

Hermann Zahlmann's Horten XV mod. W

Mr. Zahlmann's Horten XV mod. appeared in our January 1994 column. The Horten XV mod. W is a bit different, and we thought readers would appreciate seeing the various modifications which Mr. Zahlmann implemented in an effort to improve performance.

Mr. Zahlmann's major goals for the W version were identical to those of the original. The resulting sailplane was to be good looking, inexpensive to build, and easily transported. It of course had to be stable in flight, yet controllable, and capable of both thermal and slope flying. A simple radio installation was also a requirement. A performance improvement was expected to be derived from the use of winglets rather than the previous low aspect ratio fins.

On the Horten XV mod., low aspect ratio fins acted as wing fences and also served to separate the twisted and untwisted portions of the wing. This was of great benefit, as the twisted portion of the wing utilized an inverted section, and the mating of two such dissimilar surfaces would have otherwise caused quite a large amount of interference drag. The W version uses winglets rather than low aspect ratio fins, but retains the use of an inverted section over the twisted portion of the wing. The mating of the untwisted and twisted portions of the wing presented a challenge, as some type of transition had to be designed. Mr. Zahlmann's solution incorporates a trailing edge "ramp" which we will describe later and which is detailed in the included 3-view.

As usual, Mr. Zahlmann included a few interesting construction methods in the building of the Horten XV mod. W:

- The entire wing is built on a flat surface. This is easily accomplished due to the use of the Clark Y section across most of the span. The section is inverted over the entire twisted portion of the wing, and jig blocks are used to assure proper alignment. Three degrees of dihedral, as measured at the bottom of the wing, is incorporated during the final stages of the construction process.

- The transition from untwisted to twisted portions of the wing is accomplished by means of a "ramp" in the trailing edge. This "ramp" crosses one bay, and when viewed from the rear rises at a 30 degree angle. The trailing edge of the wing is flush with the building surface from the root to the end of the untwisted portion, and raised a constant 35mm over the twisted portion.

- The winglets are of relatively high aspect ratio and are angled outward ten degrees from the vertical plane. There is no toe-in; the winglets are aligned with the oncoming free stream flow.

- The W version, as the earlier model, has a cuspidate (bat) tail, but there is no reflex in the root section as used on the previous model.

The W version has a span of just over 2.5 meters, just slightly larger than the 2.4 meters of the previous, but the structure is essentially the same open

wood frame and D-tube construction with fabric covering. The center section is large, and certainly capable of holding ballast when needed. Two servos are installed in the wing and drive the elevons directly. Flight characteristics are very similar to those exhibited by conventional tailed sailplanes. It has been flown repeatedly at the Wasserkuppe, in both strong and weak winds, with no problems. Thermal flying of the Horten XV mod. W is accomplished via a V-line and dual tow hooks.

The Horten XV mod. W demonstrates superior performance, has fulfilled all of Mr. Zahlmann's stated design goals, and offers an innovative wing junction which is worthy of study.

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