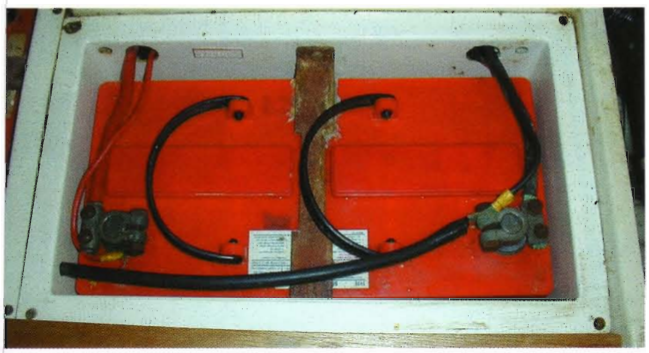
Maintaining batteries onboard



emove batteries and check that the battery compartment is ealed, so that if the electrolyte is lost through battery damage cannot find its way out of the battery compartment. Refit atteries in a battery box ensuring they are wedged or braced in.

l Clean and check batteries or physical damage especially you have experienced heavy eather during the season.

l Check terminals for orrosion or damage due to poor able connection. Often batteries ave a multitude of cables onnected to the terminals. If this ; the case, perhaps now is a good me to install suitable high-current terminal blocks and take only one cable to each battery terminal. Make sure that electrical cables are fitted so that they do not stress the battery terminals.

■ **Check that all connections are tight** (locking washers should be used) but do not over-tighten as this could damage the battery terminals and cause the battery to fail.

SELF DISCHARGE

■ **Even when disconnected, all batteries lose capacity** over a period of time. This discharge rate is affected by temperature. The lower the temperature, the slower the discharge. Lead-acid batteries will not freeze until about -20°C. Some AGM batteries will operate down to -40°C.

■ **Batteries last longer if they are not deeply discharged.** It is therefore good practice to recharge whenever possible. Wind generators and solar panels are ideal for this application as they produce relatively small amounts of current and normally have good voltage regulation.

■ When a boat remains in commission throughout the winter, there may be power drawn from the batteries by alarm systems, automatic bilge pumps etc. These loads are present even when main battery switches are switched off. Although the current drain is relatively small, this consumption must be replaced because over an extended period of time, it will deeply discharge the battery and possibly damage it past redemption.

USING A DIGITAL VOLTMETER

■ **It is advisable to recharge a battery before it falls to 50% of its capacity**

■ If you do not have shore power, wind generator or solar panels and you have to support a standing drain on the batteries, you can recharge from the alternator. Keep in mind, however, that if you wish to put back into the battery 50Ah of capacity and have a 50A alternator, you will have to run the engine for 1.5 hours to recharge the battery. Running the engine off load for this period of time may not be acceptable.

SHORE POWER

■ If you have suitable shore power available, a suitably regulated marine charger can be kept on all the time.

CHECKING THE STATE OF CHARGE

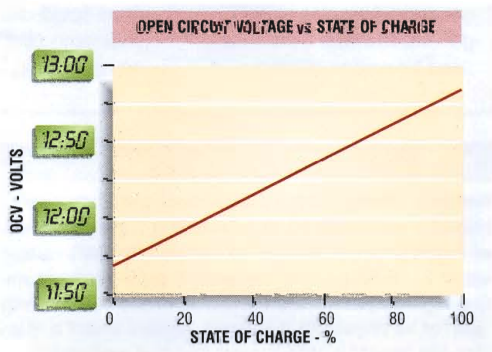
l Top up maintained atteries with le-ionised water.

you have an hydrometer, check ne specific gravity of the battery cid. This will only indicate the state f charge of the battery and will not tell you what capacity remains. Hydrometers are also useful for quickly detecting a faulty cell within a battery. Take great care with this operation as sulphuric acid is dangerous to both humans and fibreglass.

■ **Battery voltage decreases as the battery discharges** so it is possible to calculate the percentage of capacity remaining by a simple voltage measurement across the battery with everything switched off. The graph below gives an indication of remaining capacity against voltage. The graphs for different battery types vary slightly, due to variations in the specific gravity of the acid used by different manufacturers. The graph below is for an AGM pure lead-tin battery.

STATE OF CHARGE	SPECIFIC GRAVITY	VOLTAGE
100%	1.265	12.7
75%	1.225	12.4
50%	1.190	12.2
25%	1.155	12.0
DISCHARGED	1.120	11.9

Sulphation of batteries starts when specific gravity falls below 1.225 or voltage measures less than 12.4V for a 12V battery



ABOVE LEFT: a state-of-charge check using a hydrometer

ABOVE RIGHT: a state-of-charge check using a digital volt meter

CAPACITY CHECK

All batteries have a rated Amp-hour Capacity stated on the label. This is he capacity that can be drawn from he battery over a specific period of ime (usually 20 hours).

As lead-acid batteries age, their capacity reduces. When they reach between 50-60% of their rated capacity when fully charged, they are likely to fail completely. If your batteries are several years old or you have reason to believe that they may be faulty (discharge quickly and seem to lack capacity), it is necessary to carry out a capacity check to determine the amount of Amp-hour capacity remaining in the battery. This can be carried out by an electrical service agent in a marina or boat yard. They will discharge the battery on a load bank from which they can calculate the capacity available.

It is possible to carry out this test yourself as follows: fully recharge the battery. Use a resistive device such as a 40W, 12V bulb and connect it across the battery until the voltage across the battery reads 11V. Disconnect the bulb. Recharge the battery immediately to avoid damaging it. Divide the wattage of the bulb by its voltage to obtain the current consumed (3.33A in this example). Multiply the current by the number of hours the battery took to reach 11V to obtain the available Amp-hour capacity of the battery. This is not a completely accurate test but it should indicate whether the battery is in good condition or on its last legs.

If batteries are only reaching 60% of their capacity when fully recharged, replace them.

Summary

1. Ensure 'marine-grade' batteries are used
2. Ensure charging systems are compatible with batteries.
3. Charge at regular intervals.
4. Check connections for tightness or corrosion.
6. Check that you have sufficient battery capacity for all your requirements.
7. Check batteries regularly.