

# Outstanding Swiss "MARK 130" Multi Design:

... Born and Bred in thin mountain air ... for competition flying

FULL SIZE PLAN AVAILABLE THROUGH "MODEL PLAN SERVICE" ...

by Bernie Huber

◆ The "Mark 130," from a large family of "Mark" designs constructed for FAI competition, was the first to use a swept leading edge wing with flaps. This design, completed in late 1965, was the cumulative effort of building and flying fifty seven R/C models over a six year period. A good many hundreds of hours flying time was gained during this testing period, carried out in all kinds of weather, and mostly with muffler-equipped engines.

The "grandfather" and beginning of this series of designs was Chris Olsen's "Uproar", constructed in 1959. A good design in its day, which was flown



A truly beautiful multi pattern ship, ideally suited to flying in rarified air. Air brakes, full house controls. All-flying tail ... 13th in the development series.

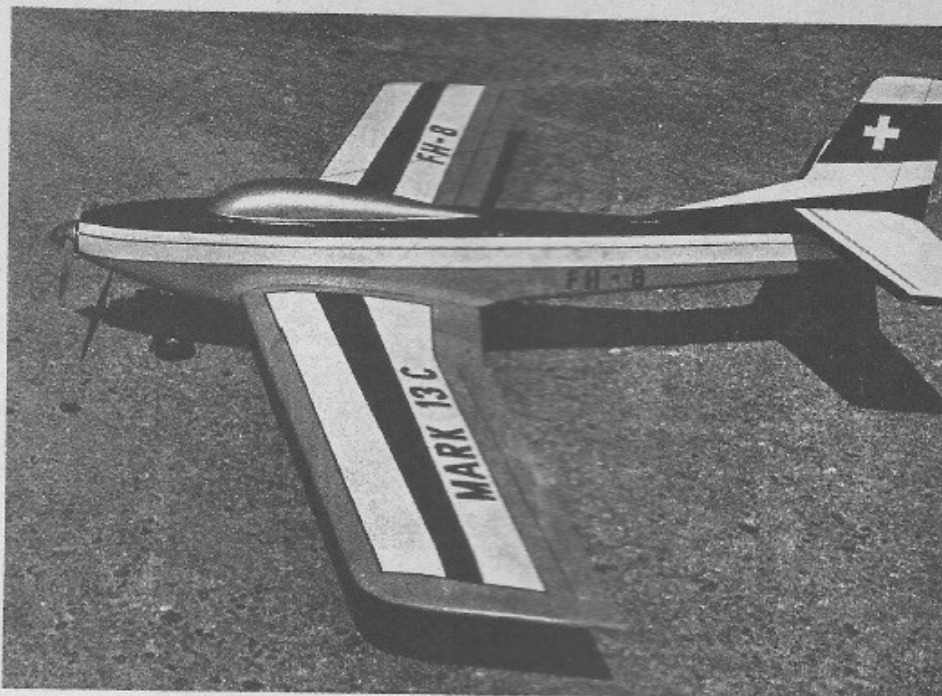
# MARK 13C

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through the year 1960 and retired in early 1961. While flying the "Uproar" extensively during this period, no less than six differently configured R/C models were built. These were designated "The N series". All used tricycle landing gear and progressed through such airfoils as NACA 0015, NACA 2415 and NACA 642A015. A considerable amount of experience, both in design requirements and in flight characteristics, resulted from flying these models in the Swiss Alps near Zurich. Concurrently two Orions were built along with three more "N" series models.

During the winter of 1961/62 a new approach to the ideal FAI competition model was made by constructing three models alike, designated BH 2-62 and a revised BH 7-62 model created. They faintly resembled the Senior Falcon. With the advent of this shoulder wing design, several different airfoils different wing shapes, wing tips and moment arms were used, in an effort to develop a highly maneuverable model capable of all FAI maneuvers in the thin mountain air of the Swiss Alps. A total of six Mark Is and five Mark IIs were built—each with a wingspan of 1580 mm (60"), using a .45 engine, which were flown on Kraft reed systems. An article in M.A.N. by Hal deBolt describing CAMLOC fasteners and their use influenced the Hubers to use them for the wing. Next off the assembly line were eight Mark IVs. Careful attention was paid to the placement of the components to provide adequate ground steering and correct C.G. location.

These eight Mark IVs flew more than 107 flights and considerable data was obtained by this type of model. Again, these Mark IV models were flown with



Slightly swept-back. Muffler used, clean configuration. A ship that does well in rarified air is also well suited to a lower altitude.

It lends itself to distinctive trim, well proportioned, typical in many respects. Bred from a long line, each improving performance.

muffler equipped engines, mostly K&B, Lee and Merco. During the same period a series of seven R/C models (named Kyros) each with a slight change in design were built and flown, using smaller engines, around the .29 size. They were primarily for the purpose of testing certain theories of aerodynamics in thin air. The final version (Kyros VII) was a "T" tailed low wing with mock tip tanks using a Lee .45 Custom Engine.

Then some of the best characteristics of the Kyros series were blended into

the Mark VI design, which was the last design for reed systems.

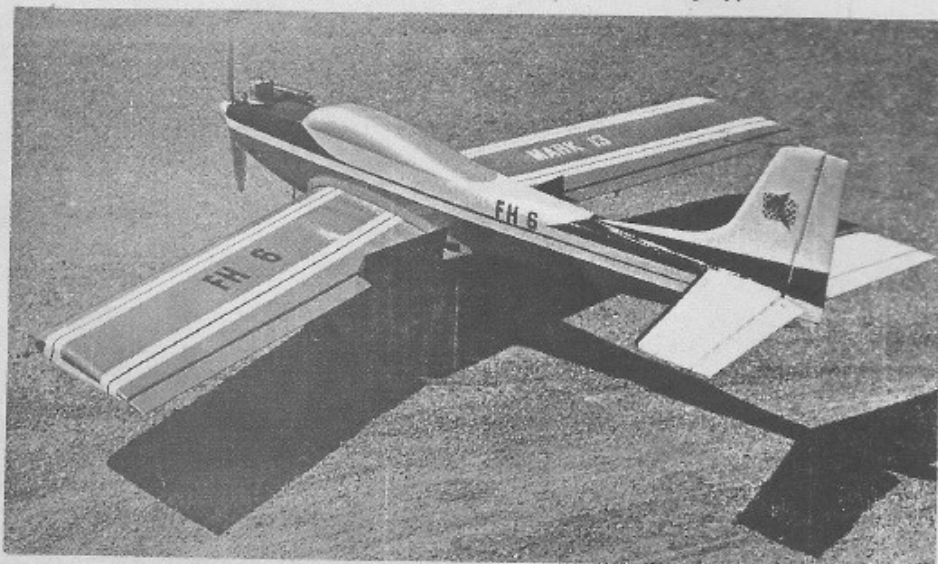
In June 1964 a proportional system was obtained and this gave new impetus to the creation of the Mark VII. The fuselage was redesigned to accept the system and a total of five Mark VII's resulted. These were extensively flown, then two of deBolts Interceptors were built and influenced the design of Mark VIII. In late 1964 the Mark IX went into production and three were built. To further refine the Mark IX design, considerable attention and consideration was given the prop design. Pitches, blade areas and blade shapes were tested in an effort to squeeze higher performance from this design. With the Mark IX the best performance was obtained by using an 11/8 prop. The second choice was the 12/6. With that decided, steps were taken to again improve the airfoil section. The Mark X used 17% airfoil (foam) while the Mark XI employed a 17% (NACA 0017) at the root, tapering to 14% at the tip. The latter proved a better flier in winds.

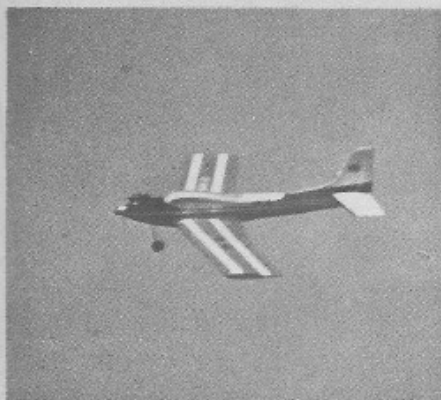
Two of Mac Beauchamp's Viper fuselages were obtained and built. As soon as weather permitted in the Spring of 1965, these were flown and though heavier than any of the Mark series, they proved adequate at those altitudes.

The nose-down attitude of the Mark X & XI was eliminated in building the Mark XII, plus the advantages of a swept wing were analysed and incorpor-

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Note the airbrakes in open position. A worthwhile addition, improves the rate of sink for more exacting control of the landing approach.





## "MARK 13C" MULTI

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ated. Strip ailerons and a muffled Super Tigre .56 with a Bonner Digimite. With the swept wing, the C.G. location posed a problem and some additional dorsal fin was added for stability. The performance was outstanding, but with that power and more streamlining, landing speeds were high.

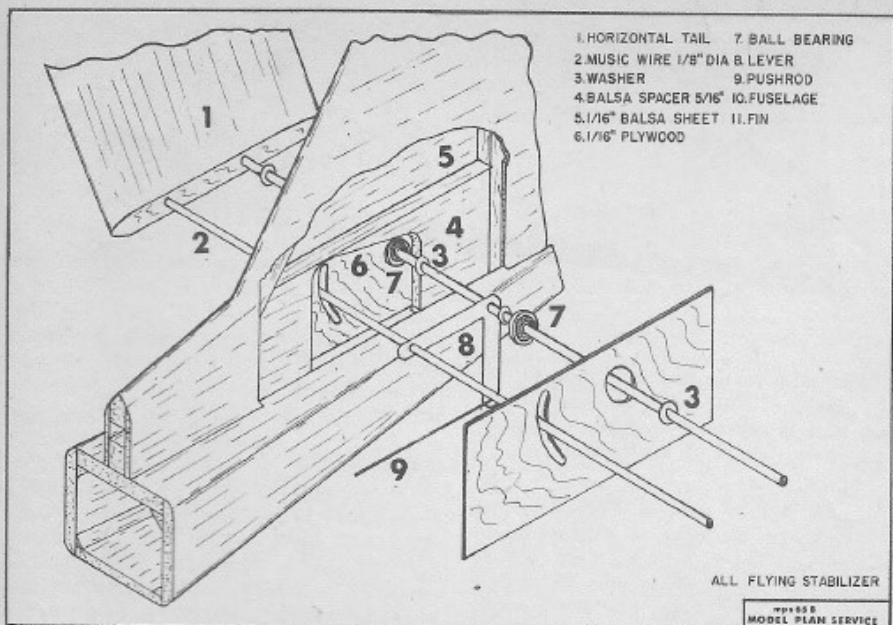
Mark XIII was then built incorporating flaps. Several configurations were considered—the conventional split trailing edge flap, the Fowler type flap, spoilers on the upper surfaces, spoilers on both surfaces, but the final decision was a drag plate (air brakes) rather than flaps. This latter type is shown on the plans. It does not produce lift, but effectively reduces flying speed. It is hinged in the center and the air flow nearly stops over the center-section of the wing. This causes a "rock steady" descent and the path of flight is hardly disturbed by gust or "ground effect" on the approach. Air brakes are highly recommended on R/C models which use a symmetrical section.

The final version of the Mark XIII was the "C" model which employed the all-flying stabilizer. Details are shown on a separate sketch in prospective. The throw must be limited to 9° up and 8° down and the use of ball bearings considered a necessity. In flight testing the stab developed a bit of flutter. The cure—permanently fix both sides of the stab to the piano wires with epoxy AFTER the trimming flights have been made.

The Mark 13C is NOT recommended for beginners and therefore step-by-step methods will not be detailed. Construction of this model is fairly straightforward and decidedly robust. The fuselage is built upside down and for a warp-free structure, build in a jig using "C" clamps for alignment. Two fuselage sides of 1/8" sheet are cut, with the 1/16" plywood and balsa sheet cut to the same size to serve as doublers. A balsa canopy is used (mostly for effect) but access to the interior is through the wing opening. The wing is fastened with Camloc fasteners but Williams Bros. Wing mounting nuts may be substituted. Likewise Rand hinges may be substituted for the Cigar Box hinges, but make the proper selection

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FLYING MODELS



## "MARK 13C" MULTI

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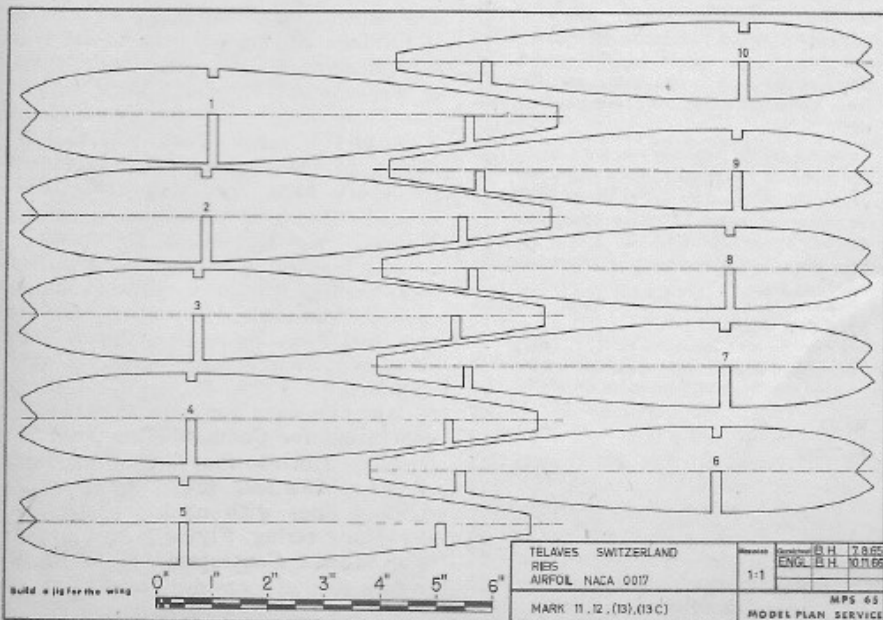
of Rand Hinges to fit the hinge action. If you get stuck in obtaining ball bearings for the all-flying stab, we suggest you contact your nearest Slot Car track for bearings similar to those prescribed. As mentioned earlier, make the stab installation permanent. The angle of attack for the wing (3°) is built into the fuselage, but in order to determine the correct angle for the stab (which is 2°) mark a spot on the fin large enough to visually check this angle before each flight.

To construct a wing without warps, build on a jig using the cut away portion of the lower rib as a guide—pinned to the board. Sheet the top surface of the wing while still on the jig, first installing the bellcranks for both ailerons and flaps (deHavilland air brakes).

Then remove the wing and finish the lower surface by mounting the landing gear blocks and sheeting the bottom surface. Covering with silk is recommended and trim as shown in the photos or as you wish.

In test flying, remember that this model was designed to spin in addition to other maneuvers and at low speed will do just that. Therefore you must take care not to stall on the approach to landing. The Mark XIII C is a smooth flying Contest model with good landing characteristics. It will perform with the best of them and certainly has been tested and refined for FAI maneuvers. So build yours with care and you will be repaid with a fine flying design developed in Switzerland.

As of this date, Mark 17, a shoulder wing design with a very long fuselage Merco 61, NACA 0018, and flown on Orbit 4-8 is awaiting decent flying weather.



FLYING MODELS