

③ ALL CHARGED UP

Use these tips for properly charging and monitoring AGM batteries to maximize their efficiency, output and life span.

BY STEVE D'ANTONIO

MONTHLY MAINTENANCE

Over the years, I've seen far too many AGM batteries fail prematurely. It's frustrating because these failures are often relatively easy to avoid. As mentioned in last month's column ("A Charge Account," May 2016), deep-cycle battery life is (or should be) measured in cycles rather than years, with the ideal state of charge ranging from 100 percent to 50 percent to 100 percent (50 percent is the maximum recommended depth of discharge).

If you routinely "shallow-cycle" a battery — for instance, by discharging to just 70 percent capacity — the battery may last longer, but at a steep price. That's because the number of amp-hours (a measure of energy over time) produced by

that battery over its lifetime will almost certainly be less than that of batteries regularly discharged to 50 percent. Lifeline, a major AGM battery manufacturer, claims its products produce approximately 1,000 cycles when they are routinely discharged to 50 percent and then fully recharged to 100 percent (though that latter figure, as we'll discuss, can be difficult to attain).

All discussions on battery charging and life span must first address monitoring, or how to know your battery bank's state of charge (SOC). On a day-to-day basis, the most convenient and reliable means of tracking this information is with an amp-hour meter, a device that acts somewhat like a gas gauge by measuring and tracking the amount of current that leaves

and re-enters a battery and converting it into a percentage of SOC.

Most lead-acid batteries, especially AGM models, benefit from a three-stage charging profile: *bulk*, which provides high, constant current; *absorption*, which is typically timed and provides moderately high current at a fixed voltage; and *float*, which supplies a fixed voltage, typically 13.2 to 13.4 volts, at very little current, typically 0.5 percent of the battery bank's rated amp-hour capacity (for example, 2.5 amps for a 500 amp-hour bank).

Many shore-powered chargers and external alternator regulators offer optional temperature compensation, which involves a probe affixed to the battery to tailor the float voltage, which is temperature-sensitive: Warmer batteries float at a lower voltage and cool batteries at a higher voltage. This feature is valuable because it diminishes the likelihood of floating at too high a voltage, or overcharging, which will shorten battery life.

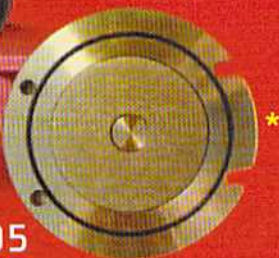
Overcharging flooded batteries is undesirable. Among other things, it requires that water be added more frequently, which is a nuisance. AGM batteries are sealed, however, and if they are overcharged to the point that they vent hydrogen/water, they cannot be refilled and their life span will be shortened.

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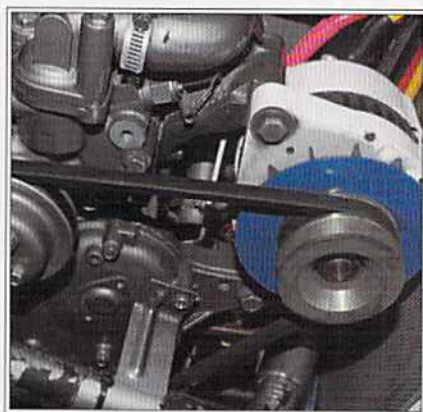
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Multistage alternator regulators ensure that AGM batteries are charged in accordance with their manufacturers' recommendations (left). AGM batteries can be overcharged; the positive grid on this battery corroded as a result of a float voltage that was too high (center). Only alternators designed for continuous high-output operation, like this one (right), should be used with external regulators. These are well-suited to charging large AGM house battery banks.

In terms of the aforementioned charge profile, particularly when using the combination of an alternator or generator and a shore charger, the challenge comes with charging the final 10 to 15 percent. Because the battery's internal resistance increases with its SOC, pushing these final amps back into the battery is a slow process — and because of this, many batteries never achieve the all-important 100 percent SOC goal. Understandably, engines and

generators are often shut down before the charge is complete, which in turn can lead to sulfation (see "Sulfation Negation," Jan. 2016). This deficit can be offset or reversed by periodically carrying out a full charge by using dockside power, making a long run under power, or using an adequately sized solar array.

Finally, check the settings on your shore-powered charger and alternator regulator to ensure they meet the

requirements of your battery manufacturer. In addition to providing an AGM setting, as most chargers and alternator regulators do, some chargers and regulators go further by offering profiles specific to battery manufacturers and/or customizability.

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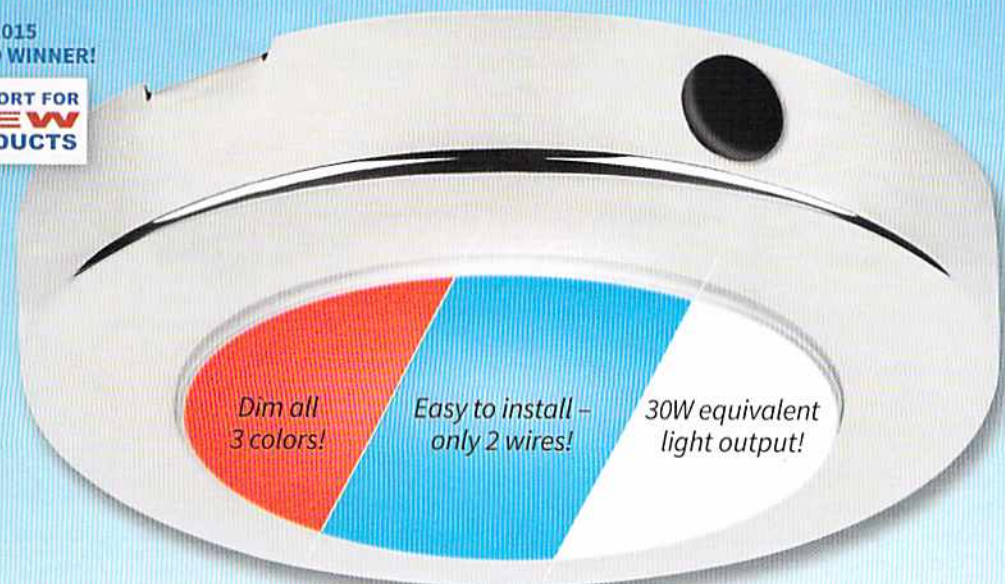
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