

## MODEL REPORT

By  
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# The

# Veron "Sky-skooter"



OUR experiences in flying the *Sky-skooter* have left us with a most favourable impression of this model's capabilities. In fact, for sport flying with radio control it is one of the most viceless designs we have come across.

The particular model we used was built from a standard kit. It was built quickly with no especial care, but with just the minimum amount of attention necessary to get accuracy. It was doped with coloured dope—four coats on the fuselage and two on the wings regardless of weight and a standard E.D. lightweight radio receiver and actuator installed. The completed model then weighed in at 23½ oz. with E.D. "Bee" motor. Plan and instruction leaflet were followed faithfully, even as regards details conflicting with our own ideas on the subject. Most of these latter features, incidentally, worked out quite satisfactorily, although there were one or two modifications we eventually thought advisable before test flying. These will be described first.

The actuator hook-up with a length of 20 s.w.g. wire extending from the actuator itself down to the rear of the fuselage appeared a source of potential trouble. With only one intermediate bearing it appeared too flexible and definitely had a tendency to vibrate with the motor running. It was therefore replaced with a rigid coupling of a type which had hitherto proved satisfactory on a similar set up.

The extension shaft is of hard  $\frac{1}{8}$  in. sq. balsa. A hardwood dowel of similar size would probably be even better, although balsa is quite strong enough for the job. Wire fittings are then forced over each end, these being bound and cemented in place. These couplings consist simply of an open spiral of wire which slips over the rod, terminating in a stub shaft. It is important that these stub shafts line up accurately. When assembled on the rod and the rod spun between these shafts it must run true, not eccentric. Bend adjustment to the necessary position is easy with the couplings bound in place.

For the rear end bearing where the drive crank emerges from the fuselage we used a Rawlplug cemented through the rear frame of the fuselage and bushed this with a small length of 18 s.w.g. aluminium tube. Aluminium tube alone would probably

have been satisfactory, but the Rawlplug provides an excellent surface for gluing and a very permanent joint. Thus any accidental knocks the rudder assembly may receive when the tailplane is not in place are not likely to loosen the bearing.

The tape hinges used for the rudder seemed to give too stiff a movement, although this method of hinging is commonly used on radio jobs. Our own idea on the subject is that the rudder should be as free as possible, thus reducing the load on the actuator to a minimum. The actuator will then continue to operate the rudder right down to the minimum number of turns on the actuator motor. The length of actuator motor which can be accommodated is quite short and a feature like this can make all the difference between retaining or losing control on a long flight where rewinding the actuator motor had been omitted, or forgotten.

The method used to hinge the rudder is very elementary, but particularly "free." Wire fittings, secured through the rudder itself, simply pivot into eyelets bent from a pin and pushed into the rear fin spar. It is unlikely that the rudder would ride up and fall out of engagement, but a stop pin was located above the top of the rudder to prevent just this. We did not use the fixed upper trim tab, which would have served the same purpose.

Battery installation was rendered relatively easy by the considerable amount of space available inside the fuselage for so small a model. A very elementary battery box was made from  $\frac{1}{4}$  sheet balsa with a 20 s.w.g. wire hook grooved into the underside. A rubber band looped between the two extremities of this hook held the batteries down. The whole battery box was cemented to the floor of the fuselage up against the front balsa former.

The various batteries were made up into two separate "packs" bound together with cellulose tape. Short lengths of wire are soldered to the batteries before installation to be hooked up to the main radio circuit. This method dispenses with the necessity of elaborate battery boxes where the batteries clip into position and make press contact. Twisted connections, or in the case of the high tension batteries, soldered connections, are far

simpler and quite as effective. This method of battery installation, in fact, is now widely used on R/C models.

The high tension batteries can be regarded as semi-permanent. They can be bound together as one with radio leads directly soldered on to them. Actuator and low tension batteries are made up as a separate pack, the four together making a convenient size for stowage. Of these four pencils, three are coupled together in series for the actuator. This being of the split-coil, low-drain type, these batteries will have a moderate life. The single pencil low tension battery, on the other hand, will have only a short life. Hence the three actuator batteries should be bound together as one, and the low tension battery then bound in separately to complete the pack. This enables the low tension battery to be replaced easily, as necessary. We replaced it every six flights, actually a long time before it showed any signs of fading.

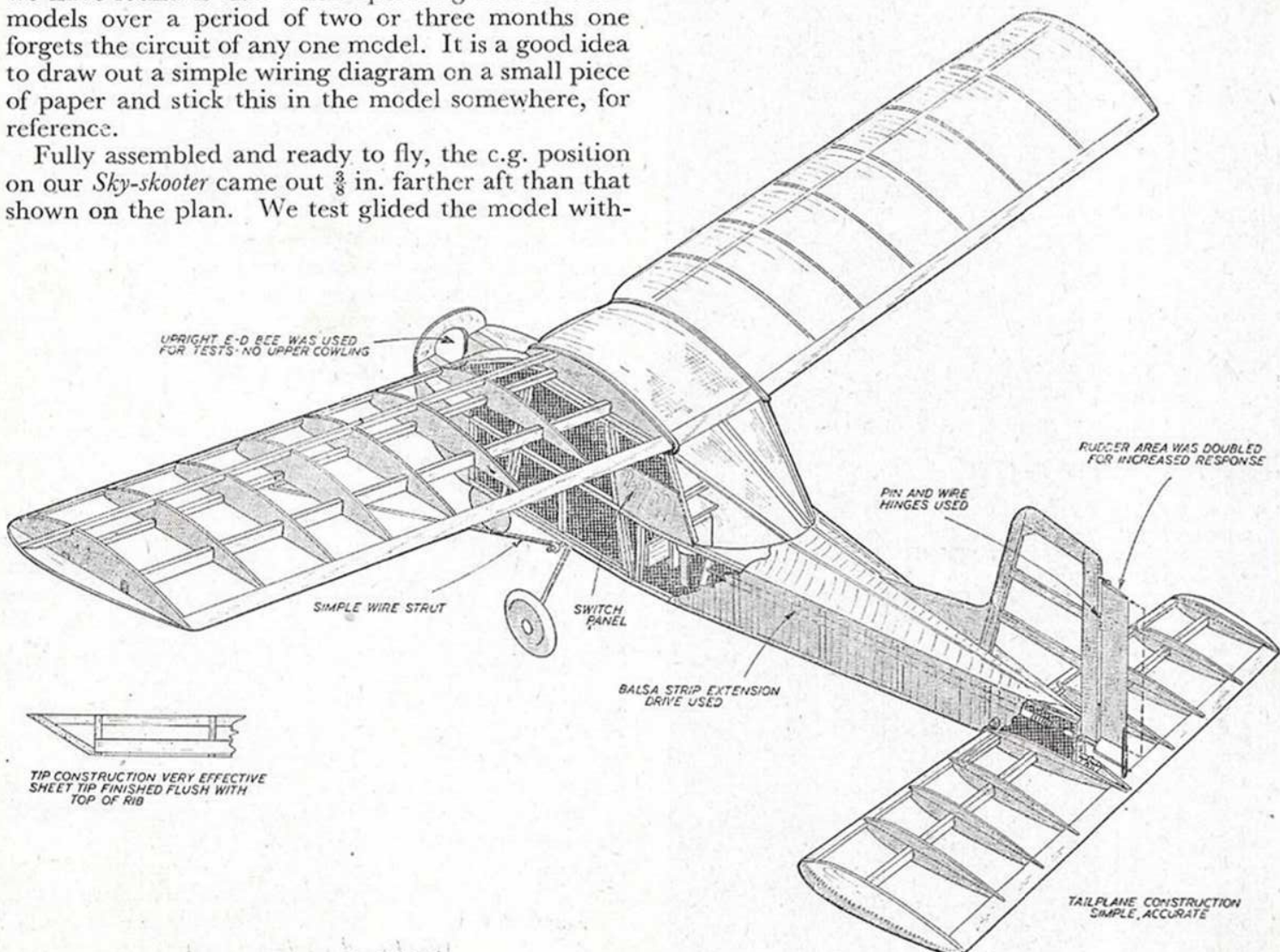
Pigtail leads soldered to these batteries were joined to the main radio leads by twisting together and so disposed that they could not foul each other. Sleeving on one wire which could be slipped over the twist joint would have been better practice. It is also good practice to colour code the battery wires to avoid confusion, and possible damage to the valve due to an accidentally bad connection. Another thing we have found is that when operating several radio models over a period of two or three months one forgets the circuit of any one model. It is a good idea to draw out a simple wiring diagram on a small piece of paper and stick this in the model somewhere, for reference.

Fully assembled and ready to fly, the c.g. position on our *Sky-skooter* came out  $\frac{3}{8}$  in. farther aft than that shown on the plan. We test glided the model with-

out adjustment and trim seemed satisfactory. We could not have shifted any of the components forward in any case without a major modification and so assume that the coloured dope we used on the fuselage resulted in the aft c.g. position. A second *Sky-skooter*, less liberally doped, balanced out at the design c.g. position.

First test flights were made on a Frog plastic propeller, which meant that the "Bee" was not giving its maximum thrust. Here it is timely to inject a word of praise for the E.D. radio receiver. We were using our own standard (Hook Brothers) transmitter and the receiver responded perfectly with the minimum of adjustment. A little trouble was experienced initially with the actuator and we found that the shorting contact was not making proper contact and needed bending outwards. The armature return spring had also to be given more tension to make it release properly, but once set up with these new adjustments the unit has never given any further trouble and is one of the best actuators we have used to date.

On the very first test flight the *Sky-skooter* had a pronounced left turn both under power and on the glide. Right rudder gave a very open right-hand circle and we used this largely to keep the model flying a reasonably straight course. We did not try left rudder as the degree of natural turn was too

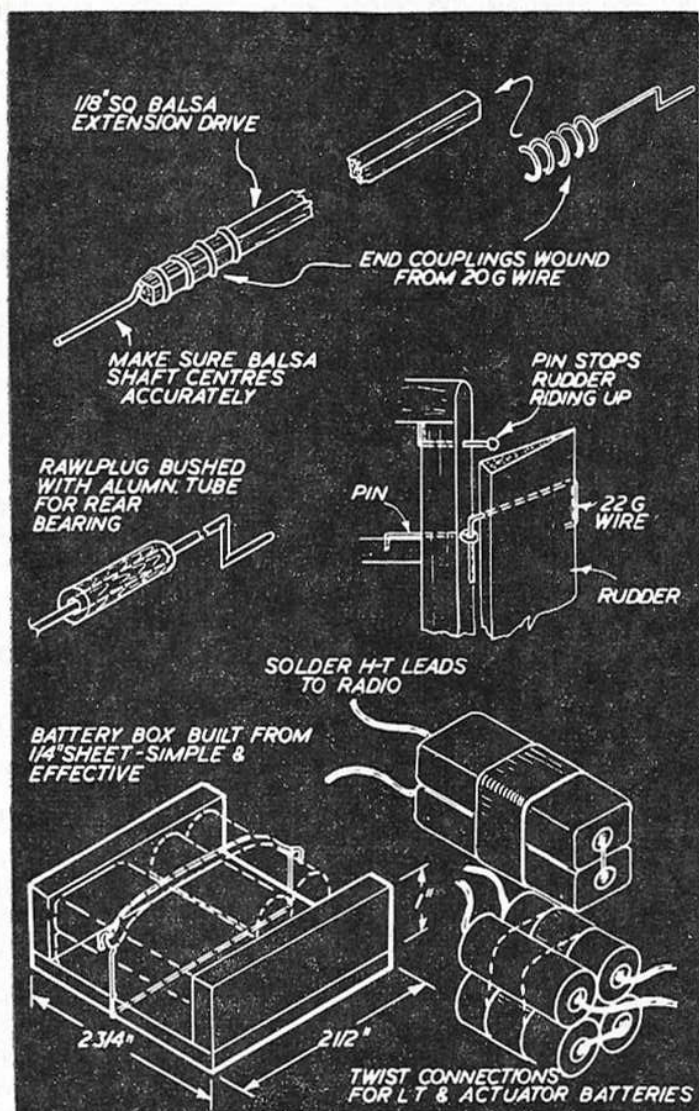


great. Held straight there was a very slight tendency to stall. Glide approach and landing were excellent. The model sat down on its tricycle undercarriage with no bounce and the minimum of shock.

It was thought desirable to increase the rudder power, and so rudder area was doubled by attaching a strip of balsa to the trailing edge, rather than trying to increase rudder movement. A slight warp in the tailplane, thought to be the cause of the left turn, was also removed. However, the left turn still persisted in flight, although the extra rudder power made it much easier to do right-hand circles and figures-of-eight. In these manoeuvres, response and stability of the model were both excellent.

A small amount of extra downthrust was added before the next flights—bringing this up to nearly 3 deg. We found, also, that no side thrust had been incorporated in the original set-up, whereas the design calls for 2 deg. right thrust. Reflying with this new trim reduced the natural left turn, although over a period of flying under different conditions—warm, daytime air and damp evening air—there was a tendency for the tailplane to warp slightly and change the turning trim. The model itself is so stable that this never proved serious, nor did it affect stability.

The method used for the attachment of the tail-



plane is ingenious but it is difficult to attach sufficient bands for adequate rigidity, whilst the cut-out into which the underside of the rear fuselage sits destroys much of the resistance to warpage. Similarly the wing rubbers are also awkwardly placed. We would have preferred them much lower down.

We tended to compare the flight performance of the *Sky-skooter* with that of the *Rudder Bug*, the aerodynamic set-up being very similar. In all respects the *Sky-skooter* was, to our mind, superior—except as regards flying speed. It flies reasonably fast for a small model, but has not got a great deal of penetration in wind drift. This fault, of course, is inherent with most small models. But it can be circled within bounds in any reasonable flying weather.

Turning response to control is quick, positive, and safe. The *Sky-skooter* is a very nice machine to fly out eights and circles or "squares." But to really enjoy it, it is necessary to choose relatively calm air conditions. The wing structure is adequately strong enough without struts and we flew both with and without them, but never attempted spin recoveries without the struts. We did not find it possible to complete, or even get near a loop although this might be possible with more speed resulting from a more powerful motor. A carefully selected propeller for the E.D. "Bee" might also provide enough thrust.

We had one amusing incident flying without wing struts when we had forgotten to fasten the door lock. Turning low down the door flew open and lifted up to lie flat against the underside of the wing for the remainder of the flight. Performance did not seem to be affected at all, although had the door been trapped partially open by the wing struts in position we imagine that the increase in drag would have been considerable.

After about a dozen flights we found the undercarriage in need of attention. Contrary to our expectations the front leg had more than sufficient rigidity. We had shortened it slightly from the plan to approximate the ground angle to landing attitude. Landing shocks had been transmitted to the plywood former, bowing this inwards and breaking the spacer immediately behind it. The whole nose former, in fact, was breaking loose. It was necessary—and would seem highly desirable on all *Sky-skooters*—to sheet in the first bay of the fuselage, especially the bottom panel.

Further flying experience with the *Sky-skooter* left us with the impression that here was, truly, an ideal model for anyone taking up radio control for the first time. It says much for the capabilities of the "Bee" that it could tow around a 4 ft., 1½ lb. model so comfortably, and for the design layout of the model itself that it would climb so well on such moderate power. The thick wing section is undoubtedly an efficient one.

We particularly liked the response to control. Holding on rudder the model turns gently and smoothly, building up relatively slowly into a spiral dive. Recovery once rudder is neutralised is good, although not all that rapid. Which brings to mind

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the fact that not all radio control fliers appear to realise that when a model is reasonably stable on a turn, and does not have an excessive rate of turn, climbing, diving and level turns are readily possible at will, simply by varying the control action.

Holding on full rudder, for example, must inevitably result in the model ending up in a spiral dive, otherwise it cannot have had enough rudder power in the first place. Whether this is vicious or not depends upon the design layout of the model. On the *Sky-skooter* it is not of the vicious type, even with doubled rudder area.

Climbing turns are then made by turning the model more slowly, in steps. Instead of holding on rudder, simply put on enough rudder to start the turn, and then neutralise, flipping the press-button momentarily through opposite rudder. As the wings roll out level again a further rudder control is given for a second or so, releasing as soon as the model begins to turn again, and so on. In this way a wide turn is achieved with the wings rocking from banked to level position all the time. No excessive angle of bank is built up, the wings thus lose very little lift and the model goes on climbing as well as turning.

Similarly for a level turn the same process is adopted, only this time holding on each part of the turn a little more to lose just that amount of lift necessary to stop the model from climbing. With a little practice, clicking the transmitter control button through the opposite rudder position so that the next pressure gives the same rudder again to hold on the turn becomes automatic. Provided the model is stable enough this method of control is fully satisfactory for different degrees of turns and demonstrates, in fact, that an actuator with proportional rudder movement i.e., half and full rudder movement, in sequence) is quite unnecessary.

Personally, we would now like to power our *Sky-skooter* with an Allbon "Javelin," or a motor of similar power and see what extra scope this would give us. Recovery from a banked turn low down on the glide is perhaps not as rapid as could be obtained, but it is difficult to "bounce" the landing from anything but a definitely bad approach. More important still, it flew "as built" with no trimming adjustments or departures from plan other than a slight increase in downthrust, this no doubt made necessary by the slightly aft c.g. position on the test machine.