

## Power Up

Upgrade your electrical system and get better performance, safely.

By Vincent Daniello

Is a new electronics suite in your future? Upgrading galley equipment? How about underwater lighting? New systems, or even just updating equipment, may overtax your electrical system. Problems like poor electronics performance or tripping shore-cord breakers may have been inherited from previous work, too. Solutions may carry added benefits like automated load management or redundancy for critical equipment. A new main electrical panel may also bring an expensive pilothouse upgrade into the 21st century.

Electronics often cause the most trouble, since they don't work well when voltage drops even modestly. "Just because it fits at the helm doesn't mean the power is available," says David Gratton of Martek in Stuart, Florida ([www.martekpb.com](http://www.martekpb.com)). Today's big, bright displays often draw more juice than older units. A new Furuno NavNet 3D plotter and 12-inch display draw double that of a NavNet system of just three years ago. An added AIS system draws just one amp when receiving. "But when you're turning in a heavy traffic area, that's like a VHF constantly transmitting," and uses up to eight amps, Gratton says.

Amps add up quickly. For a recent electronics upgrade on a 2004 Sea Ray 55, Gratton says, "We ended up with a net increase of 41 amps of DC current draw. He wanted all this new stuff, but we actually had to first see if he could have it." That boat could handle the added equipment with existing panel, charging,

**BUS PASS:**  
Blue Sea Systems modular 360 system builds considerable flexibility into new electrical panels.

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and battery capacity. For boats that can't, there are always solutions. Adding batteries beneath the helm, for example, increases DC capacity, incorporates a subpanel with added breakers, and also provides the kind of redundancy and flooding protection often required on commercial vessels. "Power for the things you're using to scream for help and give your position shouldn't end up under water," Gratton says. "[With batteries beneath the helm], every flipping thing can go wrong and you'll still have power to that essential equipment."

Alternating-current inadequacies also come aboard when adding or replacing equipment. High-def satellite TV receivers, for example, draw more current than older models—three or four amps of 120-volt AC power each, whether they're in use or not. With three receivers, that's a tenth of a 50-amp, 240-volt shore cord. Galley upgrades can also tax breakers or generators.

It's tempting just to add a shore cord, but marinas typically offer only two 50- or a single 100-amp shore connection at each slip. "The first thing we're going to try is moving loads around to change the balance," says Gregg Scrudgers of Seatech Marine Electric in West Palm Beach ([seatechllc@bellsouth.net](mailto:seatechllc@bellsouth.net)). It isn't uncommon for one shore cord to draw too much while the other is loafing or imbalances within a cord to trip breakers early.

Switching from two 50-amp cords to a single 100-amp cord eliminates these imbalances, as do isolation transformers, such as those from Charles Industries, but problems often run deep. "You get to a point where I'll recommend replacing the panel," Scrudgers says. "We're going to address every electrical issue at its core." New panels also look sharp. "On an older boat, the labels may have been changed 20 times, the knobs are chipped and cracked, breakers are mismatched, analog meters are dated. Cosmetics may be the number-one priority from the owner's perspective," he says.

## SHOCK VALUE

UNDERSTAND ELECTRICAL SYSTEMS TO BE SAFE.

Most yachts over 60 feet have at least four separate electrical systems: 12- and 24-volt direct current for critical systems, and 120- and 240-volt alternating current for conveniences. Add 12-volt AC lighting circuits, navigation electronics interfaces, entertainment and telephone systems (including cellular and satellite), and even three-phase 440-volt power on large yachts, and you end up with enough copper aboard to confound Nicola Tesla. Why so many systems? All abide by the law—Ohm's Law, which states that current in amps is proportional to voltage and inversely proportional to resistance. So, increased electrical work (resistance) requires either more volts or more amps. DC power can be stored in batteries, but its low voltage requires many amps and therefore huge cables for big jobs. AC power overcomes these limits with more volts, but requires a generator. The bottom line: If any of this is news to you, leave the wiring and tinkering to the pros.



## GET SMART ABOUT SHOREPOWER

DON'T JUST PLUG IN ANYWHERE.

Electrical-capacity issues at marinas also affect boats. Air conditioners and other equipment often won't run when voltage drops below 220 on a hot day in a busy marina. Some marinas in the U.S. even provide 208 volts at most. "Motors run hotter at lower voltage. They're more likely to trip breakers or thermal cutoffs," says Steve Treaster, inside service manager at Ward's Marine Electric in Ft. Lauderdale. A portable boost transformer on the dock or one built into the boat increases incoming voltage by 10 or 15 percent. "Many boats already have isolation transformers," says Gregg Scrudgers of Seatech Marine Electric in West Palm Beach. "It's just a matter of adding a switch." Yachts voyaging overseas often opt for power converters. "It doesn't matter what you put in. You're going to get 240 volts out," Scrudgers says. "You can plug in anywhere in the world."

Today, replacing a panel typically means cutting back and numbering all wires and then installing labor-saving terminal blocks and bus bars. Scrudgers builds and wires panels beforehand in the shop. "Everything is new. Terminal blocks, metering, breakers, bus bars, all the physical connections, those are the things that fail [over time]."

Not all boats need a complete overhaul. Simply having too few breakers is a common problem, particularly when adding new systems. A galley subpanel often frees five or six breakers, and a separate panel for air conditioners may open up 10 slots.

Watermakers or dive compressors might be taken off the main panel and powered separately by a generator or an extra shore cord. Large yachts often automatically transfer such loads as needed, but all boats can employ similar tools. "We can install an alarm to indicate when a generator or shore cord is maxed out, or even make equipment automatically shut off when demand gets too high," says Steve Treaster, inside service manager at Ward's Marine Electric in Ft. Lauderdale ([www.wardsmarine.com](http://www.wardsmarine.com)).

Going green may help. The newest LED lights are brighter than equivalent halogen bulbs yet draw half or even a third the current. New air-conditioner compressors are noticeably more efficient than units 12 or more years old. Even simply servicing neglected air conditioners often drops power draw by five to 10 percent.

Custom and off-the-shelf products are now high-tech. With a new panel, vessel-monitoring systems can indicate whether breakers are on or off to those on board or ashore, even over the Internet. "Here at Ward's, we can put the vessel's logo on the panel," Treaster says. "With our overlaid labels, once we have the layout in the computer, all we have to do to make changes is print a new overlay."

"We can learn from your old panel

what not to do again," Treaster says, noting that hinged doors sagging under the weight of wire and breakers can be corrected easily. "We can now back-mount the breakers so they stay in place and only the door opens," which Treaster says reduces problems down the road. Ward's Marine can also bring seamless generator-to-shorepower transfer aboard yachts as small as 60 feet.

For boats tight on space, Blue Sea Systems's modular 360 Panel System provides circuit protection for select systems.

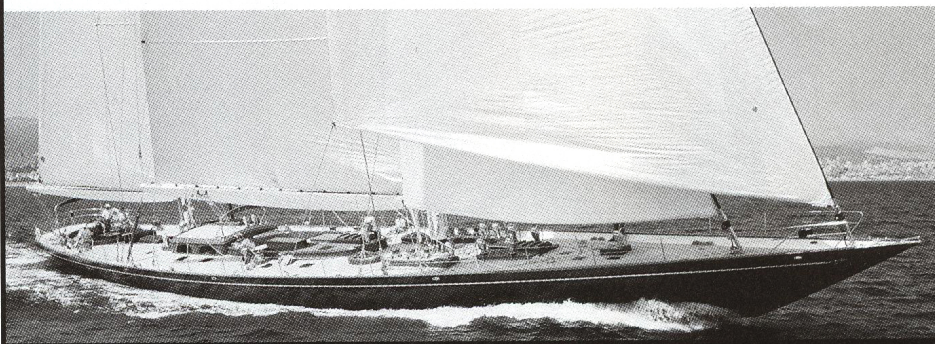
Sleek, flat rocker switches include both low- and high-amperage breakers—up to 300 amps DC or 100 amps AC. Scrudgers often uses small push-button switches on the panel face operating hidden contact switches for shore and generator power-source selection. Moritz OctoPlex touch-screen systems allow not just source selection, but also operate equipment from multiple remote stations.

All three men warn to choose contractors carefully. "Make sure whoever does the work abides by the standards the boat was built or insured to. ABS, DNV, and RINA are different than ABYC standards," Treaster says. Subtle differences may not be noticed until the next thorough survey.

Gratton works not just to class electrical standards, but also NMEA recommendations. "There is overlap, but ABYC covers electrical systems from the safety perspective. NMEA covers electronics from the performance perspective," Gratton says.

"The distribution panel is a workhorse," Gratton says. "Bringing it to current technology ensures it's up to task. You're talking about the entire AC and DC power distribution system on a boat that's going to have your family on it." □

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