POWER

You may not be familiar with automatic charging relays, but with these new devices, marine battery management and electrical power-sharing on the fly has never been easier

› BY ALLAN TARVID

SURPRISE, IRRITATION AND DREAD ARE PERHAPS OUR THREE STRONGEST EMOTIONS WHEN WE TURN THE KEY AND NOTHING HAPPENS. ONE IS ONLY LEFT TO SIT AND WONDER WHY THIS OCCURS.

"Batteries often die because a boat comes off a boat builder's line designed to run the basic equipment sold with the boat, usually a radio, running lights and a couple of bilge pumps," says Jack Wells, founder and head of New Jersey-based Wells Marine Technology. "The owner then

Automatic Charging Relay (ACR)

This diagram shows the positive wiring, with the engine alternator going directly to the positive post of one of the two batteries. (It can go to either battery but it makes more sense for it to go to the starting battery.) The automatic charging relay (ACR) senses the voltage in both batteries. When one battery rises to a level that indicates it has received enough charge to pass on additional charging power to the other battery, the ACR contacts close and combine the two battery circuits in parallel.

House Battery

Starting Battery

Isolators accomplish this through the use of silicon diodes that act like one-way check valves. They allow charging power to enter both the starting and house circuits, but stop battery power from escaping one circuit and entering the other through the same wire. Diodes consume a small amount of the charging power, which can lead to inadequate charging in extreme cases, and they tend to generate heat as they work—two nagging traits that led to the continuing search for a better system.

ENTER THE ACR

Today that better system is here, and it uses an automatic charging relay (ACR) system instead of diodes.

"An ACR is a smart device that knows how to operate a battery switch properly and do it for you automatically," explains David Johnson, senior vice president at Washington-based Blue Sea Systems.

An ACR combines start and house batteries in parallel during charging and isolates them when charging has stopped and battery voltage has fallen. Blue Sea's ACR system senses when the voltage of either battery circuit rises to a level (13.5 volts for two minutes) indicating that a charge source is active and the battery in that circuit is sufficiently charged, and thus can share charging output with another battery, even on the fly. The system's contacts then automatically connect, and the charging source is applied to both battery circuits.

When the voltage on both circuits drops to 12.7 volts for one minute, the ACR knows that the charge source is no longer active and its contacts open, completely isolating the battery circuits from each other. Some ACRs include timing delay features that wait a prescribed number of minutes or seconds before kicking in or out to prevent unnecessary cycling during short-term voltage fluctuations. Some also let you manually adjust the precise voltage levels at which they combine and isolate battery circuits.

LOW-VOLTAGE LOCKOUT

Some ACRs also have an under-voltage lockout feature that prevents the starting battery from being combined with a battery having dangerously low voltage. Batteries tend to seek the same level when combined in parallel, and a dead house battery could drag your starting battery down too far to crank your engine or keep it running. The lockout also prevents combining a good circuit with batteries or circuits that might be shorted or otherwise faulty.

ACRs with charge-sensing circuits aren't fussy about where the charge is coming from and let you charge both circuits with a single onboard, dockside or home AC charger connected to a battery in either the starting or house circuit. This works best if you connect the charger to the battery that maintains the greatest load when the boat is not in use. This could be the house circuit if you leave lights or alarm sensors working. Or it could be the start circuit if you shut off all

RELAY RACE>While the development of automatic charging relay (ACR) technology

BLUE SEA SYSTEMS

360/738-8230; *BlueSea.com*

Shown on page 20, Blue Sea Systems' SI-Series ACR ($99.99) comes with a 120-amp continuous capacity rating in 12- and 24-volt models. The system features under-voltage lockout and can be configured to isolate house loads during engine starting to protect sensitive electronics.

The ML-Series Heavy Duty ACR ($199.99) has a 500-amp continuous rating and extra features for use with twin engines.

The Add A Battery Dual Circuit system ($132.99) is a simplified combination of a manual battery switch for those who want one and an SI-Series ACR that automatically combines house and starting batteries for charging, yet isolates them when discharging or starting engines. The system also includes an emergency start switch position that combines both circuits.

Blue Sea Systems ML-Series

MAGNUM ENERGY

425/353-8833; *MagnumEnergy.com*

Magnum Energy's ME-SBC ($129) is a two-bank smart battery combiner that can handle 25 amps. Features include an integrated optional solenoid drive, remote voltage sensing for more accuracy, adjustable high- and low-battery cutout to prevent over/undercharging and automatic 12- or 24-volt operation.

Magnum Energy ME-SBC Smart Battery Combiner

PROFESSIONAL MARINER

603/433-4440; *ProMariner.com*

The ProMariner Digital Mobile Charge40 ($605.50) is a sophisticated ACR that protects your engine starting battery while conditioning and charging your house battery bank with up to 40 amps of charging power. Models for 12- and 24-volt electrical systems are available, offering software-controlled, four-stage charging including a battery conditioning mode. A user-programmable battery-type selection feature is built in and a remote helm panel is optional.

Blue Sea Systems Add A Battery