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Scratch building a Berliner Helicopter in 1/72 scale

This project was my longest running build, and took me approximately six months to complete. I embarked upon this path over a year ago when I first saw a Berliner on the web. Since I had a couple of Nieuport kits sitting on the shelf, I felt that this would be a reasonably straight forward conversion.

The initial point of my research started with the web, which supplied many pictures and a few pieces of dimensional data. I then decided that I would need more than this, and took a chance that someone at the museum where the Beliner is stored would be willing to assist me.

My email request duly reached Anne Smallman, Curator of Collections at the College Park Aviation Museum in Maryland. She provided me with the majority of the measurements and numerous photographs of the final triplane/helicopter configuration of the Berliner.

At first I thought that I would make the triplane version of the helicopter, but as looked over what needed to be done for the triplane, I came to the realization that I was probably not ready for the amount of work it would involve, and it would be wiser to tackle one of the earlier versions of the craft before the wings were added.

The first step in actually building this model started with the collecting of various kits and after market products. For the body I used two Nieuport kits - one 1/72 scale Toko Nieuport N.11 and one Esci Nieuport N.17 kit. I also needed a Bentley 220hp engine which came from Aeroclub. For the spoked wheels, I decided that getting after market ones would be best as opposed to trying to build them myself, so I purchased a few French and German WW1 photo-etched wheel sets from Tom's Modelworks. Square and round plastic stock was used for the various spars and rods which came from Evergreen. I searched for after market props that would work for the rotors but found none. Realizing that I would need to scratch build these also, I purchased some basswood strips from the local Michael's hobby shop with which to carve the props.

I then made myself a list of parts that would require fashioning.

- a new engine support
- a new axle and undercarriage struts
- six air deflectors
- a pair of tailplane to fuselage braces
- a new fin and rudder
- a new tail skid
- a nose skid and set of braces
- two main props
- one tail prop

Before commencing with the build I also set out a construction plan. I felt this was needed since there were a lot of steps to be done to build this model, and a plan would keep me on course as I progressed with the build.

The first step in the plan was to build the fuselage. I used the Toko Nieuport 11 fuselage and detailed the interior of the cockpit by adding a seat, making an instrument panel and adding ribbing. A transfer case was also fashioned from various bits and pieces from the parts box and added to the interior. Once everything was in place and painted, I joined the fuselage halves and removed the existing rudder.

I then glued together the Esci Nieuport 17 fuselage halves and when it was set I removed the headrest and attached it to the Toko fuselage, and filled in and sanded the seams.

< Inside of cockpit showing large transfer case and control stick. (via Anne Smallman)

Next was the horizontal stabilizer, which I took from the Esci kit. It is covered with a molded on fabric effect, which I removed with sand paper. It was then glued to the Toko fuselage along with the Esci support struts.

Then I added the piece containing the lower wing and centre section from the Toko kit to the fuselage, and cut off the wings. The seams between the fuselage and the center section of the wing were filled and sanded smooth.

I fashioned a new fin and rudder from plastic sheet and attach it to the fuselage. The rudder was first drawn on a piece of graph paper at a much larger scale, and was subsequently reduced to 1/72 scale on a photocopier. This was used as a template to cut the plastic. The rudder line was scribed using a ruler as a guide and a hobby knife for the scribing.

The front of the fuselage had the circular locating cuff for the engine cowl cut off, and the opening was covered over with plastic sheet. A hole was drilled in the middle to take the engine.

< Top of forward fuselage, port rotor and air deflectors. (via Anne Smallman)

The top portion of the fuselage between the cockpit and the firewall was built up with plastic and crazy glue, and sanded to shape. The fuselage sides just to the rear of the firewall needed bulges, which were supplied from the spares box. The bulges came from an old Revell Fokker

Eindekker kit. They were glued to the fuselage sides and shaped with crazy glue and sanded smooth.

With the work on the fuselage mostly complete, I then proceeded to the outriggers and truss system.

Some square plastic rod was used for the main spars. One end of each of the spars was sanded to a pyramidal shape. The spar's positions were marked on the fuselage and glued butt end style to the fuselage. I knew that this is a weak method of attachment, but I figured that once I added the truss system and the rigging it would be extremely strong. The truss was then added with plastic rod. Two small lengths of rectangular rod (which will eventually accept the engine support) were attached to the side of the fuselage at the firewall.

While I let things set for a while, I worked on fashioning the two rotors from the bass wood. This was my first attempt at carving props and I learned a couple of valuable lessons.

The first was take your time with the carving and sanding.The bass wood is soft and is easily cut and sanded. If you're not careful, it's to easy to carve or sand off too much wood and force you to start over.

The second was that making the first rotor was actually quite easy, but making a second one to match was not so easy. It took me four attempts before I had two rotors that looked identical.

A small section of wood dowel was added to the bottom of the props. The rotors were stained and then given three coats of gloss Varathane. Once they were completely dry, I added hub bosses which were included with the Tom's Modelworks spoked wheel photo-etched fret.

< Starboard rotor. (via Anne Smallman)

Next to be added to the model was the undercarriage legs and axle. Again I used round plastic rod. The legs were sanded to an airfoil shape. The struts that run from the stabilizer forward to the fuselage were cut and glued to the fuselage

I then went on to build most of the other smaller parts that were needed. The tail prop and the skid were made from some rectangular rod. The oval shaped engine mount was made from plastic sheet. Here again it took me about four tries before I got what I felt was an acceptable piece. Finally a new tail skid was made.

Two holes, one for the tail prop and one for the tail skid, were drilled into the fuselage.

Then I faced the task of rigging. My prefered method uses size 9 guitar wire. After determining which wires I wished to add, and where they were routed, I went on to the laborious task of measuring, cutting, re-measuring, re-cutting, and then gluing the wires. For the most part this proceeded much more smoothly than I anticipated. With this completed, I was pleased to see that

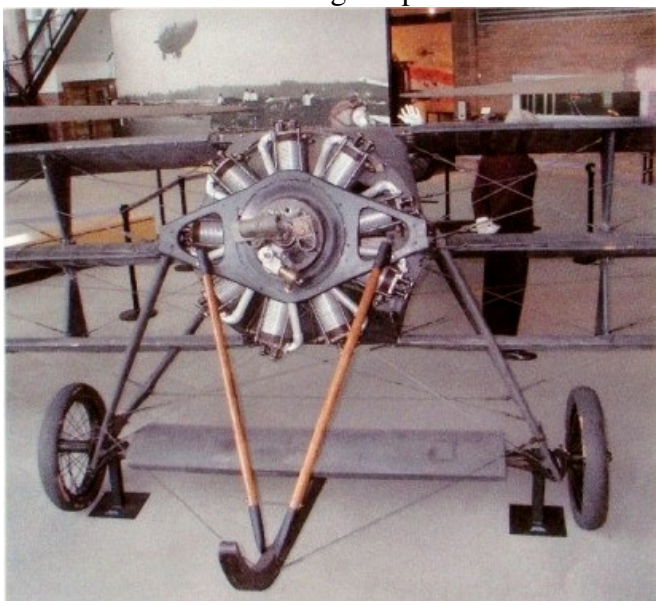
the rigging made the spar/truss assembly into a very strong structure, and I had no fears that I would damage it as I continued on with the build.

With the model mostly assembled I then moved on to the painting stage.

Much thought went into what the colour of this craft was. Colour pictures of the Berliner helicopter as it is today show it as a dark greyish colour overall. Black and white photographs on the web show that it was not always an over all dark colour, but an overall light colour early in its life and then a half light and half dark coloured later on. Armed with a number of black and white photos along with colour photos of the craft as it now sits in the museum I made the following choices for colours.

From the rear of the cockpit to the end of the rudder, the colour was to be a light grey, to represent the silver/grey doping that was common to WW1 Nieuport fighters. The portion forward of the cockpit, including the spar and truss system were to be painted a dark grey. The rotor shafts were given a dry brushing of silver to give them a metallic cast. The Aeroclub engine is a white metal casting, so I polished the casing, and the cylinders were painted black and then given a dark grey wash. The skid braces were painted a wood brown and given gloss black ends where they meet fuselage and skid. Once the paint dried, the model was then given a dull coat.

Now I moved on to adding the parts.



The engine and its mount came first, then the skid and its braces, followed by the two rotors, the tail rotor and the tail skid.

< Engine, mount and lading gear, struts, wheels and skid. (via Anne Smallman)

So there was my model, complete and sitting on its landing gear - except with no wheels! I had come to the part I dreaded most. I had various ideas, my own plus others on how to build them, and was constantly waffling on which method to use. After screwing up my courage , I finally bit the bullet, and got on with it.

As expected the wheels proved to be the most irksome part of the model. I must admit that I needed three tries at building these. My first two attempts were utter failures. I will not go into much detail on these, other than to say that the first attempt was based on my own ideas on how to build the wheels, and the second attempt followed the instructions that came with the wheel sets.

On the third attempt I followed the instructions outlined in the article "Modelling spoked-wire wheels in 1/72 scale" by Jack Taylor, published in the March 1989 issue of Fine Scale Modeler - with one minor modification. It worked quite well, though not 100 percent.

Briefly, here is what I did.

I started by making a pair of "plastic washers" by cutting two thin sections from a plastic tube, and sanding them down until they were very thin. I then took the spoked wheels and cut through the rim in four equally spaced locations. One spoked wheel was glued to one side of each of the washers. The tricky part here is getting the spokes centered on the washers. Because the spoked wheels are slightly larger than the washer, they also have to be coned in the middle while being attached.

Before attaching the second set of spokes on the reverse side, I cut and glued a small length of plastic rod to the center of the spokes to act as the hub

With the rims complete, tires were now needed. The tire is made from some fine-gauge wire insulation. Starting with about a two inch length of wire, remove a bit of insulation from the end and remove the insides. Then cut the left over insulation to length (approximately 1.75 inches). and split the insulation tube lengthwise down the middle. Use a slightly dull hobby blade in your knife for this. If the blade is too sharp it will most likely cut through the insulation and you will need to start again. Once this is done, take the tube and put a piece of thin metal down the slit to spread it apart slightly. I used a couple of really dull hobby knife blades in each piece of insulation. Heat the insulator in an oven at 300 degrees for one minute. Remove and let cool. Now it is ready to add to the wheel.

To get the tire to wrap around the wheel, slide the wheel into the slit and glue one end of the insulation to the wheel. Then carefully wrap the insulator around the circumference of the wheel crazy gluing it in place at regular intervals. When you get to the part where the two ends meet, you will need to trim the tire in small increments until they just touch. At this point there will be a seam that you will need to fill and sand.

With the wheels finished, they were sprayed black and glued to the axle. Finished at last!!

So was making this model worth the time and effort? You bet! Not only do I have a model of something you're probably not going to see in anyone else's collection, but I have also expanded my model building skills.