controllers, the company offers fully integrated power system solutions to customers. This means customers don't have to piece together components from different suppliers that may or may not be compatible or configurable.

### Solar systems and lithium-ion batteries

While Xantrex is a market leader in converting DC energy from solar panels to usable AC power, it only recently started producing solar panels. This fits into the company goal to reduce the need for generators to provide mobile AC power. The company went on to design and engineer a range of rigid and flexible panels in a variety of sizes and output. Several things make them stand out. One is their

mesh grid technology, which gives more points of contact for the sun and therefore more power even in shaded and low light conditions. The panels are very flexible and have peel and stick capabilities (also screw-down options) that allow them to be mounted on pretty well any curved surface (including canvas Bimini tops).

While a properly sized inverter can power just about any AC device, the amount of time an inverter can provide that power is directly related to the amount of available battery power. To this end, several years ago Xantrex began to invest in energy storage and developed their own lithium battery.

"We're seeing a trend in customers being more environmentally conscious and wanting to reduce their carbon footprint," says Albert Shuen, Director of Product Management. "Customers want the ability, the freedom, to operate their AC equipment, when, for example, they're on their boat, without having to run the generator. Having that energy storage in a lithium battery, and a much longer service

life (i.e. six to eight times), enables them to do that much more than with standard lead acid batteries. They can also be charged at a much higher rate than lead acid batteries."

The difficulty with lithium batteries is that until now you had to buy your battery from Shop A and an inverter from Shop B. The difficulty was making them work together. With lead acid and AGM batteries, it was easy to make them compatible, but today's lithium batteries are much more sophisticated and need to be able to communicate and integrate with inverter/chargers and battery management systems to charge and control the battery usage.

We've all heard horror stories about lithium batteries starting fires and exploding. With safety as one of Xantrex's key objectives, the company explored the various lithium chemistries out there. Tesla, for example, uses nickel cobalt aluminum (NCA). Another common one in the automotive industry is nickel manganese cobalt (NMC). The problem with both of these is that cobalt is very volatile and can thermally run away and potentially explode.

Xantrex chose to go with lithium iron phosphate (LFP), a much more stable and safe chemistry. The trade-off is that while NCA and NMC are more volatile, they also pack more power and therefore are the choice for automobile manufacturers that want to maximize the driving range for their electric cars. Xantrex's LFP batteries were the first and

*Developing and testing new products are done in house. Most Xantrex products are customizable to suit OEM customers' specific applications. The company's Highly Accelerated Life Testing system puts new products through a battery of tests, including rapid temperature increases along with vibration and shocks.*

Xantrex photos by Peter A. Robson



## INTERNATIONAL SECTION

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only in North America to be certified under UL1973 (the battery safety standard for mobile applications).

Another well-known advantage of lithium batteries is their useful energy. Xantrex's batteries are the same physical size as equivalent lead acid and AGM batteries and have the same amp hour rating. However, a 100-amp-hour battery can only provide about 50 usable amps before requiring recharging

*Director of Engineering David Miller (right) says the goal of the testing program is to produce products that won't fail for their entire working lives: "We want to test our new products to the point where they fail, then find the weaknesses and replace those components that aren't up to snuff."*

*Marketing Director Mitul Chandrani (left) emphasizes the importance of understanding inverter surge ratings. Rather than simply reading a label that may indicate the inverter is capable of handling twice the rated output, a customer needs to ask how long it can handle a surge. Many lower-end inverters are limited to 200-300 milliseconds.*

while a Xantrex lithium battery provides about 90% or more useful energy, essentially doubling the available amp hours. This makes it possible to run an inverter for a much longer time. Alternately, if a customer only needs that 50 amps, they can get a lithium battery that's half the physical size with the same usable power.

Together, the combination of solar panels, solar controllers, chargers and inverters and lithium batteries, all manufactured by the same company, means less chance of issues with connectivity. The entire system can work seamlessly.

### Surge protection

One of the things that sets Xantrex apart

from less expensive inverters is their surge capability. Customers unfamiliar with chargers-inverters may wonder what the difference is between products. Why is one cheaper than the next? Most people understand you must pay more for quality, but there's another consideration.

"When most people go into a store looking for an inverter, they read the label," says Director of Marketing Mitul Chandrani. "In almost every case, the inverter label will typically claim that the product can handle surge demand to twice the rated output—1,000 watts can surge to 2,000 watts. That's what's on the box. However, the key question is how long can the product handle a surge? The

## How the company was created

**X**antrex was founded in 1983 as a DC power supply company in British Columbia's Greater Vancouver area. The company's transition into the world of single-unit inverter/chargers came about after their acquisition of four of the leading companies in the field: Statpower, Heart Interface, Trace and Cruising Equipment.

"These companies were pioneers in the field in North America in the late 1990s and early 2000s," says Mitul Chandrani, Xantrex Director of Marketing. "They were the first to combine battery chargers and inverters into a single 'box' for mobile use." The company's first recreational inverter/charger combination unit was called Freedom, introduced in 1992. The marine version, called Freedom Marine, was the staple of the marine industry for two decades until replaced by its successor, the Freedom SW. "This meant owners of boats and RVs were not tied to household sources of AC power at docks or campgrounds. They could now plug in their AC appliances when out cruising or on the road." The Freedom series has evolved over the past 29 years and is available in a variety of models.

In 2005, Xantrex went public. Their goal, according to Chandrani, was to be able to grow the company, develop new products in the mobile environment and expand their footprint in the renewable energy space. Chandrani explains that one of their early successes was a revolutionary new product series called GT. "It was one of the first residential style of inverters to convert solar power from DC to AC."

In 2010, Xantrex was acquired by Schneider Electric, a huge European multinational energy company. They were looking to expand their renewable energy business, which was exploding around the world at the time and they knew that Xantrex was well positioned in the field. While Schneider had their fingers in pretty well everything electric, including utilities around the world, they didn't have a renewable portion that would allow them to offer their off-grid customers a full range of products, including those for power conversion, for large solar farms.

While the main focus was now on the renewable side, the mobile division was a constant and steady business for Schneider. It was well established and dominant in the heavy-duty truck and RV OEM market, as well as marine.

In 2018, Xantrex was acquired by Mission Critical Electronics, a company made up of many well-known brands in various markets. The company offers (among other products) electronic power products for fire trucks, ambulances, commercial marine boats and other emergency and specialty vehicles. Mission Critical wanted to establish their foothold in the leisure marine, RV and heavy-duty trucks to expand their reach into related markets. Instead of starting from scratch, they looked for an existing company that could meet their needs. Xantrex, with its suite of power conversion, solar and battery products, was a perfect fit.

Freedom SW or the newly introduced Freedom XC PRO can surge to full five seconds or more. Many cheaper inverters are known to surge for 200-300 milliseconds only. And these cheaper brands don't specify the duration of surge in their advertising."

### Integration trends

Embracing the popularity of onboard integration of devices, Xantrex supports the use of one multifunction panel to control battery charging, the inverter, solar control and charging and so on. This is one of the key projects that Shuen and Director of Engineering David Miller are working on.

"Connectivity is one of the big trends we're seeing in the world and not in just our industry segment," says Shuen. "Every industry segment has moved to integrated user interfaces. In the marine world, we've got systems from companies such as Maretron and Garmin that can see everything and control everything and allow a single user interface with all the pieces integrated and talking to each other through that single panel rather than having so many different gauges and readouts. In the marine world, that communications protocol is NMEA 2000®. While dedicated remote display panels are available for most of our products, our newer products such as the Freedom XC Pro series inverter/chargers have an integrated communications box that can talk to and display information on the Maretron and Garmins of the world through a simple NMEA 2000 connection."

"There are 20 or 30 different things you can find out about your inverter," adds Miller. "Voltage output level, pulse, battery voltage, everything you could see on the actual inverter/charger display itself, you can now see through these integrated display panels, as well as on the actual unit. Many of our products have Bluetooth connectivity to mobile phones and can display the same information."

Integration of multiple charging sources is also occurring and is growing more and more complex. "It is Xantrex's goal to provide customers the freedom from worrying about how everything fits together," says Shuen. "If you're parked, you can likely plug into shore power. But with solar panels, they can charge batteries at any time the sun is shining. When cruising or driving from point to point, the engine alternator will provide charging. Same goes for when you run a generator, though one goal of Xantrex is to provide solutions that reduce or eliminate the need for a gener-

ator. When these various charging sources are tied to powerful 600 amp-hour lithium batteries that can store the energy, the consumer can significantly extend the amount of time away from shore power.

### Custom OEM options

Providing customization as opposed to simply producing one-size-fits-all off-the-shelf products is another area where Xantrex is increasing its footprint within the OEM market. "We customize our solutions. You won't find many of our products that we produce specifically for OEMs in the aftermarket or mentioned on our website," says Miller. "They are strictly designed for an OEM to meet their engineering standards. This applies to batteries, solar panels, power products.

"Most of our products are configurable. For example, if an OEM wants an 1,800-watt inverter and we don't make one, we can program an existing inverter to produce 1,800 watts or whatever the OEM requires. We can also program when to cut off the inverter from the batteries and give the customer an alarm at whatever point the customer requires. We don't need to change diodes or design a new product or make a new box—things that take a lot of time. We can preconfigure it in house or tell the customer how to program it on their assembly line. Ultimate flexibility is the goal."

When it comes to solar panels and lithium batteries, they can allow an OEM to significantly reduce the size of the generator or, depending on how long a customer is going to be out on their boat, eliminate the generator completely. While solar panels and cells traditionally were available only in limited sizes, they can now be customized to size and output wattage for OEMs and be placed where normal panels would not fit. Also, the increasingly compact chargers/inverters make installation in tight spaces much easier.

"The ultimate goal for us," says Chandrani, "is to create a satisfying customer experience so that when they use their boat or RV, they can go about everyday life and turn on the microwave or air conditioner and not worry. We want to make sure our products provide that experience so they can say I had a wonderful vacation and never had to worry about the inverter and charger. The user doesn't generally care what product they have, they just want to be able to do everything they could do at home. If your inverter trips out at the start of your vacation and you don't know how to reset it, your vacation can be ruined. That to us is very important." **MEJ**

## Putting products to the test

In the mobile environment, it is vital that electrical components can handle stresses such as shock, vibration and extreme temperatures without failing.

Xantrex takes reliability to the extreme with their Highly Accelerated Life Testing (HALT) system. It serves to validate new designs through specialized equipment such as thermal testing that can ramp up temperatures rapidly between -40°C and +85°C to thermally stress components and mimic conditions in which Xantrex products are used.

New products are also subjected to vibration and shock testing for long periods to make sure nothing loosens or breaks. "If things break, we make design changes to make them more robust," says Director of Engineering David Miller. "We want to test our new products to the point where they fail then find the weaknesses and replace those components that aren't up to snuff. We continue to test until we get a product that won't fail for its full life."



*With an eye to the ever-expanding integration of onboard devices, the company supports the use of a single multifunction panel to control battery charging, the inverter, solar control and more. Albert Shuen, Director of Product Management, says newer products like their Freedom XC pro inverters/chargers can talk to and display information on Garmin, Maretron and other brands via NMEA 2000.*

### About the author

Peter A. Robson is an editor and writer based in Vancouver, BC. His work regularly appears in marine and other publications in the US and Canada.