

**H**I-LO is a really sporty job for that lightweight receiver. The original was designed to see how small and rugged one could make a model without imposing a severe penalty on the wing loading. The model is small enough to be tucked under one's coat and may be flown as a biplane, high-winged or low-winged monoplane. The crafty part of the design is the wing seating which enables this swopping of wings to be accomplished.

The construction is so simple that like the prototype, one evening should see the model ready for that final lick of fuel proof.

If you have a small diesel or glow motor and Otation, Kraft K3VK or similar lightweight receiver you should be in business. The actuator is an Elmic "Conquest". You could also use pulse control on it in a similar manner to "Twophin" (our Christmas R/C plan) or "Pulsecycle" in last month's issue.

### Construction

Ready for action? Blow the dust off the building board and off we go. . .

Trace the fuselage size on to  $\frac{1}{16}$  in. hard sheet balsa taking care to mark the wing seating and tailplane angles correctly. A radial mounted engine was chosen for simplicity, this complete with its own tank was screwed to a piece of  $\frac{1}{8}$  in. plywood backed up with scrap  $\frac{1}{8}$  in. sheet (F1). This is now pinned in place on lines marked on the balsa sides. This is important as it ensures the correct side and down thrust. Add the simple rectangular fuselage formers; the one at the leading edge of the wing (F2) is laminated from two pieces of  $\frac{1}{16}$  in. sheet with grain at right angles to each other. Two others follow mid-chord to protect the receiver should the actuator break loose, and a "skeleton" former added at the trailing edge. Fuselage sides are gently cracked by bending them over the edge of a rule (place the side on the board, place a rule over the balsa and lift the exposed end of the fuselage side) . . . crack! that does it, gently though we need one-piece, not two-piece fuselage sides. A liberal smear of cement over the crack maintains the strength thereof. Little slots are cut in the fuselage sides and the actuator lugs pushed into them. This means that the actuator is actually built in as the fuselage is assembled. It makes a strong installation, saves weight and this type of actuator does not need much servicing.

Cement the extreme tail end of the fuselage sides together and add  $\frac{1}{8}$  and  $\frac{1}{16}$  in. cross grain top and bottom panels. There are separate pieces for behind the motor, windscreen rear window top deck and

# HI LO Bipe

By PETER HOLLAND

A "QUICKIE" FOR AN .02 cu. in. GLO MOTOR AND LIGHT RADIO

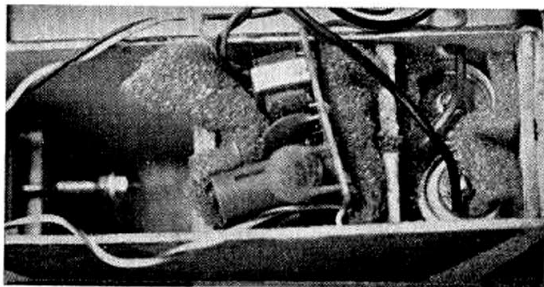
two pieces for the bottom. Put this assembly on one side to dry.

Now let's start on the wings. Both wings use the same type of construction. Cut out the ribs from  $\frac{1}{16}$  in. sheet and the wing panels from soft  $\frac{1}{16}$  in. sheet. Rub the upper surface of the wing panels over with a damp rag and warm the underside over a convenient radiator, hot pipe, old oil stove or what have you. This produces a gentle curve in the wood. Lay the ribs down on the building board over  $\frac{1}{8}$  in. square balsa spars and make quite sure that they are at right angles to it. Now using a slow drying cement coat all the ribs and pin the sheet in place. When set, saw through at the centre section bend up for dihedral and cement a strip of bandage across the joint squeezing cement down between the two root faces. Put on one side while making the tail assembly which is simply cut from quarter grain  $\frac{1}{16}$  in. sheet.

Whole tail assembly is cemented permanently on to the fuselage to ensure that nothing moves out of trim. The undercarriage is now bent from 18 s.w.g. piano wire (main legs) 16 s.w.g. nose leg. The motor is now unscrewed from its mount, and a scrap of  $\frac{1}{16}$  in. sheet carefully cut to fit around the nose leg. The motor is then screwed back in place clamping the assembly together. The idea of the little piece of  $\frac{1}{16}$  in. ply is to ensure that the motor seats correctly and is not pressing entirely on the wire.

Short lengths of  $\frac{1}{8}$  in. dowels or even pins are used to carry the wing bands and a small hatch is cut in the bottom of the fuselage to accept the rubber motor made to be hooked on to the actuator. Torque rod can be fiddled into position through this hole, and locked in place with a scrap of soft copper wire. The rear end is passed out through

It's a tight fit but a Kraft K3VK receiver, Elmic Conquest escapement and twin pencil power supply, will find room in the radio compartment. The prototype model used a Cox Pee Wee motor for power.



a small eyelet or scrap of tin which is cemented and crimped around the tail end of the fuselage. Very thin linen scraps are used for hinging the rudder and the usual loop of 20 s.w.g. wire forms the rudder horn to engage over the bent up end of the torque rod. Fuselage should now be sanded and given a covering of coloured lightweight Modelspan tissue. The tail surfaces are left "plain wood"; sanded, doped, re-sanded, doped and fuel proofed. Keep the number of coats of dope to a minimum. Cabin windows are cut from black Modelspan and doped on. The wings should now be sufficiently dry to cover and unlike a number of all sheet models, the lower surface of the wing is covered with tissue (light for heavyweight Modelspan), depending on the roughness of your flying field, two coats of dope and one of fuel proofer should be sufficient. Now add the centre section to the lower wing. This is built from  $\frac{1}{16}$  and  $\frac{1}{2}$  in. sheet and increases its chord at this point to that of the upper wing. It also gives it less incidence than that on the upper wing. A cabin top is also made from  $\frac{1}{16}$  and  $\frac{1}{2}$  in. sheet. The sheet goes over both top and bottom surfaces. When you use the model as the monoplane it fits in the lower wing seating to fair off the bottom of the fuselage with higher wing layout, and forms a natty cabin top when the upper wing is used below the fuselage. Just keep it in your pocket when flying "Hi-lo" as a biplane. Never use the lower wing *only*; it has insufficient area.

#### Radio Installation

There is nothing to it really; two U7 batteries wired with a jumper from pos. to neg. one end and with a couple of flying leads soldered on the other ends. Make up several sets like this and Sellotape them together making sure that the Sellotape traps the flying leads to prevent them pulling off. The ends of these leads are terminated in scraps of brass tube which are in turn covered with a piece of larger diameter plastic wire sleeving. The receiver is wired as follows. Take its escapement and black wire to the two soldered tags on the escapement. Take a *second* black wire from the tag which has the receiver black wire, to a scrap of piano wire (also sleeved with plastic tubing) and take the receiver red wire to a second scrap of piano wire. Plug this one into the positive battery tube connector and tuck it away in the sponge plastic or foam rubber which is packed round the batteries. Lead the other two wires (both black) out through a hole in the fuselage sides. Drop the receiver into sponge plastic lined "nest" in the fuselage. Put more scrap plastic over the top and you have an installation. Switch on by plugging the black receiver/actuator wire into the black battery lead. Presto! one installation. All should now be working, check with the transmitter for loud clicking noises. One loop of  $\frac{1}{16}$  in. square Jokari elastic, obtainable from sports shops seems to be the best from a selection of single  $\frac{1}{8}$  in. and  $\frac{1}{16}$  in. strands tried on the prototype. The only awkward looking thing about the model is the fact that it trails an aerial two or three times its own length. However by using an RF choke in the aerial lead as per Gadget Page last month you will see that the offending "tail" can be shortened.

The model should have a leisurely climb as a biplane and yet is more sprightly as a high winged monoplane. In calm weather you can put the top wing underneath after removing the lower wing and

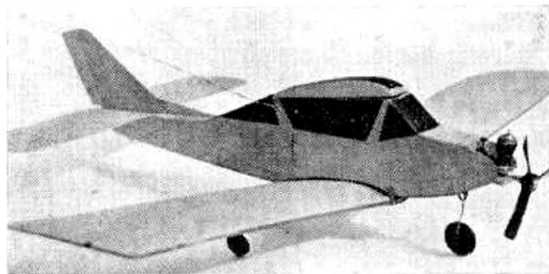
#### Hi ?



with less heavy keying, fly her as a natty little low winger. The deep section fuselage adds to the stability in turns but do not hang on the button too long. She will turn on a sixpence and may finish up with an Immelman after one turn of spin. Careful propeller selection is necessary with the smaller engines in order to make the best of the motor/weight combination.

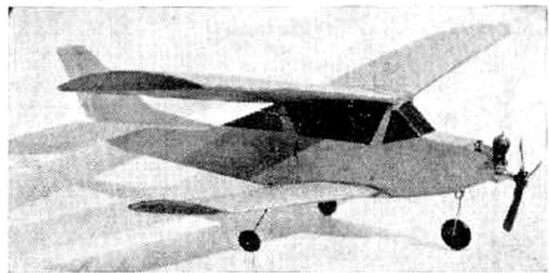
Final word of warning: Do not put an elaborate and heavy colour scheme on the model, the lighter you keep it the better the flying performance. She

#### Lo ?



is small enough to bounce quite happily if kept light. The worst that has happened to the original after a season of use is the occasional rip in the lower wing tissue due to landing on stoney ground and the need to replace the front former after spiral diving on to hard surfaces. The engine seems to take most of the landing shocks in this event, but without much weight behind it, has so far survived such unorthodox landing approach procedure. With two wings she floats into quite a nice touch down as the flying speed is considerably less.

#### Or Bipe ?



the choice is yours!