FOUND

PHOTOS BY FUDO TAKAGI

By WALT MOONEY . . . Another 2-in-1 design from the King of the Peanut Gallery. Considering his ability to dig up unusual and rare aircraft, it is only natural that he should . . . er . . find the Found . . .

• In Canada there is an aircraft company by the name of Found Brothers Aviation. Over the years they have produced some very fine utility aircraft. They are true "Bush" airplanes, and as such, have been convertible to both skis and floats.

This model is particularly suitable for a seaplane . . . capable of taking off from the water unassisted, and putting up good duration flights. The model in the photo was drawn up on a Monday, and flown in the Flightmasters seaplane contest on the following Sunday. It flies as well as any other rubber powered seaplane I have seen, but in a single week of evenings, the scale details were rather stark and the model only made it to second place.

The Model was purposely designed with a wing span of 26 inches so that Bill Northrop of MODEL BUILDER could shrink it down to Peanut size for the magazine. Because it is difficult to come up with Peanut Scale ripples, I suspect the larger model will be the more successful seaplane, so details have been added to the plans for a landplane peanut version.

With the exception of the floats, which are round topped, the only other area of the model needing countouring is the fuselage forward of the windshield. The engine cowling and nose block is carved from block balsa. Except for landing gear or float struts, there are no struts on the Found, which makes for minimum aerodynamic drag. The real airplane has a propeller spinner, shown in the top view, but not included on my model for simplicity (Some of the scale points were lost this way, no doubt.).

There is nothing new or revolutionary in the design or building of the Found, so other than describing the structure of the various components, we won't go into a step by step "how-to-build-it" article, but will put more of the article into a "let's-try-to-fly-seaplanes" effort.

The wing is a conventional stick-and-tissue structure, using notched ribs, three spars, a leading edge, trailing edge, and tips. The real airplane has dihedral breaks about half way out the semi-span, and so does the model.

The tail is also conventional and similar to the wing, except that both the vertical and horizontal tails are built flat over the plan, without the spars, and the spars and rib pieces are added after the flat surfaces are removed from the plans. A spar on both sides tends to reduce warping tendencies. Sandpaper is used to obtain the cross section desired.

The fuselage is a simple, built-up box structure. Sheet balsa is used at the tail cone area to support the tails. Four blocks of balsa provide the nose contours. Remember to hollow out the top block to allow clearance for the propeller hook and rubber motor. Use thin sheet balsa to fill in around the windows.

The floats have a single top keel, ten formers, and are covered with sheet balsa. A single sheet of three inch wide balsa will just cover the top of the floats. The floats have block balsa noses and sheet metal water rudders.

We used a seven inch diameter Peck Polymers plastic prop, a ballbearing thrust washer, and two of their nylon thrust buttons . . . the last items to be sure of a consistently aligned prop shaft. For the large model, drill out the thrust buttons to accommodate the shaft wire.

All parts of the model are covered with tissue and doped until they are water proof. I suggest several coats of dope all over the uncovered fuselage structure to prevent it soaking up water when it gets dunked and the nose plug comes out.

The floats are held parallel to each other by hardwood spreader bars. These penetrate the skin of the floats and butt against the keel. This must be a watertight joint.

The landing gear wires are cemented to the fuselage structure at their upper ends, and are attached to the spreader bars by wrapping with thread and cementing. Add strut fairings and the diagonal struts.

Note that the rear motor peg is not

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very far behind the trailing edge of the wing. This was done because it's amazing how much rubber it takes to R.O.W. a seaplane model, and it's important to have the rubber C.G. close to the flight C.G. Otherwise you have to reballast the the model every time you increase the engine power.

Now, let's try to fly Scale seaplanes. First, a seaplane ought to take off unassisted. In fact, at the Flightmaster's seaplane contests, unassisted R.O.W. is required. To do this successfully requires several things, as follows:

1. The model must float and not get water logged.

2. The model must taxi in a straight line, thus the water rudders are essential.

3. It helps if the spray from the floats doesn't hit the propeller, so add the spray dams, made from thin plastic, to the inner side of each float nose.

4. Have the C.G. in the right place. It should be just forward of the step.

5. The model must be trimmed out to fly nicely, it must climb straight, or in a very wide turn.

6. It must have enough power to take off, and it's even better if it takes off quickly.

All of the above items are important and have been observed to be important over years of observations in flying both models and full sized seaplanes.

Test glide your model until it has a reasonably straight glide, and will land in the water safely. Try low power hand launches until you have a good climb that is also fairly straight, use thrust line adjustments to obtain this. Now try some moderately wound taxi runs. Be prepared to get the model quickly if it dunks so it doesn't get a lot of water in it. If the model turns much in taxi mode, bend the water rudders to straighten it out. Bend the rudder on the float towards which the model turns . . . the other float will be tending to lift out of the water and its rudder won't be very effective. If the model turns inconsistently, that is, in either direction, bend both rudders inward . . . or replace them with slightly larger rudders.

Now try a full power takeoff. If the model takes off, WOW that's great! And what a lot of fun!

If the model taxis real fast and looks like it might take off, but doesn't quite make it, add another loop of rubber and try again.

If the model noses up and drags the aft end of the floats in the water, the C.G. is probably too far aft relative to the step. Ballast the nose to move the C.G. forward and add up elevator to maintain your flight trim.

If the model taxis at a high speed with a very flat attitude, with the aft end of the floats out of the water, you have the opposite problem and should use the opposite cure. It is not unlikely that the model will do this very long, because it has lost the stabilizing effect of the water rudders, and it will also tend to dig in the nose of the floats and tip over.

In fact, if you have too little power to take off, or even if there is just barely enough power to take off, the chances are the model will tip over most of the time. This is because of the non-scale water. It has waves that are too big and surface tension that is too strong . . . not much can be done about that . . . except more power to get off faster and miss that rogue wave.

The power required to take off will vary depending on where you fly. For instance, the model in the photos required 10 strands of the brownish Sig contest rubber to take off at Lake Elsinore (altitude 1250 feet) consistently. Whereas, it jumps off every time at sea level with eight strands.

It will actually get off at Elsinore on eight strands, but not consistently. The taxi runs are about twenty five feet long and all the little variations in the surface of the water tend to dunk the model about 50% of the time. With the bigger motor, at least 95% of the takeoff attempts are successful. I believe that the rubber I was using is not quite as powerful as Pirelli, or the newer black Sig contest rubber.

Dead calm glassy conditions are fine for test flying, but they are a little harder to R.O.W., because the surface tension is harder to break. Have a friend throw a pebble in the water just before you attempt the R.O.W.

The best conditions for R.O.W. flying include a very light breeze to lightly ripple the water, and a drift that will bring the model back to you if it lands in the water. The breeze also shortens the takeoff run and gets the model on step quicker.

It is not always easy to observe everything that occurs during a takeoff attempt. If the propeller throws a lot of spray, either add spray dams, lengthen the spray dams that you have, or shorten the propeller a little. Water thrown back on the model is another source of drag and excess weight during the takeoff.

If the model dunks itself several times, give it a chance to dry out. The extra weight of a water-logged model is unfair to the poor little thing.

Go out and have fun with your Found. It's the best excuse a person ever had to go wading along a muddy shore. ●

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with more rudder to hold the plane level.

What does the flyer do when he makes a slow roll to the right? In Bern, most top flyers started with something that is not in the rule book and they were obviously not downgraded. They raised the nose slightly before rolling to minimize the need for corrections later on. But if we suppose that you will not do something so bad, this ought to happen:

A. During the first 90° roll you will give more and more left rudder. Probably a little up in the beginning to keep the fuselage level.

B. From 90° to 180° (inverted) you will slowly neutralize rudder and start giving a little down.

C. From 180° to 270° you will apply more and more right rudder and neutralize elevator.

D. From 270°-360° you will neutralize rudder and if you need, you might even give a little up elevator, which is neutralized when finishing the roll.

What has happened to the control surfaces?

A. Aileron: constant . . . I hope. No problem.

B. Rudder: Left (90°), neutral (80°), right (270°) and neutral (360°). In low speed, or with insufficient fuselage side area, you need more rudder. Otherwise it is quite uncomplicated.

C. Elevator: A little up (0-90°), neutral (90°), more and more down to max at 180°, neutral (270°), perhaps a little up (270-360°), neutral (360°). This is more complicated. You could minimize the need for elevator correction, for example, by moving the center of gravity backwards.

What happens if you have a "down" elevator interconnection (to the "wheels") when giving rudder in knife edge? Only look at the elevator:

A. 0-90°, up elevator

B. 90-135°, elevator gradually to neutral

C. 135-180°, elevator gradually to "max" down

D. 180-225°, elevator gradually to neutral

E. 225-270°, elevator gradually to "up"

F. 270-360°, gradually from up to neutral.

This seems to be very complicated!

What happens with an "up" elevator interconnection (to the "fin")? Again, only look at the elevator:

A. 0-90°, perhaps nothing, as you will have a little up automatically.

B. 90-180°, more and more down elevator.

C. 180-270°, less and less down elevator.

D. 270-360°, again perhaps, nothing as you will have a little up elevator effect.

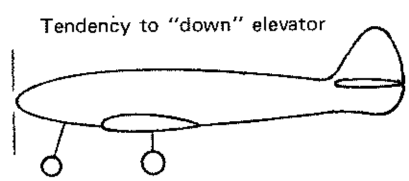
This seems to be much better!

However, this "up" elevator effect will usually be far too much. So the best choice seems to be neutral to a very slight up elevator (to the "fin") interconnection.

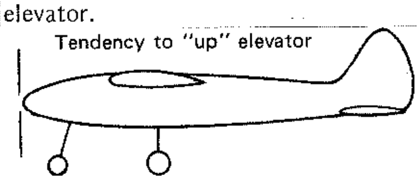
How do today's models behave? The funny thing is that it is much more common with a "down" elevator interconnection than an "up". The terrible thing is that models built alike can behave differently, with no obvious explanation. In my own experiments I have only been able to observe tendencies and I have very few cures to the problems.

What are the tendencies?

A "standard" low wing model with a high placed stabilizer used to go towards the wheels ("down") or it is sometimes quite neutral.



A mid or high wind model with a low placed stabilizer used to go towards "up" elevator.



These observations make one guess that it may have something to do with a turbulence originating from the wing root and which increases when applying rudder. If the plane doesn't have the same tencency depending upon which wing is down, it might be due to an effect from the spiraling propeller slip stream.

How can this interconnection be avoided? The two obvious measures are:

A. Move the stabilizer away from the wing turbulence . . . upwards or downwards at least 2 to 3 inches, depending upon the fuselage length.

B. The other way is to place the stabilizer with equal turbulence on both the upper and the lower surface. This would mean in line with the wing. This would probably also mean a more horizontal roll axis in a snap or very fast roll. The worst stabilizer position ought to be a 1/2 to 2 inches above or below the wing. If you are unlucky you might need the crazy positioning of one stab side placed higher than the other!

C. Move the center of gravity. If a model flies straight and level, the wing lifts the model's weight, one G. If we roll to knife edge, this ability to life one G ought to be at least partly translated to horizontal and some tendency to move towards the "fin" (up) ought to be there.

If the CG is moved far forward, you have normally to fly with more "up". When the one G disappears in knife-edge, the plane ought to move a little more towards the "fin" (up). A move of the CG backwards would then create a tendency to move towards the "wheel" (down).

This way you can change the tendency only slightly.

D. Create another turbulence on the fuselage side at a wanted height to give the desired stabilizer influence as "A" above. A sidemounted engine or muffler might work as such a turbulator. Even in this case the influence is surprisingly marginal, but it is always safer to have both fuselage sides alike with smooth wing fillets.

E. A longer tail may help to get a more even turbulence on both sides of the stabilizer, as the turbulence spreads at a longer distance from the wing. But if the stab not until now will enter the turbulence, it will be worse with a longer tail.

F. Make yourself a "black" electronic box similar to Ken Gustafsson's, here in Sweden. It gives the proper amount of elevator compensation when rudder is applied on his "Mach 1".

Most of this discussion is based upon the assumption that a turbulence is created affecting the stabilizer. But I have never seen it and do not know. Someone interested ought to investigate it with the help of a wind tunnel.

In the mean time I keep to a high speed midwing design like the DFH 18.

MODEL BUILDER

DFH-18

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