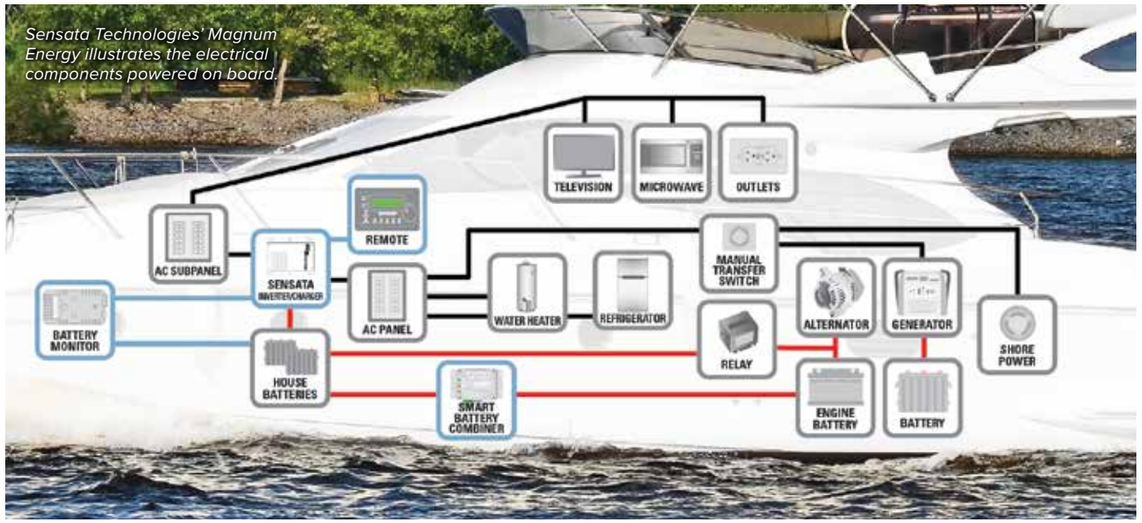

Sensata Technologies' Magnum Energy illustrates the electrical components powered on board.

Inverter Addition

New inverter/charger systems with lithium-ion batteries create sources of electricity.

By Doug Thompson

Plugging into onboard electricity using 120-volt outlets like those at home is easier than ever. Whether you have a 60-foot or 24-foot boat, you can now generate, store, and make usable electrical power without a generator.

Direct current (DC) power is produced from your boat engine, a generator, or via solar power, but to run onboard electronics and appliances, alternating current (AC) is required. An inverter converts DC power from your boat's batteries and turns it into AC power. Nowadays, better technology has made these integrated power conversion systems a viable alternative to diesel generators. Lithium-ion batteries provide excellent energy storage because they are more efficient in storing and releasing electrical energy than lead-acid or AGM batteries. Also, solar panels have become more practical and easier to use, as they constantly trickle-charge the battery bank when the sun is out.

"An integrated system can utilize the battery power efficiently enough to replace the generator," explains Dave Maryanov, director of marketing for Power Products LLC, the parent company of Mastervolt. "For example, the Sea Ray SLX-R 400e launched at the 2020 CES show in Las Vegas implemented a Mastervolt system called 'Fathom e-Power.' The system consists of four five-thousand, five-hundred-watt lithium-ion batteries connected to two three-thousand-watt Mastervolt CombiMaster inverter/chargers."

While on the water, alternators and alternator regulators are connected to the system to charge the batteries, while the Mastervolt inverter/charger provides the charging source when connected to shore power.

"The entire system communicates on a dedicated can-bus network, so all components are working together," says Maryanov. "In addition, control and monitoring of the system is consolidated to a dedicated touchscreen monitor and is fed to the MFD. The system replaces the diesel generator on the boat."

Generators still fill an important role on many boats. That is why many inverter/chargers are built to work in conjunction with generators. "An inverter with the right size battery bank can easily run most entertainment systems and galley appliances," says Keith Lovegren, product manager at Sensata Technologies, the parent company of Magnum Energy. "However, the size of a battery bank required to run an air-conditioning system for an extended period of time becomes cost prohibitive, along with larger space requirements."

Coupling an inverter/charger and generator is a win-win for the boat owner. This scenario can reduce how long the generator runs by powering AC loads from the inverter most of the time.

"The generator starts only when necessary to charge batteries," Lovegren says. "An inverter/charger will provide silent AC power, which is priceless when on the hook and you want to enjoy nature or swim without worrying about engine exhaust fumes."

Inverter technology has improved greatly over the past 25 years and now provides a true, or pure sine wave form of AC electricity that comes out like the 120-volt power outlet in your home and doesn't damage sensitive electronics like TVs or laptops. Pure sine wave inverter prices have reduced dramatically in recent years and the weight has been cut more than 70 percent.

"Today, you get more power in a smaller package," says Mitul Chandrani, director of marketing for Xantrex. "We just launched our Freedom XC Pro, which is a three thousand-watt inverter/charger that weighs eighteen pounds. It supplies a pure sine wave, and the price difference is small compared to a modified sine wave inverter. You can monitor and control the output via Bluetooth from your phone or tablet, providing a lot of control options."

It is important to note that improvements in lithium-ion battery technology have resulted in far more efficient energy storage. For example, while lead-acid batteries can only drain down to 50 percent before recharging is necessary, lithium-ion batteries can drain down to 90 percent which results in nearly twice the power from a much lighter battery. In addition, lithium-ion batteries can charge much faster than lead-acid batteries. Just make sure the inverter/charger you buy is designed to charge lithium-type batteries because not all do.

"Some boat owners are worried about fires with lithium-ion batteries," Chandrani says. "Our Xantrex Lithium Ion Iron Phosphate (LiFePO4) are UL1973 listed, a testing designation that means they will not catch fire even if they are punctured."

To figure out how much power your battery bank will supply, simply find out the number of amp-hours the battery bank offers. Batteries serve as an energy source for 12- or 24-volt equipment as well as the DC power that the inverter uses to convert to AC power. The larger the battery, measured in number of amp-hours, the longer it will last.

A boat owner must also factor in the loads on the batteries to accurately calculate both battery power required and the number of hours the battery will supply that power. To calculate the inverter size, add up the wattage draw of all AC-powered electronics and appliances and make an allowance for future additions. Magnum Energy offers an inverter calculator online as a general guideline to illustrate what loads you can run on your 12V DC vehicle's platform, and Xantrex created a PDF to help you design your system.

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