THE NEXT GENERATION IN BATTERY CHARGERS

Large battery banks are becoming a way of life for many cruising vessels (you can read the first segment of a two-part article on that very subject in this issue). While battery banks and the loads placed on them, have continued to grow steadily over the years, stand-alone battery chargers have failed to keep pace with the demands of these larger banks.

BATTERY CHARGING WISDOM

Most deep cycle battery manufacturers agree on a preferred depth of discharge that ensures maximum production of amp hours. In short, analysis shows that a battery bank will perform best, and longest, delivering the most number of amp hours over its life if it's discharged to 50 percent, and then recharged back to 100-percent capacity. That's simple enough, however, the plot thickens. The unofficial "50—90 rule" dictates that recharging to 100 percent, when using a battery charger operating via a generator, is impractical because of the exceptionally slow charge acceptance rate that a battery typically exhibits in the final stages of its charge cycle. As a battery charges, its internal resistance increases, making it increasingly difficult to replace those final amp hours. Thus, users must accept that the battery can only be practically recharged to 85 percent or 90 percent under these conditions. This isn't desirable, and it's not healthy for the battery. It's merely an electrical fact of life while the vessel is cruising and away from the dock. The caveat to this rule is that batteries should be fully recharged to 100 percent, whenever and as often as is possible and practical.

Increasing the size of a battery bank in many ways simply exacerbates these issues, especially when one takes into account the needs and capabilities of modern, sealed, valve-regulated lead acid

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Top: The Charles IMC started with a clean slate, resolving or responding to many items on the author's battery charger "wish list." Above: Battery chargers should be rugged and reliable and able to withstand years of exposure to a marine and engine room environment.

batteries (i.e., AGMs and gels). The charge acceptance rate of these batteries is substantially greater than the flooded variety. However, they also require a different charge profile that can vary even from one manufacturer to another, and temperature compensation is a veritable necessity as overcharging these batteries leads to irreparable damage, which means, virtually any SVRLA installation benefits from a charger that has the ability of accepting customized charge profiles, rather than the familiar default of flooded, AGM, and gel. A temperature probe securely adhered to the battery case will enable the charger to alter output based on battery temperature; warm batteries have a lower charge acceptance rate than cool batteries. Peculiarly, most battery charger manufacturers who offer such a probe consider it an "accessory" which must be ordered separately. In my opinion, that makes little sense; particularly when one takes into account the cost of many of today's chargers, and more significantly, the replacement cost of a large battery bank that fails prematurely.

21ST CENTURY CHARGING

I've shared with battery charger manufacturers my wish list for charger functions on more than one occasion. In some cases, it was over a cup of coffee at a boat show, while in other cases, it was in the form of a frustrated email, querying the lack of a feature, output capacity or overall robustness. Because I'm sensitive to these shortcomings, I pay attention to the release of new battery charger models. As I strolled through the Fort Lauderdale Boat Show last fall, I encountered just such a new charger. I'd heard about it and seen the press releases, but this was the first time I had the opportunity to see one in person.

Manufactured in the United States by Charles Industries, the IMC, also known as Intelligent Marine Charger, has a host of features that closely match my wish list and in some cases exceed it, starting with programmability. The IMC can, out of the box, be programmed to charge either 12- or 24-volt batteries, even simultaneously. That alone is a dramatic shift from what's been available up to this point. I eschew vessels whose electrical systems include, 24-volt engine and 12-volt generator start batteries—the fewer voltages aboard the better. Other than the smallest models, nearly all generators can be ordered in 24-volt configuration, so there's no real excuse among manufacturers for playing this mix and match game, which in the long run unnecessarily increases complexity. Having said that, where that is the case, the 12-volt battery (or a battery serving 12-volt electronics) required its own battery charger, however the IMC now fills this void.

A related feature involves battery

charge profiles. The IMC is capable of providing different charge profiles to four different batteries or banks, including flooded, gel, AGM, and NiCad, in either 12VDC or 24VDC, simultaneously. The charge profile feature is worthy of further elaboration. I frequently encounter battery banks that have failed prematurely because the profile of the charger was either set incorrectly or never set by the installer—this is more common than most folks realize—or the charger's cookie cutter default settings don't comply with the requirements of many battery manufacturers, which can vary substantially. Through the soft touch pad menu (a remote display option is available as well) and vacuum fluorescent display, the IMC allows for customization to meet recommended profile guidelines and, once set, they can be locked and password protected to prevent changes from being made. These settings can also be saved to what Charles refers to as a "memory button." It looks like a small watch battery, to either be loaded into another charger, to be reloaded if the charger needs to be replaced, or to be customized for a builder or installer by Charles. Yet another peeve of mine, and a bullet point on my charger wish list, is the ability to charge a completely dead battery. Remarkably, many chargers are unable to do this. However, the IMC includes this important feature.

IMC charger models are available in 20-amp output increments, up to an impressive 120 amps, again at either 12VDC or 24VDC, and because the IMC uses a round robin output protocol, it's capable of supplying full current on any given output leg (many chargers are unable to do this). The 20-amp steps are no coincidence; the charger's design uses 20-amp modules that are stacked internally to increase output beyond 20 amps. The benefit for 40 amps and larger units is redundancy. If a component in one module fails, a $1.50 resistor, for instance, the charger will take that module offline, alerting the user with an alarm and display indicating the reduced output. It's what Charles refers to as the "limp home mode."

The IMC isn't the only new charger that's worthy of praise, however, Charles is to be commended for starting with a blank slate and designing, from the keel up, a charger that will meet the needs of the most demanding and diverse battery bank requirements.—Steve D'Antonio