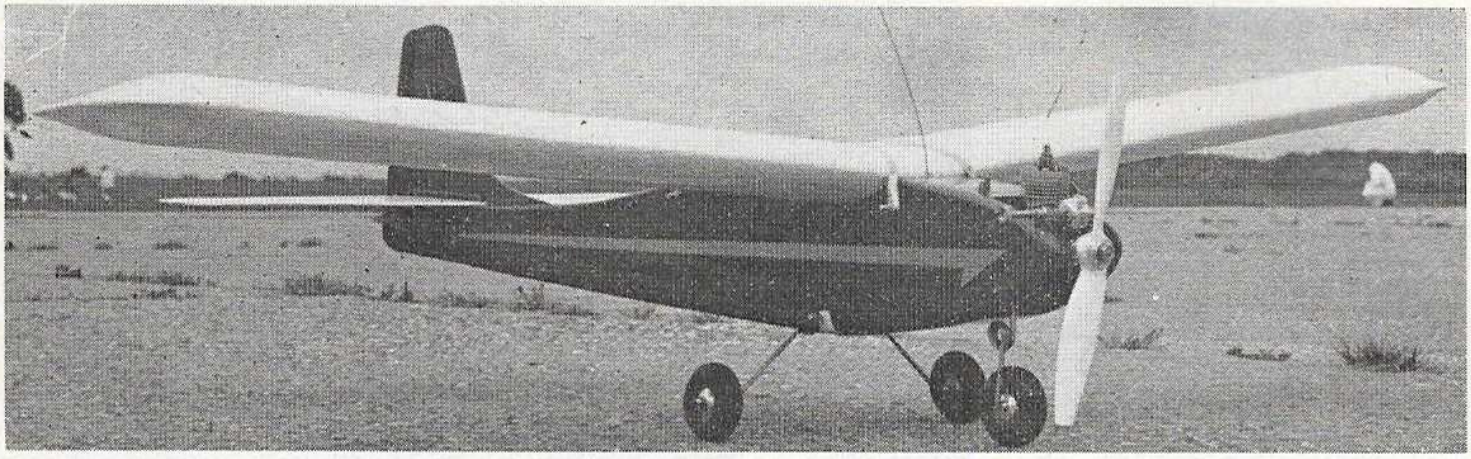
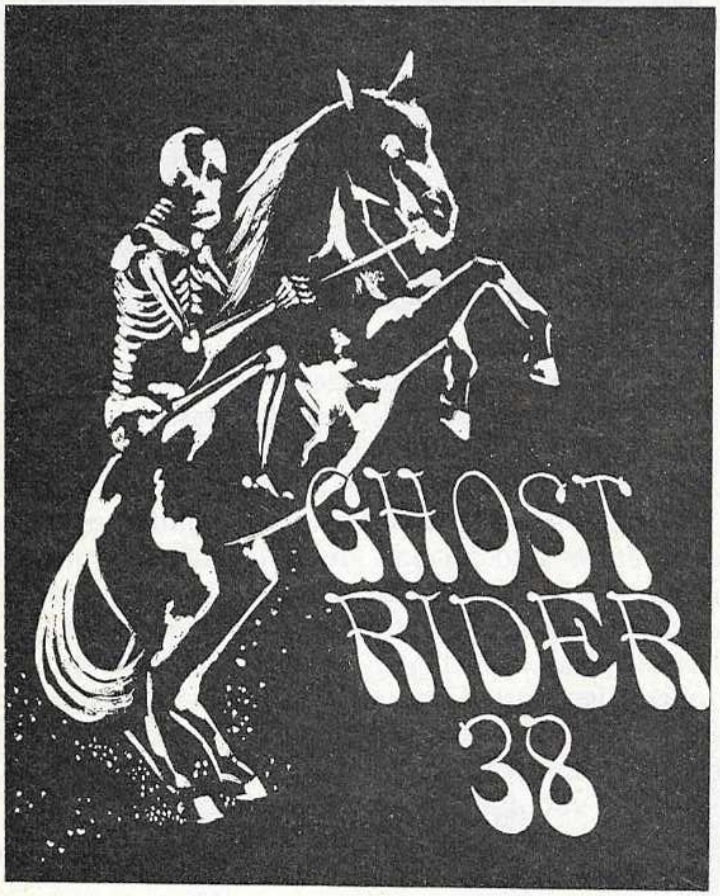


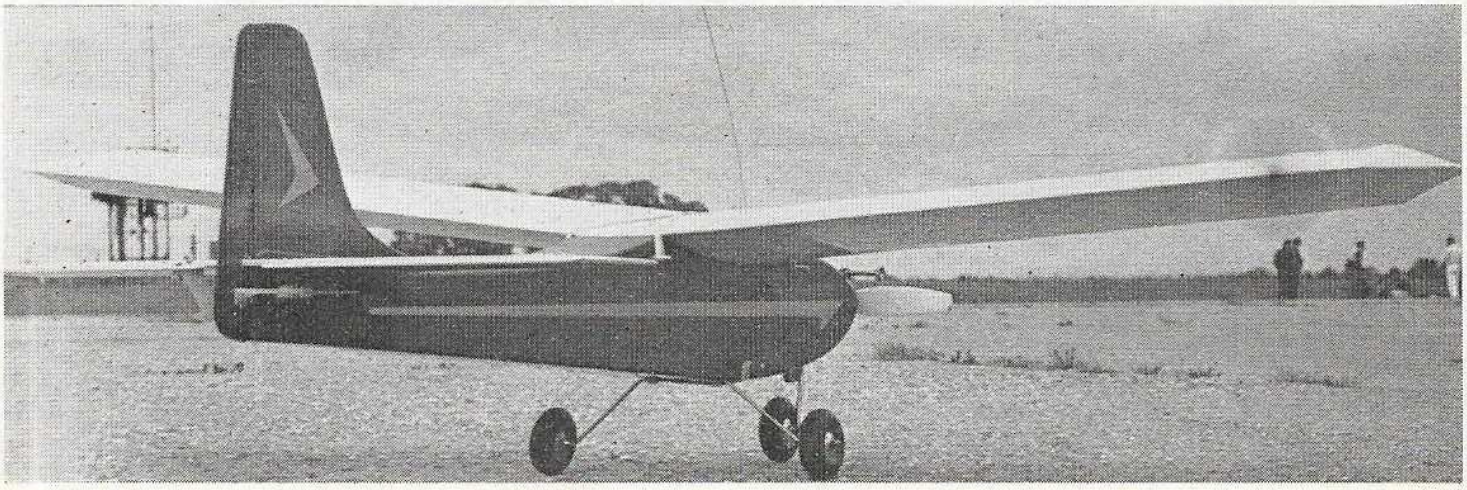


by
David Boddington

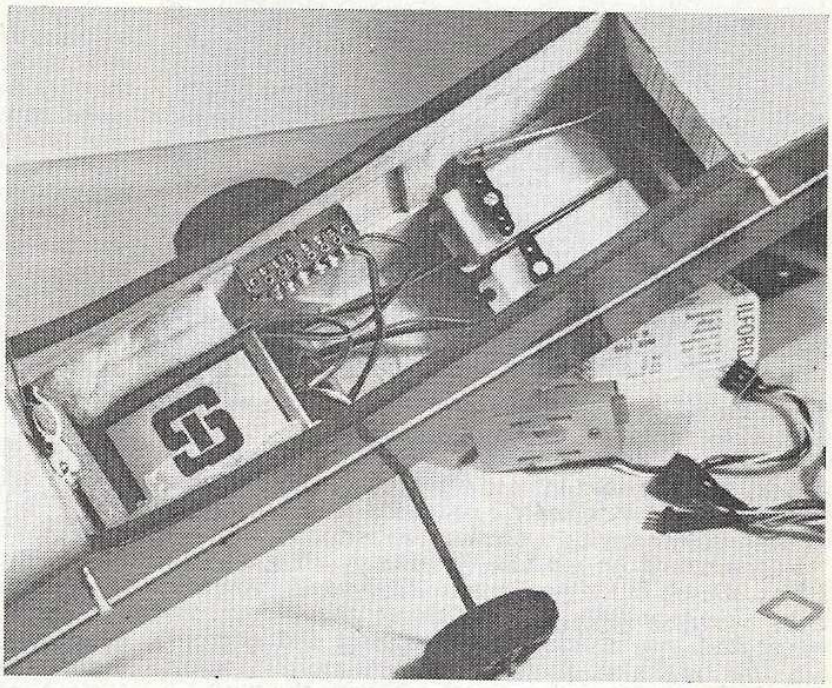
WHEN the Ghost Rider 50 design was presented in the January 1968 issue of *R.C.M.&E.* it was only after a certain amount of discussion and debate between the Editor and myself. Your Editor was in favour of publishing the 38 in. span version, now presented here, but I stuck out for the larger model. The reason I did this was because of my doubts about the abilities of some modellers to handle the smaller model. This may all sound very conceited and your reaction will probably be – if he can fly it why cannot I? Well! I was flying the GR 38 with reasonably lightweight G.G. outfits (7-8 oz.) and if this had been substituted by one of the outfits using dual battery supplies, heavier actuator and possibly heavier building of the model itself, it might have finished up as a vicious little beast.

So why present the design now? Since flying the models initially on G.G. systems I have checked them out on two function light-weight proportional equipment and the results have been well worth the time spent in installation. With a radio payload of around 11-12 oz. (Rx. switch harness 500 DEAC's and two S4 servos) the GR 38 gives very snappy flying. Its ability to carry this complement of radio equipment does also prove that it would also take the heavier G.G. equipment too. One word of warning though, the higher the wing loading the faster must be your landing approach and touch down. Slow down too much and there is the risk of reaching the stall and dropping a wing. This condition could be aided by introducing some washout to the wings but I do not believe that the characteristic is bad enough to warrant the nuisance of doing this – just get used to bringing the model in a little faster than the average sports model.

With some models you know as soon as you finish them that they are going to be 'flyers', but with others

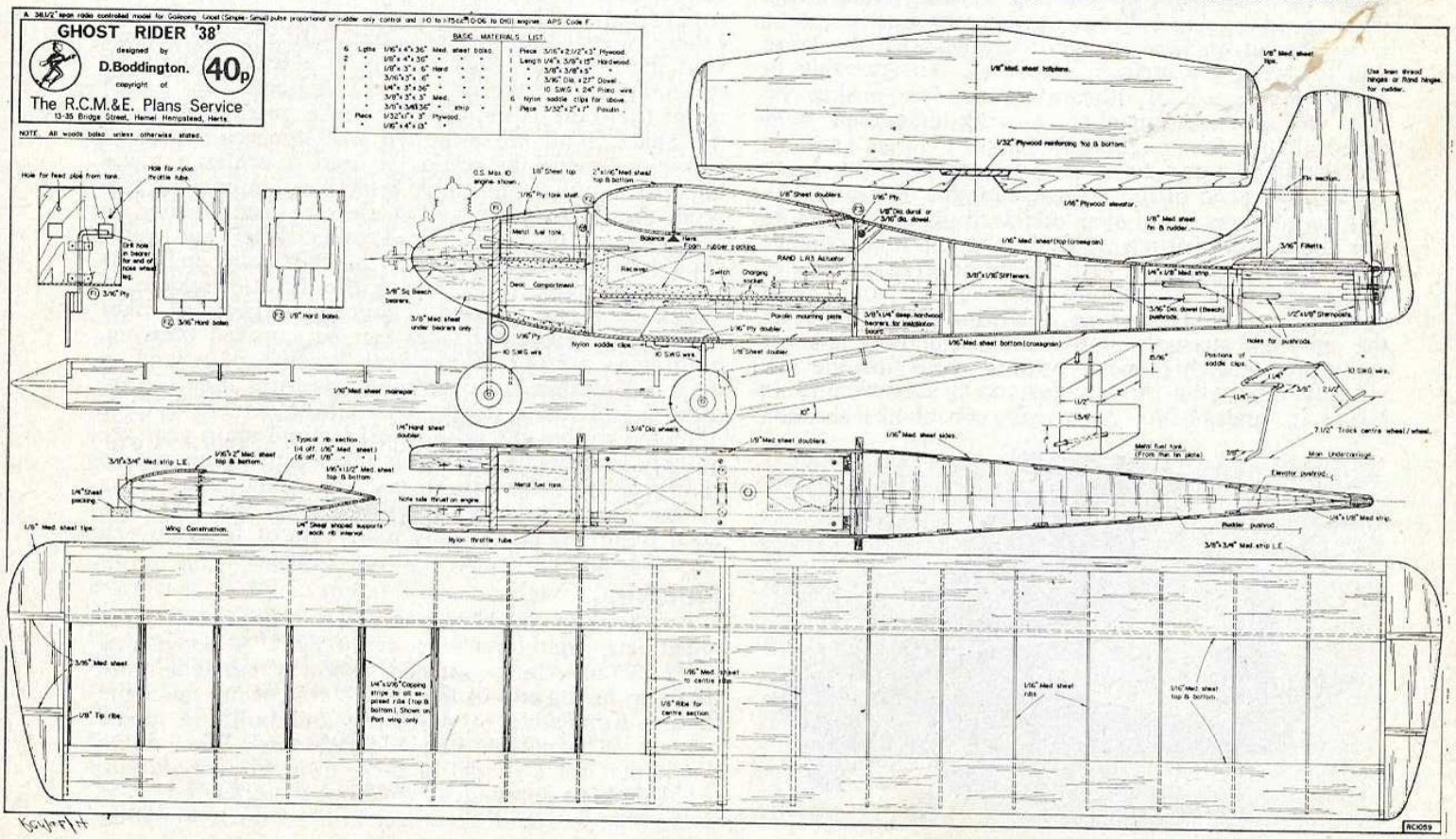


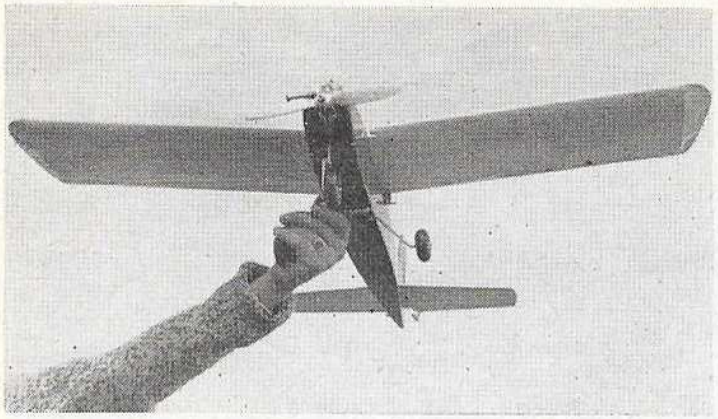
For Galloping Ghost, mini multi or just plain rudder only, this little model provides a sparkling performance.



Despite its diminutive proportions, these views of David Boddington's prototype Ghost Rider 38, give it the appearance of a big, full house multi job. Installation picture at right shows arrangement of two function Staveley analogue system.

you face the flying field with great trepidation – hoping your first attempts will be totally unobserved. Fortunately the GR 38 was one of the former types and test flights quickly proved that this initial confidence was not misplaced. In fact it is one of the few models that I have been able to resist the urge to 'improve'. Most of our flying is carried out in grass fields where the length of grass and the roughness of the ground prohibits take-offs, but on the occasions that I have flown her from a tarmac strip, the way she tracks and lifts off has caused appreciative comments from the





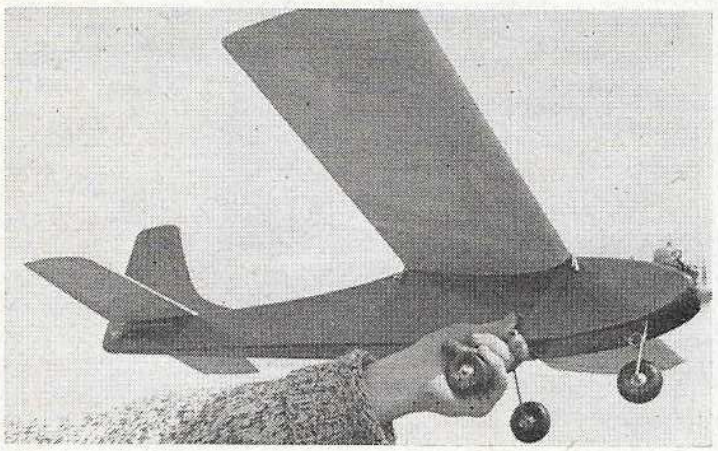
onlookers. Touch and go's have been accomplished with G.G. installed but it is important to hold on down elevator before opening up the throttle or she will try to leap into the air when up elevator sneaks in during the motor control change. The safest way is to open up the engine a notch at a time.

Engines used on the GR 38s include .09 glo's and 1.5 c.c. diesels but if you want to semi-terrify yourself every time you fly you could always fit a .15 cu. in. motor and maybe add throttle control and ailerons too. Just remember, though, when you are picking up the pieces after failing to 'catch up' with the model – I did not tell you to do it.

Construction

Wings

The wing features a thicker section than most models, either single channel or multi for reasons connected with both flying and building. The thicker wing has the advantage of a lower and less critical stalling speed, it also helps to maintain an even speed of flying regardless of altitude, i.e. less build up of speed in a dive due to increase of drag from wing, with speed increase. From the construction point of view, the advantages are considerable, with the large area of wing rib surface for gluing, it is possible to eliminate the use of dihedral braces for joining the two wing panels together. Having dispensed with dihedral braces on this model and larger models featuring the same form of wing construction. I am 100% convinced of the rightness of this decision. The full depth sheet main spar and leading edge sheeting top and bottom form a rigid 'D' box and this, together with the thick section and rib capping strips, makes for a virtually warp-proof lightweight wing. With covering materials such as Solarfilm and Monokote, the inherent strength of the wing structures is most important and this one, I promise you, fills the bill entirely. The wing ribs are formed by sandwiching six No. $\frac{1}{8}$ in. and 14 No. $\frac{1}{16}$ in. wing rib blanks between



$\frac{1}{16}$ in. ply rib templates with studding (threaded rod) holding the block together. This is the quickest and most accurate method of producing a set of wing ribs that I know of. Before constructing the wing panels make sure the building board surface is *level* and *true*. Pin down the main spar and the leading edge (over a piece of $\frac{1}{4}$ in. scrap balsa), the bottom trailing edge sheet is pinned onto shaped supports spaced at each rib interval. Glue all ribs into position followed by the top trailing edge sheet and top leading edge sheeting. Remove from the board and add bottom leading edge sheeting and capping strips.

Tailplane and Fin Assembly

No worries with these sheet structures; choose hard balsa for the rudder and good straight stock for the stabiliser. The elevator is cut from $\frac{1}{16}$ in. plywood with $\frac{1}{32}$ in. plywood stiffeners at the centre cut out area. Plywood seems to stand up to wear better than balsa for the elevator with no tendency for the elevator horn to 'pull through'.

Fuselage

Select the balsa carefully for matched fuselage sides and mark out accurately the positions of all formers, doublers, etc. on the sides with a ball point pen. The method of leaving gaps between the doublers for formers may seem odd but it positions the formers precisely and makes a strong completed structure. Personally I use white glue for *all* of the construction as it is equally suitable for balsa and the plywood former and engine bearers. When you have decided which engine you are going to use, check the width between bearers for suitability. (Spacing shown on the plan is for the Enya .09 TV III). The bearer width can be adjusted by varying the thickness of the nose doublers and the positions of the holes in F1. Do not forget to line the battery compartment with foam rubber (not foam plastic as this tends to compress too easily) before the tank shelf is secured in position. Liberally coat the fuel tank area with proofer to prevent the ingress of fuel in case of a leak in the tank (it would not be the first time!). A home constructed metal fuel tank is indicated to make maximum use of the space available although a commercial tank of suitable dimensions could be used. I prefer a metal tank to a polythene clunk tank for a model of this type, they are easier and neater to install using an epoxy glue for fixing. Feed pipes, filler and vents should be positioned to suit your particular engine as should the nylon tube bearing the throttle linkage. A 'clunk' tank can be used if continuous inverted flight is required. Undercarriages can be a mixed blessing, nothing is prettier than a real 'greaser' of a landing on a paved area but over rough pastures they can do more harm than good. The Ghost Rider U/C is designed so that the nose wheel leg and main gear are quickly removable by using miniature nylon saddle clamps to hold the wire in position. Some rebalancing of the model may be necessary when the U/C has been removed, but the ply underside of fuselage will take the landing shocks without damage.

Finishing

Any type of finish may be used on the model provided only that it is reasonably light. A seven coat paint job may look 'out of this world' but it is more likely to be the end of the model. One of my favourite sayings applicable to designing and building model 'planes is 'Simplicate and add lightness'. There is no doubt that for a model of these dimensions Solarfilm or Monokote is an ideal covering material. I always swore that I would never get hooked on it but after

using it once or twice it is difficult to get out of the habit. It makes a change to be able to sit at the table, covering and finishing a model while watching the TV and without the wife and kids accusing you of trying to kill them with lethal fumes. Give the engine bay a real good soaking of fuel proof paint and seal the edges of the covering around this area with epoxy resin. It is also worth contact cementing a small piece of steel shim on the nose doubler immediately opposite the exhaust stack of the motor to prevent charring of the finish. Colour decoration gives the modeller a chance to show some of his individuality, so why not think up some new colour schemes and patterns. It never ceases to amaze me when I see a model that faithfully reproduces the decorative scheme of the original – you can probably do better than the designer so let your imagination fly.

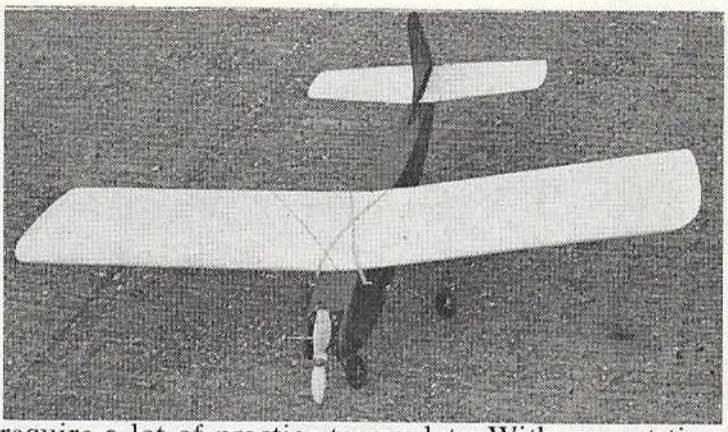
One small point on the MK wheels, if you use this type, remove the air-trap tyre and smear some epoxy glue to the hub before replacing the tyre, this prevents shedding the tyres on landing.

Installation

Some things I feel really strong about and radio installation is one of them. Get me to lecture you some day on the poor standard of radio installations and the dangers involved from these 'botch ups' – I will bore you for hours. Nothing looks worse, or is potentially more dangerous, than a rat's nest of wires creeping all over the innards of the model. The more loose wires, plugs and sockets and individual items of equipment can be avoided, the greater the reliability of our equipment. Whatever the radio equipment used make sure it is neatly and soundly installed to give it a reasonable chance of operating successfully.

Flying

Little information is to be gained from test glides with this model, much more important is to be sure that all flying surfaces are true, correctly aligned and the centre of gravity is in the place shown. Pick a day when as many things are in your favour as possible, you know, the wife has taken the kids to stay with her mother for a few days, your bank manager has gone on holiday and his stand-in does not know about your overdraft *and* the weather conditions are perfect (it takes about two years to co-ordinate that lot). Take your courage in both hands, or from the bottle, and fire the engine to full speed. Check and check again that all systems are 'go'. If you have a good take-off strip available start right off with an attempted take-off. If you have only a grass area then get someone to launch the model fairly fast and straight ahead. Do not be tempted to over-control in the early stages, just concentrate on making only sufficient control movement to keep the model heading upwind. When you have reached a reasonable height (100-150 feet) and you have had time to wipe off the beads of perspiration from your forehead, try making gentle turns to left and right. Correct any natural turns or diving and climbing with the transmitter trims, noting the action taken. Although the trims on the Tx are extremely useful in initial trimming flights, they should not be considered as a substitute for correct trimming of the model (particularly when G.G. is used), and first flights should be aimed at achieving just this. After these first few flights you should be getting the feeling of the Ghost Rider and ready to try out some more exciting manoeuvres. When you have run through the standard loops, rolls, etc., have a go at 'flick' manoeuvres. These are simple to achieve – simply give full up elevator and full rudder – but



require a lot of practice to regulate. With correct timing a single, 1½ or double flick roll can be achieved to order once one has practised it time and time again. So there she is! A few evenings at the workbench and you too can join the mini-set and enjoy small model flying in small flying areas. I have always fancied having a form of pylon racing with models of about this size, it should be great fun and rather cheaper than the standard pylon race models.

Flying the GR 38 Rudder only

For the modeller with plenty of single channel experience, the GR 38 could provide an advanced aerobatic model of considerable potential. I would certainly recommend increasing the dihedral of the wings a little to improve the positive stability, but no other changes are required. The model should *not* be trimmed to fly in a similar way to the average sports S/C model, it must be trimmed to fly fast with a shallow climb. With a 'kick-up' elevator fitted, this can be used to get the nose up to start the climb. Alternatively, when a rubber-driven escapement is employed, pulsing left, right, left, right, etc., in quick succession will also help to initiate a climb.

Aerobatics should be first attempted at a good height, as the GR 38 requires a considerable vertical distance for recovery from some aerobatic manoeuvres. To be capable of performing the more advanced aerobatics, the power must be sufficient (a good 1.5 c.c. diesel engine gives ample urge), and trimming in the pitching plane has to become nearer neutral than would normally be employed (by keeping to the rearward balance point and minimum difference between wing and tailplane incidence).

With the GR 38 correctly trimmed, it should be possible to carry out loops, roll off the top of loop, barrel rolls, spins (a larger rudder may be necessary), and even a short duration of inverted. In fact, it really becomes a case of how much the pilot is capable of, or brave enough to do. As I have said before, watch the weight, with a heavily-loaded model it may be very aerobatic, but whether you will be able to keep up with it is another matter.