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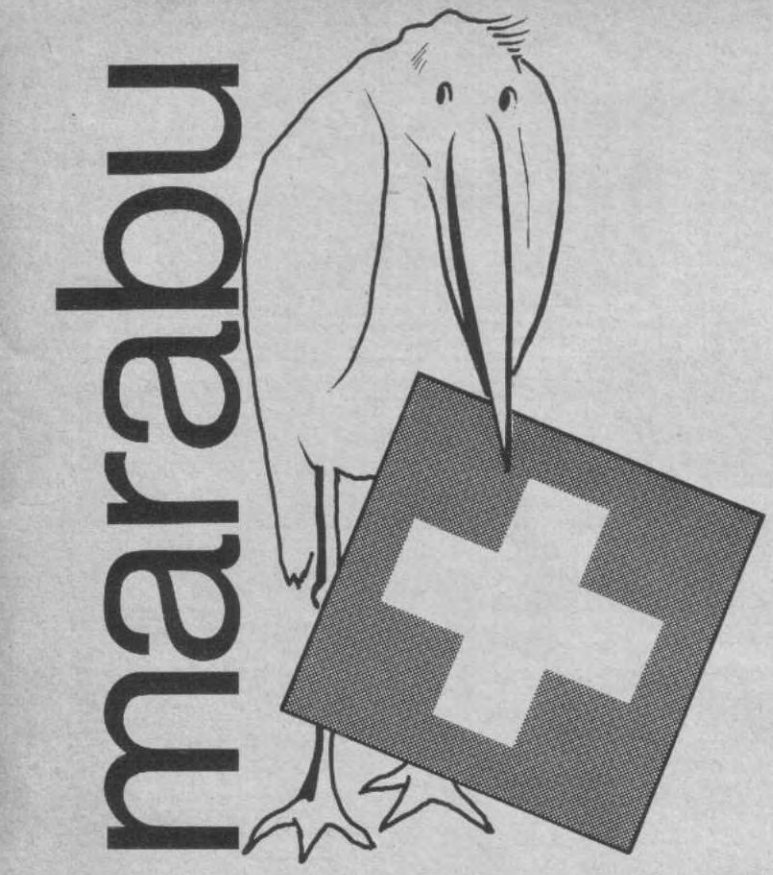
INSIDE - Plans for Bruno Giezendanner's World Champs winning MARABU



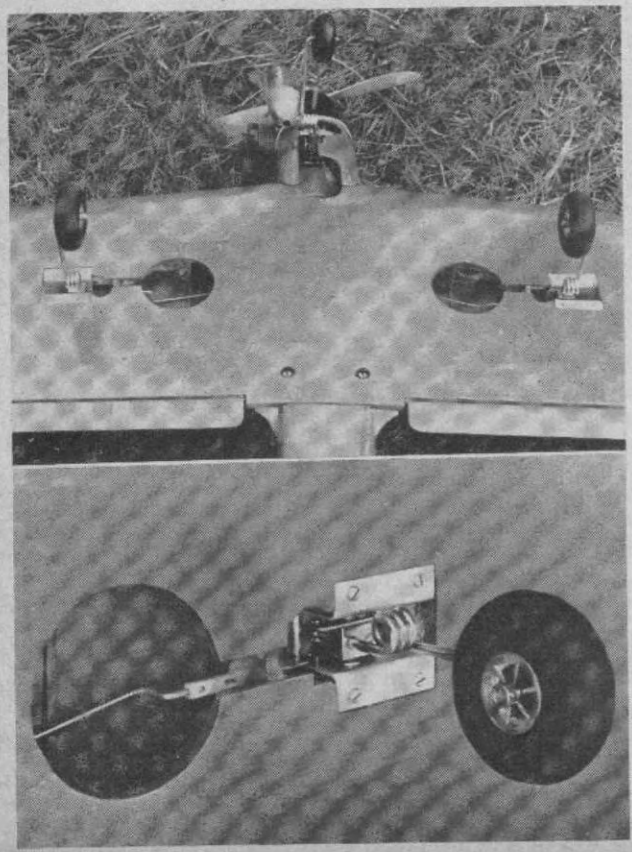
THE 1969 WORLD R/C CHAMPIONSHIPS WINNING MODEL

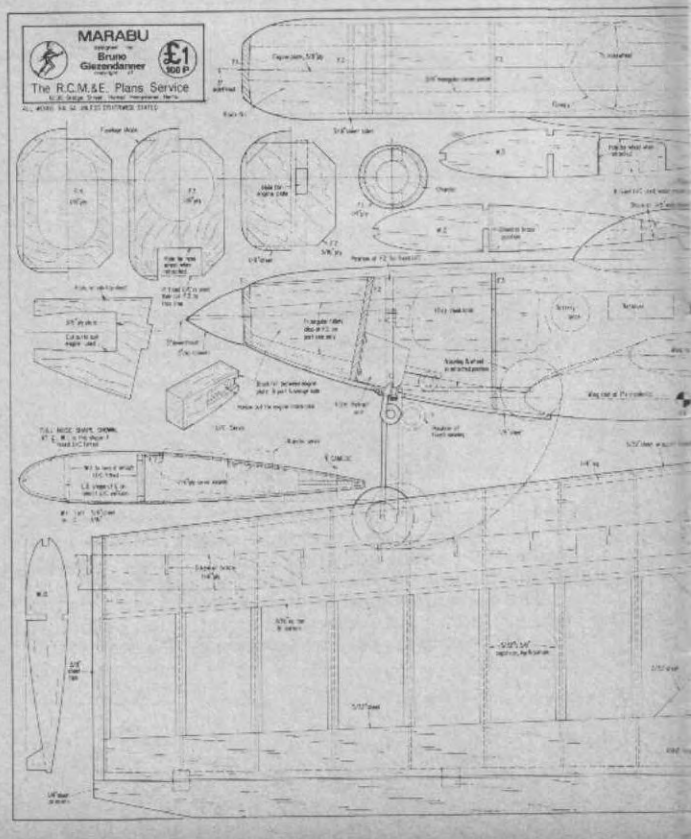
by Bruno Giezendanner

Look casually at this model and you'd probably sum it up as just another aerobatic 'barge'. Take a closer look and you begin to realise just how much intelligent thought has gone into the design of MARABU.

Progressive airfoil section, wing washout, swept leading edge, strip ailerons, long tail moment and retracting undercarriage are all features of this top design. It didn't 'happen', it was developed.

Below: two views showing the KDH retracting undercarriage system in the prototype Marabu. Main and nose leg units are driven off one servo. The Giezendanner brothers name all their models after birds. MARABU is named after a type of stork which has the odd characteristic of sitting with its legs forward, hence our title above.





MARABU is a specialist contest aerobatic design, developed from the earlier *Pelikan* (see R.C.M. & E. May '66, page 239). This model is built lightly, but at the same time, above average stability is achieved.

The constructional technique of the fuselage makes this almost unbreakable, while the wing, if built as these instructions suggest, is rigid and warp free. The wing leading edge structure follows that of the famous *Taurus*, but the addition of a small spar in the leading edge, strengthens the sheeting enormously – strong and light, a lesson for the styro foam wing enthusiasts. We have, in fact, tried to keep construction simple and without problems to reduce building time in every phase of construction where simplicity is compatible with aerodynamic and structural trueness, which is the heart of any good aerobatic model.

The wing has a change in section, increasing in thickness ratio from root to tip, using the semi-symmetrical N.A.C.A. 2415 section at the root, and progressing to the fully symmetrical N.A.C.A. 0018 at the tip. This results in a model which will fly satisfactorily at a wide range of speeds. The model flies at a constant speed throughout manoeuvres, is forgiving in characteristics and easy to fly.

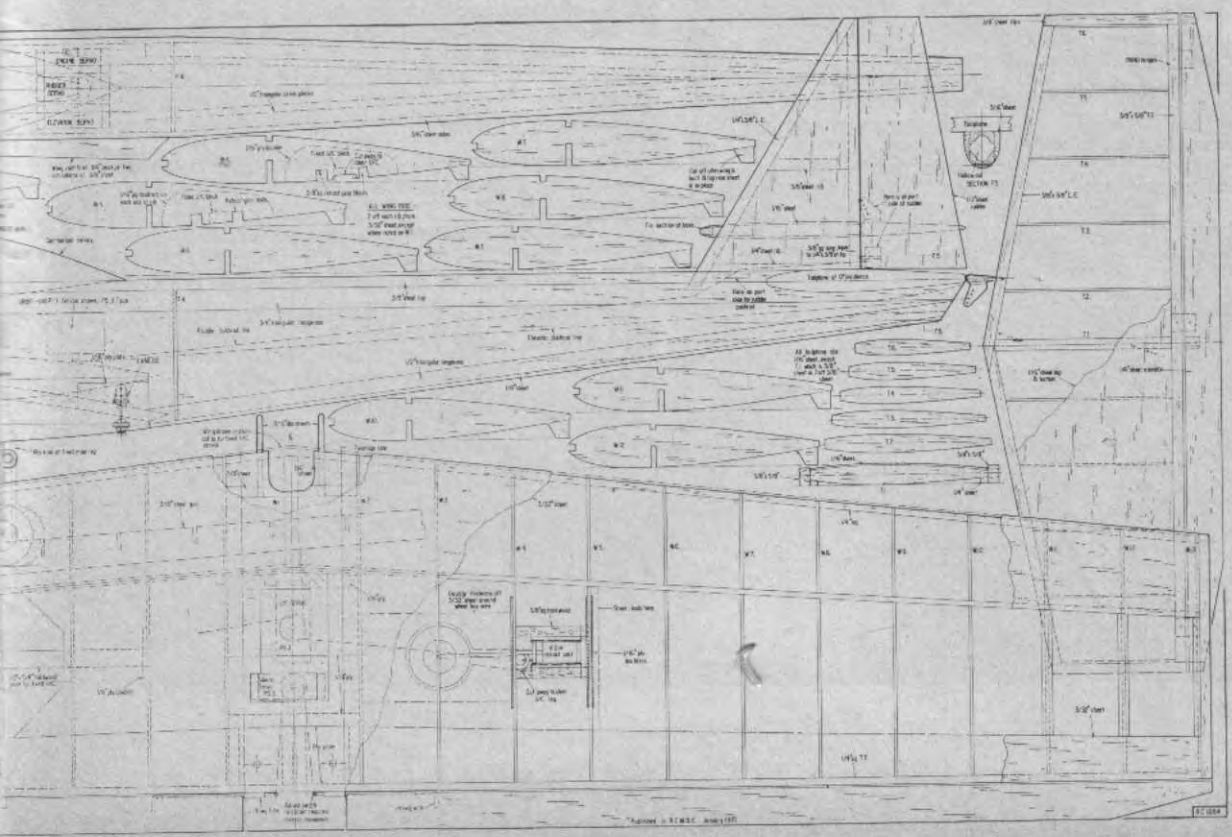
Modellers who fly regularly know what is needed in a contest model as distinct from the people who fly only the Saturday before the contest. The good contest flight depends upon a model which will fly accurately and groove through manoeuvres properly. A model is of no use to the contest flier if he has to fight it through manoeuvres.

Fuselage

The fuselage is a pretty straight forward piece of construction, but here are a few pointers of basic constructional technique.

First, cut out two fuselage sides and add to these

Full size copies of this plan, shown at 1/7th reduction, are available from R.C.M. & E. PLANS SERVICE, price 20/- including post. Please quote plan RC/1054.



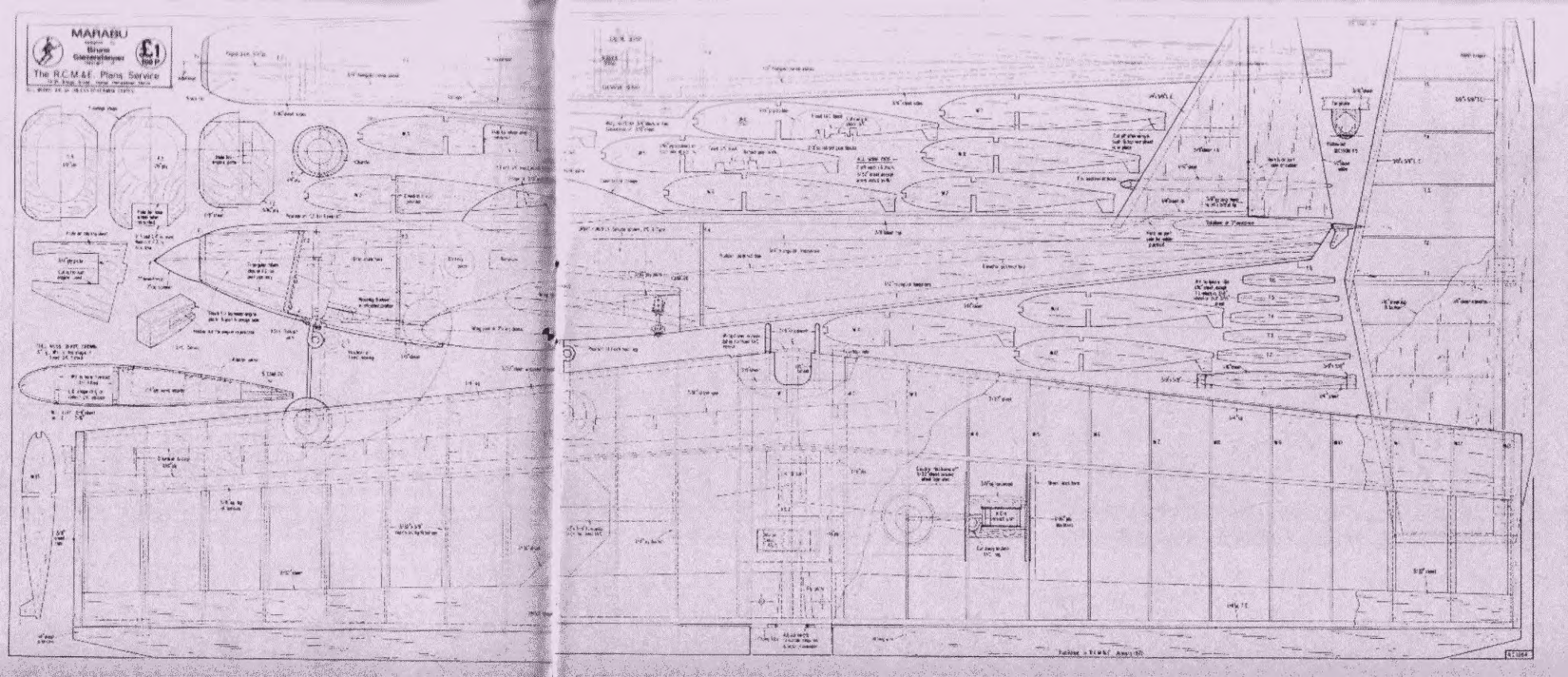
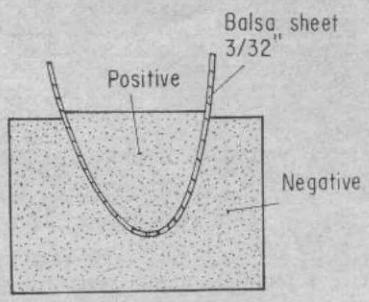

MAMARU
The R.C.M&E. Plans Service

Fig. 1



the top and bottom triangular longerons. All wood should be selected for lightness, but even so, it may be necessary to use G-cramps when drawing the fuelage sides together at the nose and drawing down the fuselage top decking and the front.

Cut out the formers F2, F3, F4 and the $\frac{1}{8}$ in. ply plate motor mount, together with its balsa filling block, which, like F2, is shaped according to whether you intend to use fixed undercarriage or the KDH retractor gear.

Build the motor mount onto the inside surface of the left hand fuselage side, making sure the angle of the motor mount is correct for downthrust and side-thrust and add F2, which should be ready drilled to accept the undercarriage unit, either fixed or retract type.

Next, add formers F3 and F4, and join the two fuselage sides to make the basic fuselage frame. Now cut the fuselage top deck to shape and lay flat on the building board. The basic fuselage is then built upside down on top of this, effectively jigging the fuselage and ensuring a straight, true structure. At this stage it will not be possible to glue the fuselage sides to the top deck forward of the cockpit due to the curve line of the basic fuselage side. Gluing here can be done after the rear fuselage work is done and set, when the top deck sheet at the nose can be drawn down to fuselage curve line.

Add the fuselage bottom decking at the rear of the fuselage.

The basic fuselage construction is now complete, leaving time now to build in the underside of the nose, rounding off the top deck and preparing the rear end to accept the fin and tailplane assemblies.

Fin and Tailplane

The fin has a thick section and must be jigged to produce a true structure free of warps.

The tailplane must also be jigged, as shown on the plan, using the leading and trailing edges as jig pieces initially, adding the top sheeting while the tailplane is flat on the board. The structure is then turned over, re-pinned to the board and the lower sheet added. The jig pieces are then shaped and sanded to form the leading and trailing edges.

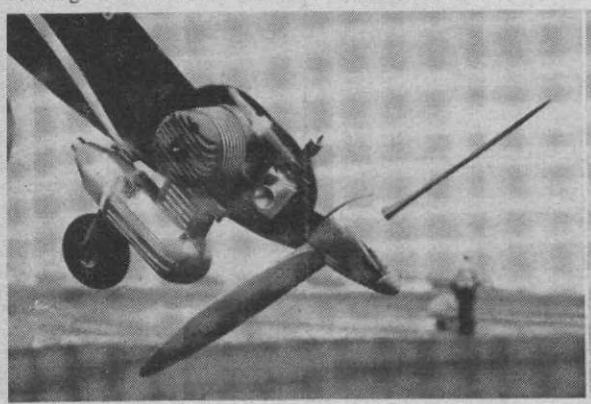
Wing

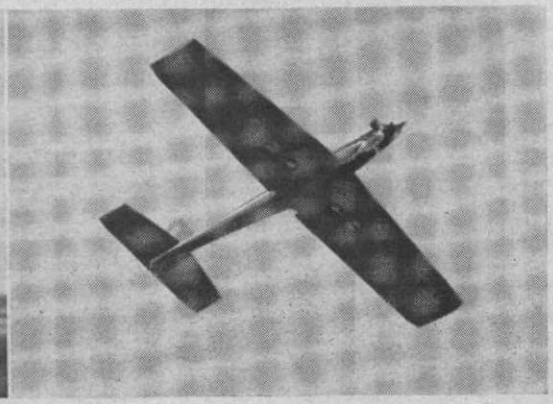
Make the wing on a laminated flat board, arranged as a dihedral jig so that the wing can be built in one piece, obviating the necessity to join two wing halves later which might result in a twisted wing. The one piece construction method ensures perfect trueness if construction work is done carefully, incorporating the correct dihedral angle. The small 'feet' at the trailing edge of each rib ensure that the correct washout of one degree is built uniformly into each wing panel. Lay out clear plastic sheet over plan.

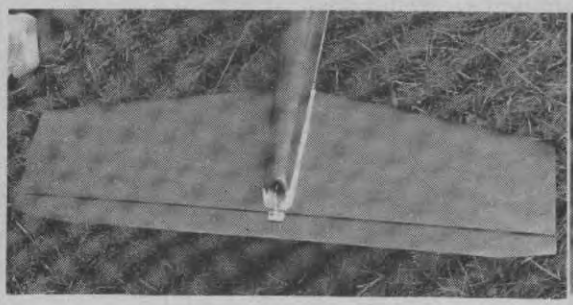
Cut and shape the mainspars, from 3/16 in. sheet, adding the spruce capping spars on the bottom. Assemble the ribs and mainspar over the plan, slot-

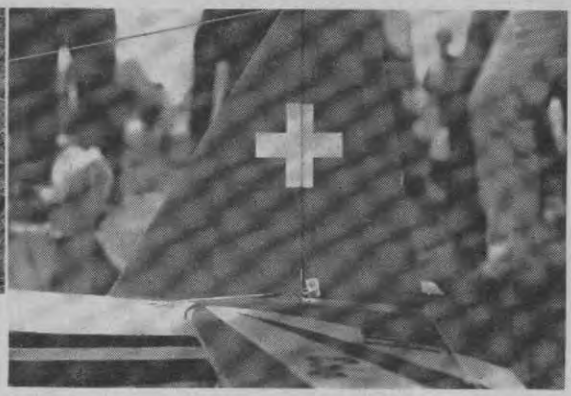
Left : view of the nose section of Marabu, showing Webra Blackhead 61 motor installation. Note pressure tap on silencer.

Below : Marabu flies past with wheels up.









Above : close up of tailplane showing protrusion of elevated push rod, linking with elevator horn.
Right : close up of fin and rudder assembly showing push rod attachment.
Centre right : some of Bruno's reserve models. Quite a collection.

ting the ribs into place egg crate style. Pin all into place rigidly and then add leading and trailing edge spars to make the assembly more rigid. Next, fit the 1/16 in. ply brace joining across the two mainspar halves. This is done without cutting at the centre line, using clamps to force it into shape.

Cement in place the top trailing edge sheet.

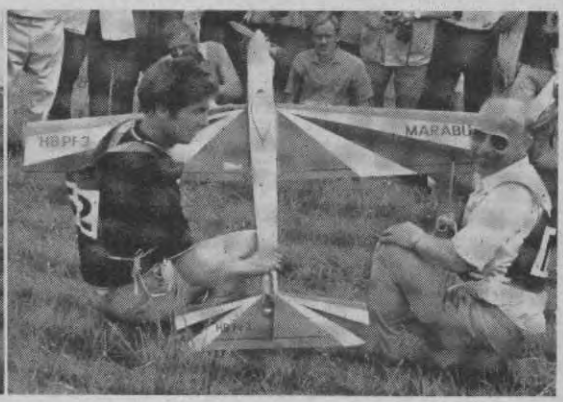
The leading edge sheet ahead of the mainspar is pre-formed to shape in one piece for each wing panel to cover top and bottom leading edge surfaces. To do this, it will probably be necessary to butt join three 4 in. wide sheets, thus avoiding a join at the leading edge point where the curve of the sheet will be sharpest. Sand away all traces of the butt joins and then soak the composite sheet in warm water for about 10 minutes.

The leading edge sheet is then shaped using the two piece positive/negative mould as shown in fig. 1. Form each wing panel leading edge sheet by clamping the sheet between the two pieces of the mould. Place both panels over a central heating system to dry for 24 hours.

Once the leading edge sheets have set in place, remove from the moulds and apply to the wing after removing from the wing jig, using a slow drying glue (white glue) to allow time to work. Cut the rear edges of the sheet to follow the line of the mainspar and then replace the wing in the jig and leave for

continued on page 52

Below : Bruno prepares for a contest flight at the World R/C Championships at Lemwerder, West Germany, together with team manager Arnald Degen and mechanic Alfred Frei. Bottom right: Bruno and mechanic Frei pose for photographers after championship clinching fourth flight at Lemwerder.



Marabu – *continued from page 19*

several days to set.

Finish all upper surface sheeting, then remove from the jig to complete the undersurface structure, including fitting of undercarriage, a job which must be done with special care if the retracting undercarriage is to be used.

EDITOR'S NOTE

Bruno Giezendanner is a quite remarkable young man, very worthy of the World champion's crown. At the age of 19, he became Swiss national R/C champion, equipping his *Pelikan* R/C model with reed equipment, bought from the proceeds of a 'custom built' model service. At Corsica in 1967, the virtual unknown arrived unheralded and walked away with 8th place, still only 21 years old.

The Giezendanner brothers work very much as a team (older brother Emil, who is modelling correspondent for the Swiss magazine *Aero Revue*, assisting as a coach and no mean flier himself, placing 3rd in this year's Swiss Nats., which Bruno won again, of course).

Pictures we have of their workshop are set against a background of racks full of uncovered wings and fuselages, which show the kind of dedicated effort that Bruno and his brother put into contest aerobatic flying. Bruno is reported to have practiced twice daily every day for two years, and if this is true, then it was certainly reflected in his superb flying at Bremen.

Bruno works with his mechanic, Alfred Frei, to make the Swiss Digi-Fly R/C gear which he uses. About 20 of these sets are produced each month, at which rate, jewel like precision and unavailability are understandable features. When asked what happens when the fully encapsulated receiver goes wrong, Alfred Frei's calm answer was simply 'it doesn't'.