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Radio Control Models

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MAP MODEL MAGAZINE

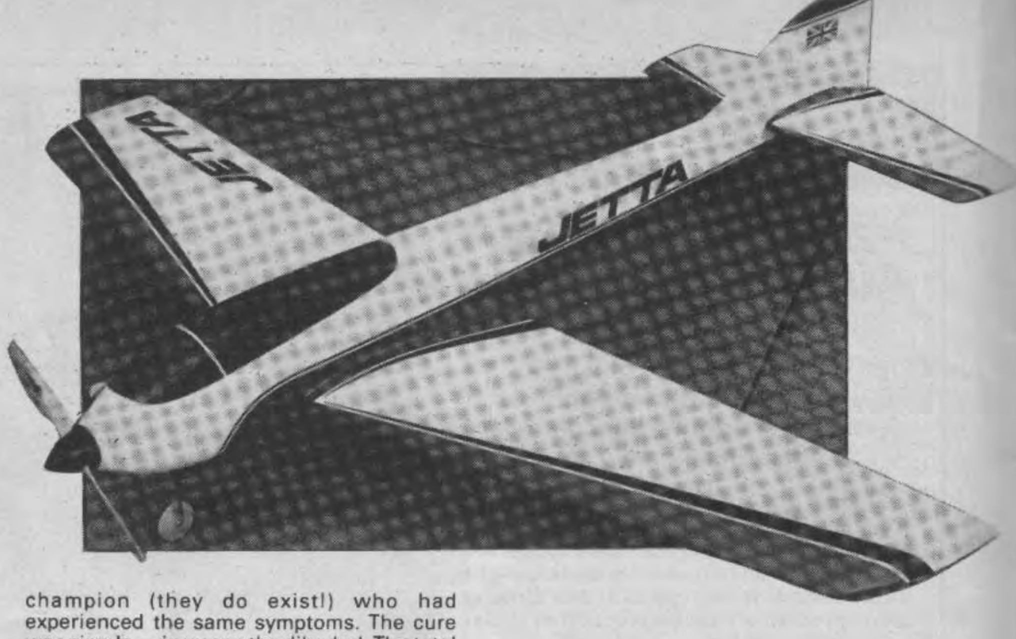
JETTA .40 SIZE FOR AEROBATICS

PULL-OUT PLANS

HAIRY GNOME BIPLANE

JETTA

Competition aerobatic model for 0.40 cu. in motors. Design by Mike Delacole



AEROBATIC CONTESTS are dominated by '60' size models and yet there seems to be no reason at all why a good '40' powered model should not be equally competitive, especially in the Standard and Senior categories of the recently reorganised G.B. Radio Controlled Aerobatics Association competition scene. The advantages of such a model are numerous; cost of building, equipping and practising are drastically reduced, as too are the problems of storage and transportation. Very important also is the availability of a flying site where one can practise. Recent legislation has definitely restricted the operation of '60' size models in many clubs.

Jetta represents an attempt to provide a competitive model designed around a tuned pipe equipped 40/45 cu.in. motor, which will give the would-be champion an ideal entrance into the sport and generally lower the cost level for the more experienced pilots.

When designing a new model, it is difficult to know where to begin, and after much searching through RCM&E back issues, it became clear that there were no absolute criteria that could be applied. There were two models which held my attention more than the others, however, and these were Hanno Prettner's 'Curare' and Joe Bridi's 'UFO'. The first prototype was born out of a set of veneered foam wings and tailplane panels that were originally intended for the RCM&E 'Hawk' (R.C. 1358). These looked about right for my needs, so they were married to a slim fuselage with a good balanced side area and a tail to nose moment of 1.75. Power was provided by a piped *Super Tigre* X45 rear exhaust motor, the model, weighing in at about 5¼lbs, fairly leapt off the ground for the maiden flight. The vertical performance was excellent too, the only major problem was that of the rudder response and this delayed the development of the model. When right rudder was applied, the primary response would be a yaw to the right followed by a secondary response of a roll to the left. The first modification was to remove area from the top of the rudder and add some onto the bottom. This made no appreciable difference and the mystery deepened as every 'expert' who was questioned on the subject gave a different diagnosis! The problem was finally solved by a helpful champion (they do exist!) who had experienced the same symptoms. The cure was simple — increase the dihedral. The total dihedral was increased from 1½in to 2½in and the transformation was dramatic. Further reading has made it clear that the dihedral requirement may be different for each particular model (of the same design). With renewned confidence the drawing board was revisited and the *Jetta* in its current form was the result. The projected dimensions were as follows:

Wing Span 55ins.
Wing Area 520sq.ins.
Tail Area 130sq.ins. (25% wing area)
O. A. Length 48½ins.
Weight A. U. 5¼-5½lbs.

The increased tail to nose moment (now 1.90) and the 25% tail area have helped the smoothness enormously. The large tail area also means that the plane is less susceptible to a rearward C of G. Detail changes were also made to the wing. Area was increased, a laminar flow type section was introduced and a constant radius leading edge was added. Aerofoil section on the tailplane was unaltered. Retracts may be considered desirable but, by using the shortest possible undercarriage legs plus streamline profile wheels, the drag induced by the fixed undercarriage has been minimised.

The construction has been made as simple as possible as it was felt that aerobatics men prefer flying to building, so anyone with a couple of 'all sheet' models already under his belt should experience no difficulties whatsoever.

General Construction

It must be stressed that this type of model should be built accurately, otherwise the performance will be adversely affected. With this in mind, be as careful as possible at each stage of the construction — from the marking out to the final sanding.

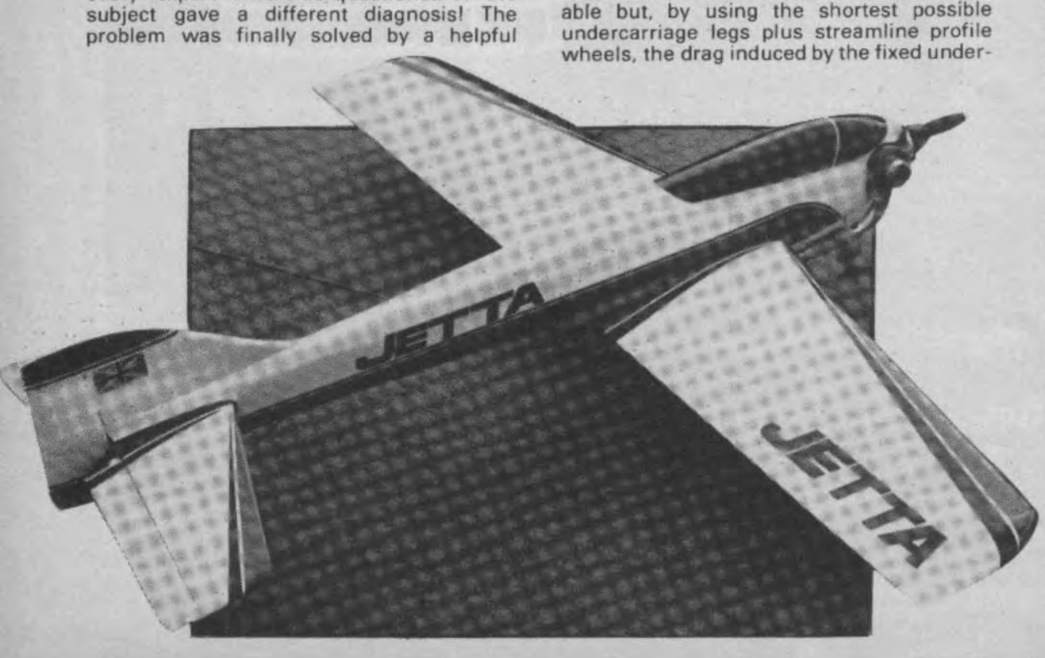
Wing

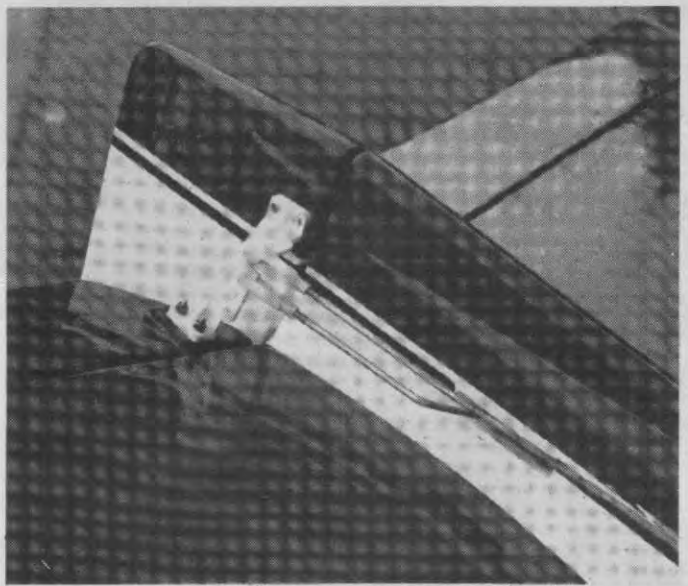
The wings on the prototypes have been made of veneered foam. These are quick to make and it is relatively easy to achieve a wing that is true and straight. They are also cheaper than a built up balsa wing and have the additional bonus of being quieter. For those of you who do not have access to a wing cutting outfit, a glance through the Classified Advertisements will reveal several mail order sources. For those of you who prefer a built up wing, details are shown on the plan.

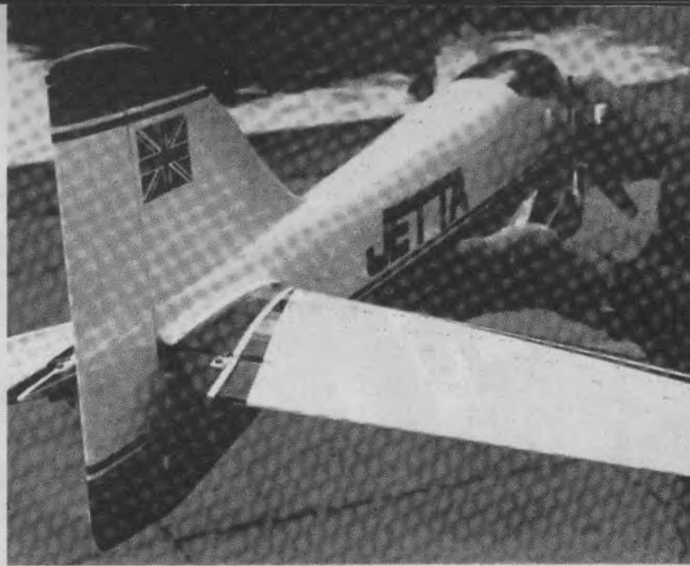
The foam wings are very basic, the only tricky bit being the ⅜in. constant radius L.E. A good method for making perfectly fitting ailerons is to hinge the aileron blank *before* any shaping takes place. This way it is impossible (or at least very difficult) to finish up with a badly fitting aileron. Before fitting the torque rods, give the subject of differential aileron movement some thought as this can either be built into the torque rods (by raking them forward) or done at a later stage on the servo output disc. A good system would be to build in a certain amount and then use the output disc for 'fine tuning'.

Tailplane

The anhedral tailplane has a full airfoil section and was also made from veneered







Left and above: tail surfaces and control connections. The anhedral tailplane requires that a forked pushrod is used for elevator connection, this is detailed on the plan. Designer, Mike Delacole, recommends differential movement for the elevators more down than up, a wedge can be fitted under the elevator control horn. This rakes the horn forward to produce the required effect.

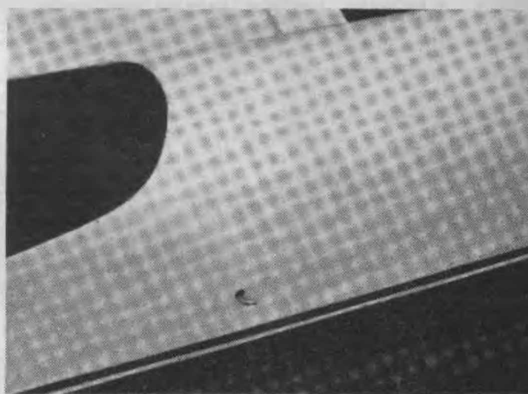
foam on the prototypes. For the purists, a built up version is also shown on the plan. It is sufficient just to epoxy the panels together and no reinforcement is required. The thick airfoil section really does improve the performance so please don't be tempted to substitute a flat plate version. Neither should the amount of anhedral be tampered with.

If you are making the built up version then proceed as follows: Make two sets of ribs by the sandwich method. Lay the L.E. and T.E. over the plan on ½in. thick blocks. Fit all ribs, not forgetting the root rib anhedral angle. This side is now sheeted. When completely dry, remove from the building board and sheet the other side. Make in two halves, taking care to make one right hand and one left hand side. The panels are then epoxied together. (For smooth fitting elevators, follow the same procedure as outlined for the ailerons, i.e. hinge *before* shaping).

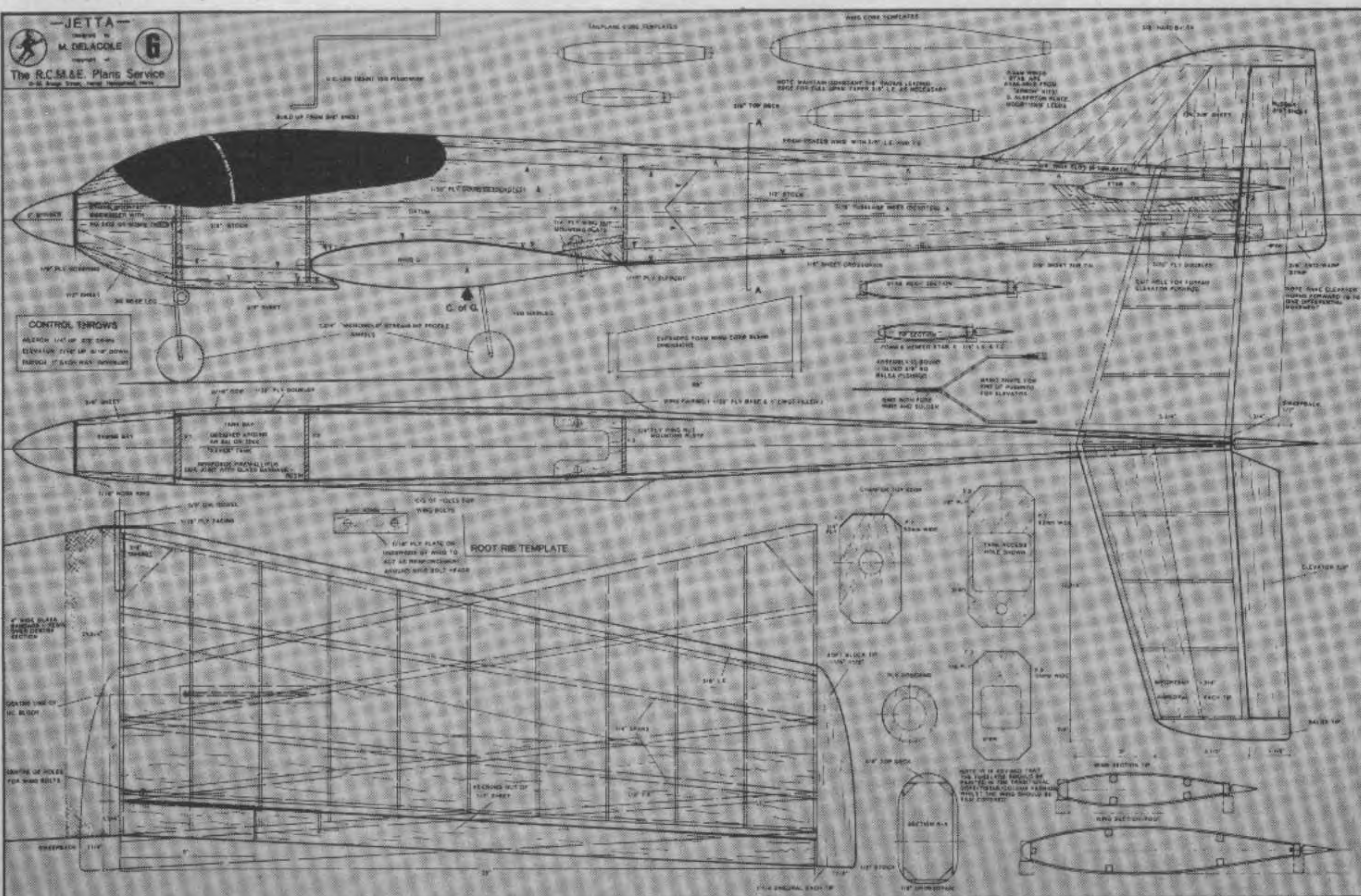
Fuselage

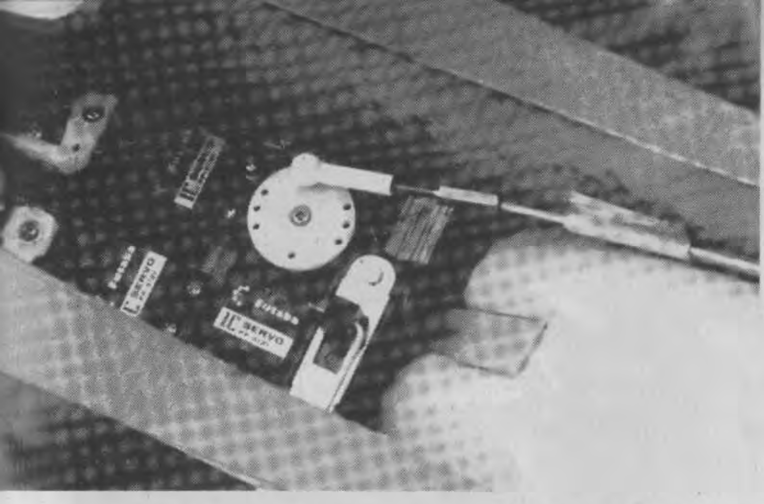
Prepare two identical sides from $^3/_{16}$in. balsa. Taking care to make one right hand and one left hand, mark out the position of the ply doublers (front and rear) on each fuselage side. Glue on doublers with contact adhesive then proceed to mark the position of all formers, datum line, wing and tailplane incidence lines. Mark the wing and tailplane incidence lines on the outside of the fuselage too, but do not cut out the hole for the tailplane at this stage. Attach all triangular stock and chamfer both stock and doublers at rear in order that the ends may be mated. Make up ply formers and drill all necessary holes in F.1. for the motor mount and the throttle cable. Cut out exit holes for the elevator pushrod in each fuselage side and make up the forked pushrod.

Now assemble the basic fuselage, taking whatever steps necessary to ensure that it

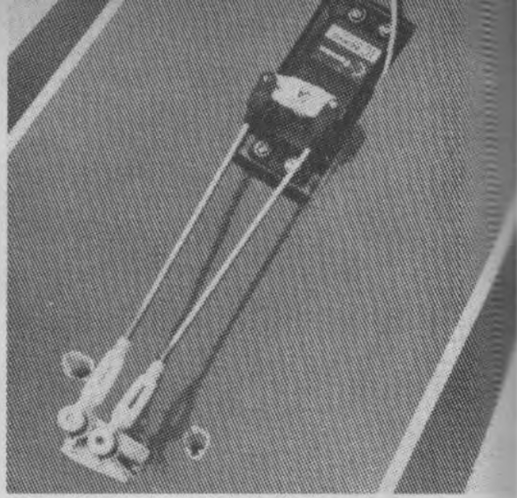


Full-size copies of the plan shown here 1/7 scale can be obtained from RCM&E Plans Service, Model & Allied Publications Ltd., PO Box 35, Bridge Street, Hemel Hempstead, Herts. HP1 1EE, price £3.25 plus 35p postage and packing. Please quote Plan No. RC1417 when ordering.





Left: servo installation and wing bolt plate detail. Fuselage is purposely narrow, but R/C equipment bay is still adequate in size for modern R/C equipment. Right: strip aileron horn connections.



comes out perfectly straight and square. Before pulling together the sides at the rear, insert the forked pushrod.

We now have a basic fuselage and at this stage certain tasks should be undertaken. Reinforce the junction of the firewall (F.1.) and the fuselage sides with some glass bandage and resin. Build in some support for the fuel tank. Fuel proof those parts of the tank bay that will be inaccessible later. It is also a good moment to plan the method you are going to choose for linking the rudder servo to the rudder horn. If anything has to be built in, this is the time to do it.

Next, glue on the $\frac{3}{8}$in. top sheeting and the $\frac{1}{8}$in. crossgrain bottom sheeting. Chamfer front of top sheeting and add on the laminations of $\frac{3}{8}$in. sheet. Glue on bottom sheeting of tank bay, fuel proofing where necessary. Next, trim all sheeting so that you have a rectangular section on the fuselage and clearly mark out the slot for the fin and the position of the subfin. Cut around the sides of the fin slot with a sharp blade, making sure that the cuts are vertical but do not remove any material at this point.

Next, fit the motor mount and engine and, using the spinner as a guide, fit the nose sheeting and the $\frac{1}{16}$in. ply nose ring. Before final shaping, add the $\frac{1}{2}$in. triangular stock. The fuselage top can now be shaped to the outline shown on the plan and generally rounded off, but take care when sanding around the fin slot and seating, not to be too enthusiastic — likewise with the subfin seating when sanding the bottom.

Make up $\frac{3}{8}$in. sheet fin and rudder and carefully remove the material from the fin slot. Glue in the fin, making sure that it is vertical. Finish off bottom rear of fuselage and attach the $\frac{3}{8}$in. subfin. Cut out hole to accept tailplane.

Next, fit the $\frac{1}{4}$in. ply plate for the wing nuts and also the $\frac{1}{16}$in. ply supports for this plate. Place wing in position on fuselage and drill through for the wing bolts. Trim wing seating as required to achieve an accurate fit. Installing the tailplane is next and this is a tricky operation, best done with the fuselage supported on a flat board. Take as many measurements as necessary and, if possible, double check with an incidence meter. When satisfied that all is correct, spot glue the tail in place with epoxy. When this is thoroughly dry, recheck the installation. If all is still correct, run epoxy round the joint and then fair the whole thing in smoothly with your favourite lightweight filler. Now make the wing fairings — these are simply a $\frac{1}{32}$in. ply base with a lightweight filler to make up the mass of the fillet. Take care not to disturb the wing incidence when installing these fairings. We can now finish off the shaping of the fuselage and sand it in readiness for the finishing process.

Finish

Hopefully, your *Jetta* should see quite a bit of service so choose a finish that will stand up to the wear and tear. All the prototypes have been given a traditional dope/tissue/colour job on the fuselage and tail surfaces but the wings have been film covered. This has proved to be an excellent combination.

Radio Installation and Linkages

The installation of the R/C equipment is simple and should present no problems. Where possible, use the equipment to balance the model before adding weight. Before making the pushrods up, the differential throws on the elevator and ailerons should be given some thought. We need more 'down' than 'up' on the elevator and this can be achieved by mounting the control horns on wedges so that they are raked forward 10°. The correct amount of aileron differential must be found through experiment — when the rolls are axial the differential is correct.

Also, give a little thought on how you are going to link the rudder servo to the control horn in order to achieve a positive slop free connection. This can be done with a closed loop system, tube in cable or a straight line pushrod. All of these require forward planning and should be decided upon before building the fuselage.

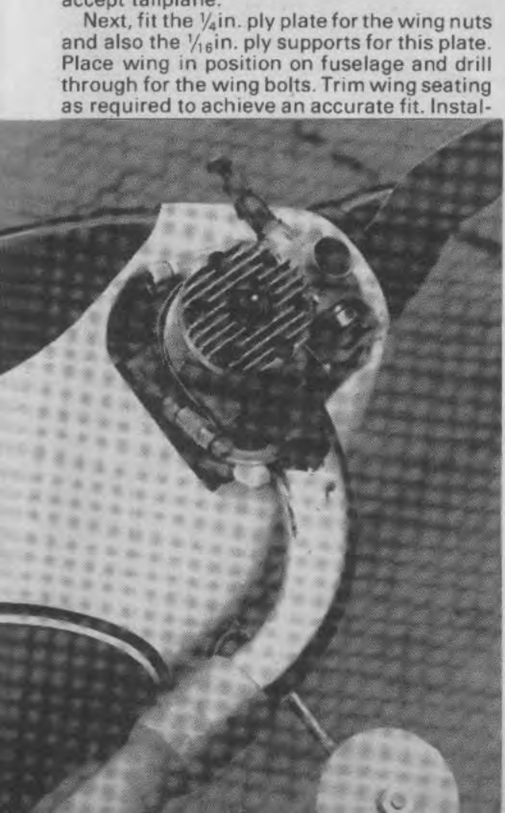
Undercarriage

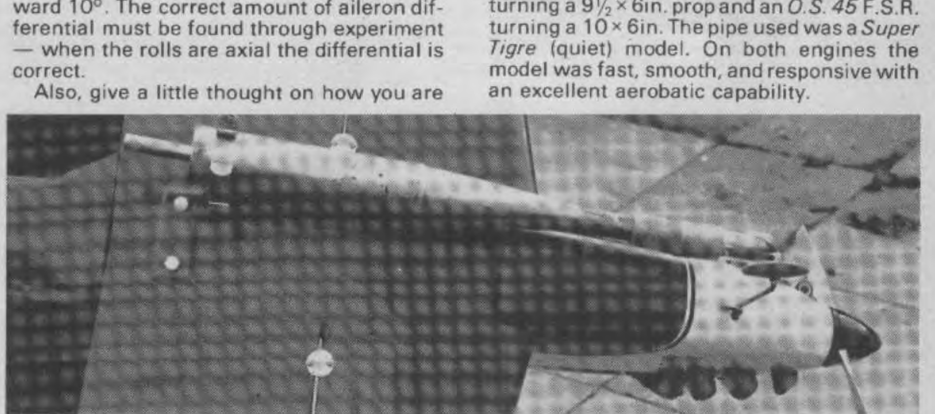
The *Jetta* has been designed as a fixed U/C aircraft. Set the plane up so that it is slightly nose light — just enough to give the wing $\frac{1}{2}$°-1° of positive incidence. This will help towards a smooth take off. The wheels shown on the plan are *Micro Mold* $1\frac{3}{4}$in. 'Streamline Profile' nylon wheels and should be bushed with brass. Don't be put off by the 'Club 20' appearance — they are ideal for our purpose. The legs shown are about the safe minimum, and may need to be lengthened slightly for longer grass.

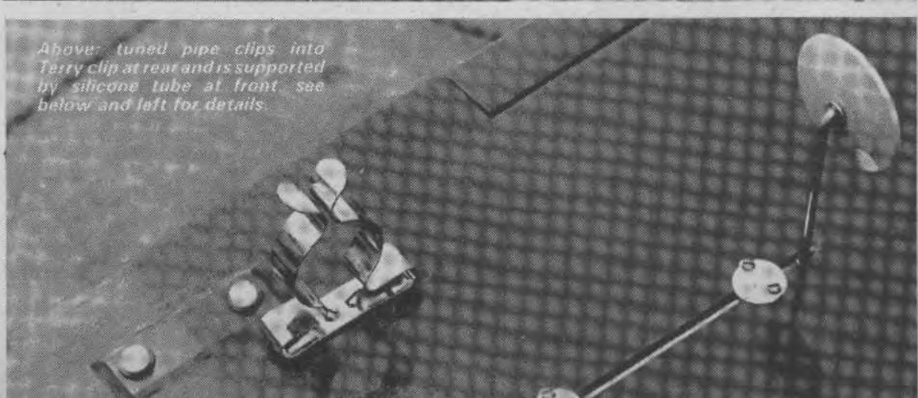
Flying

Before rushing out to put your *Jetta* through its paces, give the finished model a thorough checkover. Check that the control throws are correct and double check the C of G. The C of G shown on the plan is intended as a safe starting point but it is advisable to fly the G. The balance shown on the plan is intended as a safe starting point but it is advisable to fly the model balanced as per plan before making centre line) as deviations here can cause a trim change.

When choosing an engine, the key word is reliability, and it must have the ability to turn in consistent engine runs otherwise your practice will have been all in vain. The prototypes have been powered by a *Webra 40* turning a $9\frac{1}{2} \times 6$in. prop and an *O.S. 45* F.S.R. turning a 10×6in. The pipe used was a *Super Tigre* (quiet) model. On both engines the model was fast, smooth, and responsive with an excellent aerobatic capability.







Above: tuned pipe clips into Terry clip at rear and is supported by silicone tube at front, see below and left for details.