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Akaflieg Berlin B 11, Part 1

We first saw plans for the Akaflieg Berlin B 11 in the August 1962 issue of *Interavia*, where a very small outline drawing was reproduced. The article included a table of specifications for a large number of then current sailplane designs, but the B 11 was not listed. A couple of sentences in the text gave the forward sweep angle as 18 degrees, the span as 56.8 feet (well over 15 meters), and the area as 170 square feet. All up weight was to be no more than 795 lbs.

The simplistic 2-view drawing showed a high aspect ratio tailless glider of rather futuristic design. Fascination was immediate, and the magazine article was retained through high school, college, and the ensuing decades.

Some time later, August 1988, the *TWITT Newsletter* presented a 2-view of the B 11 with a few of the major dimensions.

Still enthralled with the design nearly a decade later, we presented what small amount of information we had, along with what at that time we believed to be an accurate 3-view, in *RC Soaring Digest*, June 1997.

Since the column in *RCSD*, we've tried several times to contact someone at Akaflieg Berlin to acquire more information, but until recently without success.

Our last attempt managed to work its way to some people endeavoring to archive documents related to the numerous school projects. The first document we received was a wind tunnel report of over 100 pages. Included in this document were detailed drawings of the 1/8 scale test model and pages and pages of graphed test results for lift and drag coefficients, pitching, roll and yaw moments, and certain forces generated by the vertical fin and rudder. The last two pages presented photos of the model in the wind tunnel immediately following oil flow studies.

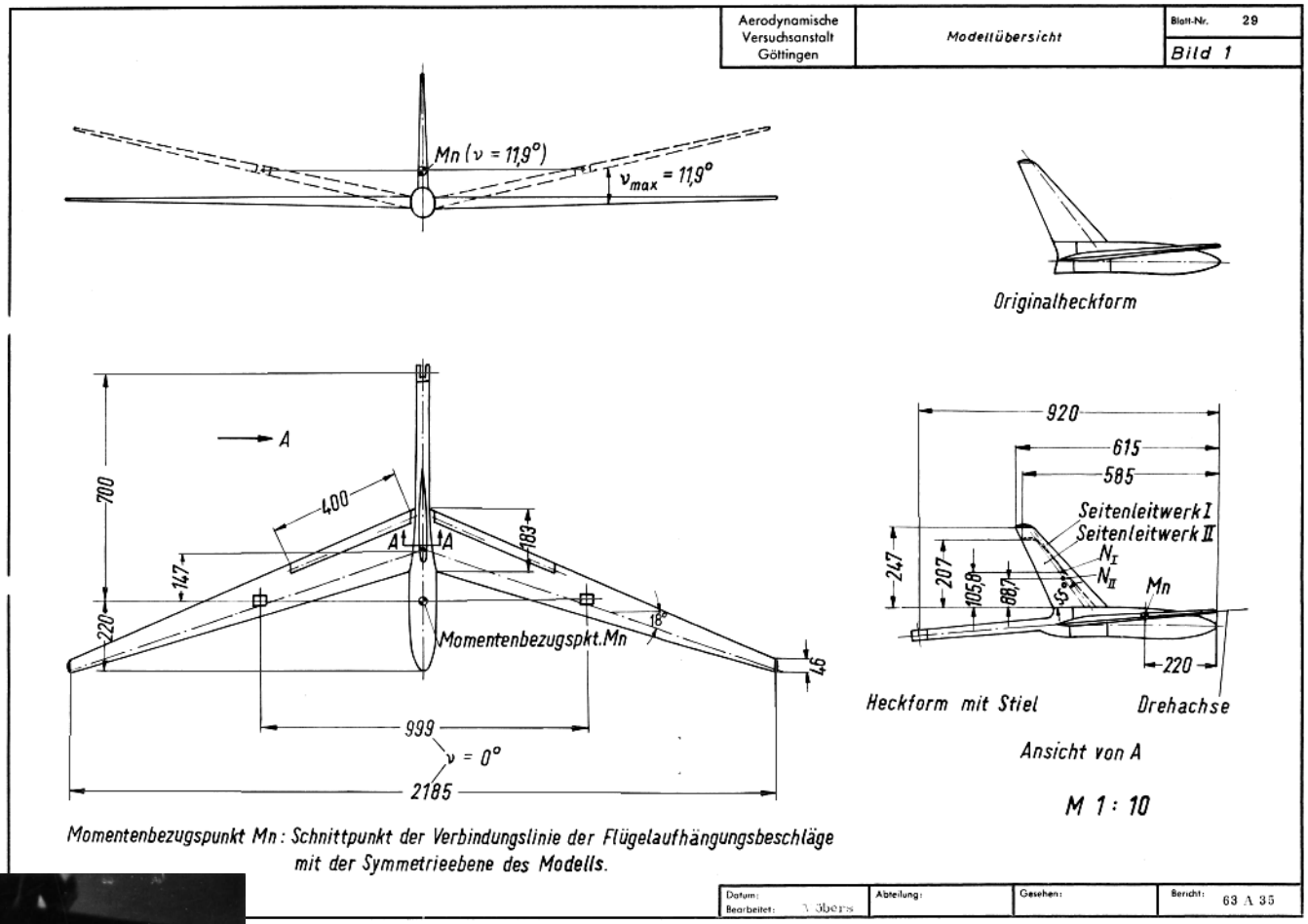
A few weeks ago we received a packet of ten photocopied drawings and photos. These drawings depict the internal wing structure and fuselage framework, and the connection of the wing and fuselage frame. The photos show the balsa skin being applied to the wing structure, a pilot sitting under the canopy in the completed metal fuselage frame, a close-up of the wing spar mounting point, another photo from the rear with the wing attached to the fuselage and the fin and rudder in place, and an overhead photo of the completed sailplane.

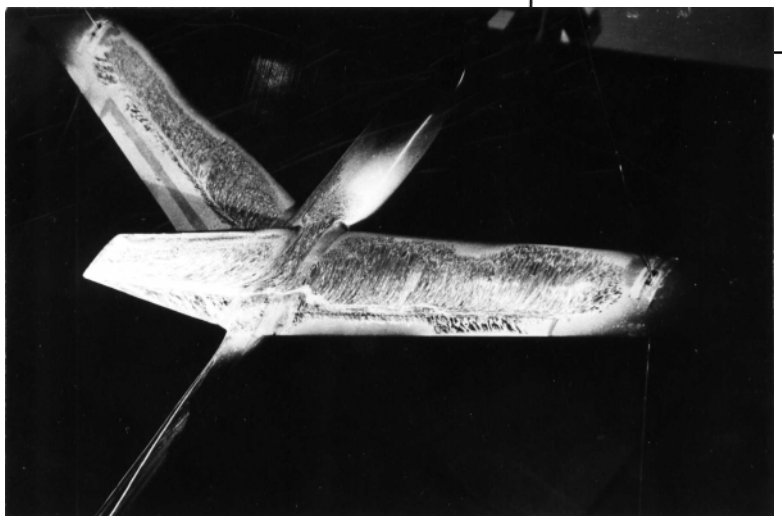
Despite the photo of the completed airframe, we also received word from Akaflieg Berlin that the B 11 never flew. The current interpretation of events, drawn from archived documents, indicates the calculation of the CG location was incorrect. Changes to the airframe to correct the problem would have been so difficult as to be impractical, so the aircraft was destroyed.

The first of October saw a huge roll of plans arrive at the Post Office. These turned out to be 14 large sheets containing scale drawings of the wing internal structure (including details of the wing-fuselage connection), overall canopy contour and cross-sections, fuselage outline in side and top views, details of the wing root rib construction, contour templates for the wing leading edge with spar placement, various views of the fuselage frame components, and details of the forward "false" spar, rudder and vertical tail. Additionally, on four separate sheets we found two preliminary three-views of the B 11, a sweep vs. taper vs. aspect ratio study, an

outline of control system variations, and a finalized overview of the control system linkages.

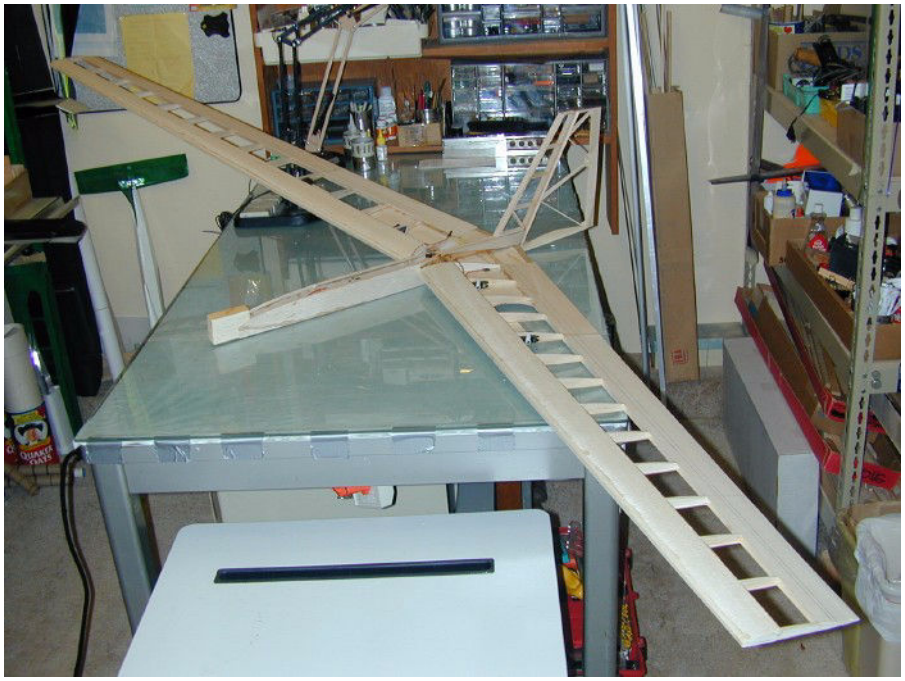
From the standpoint of a modeler, the CG problem which doomed the original is insignificant as it can be easily corrected during construction, either through use of a larger or smaller battery pack or by some other easily implemented method. We now have sufficient information about the airfoils and the control system used to be able to build an accurate and realistic model in quarter scale. The biggest drawback to creating a scale model for competition is the fact the original full size aircraft did not fly. For us this is of no consequence, so we're going ahead with a large scale model.

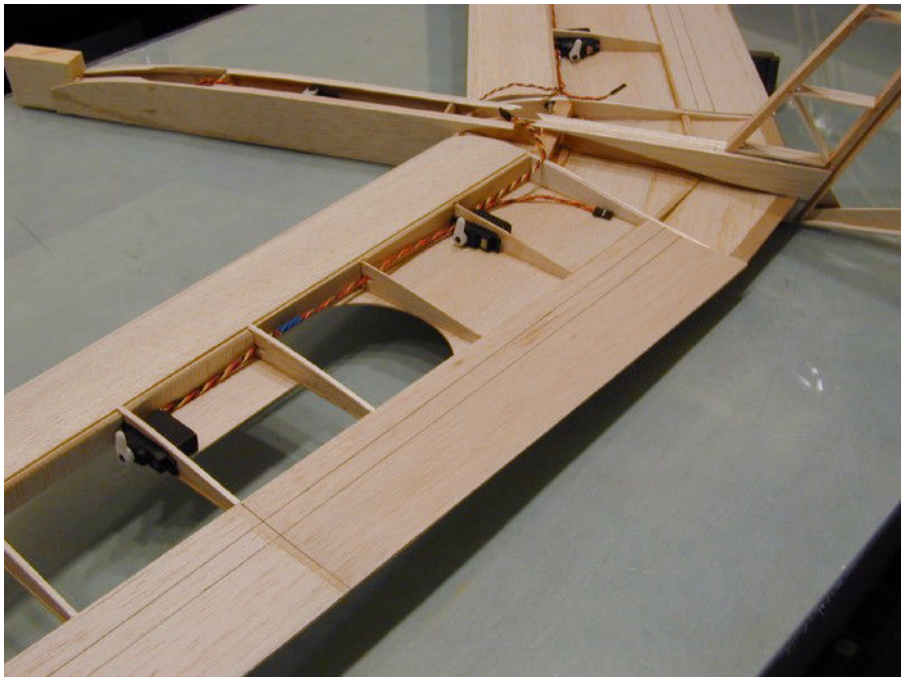




Above: Plans for the 1/10 scale wind tunnel model which incorporated adjustable dihedral and differing vertical tail configurations to investigate the effects of forward sweep and vertical tail planform on the roll and yaw moments.

Left: Photo of wind tunnel model following oil flow study.





Our B 11 testbed under construction. The forward sweep angle, 18 degrees, matches the B 11 prototype. The root section is the CJ-25^2-09, the tip is the Clark X. The wing was built without twist. The wing servos drive outboard ailerons and inboard elevators, as on the original.

While we figure out the structure for our scale model, we've dedicated some time, energy and materials toward building a test bed with the thought of acquiring some flight experience with a swept forward wing.

In an effort to determine predicted flight performance and controllability, we decided to build a planform of lower aspect ratio with an eight foot span. The lower aspect ratio allows dimensionally taller ribs and hence a proportionally greater distance between spar caps, while the eight foot span allows four foot lengths of balsa and spruce to be fully utilized.

The wing root chord for this test bed is ten inches and the tip chord is six inches. The tip of the nose is in line with the wing tips. The quarter chord line sweeps forward 18 degrees, as on the original B 11. Wing tips and some upper surface sheeting are still to be added to the framework as depicted in the included photos.

We settled on a D-tube leading edge, cap stripped ribs, and sheeted trailing edge. The control surfaces will be of the same spanwise proportion as on the full size aircraft, but have a larger chord. Each control surface will be independently operated by its own Hitec HS-81 servo.

This model was created using a straight wing plug-in, based on a single 3-view we have. While this did create some problems with the interior wing rod assembly, it does assist in making a lightweight and strong junction within the wing itself. However, in looking at the drawings and photos provided by Akaflieg Berlin, the full size aircraft had an entirely different wing-fuselage junction line, so this is another item which will need to be addressed while we're researching construction materials and methodologies.

As usual, we'll keep *RC Soaring Digest* readers up to date on our progress.