

WHY NOT TRY

# SUITCASE SCALE MODELS?

**BILL BURKINSHAW  
INTRODUCES THE  
WORLD OF MINIATURE  
R/C MODELLING**

FOR YEARS manufacturers of R/C equipment have vied with one another to produce 'smaller', 'better', 'more powerful' better range equipment and one cannot help but wonder what use the majority of R/C modellers really put the resulting products to. One aspect of this pursuit of excellence is the continuing reduction in size of equipment to the extent that full 4 function outfits at weights only  $\frac{1}{5}$  of that available for early mass produced sets are now available. Micro miniature seems rather pointless unless it is tied in to really small models, particularly as so often the cost of miniaturisation is higher than more conventionally sized components.

## Why small models?

There is an undoubted fascination for the miniature in all things but, apart from curiosity or fascination, what reason would promote anyone to try to build smaller models when all the pundits seem intent on telling us the 'Big is Beautiful?' Time, space, cost, are three major factors in the 'small is smart' equation which when blended in with the curiosity factor have made the small R/C model irresistible for many builders and flyers.

## What's in a name?

Our transatlantic cousins coined the phrase 'Suitcase Scale' as a generic term to cover ultra-small R/C models and in its own way this is quite descriptive of the genre. However "First define your suitcase," as Mrs. Beeton might have said, had she been an R/C modeller! Suitcase is a very loose term, perhaps an all embracing term or actual scale limit is unnecessary; more realistically the size of model is determined by the power plant used. I would prefer to see no actual size weight or scale applied but more simply an engine capacity limit of 0.03 cu. in. which allows the immensely popular Cox TD .020 or the silenced, throttle equipped *G Mark* .03 to be used. A limit on the size of the model is automatically imposed by the power output of the engine and the result is likely to be a model of less than 30in. with a maximum weight of around 12oz.

Size of engines, number of R/C functions apart, 'Suitcase Scale' is a handy name to string to the concept, so for the time being 'Suitcase Scale' it is.



Left: David Wilshere has been building models on the suitcase scale theme for some time, this is his second twin for 3 function R/C.

## Bonus Points

Time, space, cost have been quoted as prime factors in the attraction of 'Suitcase Scale', let's be more specific! I would claim to be an average to fast builder and I possess a well equipped workshop so if I say  $1\frac{1}{2}$  days from first knife cut to engine start-up, bear in mind those factors. By far the longest part of the operation was covering and installing the R/C equipment in the 'Match Stick' (mini 'Ugly Stick') design, my first attempt at such a small model. But, bear in mind I only had an outline drawing and had to decide upon constructional methods, material sizes and draw out formers and ribs, etc., as building progressed.

As to costs, well I purchased a single sheet of  $4 \times 36 \times \frac{1}{16}$ in. balsa, ditto  $\frac{1}{32}$ in., two strips of  $\frac{1}{8}$ in. sq. and one strip of  $\frac{3}{16}$ in. sq. and found a scrap of  $\frac{3}{32}$ in. balsa in my odds and ends box! A single 25gm bottle of medium viscosity cyanoacrylate has so far provided the bonding agent for two models and I still have half a bottle left.

Of course there are other little bits and pieces of material in the way of plywood, wire, horns, etc., but only tiny quantities of each. I didn't even use all the wood I purchased.

Space, or limited space advantages are two-fold. The models take little in the way of facilities to build, they can be built on a small board balanced on one's knees in front of the

Below: an earlier David Wilshere twin, full 4 function B.N. Islander alongside 1/4 scale Stampe.



fire or television, Hi-Fi, or what have you; in the comfort of the family sitting-room. Flying only requires a very small field, in fact the small size of the models restrict the distance away from the pilot that they can be flown under conditions of full visibility.

Such small lightweight models prove remarkably robust, there is very little in the way of inertia damage caused when models are heavily landed, all the component parts are extremely light. In general they just bounce or flip over with zero effect. Items such as battery packs which can cause such internal havoc when a large model crashes are also very light and do not cause damage.

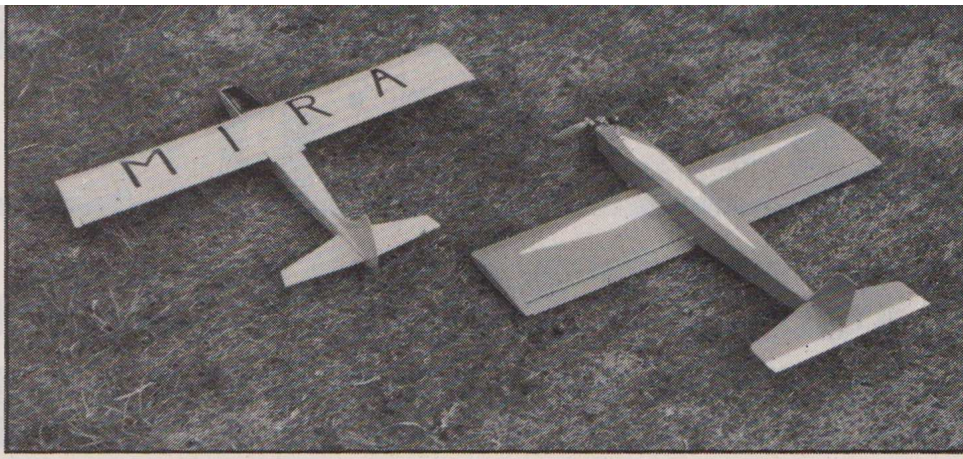
Finally, although 20% Nitro fuel cost are high pint for pint compared with straight or 5% nitro fuel used by larger glow motors, quantities used are very small. Engines such as the Cox O20 used are very easy on glow heads. One example I know of is 5 years old and has had continuous regular use and still has the original glowhead fitted.

## Disadvantages

There are disadvantages, but once you have taken a look at the designs presented here, you must be forced to agree that it is difficult to see how these outweigh the advantages. The disadvantages are in any event often present to a far lesser degree than some sceptics would have you believe.

Miniature R/C equipment is more expensive than its larger counterpart. This is inescapable, but even if the minute does lose its appeal eventually, the micro servos can still be used on a larger model to operate a sliding canopy, undercarriage doors or other scale detail. The micro receiver can of course be used in any size of model as long as you don't throw it away with the packing foam when changing equipment out of one 1/4th scale giant to another!

Tiny battery packs need special chargers — or do they? No, a simple modification to a spare charging lead is all that is required to charge 100 or 200 mA battery packs. The engines are noisy and fussy. Noisy yes, and no; the *G-Mark* O3 is fitted with a silencer and thus refutes one criticism. The Coxes have a



Left: you don't have to confine yourself to power models, MIRA the micro slope soarer is also from the Wilshere Stable.

high pitched exhaust note but actual volume is not dramatic. Fussy no, the Cox engines are made to very high standards and start and run extremely well and providing good high nitro fuel (in tiny quantities) is used, are easy to start and adjust.

These models are tiny thus their ability to

combat adverse wind conditions is limited but in light breeze conditions they fly well. Few of them are any more twitchy than a responsive aerobatic sports model, it is obviously important to make sure control surface throws are correct and balance points are right as with any other R/C model.

Quick reactions are not any more necessary than with any other fast responsive aircraft but good eyesight and reasonable level of skill is necessary. They move fast and are soon tiny specks and dis-orientation is possible for the unwary. Even with engine failures and down wind landings you are unlikely to have to walk very far to retrieve the model, you just don't fly them very far away.

### So far so good

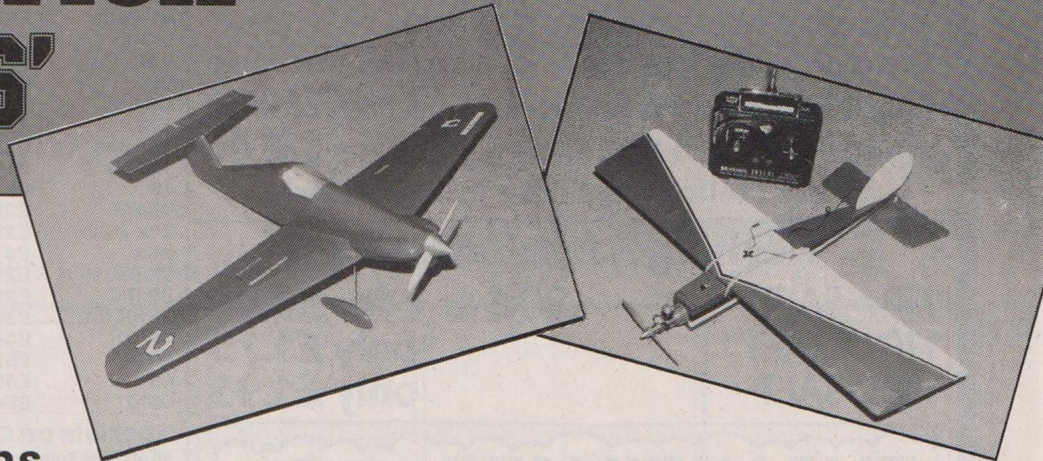
If all of this above hasn't set your minds ticking and your curiosity awakening then I despair. Take a look at the plans accompanying this article and maybe that will tilt the balance. If you do try one, rest assured it won't take long to get airborne and I am sure you will have a lot of fun.

In the next issue of RCM&E we will be publishing a directory of goods and equipment suitable for 'Suitcase Scale' — keep it 'small and sophisticated.'

# 'MATCH-STICK' AND 'RIVETS'

Two micro R/C models for 0.020cu. in. motors and two function R/C RCM&E staff designs

## PULL-OUT PLANS FOR SUITCASE SCALE



### Two Pull-Out Plans

Hopefully having whetted your appetites, take a look at the two full-size plans accompanying this article. Both designs are suitable for the Cox 'Tee Dee' .020 or G Mark 0.03 motor, both could be considered scale as the 'Matchstick' is an approximately 1/2-size 'Ugly Stick' and the 'Rivets' is fairly close to scale. The 'Matchstick' provides a very good starting point for this style of model, it is boxy, easy to construct and a stable flyer allowing a little practice with such small models before moving on to the undeniably slightly more difficult area of scale models.

### 'Matchstick'

Construction of this model is very simple, fuselage sides are cut from 1/16 in. balsa with diagonal grain 1/32 in. balsa doublers back to F.3. Drill wing dowel holes before assembling fuselage through both sides simultaneously. Cut out formers and assemble F2 and F3 between the fuselage sides then sheet the wing bay area underside of the fuselage. Pull-in the rear fuselage sides and glue together, followed by fitting the nose former 1/8 sq. balsa reinforcements. Cut the tailplane and elevator from 3/32 in. balsa, the fin from 1/16 in. balsa adding the anti-warp strip to the fin as shown on the plan.

Now complete the fuselage top and bottom sheeting noting grain directions and glue tailplane and fin into place. Fit the scrap 1/16 in. ply cross-piece onto the fuselage nose and

make up the battery hatch.

Servo mounts are hard balsa, the elevator push-rod is simply a length of 18swg piano wire with a 'Z' bend at the servo end and a mini horn, clevis, etc. at the elevator end. If you really trust your wire bending accuracy, the elevator connection can be a simple right angle bend with the push-rod very positively sprung into place.

The wings are equally simple. Cut a plywood template for the ribs and make 18 identical 1/16 in. balsa ribs. Cut the trailing edge bottom sheet and chamfer as shown on the cross-section. Assemble all the ribs onto the trailing edge, add the top spar and leading edge and the upper trailing edge. Remove from the board and fit the second wing spar. Add the wing tip profiles and triangular gussets, sheet the centre section with 1/32 in. balsa and cut out the hole for the servo. Note that the servo output shaft projects through the wing upper surface and it is necessary to position the hard balsa servo mounting beams so that the top of the case is against the top sheeting. Sand the complete wing ready for covering.

### Covering

We used 'Solarfilm' and cut up the sections to produce the colour scheme and assembled these on my work-bench before applying to the wing. This technique worked well, only a 3/16 in. overlap is needed and providing you don't use too much heat when shrinking the covering, these overlaps will hold. Covering this way saves the weight of a double layer of

film where trim colours are applied.

Both elevator and ailerons are hinged with 'Solarfilm'. Cut a 3/8 in. wide strip and lay the elevator flat down on the wing trailing edge. Film over the aileron and wing trail edge then fold down the aileron into its functioning position and now seal the top surface with a second 3/8 in. strip.

The engine is fitted with 2 x 8B.A. nuts and bolts and with 100mA battery Futaba Micro AM receiver and two servos the model weighed 7.5ozs. ready to fly and balanced right on the main spar.

### 'Rivets'

Using similar sizes of materials and being of a similar physical size, 'Rivets' is once again a remarkably quick and simple aircraft to build. There are some added difficulties, the wing tapers and the fuselage top deck is curved but both these complications are minimised because of the small size of the model and the thin section materials used.

Cut out the full set of fuselage formers and the basic sides using a good firm grade of 1/16 in. balsa for the sides. Mark the positions of F3 and F4 on the sides and assemble the two formers onto the sides. Now pull in the rear fuselage fitting the fin post and fin former plus F4 at the same time. Cut and fit the stringer down the fuselage top rear deck, noting that it projects over the cockpit opening.

Pin the basic fuselage down over a carefully marked and drawn centre line and pull in the fuselage sides at the front to fit F2 and

# 'MATCH-STICK'

F1. You can now add the front upper  $\frac{1}{8}$  in. sq. stringer and the upper fuselage sides. Use a medium grade balsa for the curved upper front decking and it should pull round the curve satisfactorily. Sheet the fin and add the leading edge and the 1.5mm ply wing mount plates.

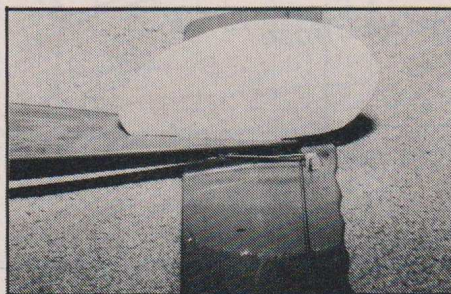
Before sheeting the lower fuselage, fit the elevator control snake tube. Make up the lower cowling duct from  $\frac{1}{16}$  in. balsa, carve and fit very soft balsa check cowls then with a razor saw, carefully cut away the engine cowl area so that the engine can be fitted.

Before constructing the wings you will need to make up a pair of torque rods to operate the inset ailerons. Note that the wings are built upside down on the plan. The undercarriage is a plug-in fit and is really only intended for static display. Both servos are mounted on hard balsa rails with plenty of room available for receiver and battery pack. Final touches before covering include a tail-skid, ply reinforcement for the wing retaining screw on the wing undersurface and a cockpit.

This was cut from a streamlined bubble style canopy with the flat front windshield section forming the top, surface of the 'Rivets' canopy. A canopy of around 6-7 in. overall length will be needed — try a *Micro Mold E - V10*.

## Flying Small Models

Firstly fix yourself up with some 20% Nitro fuel, a 1.5 volt glow battery (A 1.2AH Ni-Cad

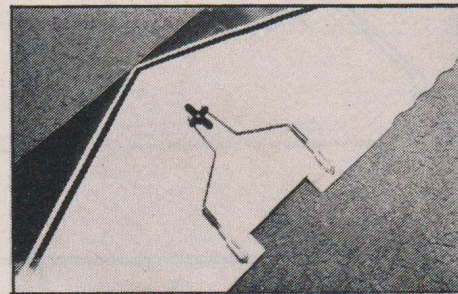


*Above: no rudder and ultra simple elevator connection on the Matchstick. Elevator is hinged with film and is thus fully sealed.*

cell is fine) and choose a calm day. Fuel up the motor and use either hand-start or the spring starter. Don't use your normal hi-torque 12-volt starter! These small motors nearly always need a prime through the exhaust to set them off.

Set the needle valve with the nose slightly high and be very delicate, open the needle ever so slightly from the optimum 2-stroking setting and check over the controls before launching. Do have someone experienced to launch the model, neither a full-blooded hurl nor faint-hearted drop are going to help!

Once airborne, don't allow the model to get too far away, particularly downwind, far better to continually fly upwind (and out of the sun if possible).



*Above: Matchstick aileron connection is completely external for real simplicity. Torque rods and internal linkage is easily possible within the fuselage however.*

If the engine does go off song from being over-rich then putting the nose up will sometimes lean out enough or just as good, cause it to cut!

Once the engine has cut you will find the glide quite fast and landing approach has to be planned and executed smartly. With a little practice you will find that you can land the model at your feet 'deadstick' every time.

Roll rate of these tiny models is usually very fast, but surprisingly they are not usually twitchy. With a wing loading of less than 8oz./sq.ft. the models are not prone to tip-stalling either.

Next month — What's available in the 'Suitcase Scale' market place.