

The Berg O. Aviatik D-1

by Frank Dellamura

Too stable they called it. Perhaps pilots were braver then. Austria's WW-I fighter as a Stand-Off R/C. Takes a .40.

I am the kind of modeler who is more than a bit jaded with the endless run of look alike scale and semi-scale kits. There are endless variations of P-40's, P-51's, FW-190's ad-nauseum. Go back to World War I and you've got the same thing, only with less variety.

Lately I've felt the need to satiate a modest mania for a World War I bird. After searching the available literature I ran across some photos of a pugnacious-looking little biplane known as the Berg-Aviatik D-1. The peculiar, stocky (even ugly) look of the machine began to captivate me. A little more digging revealed that the airplane hasn't a curved surface anywhere! That's just the kind of model I was hoping to find! A Profile Publication edition (No. 151) gave me just about all of the information I needed to start.

It's very likely that not many of you have heard of the airplane. It is one of the few fighters designed and produced solely in Austria for use in her own Air Force. While it was a well designed fighter it never became too popular with the pilots since she was a bit too stable for the tastes of the day. Her name stems from it's designer Julius Von Berg and the producer Oesterreichische-Ungarische Flugzeug-fabrik Aviatik (try saying that three times, rapidly) or Aviatik for short.

The early D-1's were fitted with 185 hp Daimler engines and a car-type radiator in the nose (similar to the Fokker D-7, but uglier). The prototype had cheek type radiators with a fairly well streamlined nose cowl. The last of the series employed a box-type radiator on the upper surface of the top wing. I picked the streamlined cowl. It looks far better than the car radiator. For those of you who would prefer a change the drawing shows two nose configurations and three radiator types. Since my model is not fully scale I left off the radiators because, frankly, I think the ship looks better without them. Further, you certainly don't need the extra drag especially if you're flying with a .35.

Another detail you can dispense with are the machine guns. The D-1 carried two 8mm Schwarzhos machine guns that were completely buried inside the fuselage (alongside of the engine). All that's needed are two pieces of dowel as indicated on the plans.

The Berg D-1 was a pretty good fighter when it's engine didn't overheat. At an all-up weight of 1,815 pounds and a top speed of 116 mph she compared favorably to fighters like the Nieuport 23 or the 180 hp version of the Fokker D-7.

Model Description

With two equal span (and chord) wings at 24 feet, the D-1 makes an ideal subject for a 1½ inch to the foot rendition. The model span turns out to be a neat 36 inches with a total wing area of 560 square inches. The dimensions put the model nicely inside of the .35 to .45 displacement range.

The problem with many scale models (and especially World War I models) is tail heaviness. The short nose moments, of most W.W.I types, is particularly troublesome. Not being a class A super-stick radio jockey I took great pains to make sure that the model would balance with a minimum of ballast up front. I carefully laid out the model, in reduced scale, and proceeded to calculate every last sheet and stick of balsa, spruce, plywood and covering. After working out the theoretical weight and balance point I found that my original plan to use all sheet fuselage and tail surfaces required enough lead in the nose to make the airplane a flying brick! At this point a drastic change of plan was in order. Out went the sheet tail surfaces as well as the fuselage sheeting aft fuselage would be the side panels. The substituted with a suitable MonoKote or silk covering. The only sheet left in the aft fuselage would be the side panels. The nose was lengthened one inch. This would

move the engine further forward in order to help balance the airplane. Along with the increased nose length the landing gear was "tweaked" forward also. Moving the landing gear forward preserved the short-nose look as well and improved the balance situation further. While the stagger angle is greater than scale, the slight deviation would help relieve the aft C.G. problem while retaining the short-nosed look.

All of the tedious weight calculations and re-drawing paid off. The result was an airplane with a basic structural weight of 2 pounds 7 ounces (less engine, fuel and radio). When flying hardware is added the ship came out to 4 pounds 11, or just shy of a wing loading of 20 ounces per square foot. The result is a modest sized airplane that will not fly beyond the capability of the average flyer's ability. The C.G. should be not further aft on the finished model than the 30% top wing chord position indicated. 25% is preferable.

Wing Construction

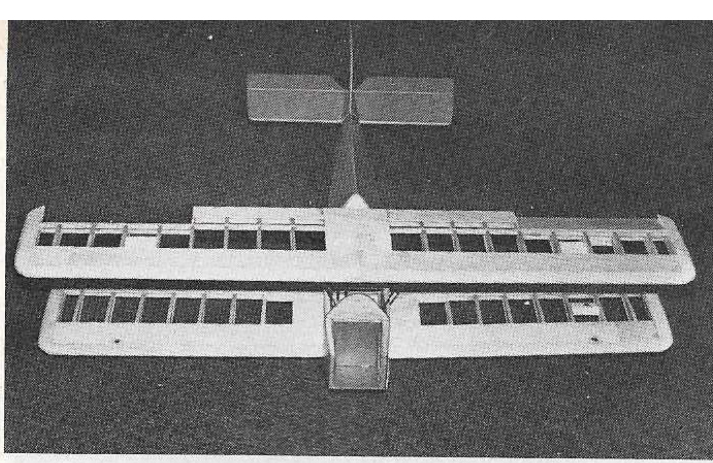
The scale airfoil, being a thin reflex type, was discarded immediately. I replaced it with a 14% thick Clark Y. The change makes it easier to build the wing and improves the flying qualities. I selected the thinnest airfoil consistent with the aileron servo size. Depending on the radio equipment you have you may feel the need to build the wing a hair thicker. The slight increase will not harm the flying qualities noticeably. Drag will be a little higher, but then the stall characteristics will become gentler as the airfoil thickness increases.

The leading edges are ¾" stock (square or shaped). All ribs are constructed of ⅜" stock as is all of the wing sheeting. I used the all-sheet trailing edge method of construction and cut the ailerons out after the structure was completed. All spars were made from ¼" square hard balsa. The relatively narrow chord, combined with the sheeting, makes for a very robust wing structure. Both wings have their center-sections sheeted (on the undersides) with ⅛" plywood. Hardwood blocks were imbedded and epoxied into the upper wing center-section to provide hard-points for mounting the upper wing to the cabane struts.

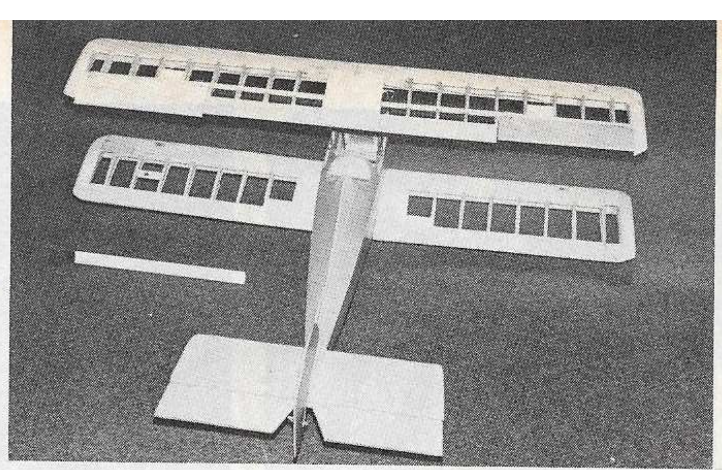
Both wings are built flat, the lower wing is broken, where the fuselage sides meet it, and a modest amount of dihedral was put in before the plywood spar webs are glued into place. The small amount of dihedral does improve lateral stability a



A K&B .40 cowed within, Top Flite maple prop. Landing gear is more than adequate, designed to meet the impacts. More strut work to mount the upper wing. It totals up to a rugged aircraft.



A trial fit for alignment. The wings are very rugged, able to withstand aerobatics. The tail surfaces are seen covered, fuselage easily built.



An adequate space exists between the upper and lower wings, often a weak point in old biplane designs. Ailerons are positioned on the upper wing.

bit, more importantly, it prevents the finished model from having a drooped wing look. Wing tip blocks are carved from 1" square balsa and sanded smooth. There is little else to say about the wing's construction. They are very simple and go together fast. I estimate it took me less than eight hours to complete both wing structures. Making the 44 ribs was a bit of a pain. I first made two rib patterns out of some old plywood paneling, then gang-sanded a stack of ten at a time. Once the patterns are made, making up the ribs goes very fast.

Fuselage

The body structure is the essence of simplicity. There are no compound (double curvature) curves anywhere. The sides were made up from 1/8" sheet balsa, reinforced with 1/4" square balsa strip. All formers are balsa with the exception of the firewall and the former that makes up the forward wall of the cockpit. It's tempting to sheet the upper and lower sections of the fuselage, aft of the wings, but don't do it! Remember that rear C.G. problem!

The only parts of the fuselage that were a little troublesome was the nose block and the cowling from the firewall to the cockpit (topside). I had originally planned to build up the nose using laminated balsa

but a friend of mine suggested I vacuum form it from .040 styrene. He (being an avid plastic modeler) had a home-made vacuum forming rig powered by the wife's vacuum cleaner. I made the form and he graciously consented to mold the nose piece. It came out quite nice and I'd suggest this method if you have access to the equipment. If you go this route be sure that no part of the styrene cowl touches any hot part of the engine. Styrene can melt easily.

The engine cowl area can be treated in two ways. Either use thin aluminum flashing (at a hardware store) or plank the cowl over using balsa. My model is planked, doped and covered with aluminum foil which is in turn painted with clear epoxy. Frankly, I prefer the aluminum flashing. It's a little harder to do but the shiny finish does wonders for the airplane's appearance. If you elect to go with aluminum, fit the cowling *before* the cabane struts are installed. It makes the job a lot easier.

When you put together the cabane struts, the copper tubing, shown in the drawing, allows you to adjust the upper wing for incidence and parallelism with a minimum of fuss. When the adjustments are completed just solder up the tubing and you've completed the job.

There is little more to say about the fuselage. The drawing indicates a six ounce

round tank. If you install the tank lower you will be able to squeeze in an eight ounce square type.

Finally I considered a steerable tail skid, but opted to stick with the more scale-like sprung skid that the real article carried.

The Tail Surfaces

The original plan to use all sheet surfaces was discarded. Instead a more conventional open rib construction was used. It's truer to scale as well as being lighter. All of the tail surfaces are built up of 1/4" square stock and sheet balsa with gusseting added at strategic points.

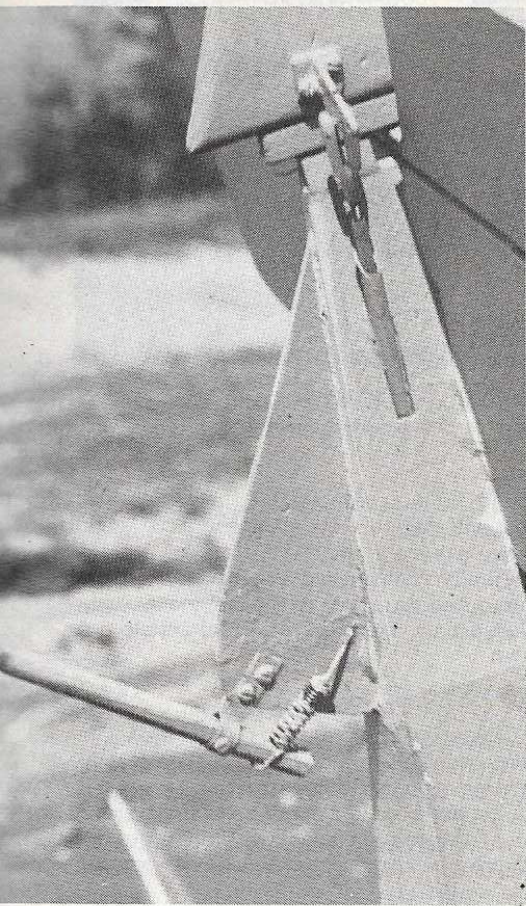
I originally thought that the tail bracing would be required for stiffness. When I finished the model the vertical and horizontal struts proved to be rigid enough. Being a little lazy and with a thought toward reducing drag I decided not to fit them to the model.

Painting and Detailing

Just like most World War I airplanes, the color scheme is nearly unlimited. The standard colors were light blue or grey undersides and a regular hexagonal lozenge pattern on the upper surfaces. The Austrian pattern is not entirely similar to the German type. Where the lozenge shape

PHOTOGRAPHY: DON MCGOVERN





The spring-loaded tailskid. With a little luck it might drag you to a halt before the next big shell hole. Rudder horn, clevis is visible too. **At top:** Enough of winter, airborne at last: The ship performs nicely, fly it in for a landing. **Right:** Logictrol LRB-4 radio, room to spare.



of the Austrian pattern was a regular hexagon, the German pattern used a non-symmetric oblong figure of six sides.

The engine cowling was usually left bare aluminum. On many versions however, it was painted the same general colors as the rest of the aircraft.

The early production versions had clear (or buff) doped undersides with a natural wood finish on the fuselage. Wheels were either bare spokes or covered. Some versions had crosses painted on the hubs. The insignia varied also. Early versions used a white-outlined Maltese Cross. This was later changed to the straight Cross with white outline. In some cases the white outline was deleted. Serial numbers were conspicuously located on the fuselage sides. As you can see there is quite a lot of latitude with respect to painting up your personalized version.

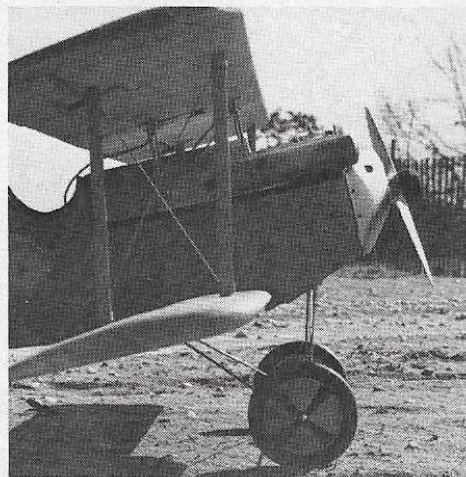
The color scheme I picked is totally fictitious but entirely plausible. Using flat RS "Perfect Paint" yielded a dull and used military look to the model. The undersides were painted Japanese Grey (no. PC36). The rest of the airplane was painted German Light Blue (no. PC 34) and a broken zig-zag pattern added using Azure Blue (no. PC 35). The finished effect is a subdued and business-like look, very teutonic in appearance.

Having finished the ship just before Christmas, my son, Bob thought it would be a great idea to get me an Enya 40. I thought this to be a great idea too! So the Enya 40 went in swinging an 11-6 wood prop (I break my engines in while flying).

In order to bring the engine to the correct position you've got to use long engine mounts. I would suggest the Sig large aluminum mounts bolted and epoxied to the firewall (the bolts are epoxied, not the mounts).

Flying Notes

It seems that I almost always finish most of my models around the end of the year when it's rotten cold and snowy. You just don't R.O.G. in a foot of snow. Rather than wait until March I decided to take my chances with a hand launch.



A silent nose tastes the wind. Winter's end, a time to fly. World War I birds recall an age we were not born to know. Brave men flew them.

After an anxious circuit of our frozen wasteland (and a splash-down in the snow) the ship was trimmed out and the next flight went well. It was cut short only due to an impending case of frostbite.

Aileron-only turns are no problem. If you dial in rudder you may get a surprise. The low aspect ratio barn-door rudder is pretty sensitive. The ship handled pretty much like I expected it would. It's responsive to her ailerons and elevator, but not excessively so. The rudder response is a little quicker than I would like, but this situation could be eased by reducing the rudder area a bit.

Whatever you do be careful about trying to land at engine idle rpm. It wants to drop right out of the sky. I ran some very preliminary stall speed calculations before starting the project, and the second flight proved them essentially correct. Keep your nose down or it will stall before you retard to idle rpm (about 30 mph). You've got to come in a little hot and cut throttle at the last minute. It's a draggy airplane and I'm glad I didn't aggravate the situation by adding strut wires and radiators.

It appears that any good .40 engine is more than adequate and a good .35 engine should be no problem at all.

Good luck and I hope to see some of you at Rhienbeck-1977.

References

- "Fighter Aircraft of the 1914-1918 War," Harleyford Publications
- "Profile Publications No. 151," Aero Publishers