John Watters offers you this lovely little biplane for CO2 power or conversion to electric or rubber

Anyone who has been to Old Warden and has visited the splendid display of full size aircraft, cannot fail to have noticed a green and cream 2 seat biplane. Particularly interesting, since this aircraft does not have the normal biplane struts and wires. The aircraft in question is the sole remaining Parnell Elf. Designed by Harold Bolas, the Elf was developed from a series of aircraft to come out of the Parnell factory. It was hoped that this aircraft would fit in with demand for private aircraft ownership in the early thirties. As it transpired only three of this type were ever built. Unlike the majority of bipoles designed at the same period, the Elf did not have a gravity fed fuel tank, in the upper wing centre section. What it did have, was a pumped system from a tank within the fuselage. This system caused the first two Elves to make forced landings, due to pump failure. Resulting in their eventual destruction. The Shuttleworth Elf was purchased by them in 1959 and lovingly restored to full air worthiness, eventually flying again in June 1980.

Having designed and built a number of free flight powered biplanes, the Elf looked a perfect prototype for modelling. Up to now all the models I have designed were intended for outdoor flying. So I thought it would make a change to have a model that could be for both indoor and outdoor. Given the right conditions of course. The Elf is an uncomplicated aircraft and with the Warren girder strut arrangement, offers something different in a biplane.

Fuselage

Nothing complicated here. First build two side frames to the shaded outline, including the 1/16" sheet piece for the bottom wing. When both are completed build up the body using 1/16" cross pieces and the top and bottom formers. With the built up fuselage structure complete, you can at this stage add the 1/32" sheet sides.

The nose section of the model is made separate from the rest of the body. Formers F1, F2 & F3 should be positioned onto the bottom nose crutch piece. Former F2 can be pre-drilled to suit your motor. The two 3/32" sheet side pieces can now be attached to the three formers and allowed to set. The complete nose assembly can now be glued onto the body, making sure that it is true. At this stage the front and rear undercarriage wires should be fitted. I used nothing more than masking tape to fix the wires in position. This works well and allows some degree of flexibility.

Having assembled the undercarriage, the bottom of the body can be sheeted and the nose filled-in using sheet and soft block, or even foam. Now, I always think the next stage is one of the trickiest with CO2 motors. That is actually fitting the motor. For balance the bottle should be positioned as shown on the plan. How you run the pipes and charger nozzle you will have to decide for yourself. I ended up with the charger being a free assembly, coming out of the rear cockpit. When you are happy with your motor fixing, the top formers can be sheeted over using 1/32" balsa, or again, a foam block.

The motor cowling is a built-up structure, which is probably best constructed on the body. This will allow you to contour the cowling in with the fuselage. All the cooling ducts and exhaust pipe are simply added on pieces of balsa. Although the vents are a bit ‘fiddly’, they do give the model a realistic appearance.

I used PVA glue for the most part in the construction of this model. Do be sparing with your application, a cocktail stick is ideal for placing a small blob of glue. Weight as we all know with models of this size is a penalty.

Tail & fin

Although the drawing shows the tail and fin with hinged surfaces, it is not necessary, although having them separate can make trimming easier. The actual construction either way does not differ greatly. Both the fin and tailplane use the same method of building. Pin down the centre spars and glue the ribs in place.

The ribs at this stage are simply strips of 1/32" sheet cut to the required length. Adding the leading and trailing edges and positioning them centrally onto the ribs, completes the structure. The outer edges of the fin are built up from two laminations of 1/32" balsa strips. When completed sand the structure to the profile shown on the plan.

Wings

Both wings are built-up in the same manner. First cut the ribs from 1/32" sheet. If you decide to add the ribs, they should be cut along with the ribs and all sanded to shape together. The plan is self explanatory. There are no dihedral braces between the top centre section and the top wing. The two top wing panels are

John’s Elf is CO2 powered and the motor fits nicely into the cowling. Other forms of power could be used with a little modification.

The original model weighs in at 2ozs but this could be reduced with a little care, especially if you only intend to fly it indoors. John flies his model indoors and out and here it is climbing away out-of-doors looking wonderfully realistic.
are hand painting be sure to use thinned down
glue directly to the centre section. Do make
sure when you do this that the dihedral is the
same under both wings.
I used small wire bag tie to hold the struts
to the wings. These I shaped around a small
diameter wire. When completed they were cut
to length and glued to the spars with cyano.
The crosses shown on the plan depict the
position for the strut hooks. 15 Anp. fuse wire
will suffice just as well.

Finishing & assembly
I used lightweight white tissue to cover the
total model. This should be water shrunk and
when dry, given two coats of thinned down clear
dope. A 50/50 mix or even thinner. It may be
necessary to give more coats. But whatever you
do, do not use full strength dope. You may find
it best to pin down the livings and tail surfaces
during the final stages of assembly. Although I have not used
Solarfilm Lighspan on this size of model, I
know it is a suitable material, having seen it
used on peanut size models. When you have
covered all the individual parts, assemble the
wing onto the cabane struts and body, checking
that they are straight and that the bottom wings
are at the correct dihedral. I have found that
using small amounts of glue best when fixing
these to avoid warping. Although I have not used

To colour the model I used thinned down
dope. A 50/50 mix or even thinner. It may be
necessary to give more coats. But whatever you
use – remember the weight penalty. All the
lettering was hand painted, after transferring
the letter shapes using soft pencil unto the
surfaces from a cut-out paper mask. If you use
this method use a very soft pencil, B grade or
softer, as it is very easy to pierce the tissue.
Before finally gluing the tail onto the body,
check the balance of the model. This should
be at 1/3 from the wing leading edge. I found
that I needed a small amount of weight in the
rear of the fuselage.

Fusing
Start by using a small amount of liquid or a
gas charge, to get the trim of the model right.
Build up the charges until you have achieved a
full liquid charge. You will probably have to make
small trimming charges as you go along.
This is where the separate surfaces help. I found
that the model flew well in left hand circles,
both indoors and out. My model had a flying
weight of 50 grammes. This can probably be
reduced by not sheeting in the sides on the
fuselage, and the use of lighter wood. This size
of model, would lend itself to being also
powered by an electric unit, or even rubber.
Try which ever suits you best – have fun.

Parnall Elf References:
Aeromodeller Plans Pack 3026.

Shuttleworth Collection – Old Warden
Aerodrome

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