

CARBON FOAM BATTERIES

Four real-world installations
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Last July, we wrote about a new carbon foam AGM lead acid battery technology that was taking the marine industry by storm. The Firefly Oasis carbon foam AGM battery was developed by Caterpillar to replace the lead acid batteries that they were using in their work vehicles. They found that the old battery technology could not consistently withstand constant vibration, inconsistent charging or long periods without charging. This new technology is based on the sealed valve-regulated design of a conventional lead acid battery but the negative plate has been replaced by a light-weight, sulfation-resistant, microcell material.

The number one reason that boat batteries fail is because the batteries are not regularly charged to completion. The micro-cell material gives the battery a higher density, allowing it to accept and disperse power faster. The Firefly can deliver 80 percent of usable battery capacity (depth of discharge or DOD to 20 percent) and still offer three to four times the battery life of a standard AGM. One of the biggest benefits of this technology for boaters is that the battery can be left in a partial state of discharge (i.e. extended cruising, sitting on a trailer or at a dock without power) and it will not lose any permanent capacity. You simply have to charge the battery and it will return to 100 percent of its original capacity.

Boaters are taking more and more land-based comforts on the water so they are looking for more power, in less space, with less weight. In many cases, there is not enough room to simply add more batteries so boaters are looking for a higher usable battery capacity with a much faster ability to charge. In this article, we are going to talk with four boater owners who recently made the switch to Firefly AGM batteries

CASE 1

The first installation we are going to look at is on a Hunter 33.5 that had four flooded golf cart batteries for a total capacity of 420 Ah or 145 Ah of usable battery capacity (i.e. flooded lead acid bulk charging: 50 percent to 85 percent DOD while cruising or 35 percent of usable capacity). The owner, Tim Grady, had done a great deal of research on both lithium and carbon foam technology and chose the Firefly because of the low

maintenance and the good reviews that the technology had received. "At the end of the day," states Tim, "I would rather spend the money now than later and know that I have a far more forgiving battery." He installed three Firefly batteries for a total of 330 Ah or 215 Ah of usable battery capacity (Firefly bulk charging: 20 percent DOD to 85 percent DOD or 65 percent of usable capacity).

CASE 2

The second owner has a Bavaria 46 with limited space for batteries. His original bank had a total battery capacity of 500 Ah or 175 Ah of usable battery capacity. Because of the limitations of the dimensions, the original lead acid batteries were not installed in battery boxes. This is dangerous with lead acid batteries as the sulphuric acid, that can seep out when the batteries get warm during bulk charging, is highly corrosive. On top of that, the owner lives in Alber-

ta and cannot get to the boat on a regular basis to maintain the flooded batteries. This also means that if the shore power is disconnected for a long period of time the lead acid batteries may completely discharge or the water level will drop, exposing the battery plates and potentially causing sulfation. This greatly reduces the life span of a lead acid battery and in most cases it will not recover. For this boater, Firefly batteries made perfect sense because they do not require battery boxes and they can be left for extended periods without a charge and will only lose one to two percent of their capacity per month.

As long as they don't drop below 20 percent of capacity, they can be recharged to 100 percent with no permanent damage. He installed five Firefly batteries for a total capacity of 550 Ah or 360 Ah of usable capacity, nearly doubling the usable battery capacity with no increase in weight or space.



Firefly AGM batteries provide more battery capacity in less space, at a price.

CASE 3

Our third boater purchased a relatively new 20-metre boat from Florida that was specifically designed to go from dock to dock. The owner preferred to anchor and was constantly managing the power consumption or running the generator. The boat came with six 8D flooded lead acid batteries that were wired in 24-volt which gave him 780 Ah of total capacity or 273 Ah of usable capacity. Because he had a 24-volt system, we installed 14 Firefly batteries for a total capacity of 770 Ah or 500 Ah of usable battery capacity. This gave him an 85 percent increase in capacity.

CASE 4


The final installation was on an older Monk McQueen that had six 2V batteries that produced 1,100Ah or 385Ah of usable battery capacity. The big challenge was that these 2V batteries weigh almost 55 kilograms each, were in boxes of two, and were incredibly difficult to manoeuvre in and out of the boat. The owner recognized this challenge and made a point of saying he would do it differently the next time. He replaced the current battery bank with 10 Firefly batteries which would give him 1,100Ah but a whopping 715Ah of usable battery capacity.

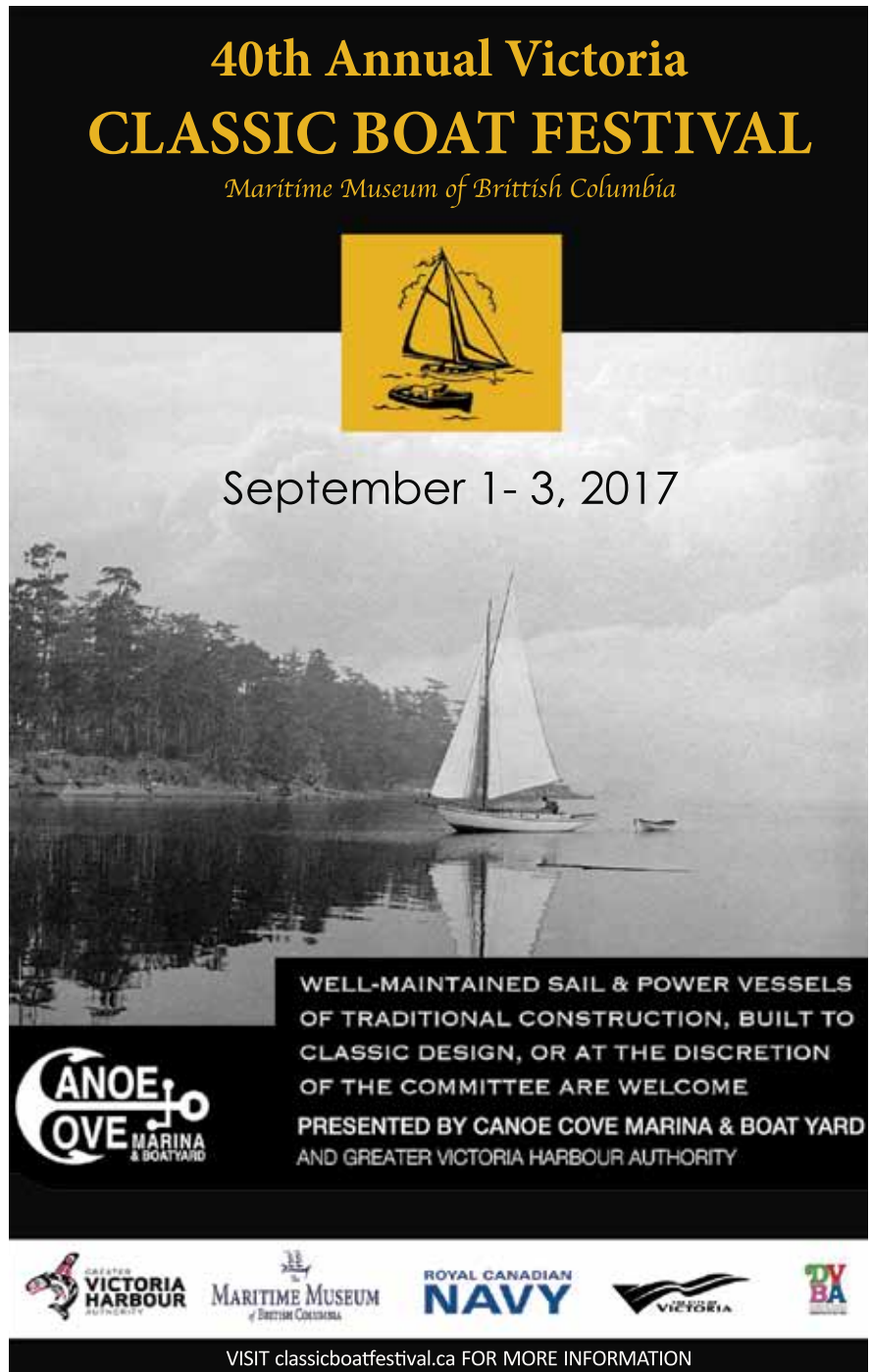
THERE ARE A FEW THINGS to remember if you are going to change the battery chemistry on your boat, especially if you are switching from flooded lead acid to AGM. The profiles must be changed on your battery charger, external regulator, battery monitor and solar controllers. Some of the newer chargers offer a programmable mode that allows you to enter specific voltages. You will want to charge the Firefly to 14.4 for the bulk phase and 13.2 for the float phase. You do not need to fully charge

the Firefly each cycle in order to maintain the capacity, and only need to perform a complete charge cycle when you want to maximize the capacity for the following discharge cycle. The Firefly does not require a float charge, but if float charging (due to the longer projected lifespan) it is important to keep the float voltage at or below 13.2 volts to ensure the battery lasts for


as many cycles as possible. For programmable charging sources, adjust the "reset to bulk phase" to occur if the battery voltage drops below 12.0 volts for more than one minute.

In terms of cost, lead acid batteries will always have the lowest upfront price tag but you have to factor in the maintenance of consistently checking the fluid levels, the


inability to always discharge below 50 percent DOD, the need for a battery box and the low amount of cycles. Even if you are super conscientious, a lead acid battery will only give you 300 cycles at 50 percent DOD, a regular AGM will give you 450 cycles at 50 percent DOD, whereas a carbon foam battery will provide 3,600 cycles at 50 percent DOD. 









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