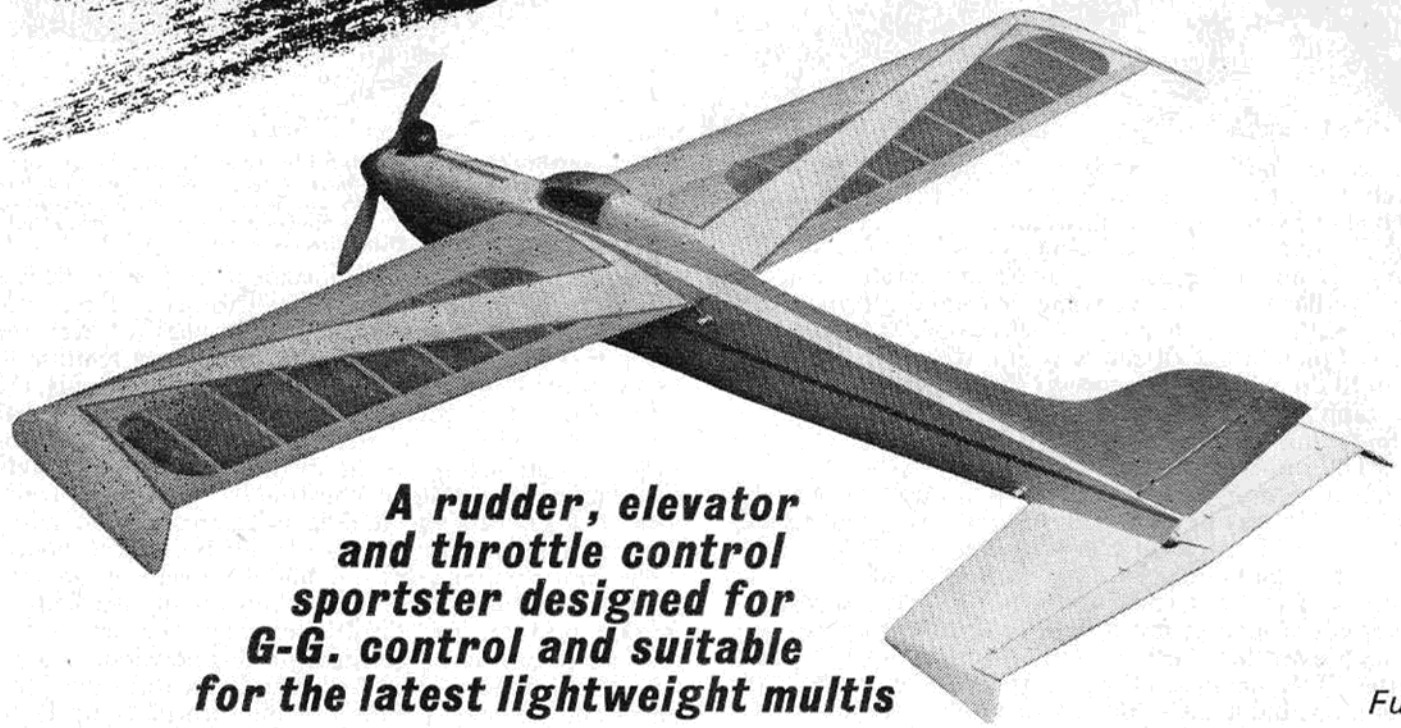
Ssssshhwept

By
Geoff Dallimer



A rudder, elevator and throttle control sportster designed for G-G. control and suitable for the latest lightweight multis

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THOSE of you who know the designer may be surprised to find me building R/C – however, having spent two hours in a fruitless search downwind for a lost Wakefield model, my thoughts on the long walk back centred around the application of R/C to 'free flight' events! However, a little reflection on the problems of 'penetration', and a visit to the 'other half' of our club – largely single channel sport flyers – convinced me of the need for a single channel design that was a little different, and could give a lively performance on a limited budget.

Since I had flown 'G.G.' as long back as 1958 (before 'advancing' to free flight competition flying incidentally!), the many advantages of pulse proportional were not lost upon me. That engine control is also available now from actuators of the *Rand* type makes this kind of control system very competitive indeed on a cost/value basis for the sport flyer.

The basic design parameters set were simple, i.e. single channel pulse proportional control, light airframe, adequate power, and an 'out of the rut' appearance if possible.

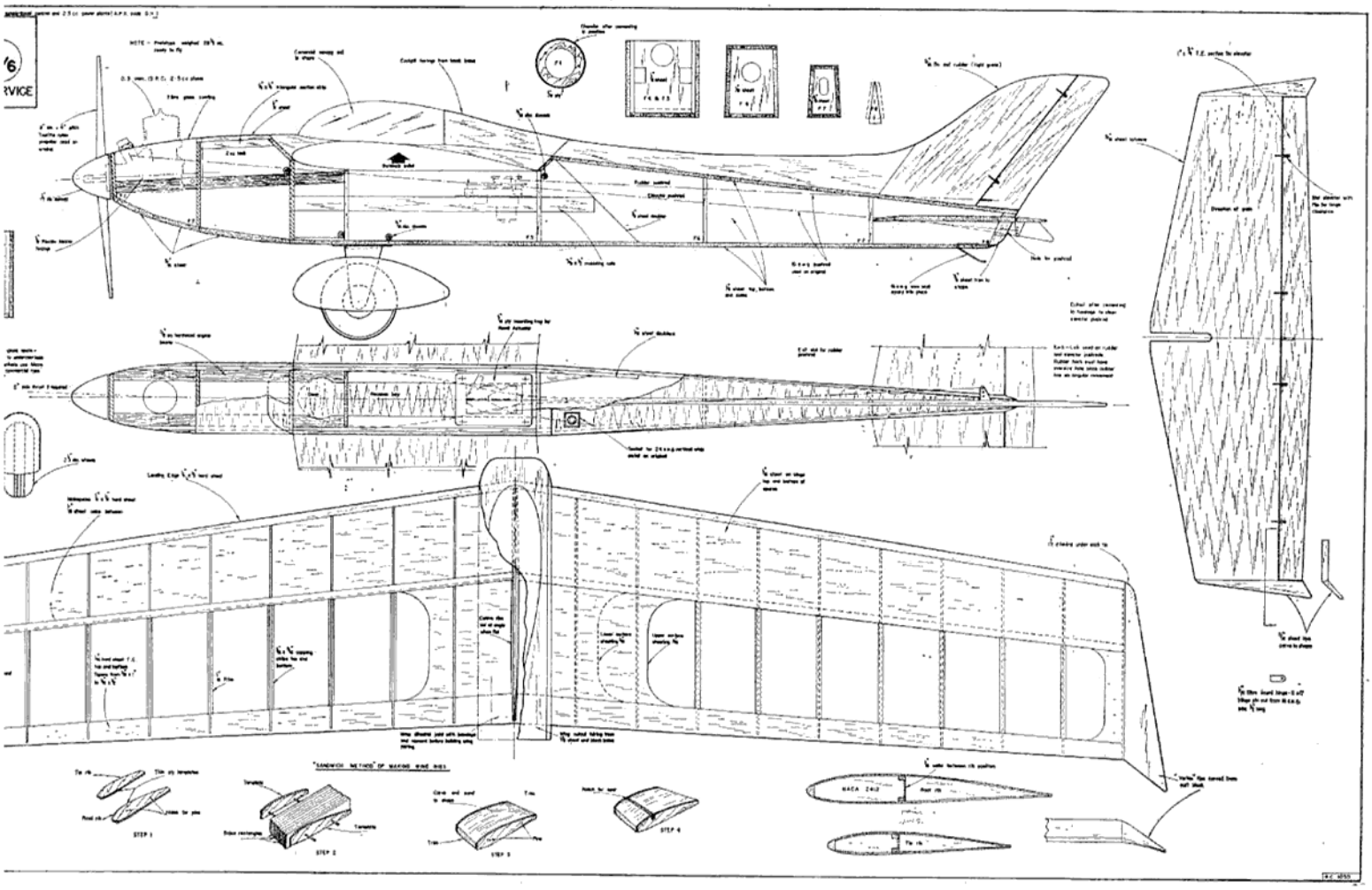
In the event 'Sssshhwept' met these requirements reasonably well, weighing in at 28 oz. complete with 500 DKZ DEAC driving home-built receiver and Rand actuator. Swept wing configuration was adopted in an endeavour to smooth out any tendency to 'gallop' by increasing longitudinal stability, whilst vortex tips can be claimed to be advantageous during fast circuits! The airframe is quite conventional – perhaps traditional would be a better word – and since the construction is to be light, its strength must come from spreading impact loads evenly into the structure, and by avoiding localised highly stressed areas. Two load-bearing members bridge the wing cut-out between engine mounting and aft sections of the fuselage, and serve the double purpose of providing a mounting rail for the Rand/Rx. unit à la Boddington!

'Sssshhwept' has withstood a high speed dive into the ground, most damage resulting from the power pack going through the ¼ in. ply bulkhead. In this particular instance the model had got into an uncontrollable dive with the dive steepening as airspeed increased – a state not unknown with other swept wing designs including full-size aircraft as the late John Derry demonstrated in the *DH*108 when unexpectedly achieving the first British faster than sound flight during a near vertical dive. Like the swept wing DH108, 'Sssshhwept' will recover if the power is throttled back – and you have enough height!

Wing

Commence construction with the wing by sandwiching the required number of blanks between root and tip ribs, then carve the resulting block to shape. Lightly sand each rib separately to trim its outline to match the wing taper. Ensure that the assembly is true before cementing the joints – warps are troublesome enough without building them in! It is particularly fatal to force fit the webbing between the mainspars, since this is almost certain to result in a twisted wing. To fit the L.E. sheeting I prefer to butt joint it first to the L.E., and when the joint has set, pull it down on to the mainspar securing each rib/sheet interface finally with a fillet of cement. Tips may be laminated from ¼ in. sheet or cut from solid block, in either case carve to shape after cementing into position. A fibre glass or bandage strip is wrapped around the centres of the wing after sheeting and impregnated with cement to strengthen the dihedral joint.

Scrap block and sheet is used to construct the centre fairing to blend with the fuselage after the wing is mounted



1/7th scale reproduction are available from R.C.M.&E. plans service, plan RC/1030, price 9/- inc. post.

in position. Finally add cockpit and its fairing to blend into the fin strake.

Fuselage

Cut out the fuselage sides and glue on the doublers. Assembly then commences with the ply formers, fuselage sides, and engine bearers fitted together as a unit, Liberally coat each joint with epoxy glue using masking tape to keep the unit correctly aligned. Bake in oven for 30 mins. at Regulo 1 (200 deg.F) – married types had best do this on their wive's evening out! When cool add the balsa formers and pull the sides together at the tail, from this point it is largely a matter of adding one part after another but leaving the top sheeting until last. I prefer not to cut the holes in the formers until they are in position and can then be formed with a round rat-tail file to clear the control push rods. Slot in the tailplane assembly and cement securely taking care that it is true and square. Form the required clearance in the tailplane and at the aft end of the fuselage for the elevator push rod. Now add top sheeting. Sand all sheet smooth and cover with lightweight tissue before adding fin and dowels.

The fibre glass cowling is prepared over a balsa mould which is best carved in place on the engine bay so that it matches the fuselage lines. Remove the mould from fuselage and add extension pieces so that the final moulding will incorporate the required overlap for securing screws. The mould must be well finished with sanding sealer and polyurethane varnish so that it does not soak up resin, a silicone wax polish is used as a release agent to prevent the moulding sticking to the mould. The moulding itself can be made either from fibre glass cloth or heavy nylon, two to three layers are sufficient with epoxy glue brushed on as the binding resin. Cure at low temperature to prevent bubbling.

Fabricate the undercarriage from dural and make a pair of wheel spats in the same way as that described for the engine cowling. Alternately commercial *Micro Mold* spats are available. Frankly though, if you normally fly from a rough grass field – as do so many of us –don't bother with an undercarriage at all. Less weight, less drag! It is, in these circumstances, best to add a layer of nylon and epoxy resin to the underside of the nose to strengthen it against stone damage. Now tell your 'multi' friends to admire your 'retracted' undercarriage! The majority of my prototype flying was done in this manner.

Tailplane and Control Surfaces

Both fin and tailplane are formed from medium/light balsa, but note the grain direction at the tips. This adds considerable stiffness to the tailplane. Standard 1 in. x 3/16 in. T.E. stock can be used for the control surfaces. The hinges have proved very satisfactory costing all of 2d., being both free moving and neat. The hinge plate is made from 1/32 in. S.R.B.F. (Synthetic Resin Bonded Fabric) or fibre glass P.C. board (remove copper laminate), and the hinge pin from piano wire. Secure plate and pins into place with epoxy glue, but please, a dab of resin at each end only of the hinge pin, and none in the hinge joint! However if preferred simple Mylar or Rand hinges are also effective, whatever you use, do make sure they move freely.

Finishing

You got this far? Cover wings with lightweight nylon and apply three coats of clear dope to fill cloth before fuelproofing with polyurethane yacht varnish. Trim decor is also polyurethane. Original was all yellow with yellow

Author and designer Geoff Dallimer displays Sssshhwept ready for action at the flying field. below: rear view of prototype model. Note droop tips on wing and tailplane.

wing flashes picked out in red *Monokote*. It is advisable to allow a few days to elapse before applying polyurethane on cellulose dopes since the volatile constituents of acetate take some time to evaporate completely from the nylon covering.

Fuselage and tailplane were covered in lightweight tissue, followed by two coats sanding sealer and two coats polyurethane rubbed down with 300 wet and dry emery used wet.

Radio Installation

The Rand actuator is mounted via grommets on a ply plate screwed to the mounting rails, and connected to the control surfaces by 16 s.w.g. piano wire control rods with 'Kwik Link' ends. Do ensure that the control linkages are really free. Any stiffness – particularly in the throttle linkage – will result in excess 'gallop' during throttle commands due to the actuator motor slowing. The throttle linkage is a 22 s.w.g. wire in nylon tubing. (Ball pen refill.)

DEAC power pack and receiver are protected by encasing in rigid expanded polystyrene foam, and all wiring joints, i.e. switch, DEAC, aerial socket etc., should be supported by a coating of cold cure rubber. Silastomer, Evostik, Copydex, are all suitable and well worthwhile despite being rather messy!

The vertical whip aerial has proved very effective in increasing range without having trouble from servo noise due to over-sensitive receivers. Don't forget to secure the aerial plug with a rubber band however, or the 'in flight' range might suddenly become non-existent! Take care also when bending down over the model to avoid eye injury.

Flying

Your first flight cannot possibly be as spectacular as that of the prototype! Radio checkout was O.K. and the *Max 15RC* responded well to the Rand throttle control, so with throttle wide open a fellow club member launched the model. The immediate result was consecutive loops with my assistant laying flat on the ground yelling 'cut the motor' each time the model passed a foot above his head! . . . Yes, the plans do include the mods! If you don't wish to repeat this performance I recommend reversing the propeller for the first few flights as this is a very effective method of reducing power.

Before attempting to fly, check wing is free from warps, that c.g. is in correct place (never attempt to fly without one!), and that control surfaces are flapping equally about the centre line of tailplane and fin. Test gliding is largely a waste of time so go straight off at about ¾ power, holding a little up elevator on the stick. If you get into trouble, don't forget the engine control in your panic – with slow engine the model is quite docile. If you get in real trouble press slow engine and hold the signal, this gives additional up elevator that can be very helpful in desperate situations!

Back on the ground after that first flight adjust elevator and rudder linkages as found necessary to give a straight but slightly climbing 'hands off' trim. If model requires down trim on high power increase downthrust, and similarly use sidethrust to cure a power induced turn.

Don't believe you are getting separate proportional controls with any G.G. system as it is just not possible. There is always a degree of 'mixing' taking place – particularly at extremes of control – but don't let it worry you. In practice you will soon begin to 'waggle' that stick with a characteristic 'G.G. man' style of stirring until something that you intended happens at the model end! It's great when it does!