

## **FLOAT SELECTION AND FINE TUNING YOUR WATERPLANE**

For those starting out, or experiencing some difficulty getting their floatplane off the water, this information will hopefully go towards helping you to tackle your waterplane project with confidence.

### **CHECK THE ENGINE SIZE ON YOUR MODEL**

Will the engine on your floatplane cope with the extra weight of the floats, the landing gear, and the additional drag of the floats on the water? If the model you plan to use for water flying is able to take-off from grass at 3/4 throttle with ease it should fly off water. If in doubt, replace it with the next larger size engine.

### **SELECT FLOATS THAT ARE RIGHT FOR YOUR MODEL**

It's no good just going out and buying a set of floats in the belief that they will be fine based solely on the engine or wingspan of the model. The same goes for building a set from plans. One only has to go to a 'splash in' where the results of poorly matched floats to model can be observed first hand. At one such meeting recently on one model the floats were marginal and on another the floats were way too long. In the marginal case (floats too small for the weight of the model) the floats sat deep in the water and while turning into the wind to take-off, the float on the outside of the turn went under water dipping the wing into the water. The over-long floats supported the model fine, but prevented the model rotating backwards enough and would not leave the water without a fair amount of drama. So how do you size your floats to fit your model floatplane? The best way to do this is to multiply the fuselage length (prop washer to rudder hinge line) times 0.80.

$$\text{FUSELAGE LENGTH X 0.80 = FLOAT LENGTH}$$

Now before you purchase or start building your floats you need to check one more thing. With the float step located at the C.G. of the model, the float bow (front tip) should extend past the prop at least 2". This will prevent the front of the float from going underwater when you open the throttle quickly. Figure 1 shows the fuselage length measurement, identifies the float step, and illustrates the float step/fuselage Set-up and the float tip/prop placement.

### **PROP SIZE**

Your model is now carrying the extra weight of the floats and float landing gear. You also have the additional drag of the floats in the water. Changing the prop to a larger diameter and smaller pitch will give you extra pull on the water.

## **FLOAT-TO-MODEL DISTANCE**

You need to keep the propeller away from the water and water spray during taxing, take-offs and landings. The float-to-aeroplane distance is measured from the bottom of the prop arc to the top of the floats. You should have a minimum of 2". See figure 2.

## **DISTANCE BETWEEN FLOATS**

To ensure stability during windy conditions float-to-float distance is important. Normal wheel spacing is the minimum float spacing you can get away with. In windy conditions the minimum spacing may dip the wing in the water or, if not caught in time, flip your model over when you make a cross-wind turn. A float-to-float spacing of at least 25% of the model's wingspan will ensure stability on the water in most kinds of wind conditions. I use between 25% and 33% float spacing and this has worked well. See Figure 3.

## **FLOAT POSITIONING IN RELATIONSHIP TO THE MODEL**

This is usually the major cause of most modellers' problems when their floatplane experiences difficulty flying off the water. The float attitude (looking at the model from the side and the front) in relationship to the plane is often incorrect. First, looking at the model from the side, the floats should sit parallel with the flight attitude of the aeroplane. See Figure 2. Second, looking at the model from the front, the fuselage should be centered between the floats and the floats should be parallel with one another. See Figure 3. Plans do not usually mention the model's flight attitude, however most fuselage elevations are drawn in the flight attitude. In most cases the normal flight attitude of the model is when the tailplane is horizontal. This will therefore become the datum line. I draw the float set-up on the plans 2" below the propeller arc and parallel to the tailplane (the datum line). If the leading edge of the wing is at a positive angle the set-up is complete. If, however, the wing angle is zero (parallel to the tailplane) then add 5/8" to the height of the front landing gear. This allows the wing to sit at approximately 3 degrees positive incidence when the tailplane is horizontal. This has been found to be the best angle of incidence. The positive wing angle lets the wing lift the model off the water with little effort on behalf of the pilot. You now have enough information to draw the front and rear float landing gear to full scale. Make the hardware to this drawing and all you have to do is attach it to our model and floats, insure proper alignment, add water rudder, balance the model and fly.

## **ASSEMBLING THE FLOATS TO THE MODEL**

Make sure that the workbench is level. Then align the floats the correct distance apart. Using a spirit level on the top of each float in turn, pack up the front or rear of the floats with books, etc., so that the floats are level. Then get the

fuselage with the undercarriage gear fixed (the nose gear landing mount is attached to the landing gear) and place it between the floats also supported by books or what-have-you. Place the model's C.G. over the float step. Using a square align the front float gear (so it is perpendicular to the fuselage) and tape it to the floats. With the spirit level on the model's tailplane adjust the rear float gear until the tailplane is horizontal and tape in place. Double-check the C.G./step alignment. Next, mark the undercarriage location on the floats, drill the mounting holes and attach the floats to the undercarriage legs. Take measurements at the front and rear of the floats to check that they are parallel. If not, adjust the landing gear on the nose bearing mount accordingly.

### **WATER RUDDER**

You will need a means to steer your model during taxiing to and from the take off and landing areas. I have flown quite successfully without a water rudder. However, some models need a lot of room to turn, so take the time to add a water rudder; it makes life a lot easier! You can attach a water rudder to the air rudder using piano wire, or you can attach a water rudder to the rear end of the floats. I have tried both and both work well. For a 40 size model it is suggested to have a water rudder of 3" square.

### **ENGINE TICK-OVER**

You need a reliable idle. There is no strip or runway in water flying. You have to take off and land depending on the wind direction, so you will have to taxi out to the best take-off point, and after landing (alighting), taxi back. A dead stick on the water (for those of us who do not have a boat) means a long wait for the wind to bring it back to the bank where it can be retrieved. When on water it is suggested you advance the tick-over a few clicks.

### **ATTACHING THE UNDERCARRIAGE TO THE FLOATS**

Most floats are clamped in place using saddle clamps. Just make sure they are a tight fit around the piano wire. Or you might try using a tricycle nose gear bearing mount. See Figure 4. It attaches to the floats with four wood screws. The piano wire passes through it and is held in place with a wheel collet. This will allow easy attachment and parallel adjustment of the floats.

### **TYPES OF FLOATS**

You can now purchase floats made of various materials, i.e. wood, plastic, foam and combinations of these, or you can make your own. Foam floats are easy to work with. They also have greater buoyancy ratings and can handle heavier loads.

### **LANDING GEAR**

For a nose-wheel model just remove both the land nose and main gear and replace with your float undercarriage. Use the same diameter piano wire as your land gear. A trike water set-up is shown in Figure 5.

It is not difficult to bend the piano wire into shape if you use a wire bender or a vise. Don't try doing it in your hands. After bending the various wire parts, assemble, bind the joints and solder. For a tail dragger remove the land gear and replace it with a rear float gear as shown in Figure 5.

This will be the front float attachment. You then have to add a plywood or hardwood undercarriage support to the fuselage at the rear of the wing. This is the rear float location. The rear legs are the same design as the rear float gear in figure 5. You will need to add an "N" brace between the front and rear legs or use a single brace to prevent the gear from folding. See Figure 6.

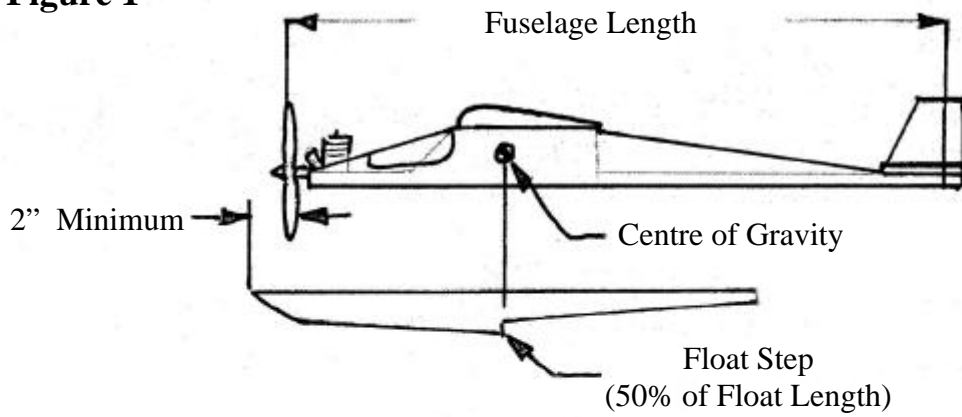
### **BALANCING THE MODEL**

Just as you balance your landplane you must also balance your floatplane. Set the model up with the C.G in the same place as it was when rigged for land flying. If you have to rebalance, and you probably will, because it is most likely that it will be tail heavy, add the lead weights to the floats. This way you can switch from land to float flying without removing/adding weight every time. This is another advantage of foam floats because you just drill a hole or two at the tip of the floats (if tail heavy), add the lead and epoxy and you're finished.

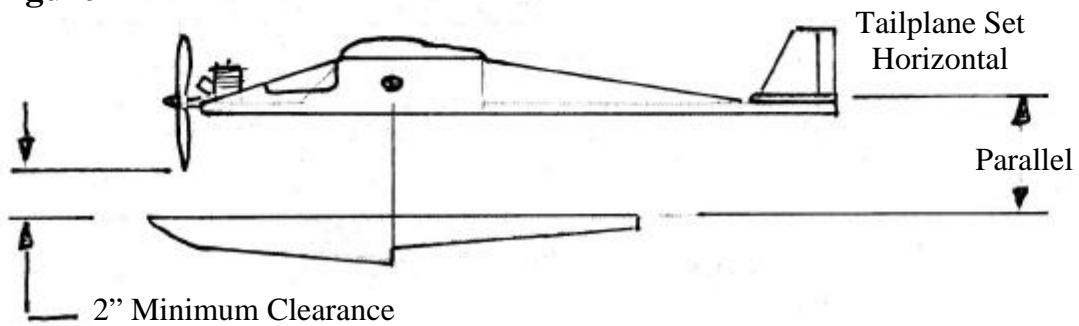
### **HAPPY WATER FLYING!**



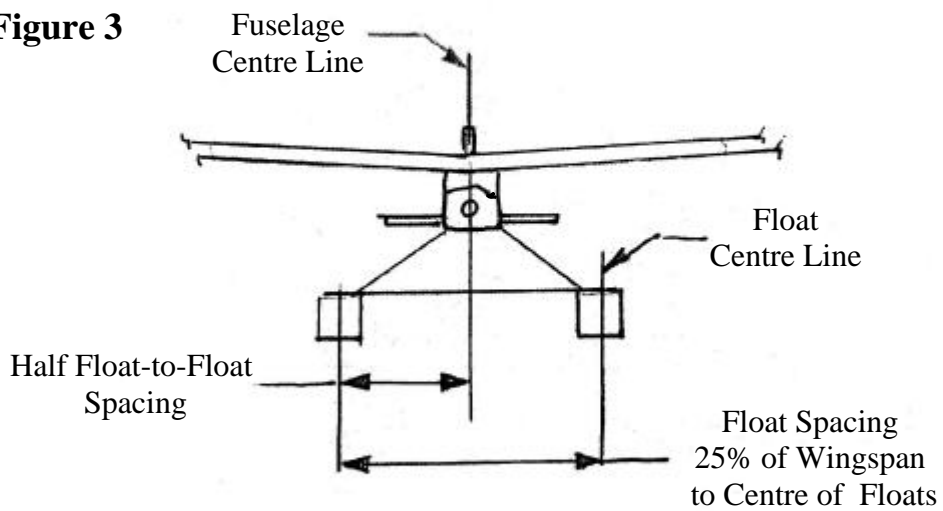
**Figure 1**



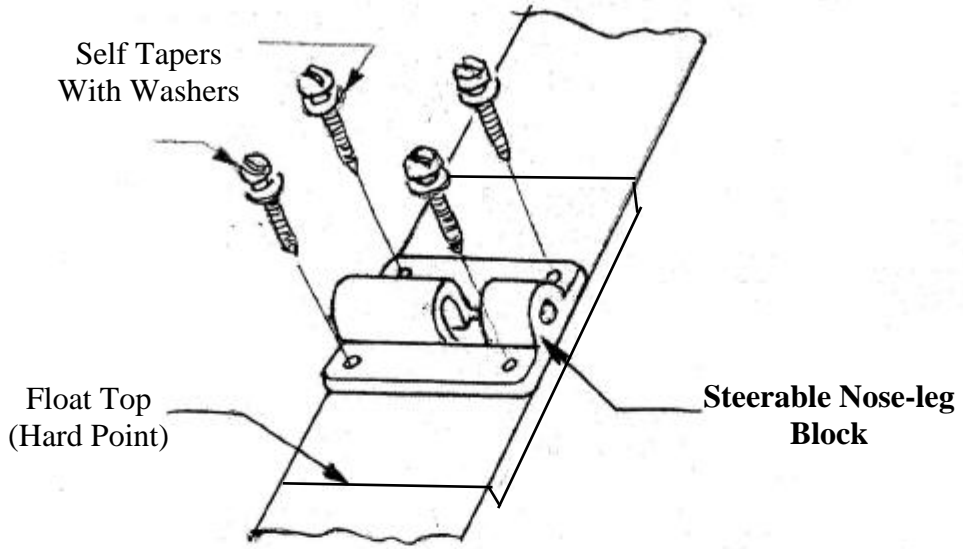
**Figure 2**



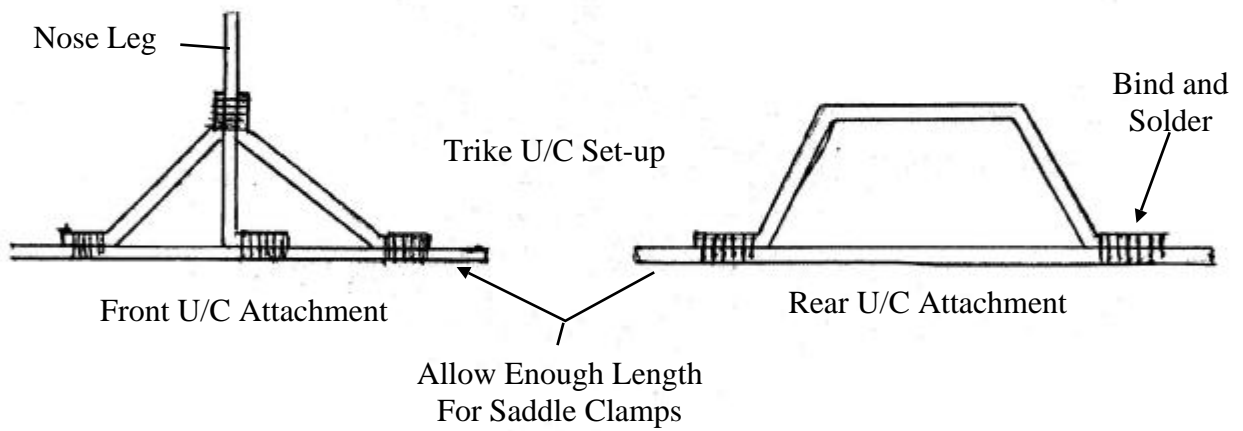
**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**

