
USAF
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AIR FORCE

The other side of the coin . . .

TITAN

CLIVE WELLER'S 62" F.A.I aerobatic model –

Clive is among those who take great pains to keep noise to a minimum — though we still maintain that the schedule itself does absolutely nothing to help this cause!

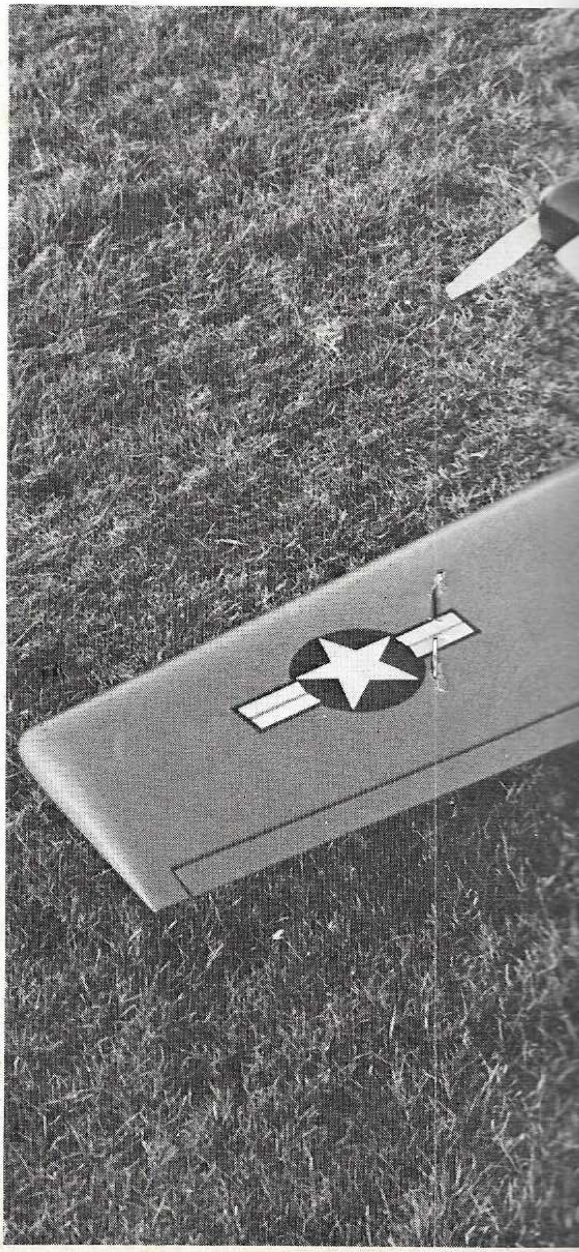
AN EXPLANATION of the *raison d'etre* for this new design of mine is, I feel, called for, before going on to extol its virtues and give guidance on constructional points. It goes something like this . . .

I have been flying 60-powered models for a number of years, both in contests and for general fun flying; never having been a scale model enthusiast, I have therefore always used the relatively stereotyped 'pattern ship'—to borrow a phrase from our American cousins. On hearing from a friend abroad, around the middle of last year, that a new pattern containing tighter and more difficult manoeuvres was proposed, I started to think what could—if anything—be done with the design of current aerobatic models to make these new manoeuvres easier to perform. As you have seen, in the February and March issues of *Radio Modeller*, the new pattern has now been adopted by the FAI for world-wide contest use—and, of course, by the SMAE for all their aerobatic events from now on.

Titan is my approach to this new pattern.

In the past few years, the power available from the '60' range of engines has increased, with new and improved engine designs, tuned pipes, big bores, carburettors and pumps, this has meant that existing model designs have been going faster and faster. With *Titan*, which features a larger, thicker wing and tailplane than is usual, I now have a 'steadier' model. The top speed does not seem much slower, but when it is slowed, it decelerates much more rapidly, making the high-entry manoeuvres and vertical downward parts a great deal less frightening because there is less build-up of speed.

The larger wing area keeps the



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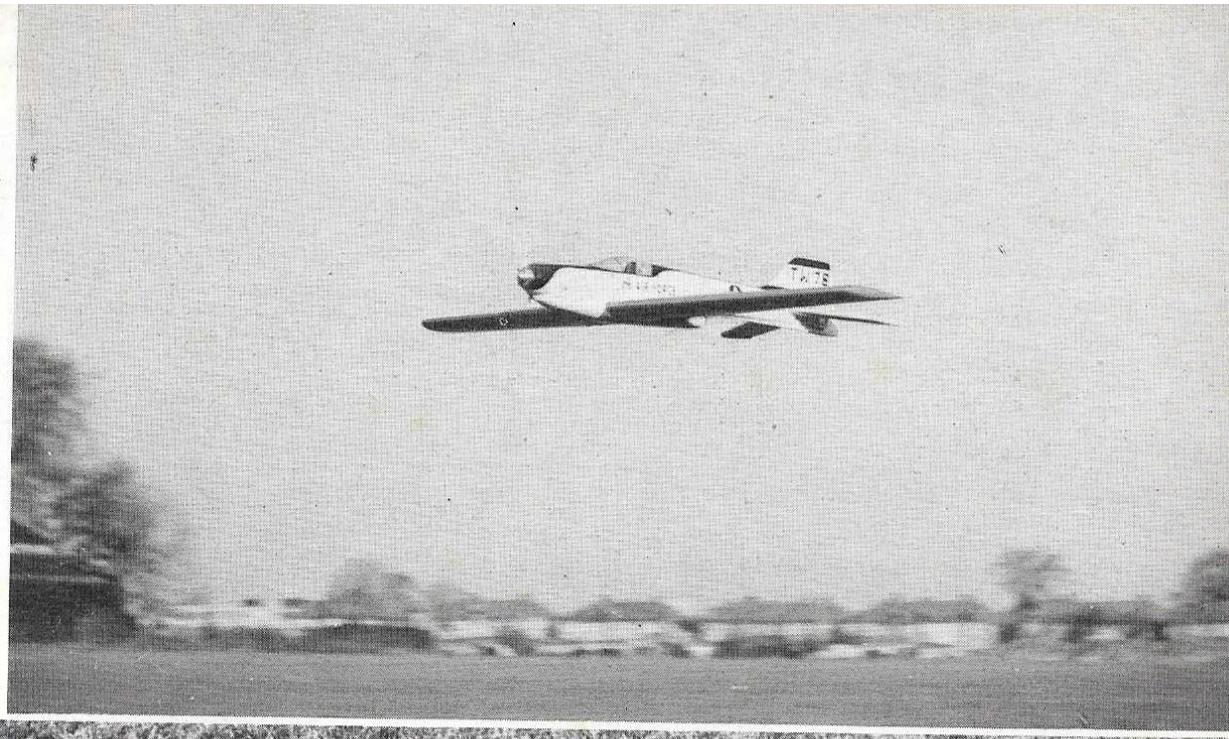
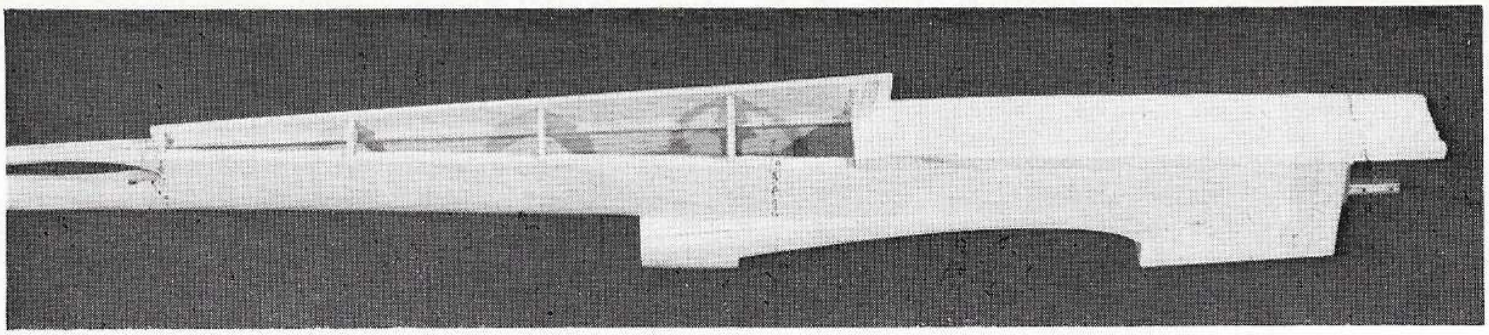




wing loading down—back, in fact, to somewhere nearer where it was before we started increasing loadings with retracts, extra battery and larger tank. The fuselage is of a semi-scale configuration, in the style of a jet fighter, with twin 'jet outlet pipes' behind the wing. This was done to reduce the weight at the tail end (*one* day I hope to get time to make a fibreglass fuselage!) and with the large nose ring and small spinner creating an air intake to complete the effect.

The tailplane is of the anhedral type. This seemed to me to improve the performance of other models, so I tried it. The fin has a low profile, with a fairly large rudder.

To return to the wing; it will be seen that this incorporates flaps. These were fitted mainly to work in conjunction with the elevators, to make the model pull up or down more sharply for the 'squares'—much in the manner of a control-line stunt job. They *can* be used for landing but I have not found the necessity for this, even in a flat calm. If you don't fancy having them, then do not fit them—it will not affect the general performance too much. (I should explain here, however, that I have an electronic 'mixer' *in my transmitter* which, at the operation of a switch, couples the flaps with the elevator, but working in the opposite direction—or returns them to independently operated flaps, when the coupled effect is not required.)

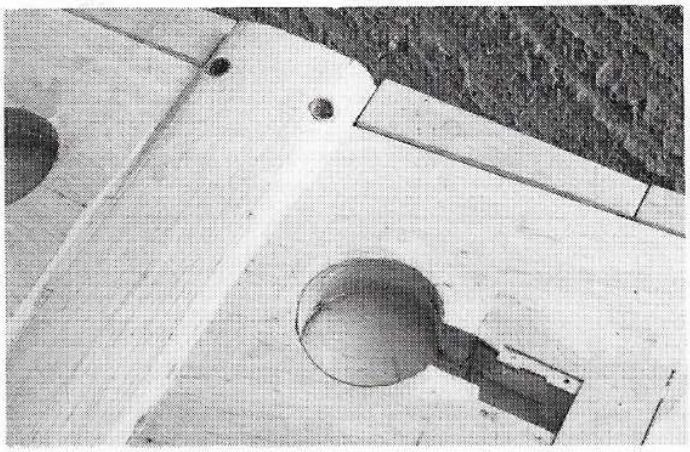
CONSTRUCTION

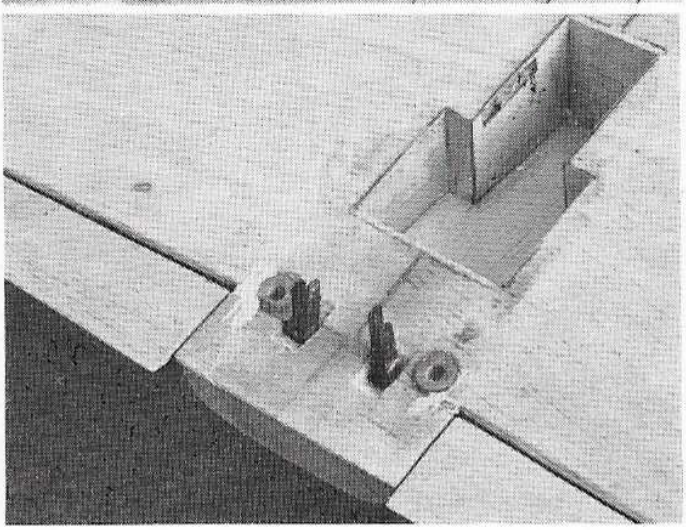
Wing

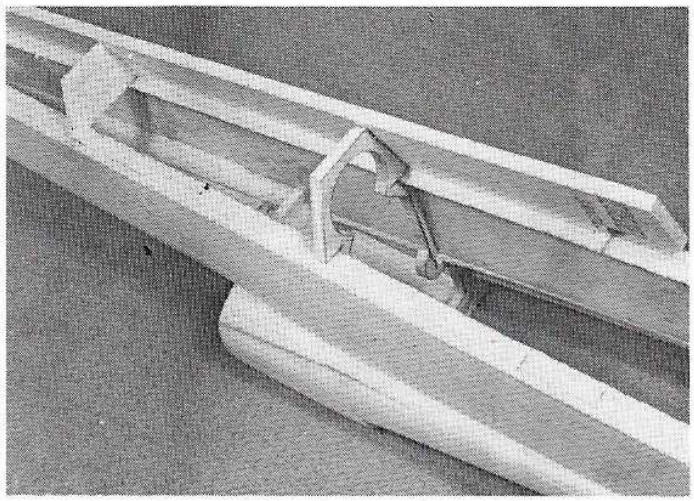
The plan caters for either a built-up wing or the sheet-covered foam variety. The built-up version follows the usual constructional methods, with ribs produced by the well-known 'sandwich' method, using root and tip ribs. These are fitted to spruce spars with balsa webbing between. The wing panels are joined with ply braces and covered with $\frac{3}{32}$in. sheet balsa after fitting the leading and trailing edges. At this point a piece of $\frac{1}{32}$in. ply is slid into a saw-cut in the rear of the tip block, to prevent damage.

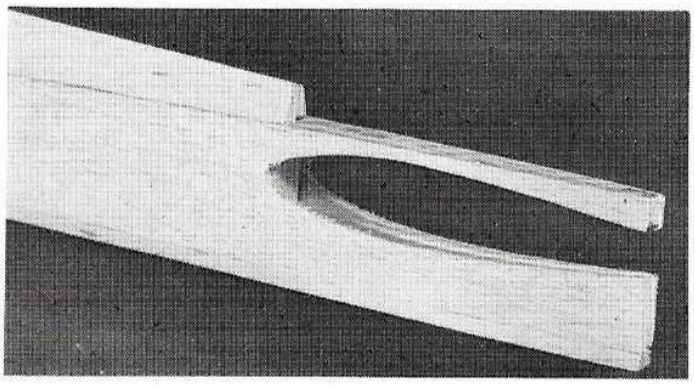
The foam version is covered with $\frac{1}{16}$in. balsa and has a $\frac{3}{8}$in. balsa leading edge and $\frac{1}{4}$in. balsa trailing edge. Ply plates are inset for mounting the retract u/c units. Trailing edge stock from which the ailerons and flaps are cut is tack-glued in place, the tip block fitted and the core sanded to obtain a good surface. The servo and u/c wheel bays are cut with a sharp knife and lined with $\frac{1}{32}$in. ply. The wing dowels are fitted through two short ply spars at the leading edge and epoxied in, as is a ply plate for the wing hold-down bolts. The joint is now covered with glass cloth and resin.

When the wing centre is hard, remove the flaps and ailerons, and mark their positions. If you do not fit flaps, the aileron torque rod is fitted by removing the central trailing edge and the wood to clear rod and bearing then refitting the trailing edge. If you *are* fitting flaps you will require a double torque-

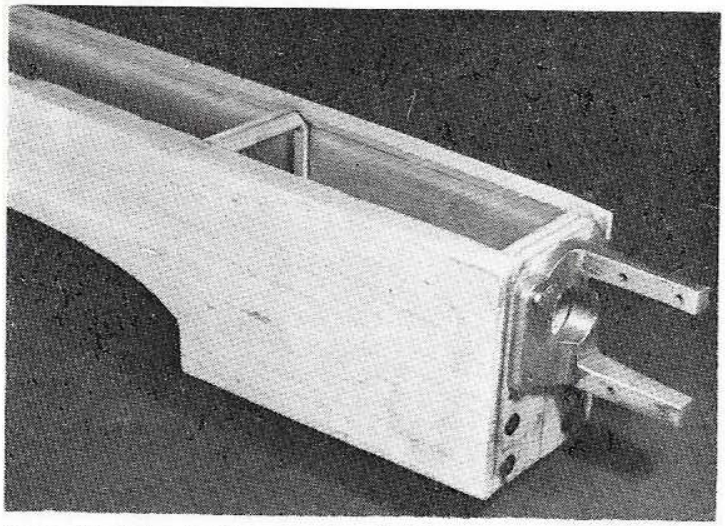




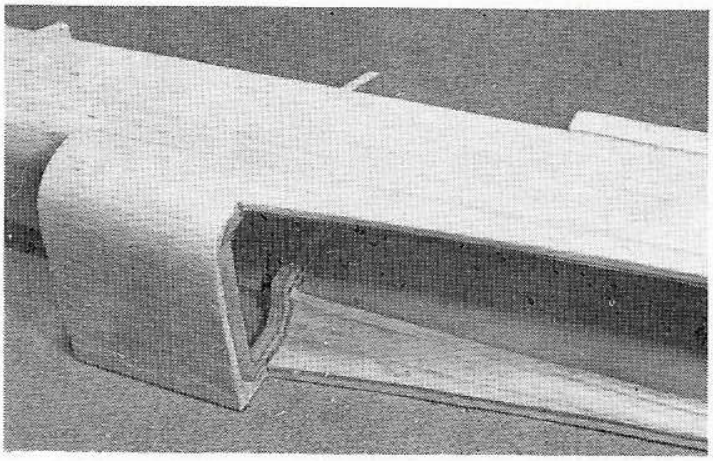




These constructional close-ups give a good insight into the detail points of fuselage and wings. Note double bellcrank system for ailerons/flaps, seen near servo well, at left. (*See also page 47*).

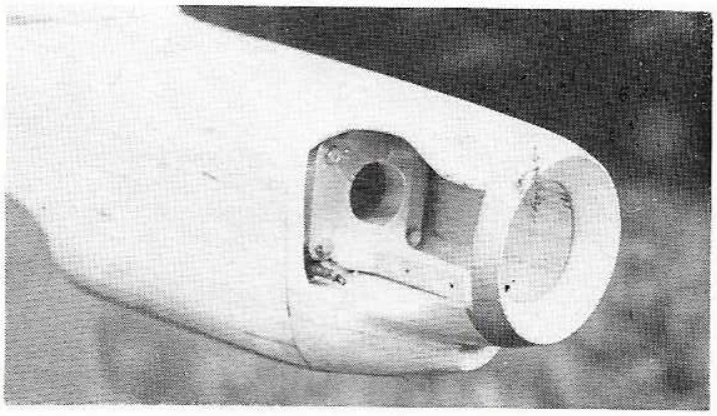


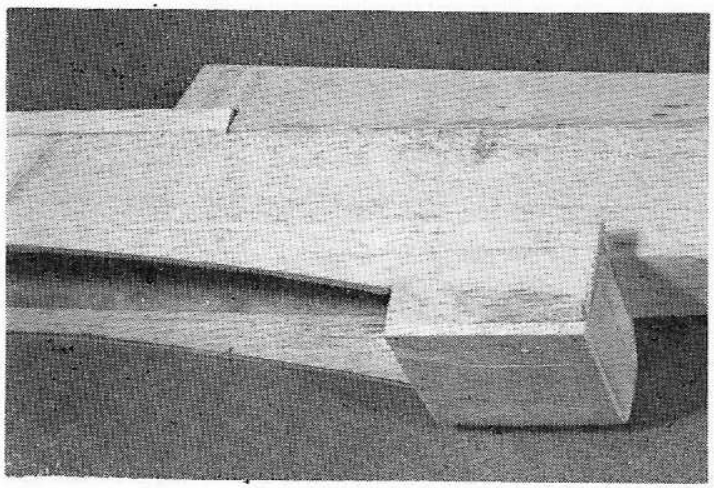
Above "basic box" with top to be added, but motor mount in place—



The "jet pipe" at rear of wing seat is built square, then carved and sanded—and rings added, so that the finished result is as shown below.

—and, below, the finished carved and sanded nose area—including nose-ring.





rod as shown on the drawing. This is a piece of 10g wire with a brass tube over the outside with tongues of wire soldered on to fit into the flap. A small bearing is fitted between the end of the flap and the aileron—this I made from a piece of paxolin. The bearing on the other end is made from a piece of nylon tube (mine was actually Sullivan cable 'outer'). After this is fitted, the centre trailing edge is replaced.

Tail group

The elevators and rudder are made from very light sheet balsa, planed and sanded to shape. The fin is made up from a lamination of light sheets, the centre being hollow (as shown dotted on plan). This is shaped roughly but left until fixed to the fuselage for final shaping and contouring into the decking.

The tailplane may either be made from foam, or built up as shown on the plan, and then fitted with $\frac{1}{4}$in. leading and trailing edges before covering with $\frac{1}{16}$in. sheet balsa. The tip blocks are then fitted and the whole unit is then sanded. A piece of $\frac{1}{32}$in. ply is inserted in the rear tip to reinforce it against damage. The two halves are joined as shown on the plan, and then glass-cloth/resin applied to the centre.

Fuselage

The fuselage is of the usual balsa-with-ply-doublers construction, the doublers being bonded to the balsa with Evo-Stik contact adhesive. Once laminated, the $\frac{3}{16}$in. wide slot is cut, which allows the lower side sheets to be bent out to form the 'jet tailpipes' when fitting the formers.

Once the sides and formers are assembled, fit the wing, by fitting bolt mounts and drilling for the wing dowels. Once the wing is fitted, mount the tailplane, fin and engine mount. To ensure correct alignment, I use an incidence meter and a tape measure. Do take time in getting the alignment right, as accuracy or otherwise can make or break the precision of the flying performance.

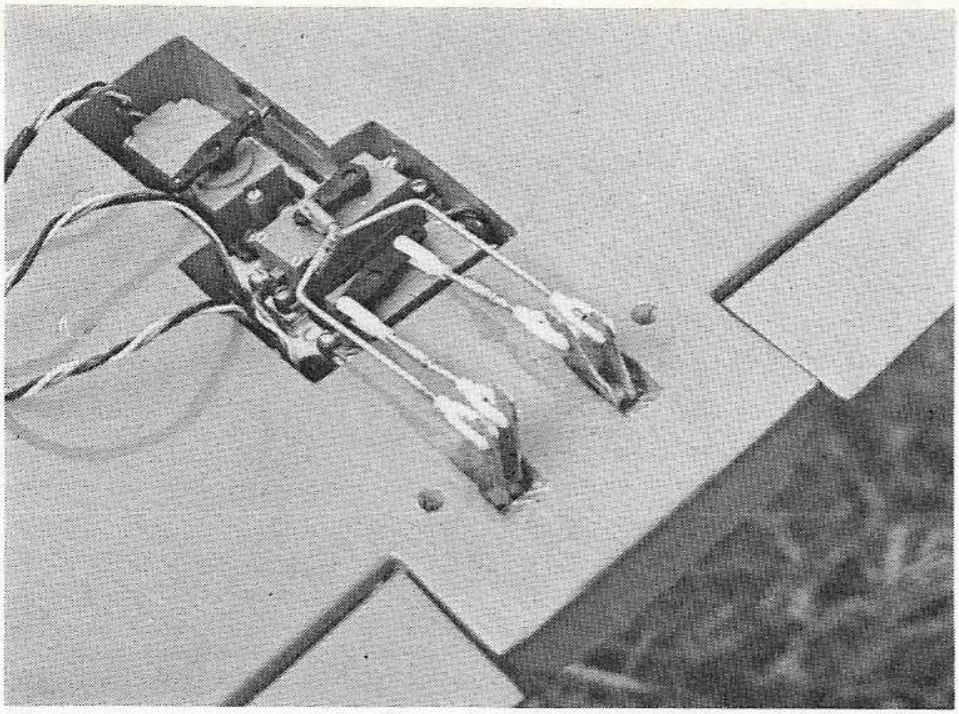
Once aligned, the upper side sheet, top block and engine cowling plus nose-ring are added. The latter is made up from circles of ply,

laminated. The shape is obtained by placing a bolt through the middle and turning it in a drill while sanding. When the outside is completed, the inside is removed with a saw and the ring's inside then sanded.

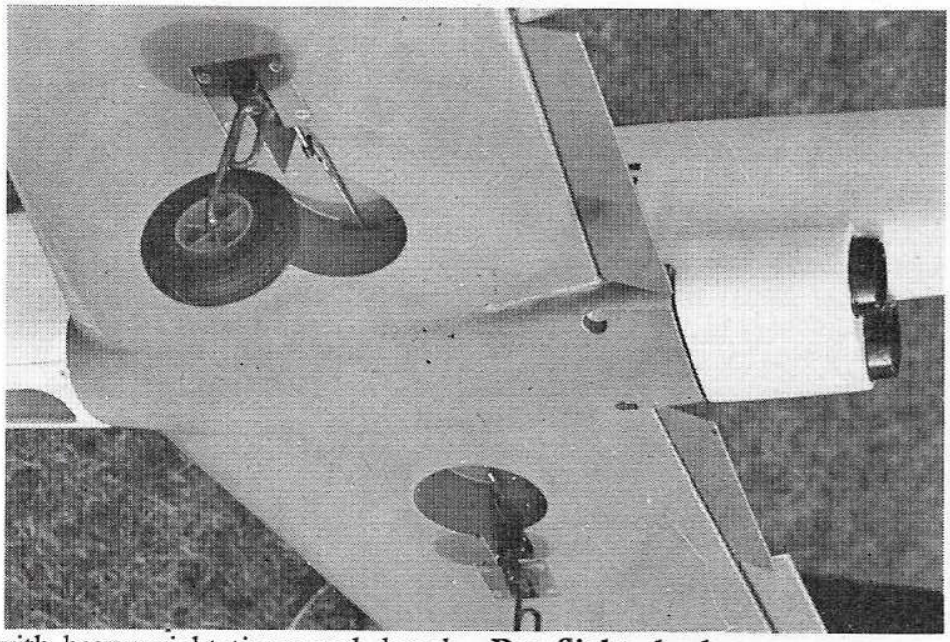
There is a fair amount of block balsa under the engine, and this helps to damp vibration. This block is shaped to form a dummy air intake, to reduce the frontal area. The tank floor may be adjusted in height to accommodate different nose retract units, as may the removable panel which contains the nose u/c cut-out.

Before fitting the lower rear fuselage sheet and fin dorsal, arrange the control runs to the tail, installing the twin pushrods for the elevators and either rod or cables for the rudder, making sure there is no fouling. All that then remains is to fair the fin into the fuselage, using scrap, and with the wing in place, the underwing-to-fuselage fairing is shaped from sheet and block.

With all the components in position, the rest is just a matter of planing and sanding to obtain a good shape. A nice radius can be produced on all corners—remember there is triangular strip inside most edges. Once the shape is to your liking, the two tailpipes are fixed; these can be made from aluminium or plastic tube—or tin lids. Finally, the canopy may be fixed in place—having done whatever your 'thing' is with the 'cockpit' interior.



Three servos in wing well; front one is for retracts, middle one for flaps and rear one for the ailerons. Note the double crank system—flaps may be used coupled with elevators or independently, as required. At foot of page is shown fuselage installation—plus the pipe that helps quieten Clive's model.



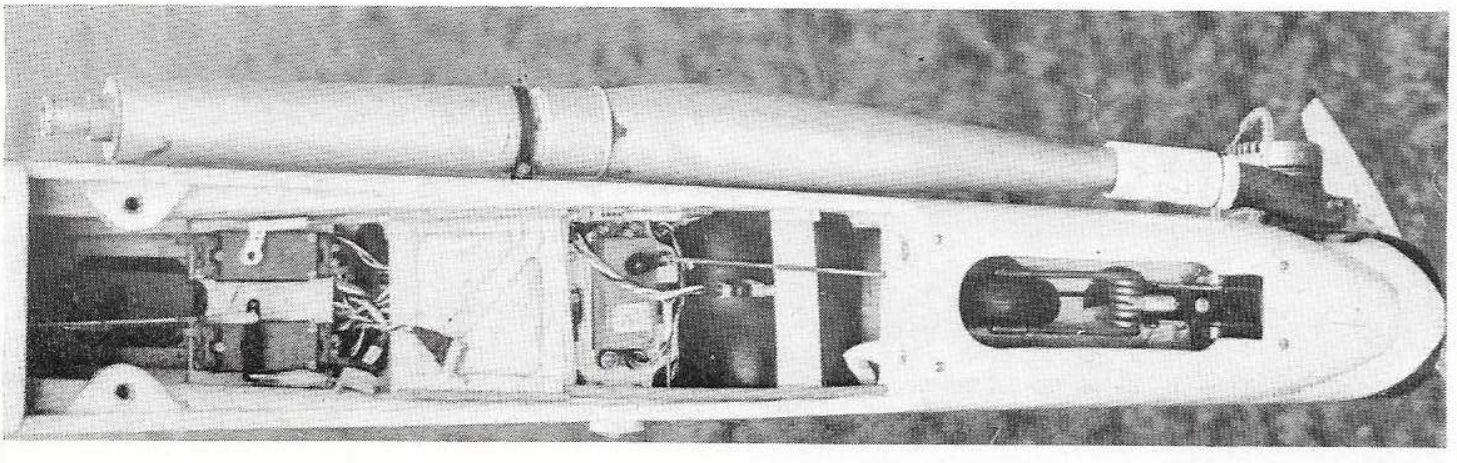
Finishing

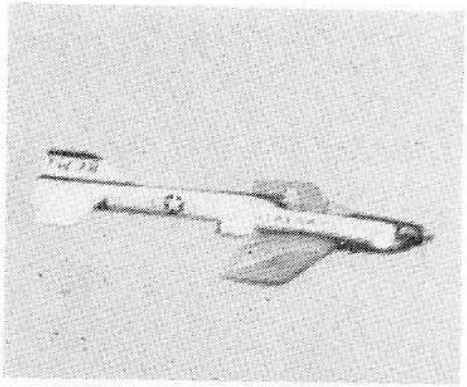
My original was finished as follows, (though you will have your own pet methods, no doubt). The whole model was given two coats of sanding sealer and rubbed down, then any knocks or holes were filled with a mix of sealer and talcum powder in the form of a paste. The same material is used to put a small fillet around the tail/fuselage joint and fin/fuselage joint. Then a final rub down, followed by a coat of dope.

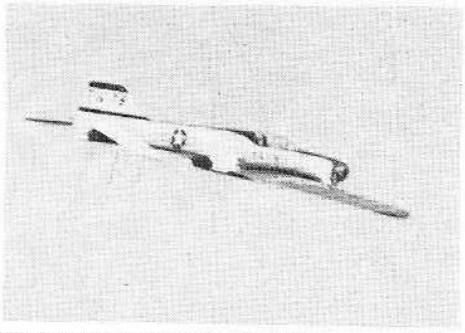
The whole model was covered with heavyweight tissue and doped until a shine just started to appear (lightly sanding between coats). Then a final rub down before a coat of cellulose primer was applied. Once hard, this was rubbed down and a cellulose paint finish applied. After the transfers were in place, a coat of Tufkote fuel-proofer was applied overall.

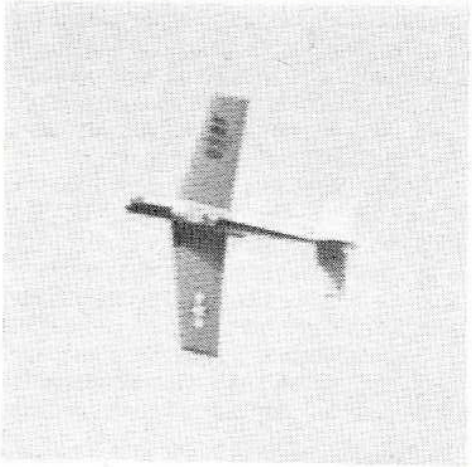
Pre-flight checks . . .

The original *Titan* is powered by an OS 60F-SR with an ED Power Pipe and ED carb., Violett retracts and a 16oz. fuel tank. The all-up weight is 9lb. 6oz. I should say at this point that I use a 1.2Ah and a 550mAh battery (retracts and radio, respectively) for long flying sessions, and these, together with a liberal









Typical in-flight views—including some knife-edge, at right.

paint job, have put up the weight. I would say that, with well chosen wood and a lighter finish, the weight would be around 8½lb. (With no retracts or flaps, and a film covering, it would be even lighter).

The control movements are as follows: *rudder* 3½in., *elevator* $\frac{11}{16}$in., *ailerons* $\frac{7}{16}$in., *flaps* 1in. (These are *total throws*).

Flying

For takeoff, let the speed build up on the ground, after which a small touch of elevator is all that is needed for the model to lift off. The climb is nice and straight (at least it is on my original!) and the general flying very smooth and 'groovy'. This tendency is very noticeable in the way that *Titan* holds its track through loops and the negative G manoeuvres.

This large-area model can really be 'floated' in for the landing, and flared out well without fear of running out of stick movement. But watch out for overshooting on your first landing, because she does tend to 'go on a bit'.

Knife-edge flight does not seem at all impaired by the relative lack of side area—which is, of course, just as well for the manoeuvres like slow roll and reverse-point roll. And those coupled flaps really are effective; I know this because I have tried the 'square' manoeuvres both with and without these devices, for direct comparison.

In short, the *Titan* has met all the requirements I set out to achieve when I first sat down at the drawing board—and, as an added bonus, the model makes a very pleasing picture in flight. In fact, there have been numerous comments already, this season, to the effect that it was a nice departure from the 'fishy' look, *and* the run-of-the-mill traditional aerobatic model.

WHERE TO SEE...

If you would like to see some competitive aerobatic flying, why not go to one of these SMAE events? (SMAE membership is usually necessary, however, for admittance to R.A.F. airfields, for security reasons)..

April 30th. Acaster Malbis, Yorkshire.
June 25th. West Raynham, Norfolk.
July 23rd. Langar, Notts.
Sept. 3rd. G.A.C. airfield, Glos.
Oct. 1st. Bulford Camp, Wiltshire.

And of course, the Nationals, R.A.F. Barkston Heath, near Grantham, Lincs., May 27/28/29th.