

**PUTTING AN ELECTRIC ARF ON FLOATS**  
**by Bob Aberle, Technical Editor (Model Aviation)**

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The popular BONNIE-20 electric ARF, distributed by Hobby Lobby International, has been the subject of two preceding articles in Sport Aviator. The first article was on the BONNIE itself from an assembly and flying viewpoint. You can find that very detailed article, "[BONNIE-20 Electric Trainer](#)", in Sport Aviator's "On The Flight Line" Section.

A second article, "[BONNIE-20, Adapting To Li-Poly Batteries](#)" examined in detail substituting several of the new Li-Poly battery packs and provided the improved performance data obtained using these batteries. This third BONNIE-20 article takes up the subject of flying the BONNIE-20 off water using a pair of scale like twin floats.



Photo 1

The floats selected, like the BONNIE itself, are available from Hobby Lobby International. These "ZEEDO", ready to use fiberglass floats, are available in four different sizes (27 inch float length, 31, 35 and 39 inches). The four float sizes are intended for model weights ranging from 3 to 15 pounds. The particular floats chosen for the BONNIE-20 are 31 inches in length and are capable of supporting models from 5 to 7.9 pounds. While great for electric-powered models, these floats are also designed to support glow or gasoline powered aircraft.



Photo 2

Since my BONNIE weighed exactly 4 pounds (or 64 ounces) with the floats installed, the 31 in. floats were a little more than was actually necessary. But where float models are concerned, it is better to be on the conservative side and get plenty of "lift." Keep in mind that this series of floats can be adapted to many different model aircraft; they aren't exclusively for the BONNIE-20.

These ZEEDO floats are made from fiberglass and come in an all-white color. The combined weight of the twin floats, the mounting brackets and screws and a front wire strut, comes to a little over 9.3 ounces. Removing the three wheels from the BONNIE saved 1.5 ounces. So the net increase when substituting floats for the wheels was 7.8 ounces. The BONNIE-20 was configured with an FMA/KOKAM 3S1P Li-Poly battery pack made up of 2.0 aH/15C load capable cells weighing 6.0 ounces.



Photo 3

The BONNIE with that battery pack and wheels weighs 56.2 ounces (19.1 oz/sq.ft wing loading). The BONNIE with the same battery pack, but with floats instead of the wheels, weighs 64.0 ounces (21.8 oz/sq.ft wing loading). I think it safe to say that the weight increase was minimal and as a result the performance difference (wheels vs. floats) was insignificant.



Photo 4



Photo 5

The ZEEDO floats are provided with four molded plastic (or nylon) mounting brackets and sheet metal type screws. Two of these mounting brackets attach to the top of each float. One bracket is for the aft mounting point (photo 4) while the other is for the forward mounting point. The single page instruction sheet supplied is not particularly helpful. The forward mounting strut is not provided, since it will vary considerably depending on your particular model aircraft. So it is your responsibility to select, bend up and assemble this forward float-mounting strut (photo 5).

Locating the twin floats on your model is one of the most critical steps in the assembly process. Place the floats too far forward or aft and the aircraft might not get off the water. The key point is to locate the **bottom step** in each float so that it roughly coincides with the **CG** (Center of Gravity) of your aircraft.



Photo 6

In this particular application, I was lucky since the BONNIE's CG is approximately at the axle of the main landing wheels (photo 6). A strap type (Cessna style) landing gear comes with the BONNIE. I was able to remove the two main wheels and axles to attach this strap landing gear directly to each float.

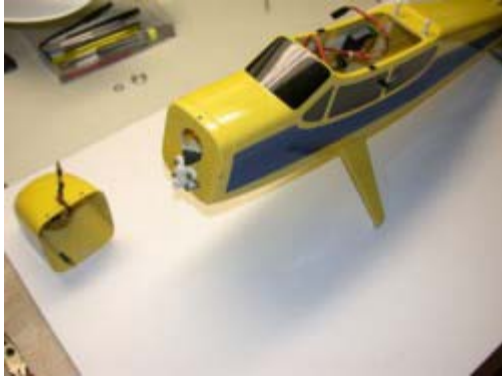


Photo 7

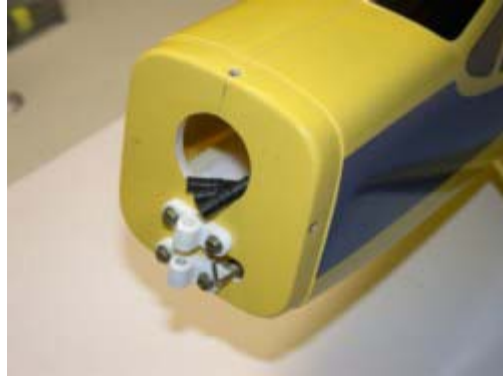


Photo 8

Taking this float-mounting process in sequence, first remove the cowl (which also contains the AXI brushless “outrunner” motor) leaving the firewall exposed (photo 7). Disconnect the nose wheel steering linkage, loosen the wire strut collar and remove the strut and nose wheel (photo 8). The nose wheel bracket stays where it is and will become part of the forward float attach point.



Photo 9



Photo 10

If you hold up each float to a strong light source you will note an internally mounted wood strip that runs along the top of the floats. Both mounting brackets (for each float) get screwed into this hard wood insert for added strength (photo 9). Since the CG position and the main landing wheels are in the same position, set the mounting bracket directly over the [float step](#) (on each float). The forward bracket can be added later. I attached the rear float bracket to the BONNIE’s landing gear, in place of the axle, using 8-32 X 1 ½ in. long machine bolts, with two nuts each to make sure they the bolts can’t work their way loose. You may have to drill out the holes in the float bracket just a little bit so that these 8-32 screws can easily pass through.

With both floats attached at the rear, drop a scrap piece of 1/8 in. diameter wire down through the nose gear bracket (which is mounted on the firewall). Next run a ruler across from float to float so that it touches that wire. Mark that spot on each float for the forward mounting brackets. Attach both forward brackets at this time.



Photo 11

Now you have the floats mounted in the rear, but the BONNIE's fuselage angle can still be elevated or lowered *until* you attach the front ends of the floats. With the top of both floats *level*, position the BONNIE fuselage so that the reference or datum line is roughly parallel with the top of the floats (photo 11). Once you have this level fuselage position established, block up the rear end. Now place the forward mounting brackets on both marks and screw them in place. (*Ed Note: Remember that all Sport Aviator photos can be enlarged just by clicking on the photo. This may help you to follow Bob's assembly steps better.*)



Photo 12 Photo 13

The next part is the tricky one! You must bend up a forward float mounting strut from 1/8 in. diameter wire (available at any hobby shop). The scheme I came up with consists of four separate pieces of wire. One length of wire is approximately 11 inches in length and goes across from float to float and through the holes in the mounting brackets (photo 12). This wire keeps the float tips pointed parallel to the taxi/flight direction and is held in place with two 1/8 inch wheel collars at each mounting bracket (photo 13).

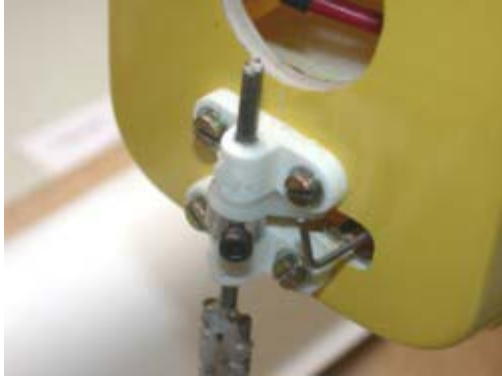


Photo 14



Photo 15

The next piece of wire gets inserted down through the hole in the nose gear mounting bracket, which is attached to the firewall. Pass this wire down through the hole in the bracket so that approx. 1 ¼ inches of the wire projects out the bottom of the cowl (when it is re-installed). This wire can be held in position with the same wheel collar that was used to hold the BONNIE's steerable nose gear strut in place (photo 14) With these two wires in place, I used a piece of scrap cardboard to draw the size and shape of the two additional 1/8 inch wires that connect from the upper nose gear strut down to the horizontal wire that connects the two floats (photo 15) to the fuselage. The resulting forward strut resembles an ordinary triangle.



Photo 16



Photo 17

The upper part of the triangle-shaped wires gets soldered to the upper strut (photo 16). At the bottom, each triangle shaped wire is soldered to the horizontal wire (photo 17), very close to the in-board wheel collar (photo 18).



Photo 18



Photo 19

For soldering the 1/8 in. wire, I used an Ungar 47-watt element iron with a large chisel tip. Soldering of wire is best done with a silver solder and a special paste. For this I selected Radio Shack Silver-Bearing Solder (Catalog No. 64-026) along with Silver-Bearing Paste Solder Weld (catalog No. 64-029). Both products are shown in photo 19.

But just solder isn't enough for a strong joint, so I wrapped all three joints with copper wire extracted from individual strands of No. 18 gage stranded wire (Radio Shack No. 278-567). You first wrap the wire joint with the thin copper wire. Then apply some paste followed by the combined application of the solder and the heat from the iron. This produced nice shiny solder joints that will last a long time and will easily support the weight of these floats. Always make sure to clean all the surfaces to be soldered with denatured alcohol and then lightly sand to a bright finish.

Using this attachment scheme you still will be able to loosen the set screw on the upper collar, which will enable you to raise or lower the forward portion of both floats. I was content leaving the fuselage reference line parallel with the tops of the floats. That worked out perfectly!



Photo 20

When all is done you have two floats mounted such that the step on the underside of each float is roughly in line with the CG of the aircraft (photo 20). The spacing between the two floats was set by the width of the Cessna-style BONNIE main landing gear. This worked out to an inside float separation of 6 inches. If measuring from the top mounting brackets (on the float centerline) the separation distance is 10 inches from bracket to bracket. This normally would be considered rather close float spacing. But the convenience of not having to bend up a second rear wire strut made the closer spacing worth it. In actual practice, this close float spacing provided no problems at all.

The very last item to consider is a steerable water rudder. Mike Hines, Hobby Lobby's General Manager, pointed out that his BONNIE flew without the need for any extra water rudder. In other

words he was able to steer the BONNIE on the water and into the air using just the regular aircraft rudder. After flying the BONNIE on floats myself I tend to agree with Mike. But I still would be concerned when flying the aircraft in windy conditions. In that case, water maneuvering might prove a problem. Because of these concerns I decided to add a water rudder. (*Ed Note: Even with my own design high-performance seaplanes, designed to fly in windy conditions, the need for a water rudder in wind is more than apparent. Use one.*)

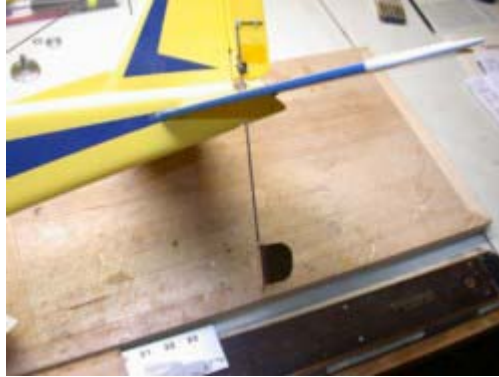


Photo 21

There are two ways to do this: (1) - extend the existing rudder so that a tab actually sticks down into the water (photo 21). When the aircraft's rudder is turned, the extension (which looks like a golf club) also steers or turns with it. (2) - place a small rudder on the end of one of the floats and run a cable back up the float, inside the fuselage and connect it to the rudder servo.



Photo 22



Photo 23

I felt the rudder extension was the easier approach. Only problem with doing this on the BONNIE is that the fin and rudder are mounted up *on top* of the rear fuselage, rather than at the end. To make this system work, I first removed the rudder, which is easy to do with the provided hinges, by “snapping” the removable hinge joint apart. Then I cut a hole from the top, through the bottom, of the fuselage just before the end (photo 22). Next I cut a length of 3/32 in. diameter wire that ran from the rudder, down through the hole in the fuselage, projecting down a total of 6 inches from the fuselage bottom to the bottom of the water rudder. The wire was bent at the top at a right angle. Three “J-bolts” were used to attach the 3/32 wire to the aircraft's rudder (photo 23).



Photo 24

On the bottom end of the wire, I fashioned a water rudder out of some 1/32 inch thick brass sheet material (available at any good hobby shop). This water rudder measured roughly 1 ½ inches high X 2 inches long (photo 24).



Photo 25



Photo 26

I then attached this brass water rudder to the 3/32 inch wire again using the Radio Shack silver solder and paste. With this arrangement the BONNIE taxis easily at close to idle speeds (photos 25 and 26), which is what you want. In flight, the added drag of the water rudder on the end of the long wire went unnoticed. The instruction sheet showed the use of a fixed rudder extension on the lower side rear of the fuselage. They claimed that the aircraft might yaw in flight without this added fixed fin area. I didn't do that and quite frankly, it proved unnecessary.



Photo 27



Photo 28

With the combined AXI brushless motor and the FMA/Kokam Li-Poly battery pack, the BONNIE is a fast and responsive performer. Taking off from the water takes hardly more “ground run” than does taking off from a runway (photo 27). Flight performance seems hardly any different, despite the added drag and weight of the floats (photo 28).



Photo 29

I found the BONNIE-20 on floats to be a very “clean” aircraft in flight. On one occasion, I landed with the BONNIE pointing towards the beach (photo 29). I didn’t realize that, although on the water, it was still moving quite fast. Next thing I know the seaplane was skidding up on the wet beach front sand, ending up about 20 feet onto the shore! So be advised and try to land parallel with the beach so you can bleed off some of the landing speed. The float design seemed optimum in the sense that little water got up on to the aircraft itself. That keeps everything dry, as it should be.

The only nuisance part of this entire set up is the time it takes to revert back to land based operation. Removing the floats and placing the wheels back on the aircraft takes time. Realistically you would likely install the floats at the beginning of the summer and leave them on until the fall, at which time you would go back to the wheels for winter or cold weather flying. You may even install skis in place of the wheels for a real winter flying experience. (*Ed Note: Bring lots of hot coffee if you try this.*)



Photo 30 Photo 31

Was it fun to fly off the water on floats – you bet! Also with quiet electric power, you can fly at sunrise, on any lake, and never draw any attention – think of it!

For more information on the BONNIE 20 on floats, visit both [www.hobby-lobby.com](http://www.hobby-lobby.com) and <http://www.hobby-lobby.com/floats.htm>

The Hobby Lobby catalog number for the 31 in. floats used in this article is PPF820.

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