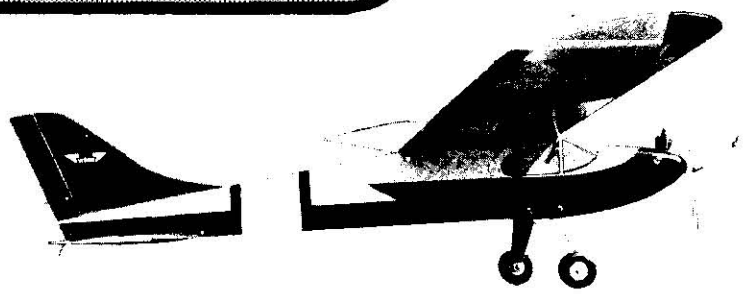
# VERON 'ROBOT'



## INTERNATIONAL **RADIO TRAINER**

The " ROBOT " has been designed as an easy-to-build, inherently stable, robust and dependable trainer for single channel radio control.

An ideal and compact size of 45", its design gives maximum wind penetration when powered with 1·49 to 2·49 c.c. (·09 to ·15 cu. ins.) diesel and glow-plug motors, yet amply big enough in wing area — 400 square inches — to carry up to practically all the present single channel circuits for rudder, elevator and engine speed control and up to 3·5 c.c. with " light " multi .

For those radio units not supplied with actuators, we suggest the F. Rising " Compound," Elmic " Conquest " or " Commander," Bonner " Varicomp " (Type R.E.), Babcock " Compound " or " Hyper-Compound " — all rubber driven.

With single channel radio receivers, 2 position engine speed control (with suitable 2 speed carburettor or exhaust choke) can be operated by a " quick-blip " of the signal key. An F. Rising 2 Panel clockwork actuator supplies the action or a compact rubber-driven escapement such as F. Rising " Lightweight," Elmic " Conquest " or " Corporal," etc.

The R.E.P. " Twin-Triple " is a two channel unit amply light enough for the " ROBOT " ; installation details are given. As both direction and height control are gained by coupling rudder and elevator to the " Commander " and " Corporal " escapements supplied, engine speed is not really required. Similarly this applies to such units as Babcock " Hyper-compound."

**In a word, rudder only with a 1·49 c.c. engine is ideal for the beginner. If fitting radio with more ancilliary services, elevator and/or engine speed control, etc., then fit a 2·46 c.c. engine.**

Wiring circuits of all commercial units are given with the individual instruction leaflets. The only parts provided for radio installation are balsa torque rods, wire, tubing and rudder control horn only.

A Multi-channel unit recommended for this model would be maximum four channels (but possibly six with " relayless " receivers), dependant upon power used and experience. The design permits rudder, elevator and engine speed control

" Up " elevator control is given with the " Varicomp," Babcock " Compound," etc., by selecting the third position by use of a trip-elevator action — full details on individual instruction sheets.

Simple tools are needed. Use " Britfix " Balsa Wood Cement or " Britfix 55 " White P.V.A. Adhesive. " Britfix " Clear Shrinking Dopes and Thinners, or for glow-plug motor powered models, " Britfix " Butyrate clear and coloured dopes. Use a VERON Balsa Knife, modelling pliers, ¼" and ¼" drills with wheel-brace, greaseproof paper to protect the plan, tissue paste and garnet paper, medium and fine.

We recommend Veron No. 9 (1 oz.) or No. 10 (2 oz.) Polythene " Clunk " tanks or Davies-Charlton 10, 15 or 30 c.c. metal tanks dependant upon engine and duration required. Details are given on the plan for the making and fitting of a Polythene " Clunk " tank 1, 2 or 3 oz.

The simple sequence of assembly is pictorially laid out in a diagrammatic sequence which, if followed carefully with the corresponding paragraphs in these instructions, will greatly facilitate building.

### 1. BASIC FRAMES

Laminate $\frac{1}{16}$" x 3" x 4½" (4·5 x 76 x 114 m.m.) balsa former A to the $\frac{1}{16}$" ply x 3½" x 4½" (1·5 x 83 x 114 m.m.). Trim top edge of balsa only to angle shown on plan using dihedral gusset as template. Add side strips of $\frac{1}{16}$" x $\frac{1}{16}$" (1·5 x 4·5 m.m.).

Make up basic frame B of $\frac{1}{16}$" x $\frac{3}{16}$" (4·5 x 19 m.m.) over plan with spacers of $\frac{1}{16}$" x $\frac{1}{16}$" (4·5 x 4·5 m.m.) indicated.

### 2. SHEET SIDES

Lay $\frac{1}{16}$" (2·5 m.m.) sheet sides over plan trimming exactly to shape if necessary. By use of extended lines on plan, pencil in location of crosspieces. Mark and draw line parallel to base 3$\frac{5}{16}$" above it (as shown on plan and in Diagram 2) to aid location of lower edge of upper die-cut ply longeron. This sets the wing incidence.

Laminate (double coating with cement) the die cut ply longerons to upper and lower edges. Pin in place until dry. See Diagram 2.

### 3. LONGERONS AND UPRIGHTS

Add $\frac{1}{16}$" x $\frac{1}{16}$" (4·5 x 4·5 m.m.) longerons to upper and lower rear edges of $\frac{1}{16}$" (2·5 m.m.) sheet, also verticals marked. Add longerons to lower front edges only, $\frac{1}{16}$" (4·5 m.m.) short at front with gaps as indicated on Plan and Diagram 3 to fit frames A and B. Drill or cut out $\frac{1}{16}$" dowel holes through balsa sides. Partially incise or score fuselage side at frame B ON INNER FACES ONLY.

### 4. JOINING SIDES

Temporarily locate basic frames to check fit. If satisfied, join two sides with basic frames in place, double coating all jointing edges with cement and temporarily pinning to secure.

Before allowing incised side to set, chamfer longerons at rear, draw sides together and secure with clip or clothes peg whilst setting. Check at all times for alignment.

Add $\frac{1}{16}$" x $\frac{1}{16}$" (4·5 x 4·5 m.m.) crosspieces indicated. Also scrap fillets at top front — see Diagram 4.

### 5. FUSELAGE SIDES

Add $\frac{1}{16}$" (1·5 m.m.) ply base to radio compartment, also $\frac{1}{16}$" x 4" (1·5 x 101 m.m.) balsa sheeting cross-grained to top and bottom of rear fuselage. Add $\frac{1}{16}$" (8 m.m.) dowels for wing and undercarriage. Locate as tight fit only to permit replacement. Also ¼" (3 m.m.) dowels for tail.

Trim ¼" x 2" x 3" (6·5 x 51 x 76 m.m.) to tight fit across fuselage aft of frame A to make battery compartment. Cement firmly in place.

### 6. ENGINE MOUNT

Double coat with cement surfaces of hardwood beams and spacer where jointing will be made. Join beams and spacer on level surface — allow to completely set.

Join two nose blocks to bearers, slotting in position, squaring two blocks with ¾" x 2" x 2" (9·5 x 51 x 51 m.m.) spacer underneath. See Plan and Diagram 6.

Sand rear edge of assembly level on a flat surface, checking against ply face of frame A for fit. Double coat with cement and join nose assembly to frame A, temporarily pinning whilst setting. When set, sand whole structure smooth with all lower and rear edges round.

### 7. WINGS

Build two wing panels separately over plan. Locate trailing edge with rear edge on packing. **This gives the trailing edge a " reflex," the factor which gives the model its lateral stability and that it will always tend to level off in a stall. It is essential.** Set lower spar on $\frac{1}{16}$" (1·5 m.m.) packing strips. Slot ribs in place. Add leading edge, then top spar. Finally diagonal ribs. Allow to set before raising from board

### 8. CENTRE SECTION

Trim butting faces of leading edges, spars and trailing edges so that when one panel is flat to board, other can be raised with outer rib supported on 5" (127 m.m.) block (2½" (63 m.m.) dihedral each side).

Join two halves with die cut ply gussets. Trim two centre ribs, laminate and locate. Add scrap corner gussets — see Diagram 8.

### 9. CENTRE SECTION SHEETING AND TIPS

Add leading edge sheeting, $\frac{1}{16}$" x 2" wide (1·5 x 51 m.m.), butt jointing at centre. Also sheet in two centre section bays (top only) level with ribs. Cement triangular tip blocks in place. Allow to set before trimming upper surface to camber which will automatically create a streamline tip. Sand whole structure smooth.

### 10. TAILPLANE

Pin trailing edge over plan, rear edge supported on $\frac{1}{16}$" (1·5 m.m.) packing strips. Scarf joint two lengths of $\frac{3}{16}$" x ¼" (4·5 x 19 m.m.) and pin in place for leading edge. Insert tip pieces. Firm, clean jointing is essential.

Inset ribs of $\frac{3}{16}$" x $\frac{3}{16}$" (4·5 x 4·5 m.m.) and centre ribs of $\frac{1}{16}$" x $\frac{3}{16}$" (4·5 x 19 m.m.). Finally corner gussets. Add top spar of $\frac{1}{16}$" x ¼" (3 x 6 m.m.).

### 11. TAILPLANE CAMBER

Add rib strips of ⅛" x ⅛" (3 x 3 m.m.). Allow to set before raising structure from board and adding lower spar and rib strips.

With garnet paper wrapped around a hardwood block, sand ribs to camber, rounding leading edge and tips — see section on Plan.

### 12. FIN AND TAIL ASSEMBLY

Cement fin and fin fairing together. Chamfer fairing to streamline. Cover with tissue BEFORE cementing to fuselage between $\frac{3}{16}$" x $\frac{3}{16}$" (4·5 x 4·5 m.m.) runners. Stitch rudder in place, see panel 5 on instructional diagrams. Check fin for vertical and alignment.

Check fit of tailplane under stern bay. Bend 16 s.w.g. wire to form of skid, bind to shaped ⅛" ply, sewing through drilled holes. Inset skid into longerons not to interfere with tailplane seating. Sew ply elevators to rear of tailplane, coupling with sewn 20 s.w.g. link.

### 13. COVERING AND FINISHING

Cover all flying surfaces with " Modelspan " or Nylon as desired. Fin is covered before cementing to fuselage. All wooden surfaces (fuselage, etc.) are best covered with tissue or nylon adhered with dope and banana oil mixed and sufficient coats applied — sanding between coats — to impart a gloss to the surface. Thoroughly proof the engine bay. If using a diesel, a mixture of dope and banana oil with a top coat of " Aero-glas " fuel proofer. If using " glow " motors, apply " Butyrate " dopes all over (no banana oil) and only " Butyrate " coloured dopes.

Colour schemes are optional and general details are given on the Plan and can be seen from the box lid illustration.

Lateral trim tabs on the wing trailing edge are thoroughly recommended — see Plan. Metal strip for hinges is provided.

### 14. ENGINE MOUNTING AND TANKS

Engines are bolted directly on top of the beams with 2° right sidethrust, downthrust as imparted by the sloping beams or with extra packing washers under rear lug if found necessary. Secure bolt heads with wire soldered across slots in heads — see Diagram 12.

Novices to radio are advised not to fit too large a tank. A simple " Clunk " tank can be made from a 1, 2 or 3-oz. Polythene bottle (Veron No. 9 (1-oz.) or No. 10 (2-oz.) " Clunk " tanks). Details on plan. See Diagram 11 for mounting details — or alternatively fit a metal tank, Davies-Charlton 10, 15 or 30 c.c., etc.

### 15. WHEELS AND UNDERCARRIAGE

Wheels are retained by 4 B.A. bolts supplied with 2 nuts securing to dural undercart. Unit is secured to fuselage with two heavy rubber bands each side, tight enough to absorb landing impact WITHOUT folding backwards. File all rough edges on dural and smooth with emery cloth.

### 16. RADIO INSTALLATION AND OPERATION

Many combinations of transmitter, receiver and actuator are possible as well as those recommended in the introduction.

For beginners, we recommend that rudder operation only be used with limited fuel run to prevent altitude flyaways. Such units which are supplied with an integral rotary action actuator which can be coupled to rudder via a link rod — see Panels 7 and 8.

Rubber-driven actuators are bolted to ply bulkheads which are located in slots formed by two hard $\frac{3}{16}$" x $\frac{3}{16}$" balsa strips (4·5 x 4·5 m.m.) each side of radio bay. The actuator height can be governed by spacers. See Panels 1 and 3.

Receivers are best packed in Foam Plastic or " Dunlopillo " cut from block or laminated from sheet with " CONTACT " adhesive. Foam Plastic is resilient enough to prevent damage during impact, but not resilient enough to cut out vibration if the unit is TOO TIGHTLY PACKED. The unit should be FREE ENOUGH TO SLIP OUT IF THE MODEL IS INVERTED, BUT CLOSE ENOUGH TO PREVENT FORE AND AFT MOVEMENT IF COUPLED TO PUSH-PULL LINKAGE. A " lid " of Foam Plastic can be interposed between receivers and wing when located.

**There is a good reason for setting receivers upright —**

this is to place the relay contacts in a position where they will not vibrate in sympathy with the vertical vibration of the motor

Battery packs are best placed against the forward bulkhead to prevent damage to radio during impact. Locate in foam plastic or rubber boxes — see Panel 2.

**In certain cases, particularly where double controls lead to the rear (rudder and elevator) and double rubber motors, such as with " Twin-Triple," batteries are best located under the engine beams forward of frame A. Check balance by locating all accessories before finally installing.**

Some receivers have switches wired complete so as to facilitate changing radio from one model to another. Panel 4 shows how switches are located on dowel pegs and retained by foam rubber radio box. Place switch on port side, or starboard if you are left-handed.

Rudder and elevators are stitched in place with interlaced stitch as in Panel 5.

Use Terylene thread and a fine needle. Pre-drill holes through ply elevators with 20 s.w.g. wire drill.

Where using actuators with torque-rod operation on elevators, R.E.P. " Twin-Triple," Bonner " Varicomp," Babcock " Hyper-compound," etc., it will be best to fit ply elevators made from 1⅛" wide ply (not supplied) with a ⅛" portion forward of the hinge line to form an aerodynamic balance. See Panel 6.

Only rudder control horn (duraluminin) is provided ready made in the kit. Other forms of transmission are made from wire as detailed in Panels 7, 8 and 9, also on Plan.

Rubber motors for actuators can be taken rearwards and access to winding loops made through removable ply and balsa panels in the fuselage side — see Plan for details. If fitting rudder only at rear, an alternative rubber winder can be provided as in Panel 15.

Engine cut-out or two-speed control can be obtained through a " F. Rising " Clockwork 2 Pawl Actuator fitted under the engine beams and connected by wire linkage to a 2-speed throttle control (available only for E.D. 2·46 " Racer," A.M. 15 and imported engines).

Simple rubber-driven escapements can be fitted for motor control ONLY if there is room for rubber drive in the radio compartment.

" Dese " cells may be permanently built in under nose bay, with access plugs for re-charging where possible, to use them with low voltage transistorized receivers, etc. Solder " snap " fasteners to battery leads for ease of replacements ; use multi-flex, not single strand, for all radio wiring.

Alternative identification numbers of standard receiver and transmitter batteries are given in Panel 17.

### 17. FLYING

Correct balance is essential. The model, with all radio gear and batteries, should hang slightly nose down (gliding attitude) when supported under the C.G. balance point marked on the Plan. i.e., ½" (12·5 m.m.) behind the spar.

Add ballast to tail or nose if required. Glide test thoroughly in quiet conditions, using minimum of tailplane packing for incidence corrections, above leading edge if model tends to dive above trailing edge if model tends to stall.

It is recommended that model be glide-tested and initially given short test hops on low power with radio receiver replaced by equivalent ballast IF YOU HAVE NOT HAD EXPERIENCE PREVIOUSLY WITH POWERED MODEL AIRCRAFT. Lock rudder and other controls, use limited fuel for short run. Use tabs for trimming. Adjust engine thrust line for counter torque and down thrust.

All makers' radio instructions give details for range testing and tuning. IT IS THOROUGHLY RECOMMENDED THAT COMPLETE RANGE TESTING BE CARRIED OUT (MINIMUM 250 YARDS) FOR ALL CONTROLS WITH THE MODEL HELD HIGH BY A HELPER WITH THE ENGINE RUNNING AT PEAK REVS. Arrange a code of hand signals between helper and self to ascertain correct response to signals.

The ROBOT has few vices. The semi-reflex trailing edge on the N.A.C.A. 2412 section makes for minimum centre of pressure travel — increasing longitudinal stability, no tendency to " mush " on the glide or stall under power, nor to " balloon " when turning into wind. The incidence and thrust set up should be for near level flight down wind. A lot will depend upon power used and loading as to how responsive the model is.

" Penetration " is essential and that is what the design provides — ability to fly fast into wind to prevent any tendency to fly out of range down wind. Its inherent stability will permit self-rectification from awkward attitudes if everything is " neutralised."

BEFORE ANY FLYING UNDER RADIO IS ATTEMPTED, ENSURE YOU ARE COMPLETELY FAMILIAR WITH THE SIGNAL SYSTEM REQUIRED FOR THE OPERATION OF YOUR PARTICULAR ACTUATOR. PRACTICE INDOORS WITH LIVE RADIO AND WATCH THE RESPONSE ON YOUR MODEL'S CONTROLS.

Use your discretion and pick only calm conditions for first flights.

Check engine and fuel. Range check Radio. Ensure batteries are fresh. Check rubber bands on wing and tail — in fact, check everything, including the fact that nobody near is also " checking " his radio or that you are interfering with him !

Launch model straight into wind (checking that all radio was switched " ON ". Let the model fly ahead and gain altitude BEFORE sending any signals. Only use radio to make corrections at low altitude if it is essential for the safety of the model.

Keep the model well up wind until you are completely familiar with its responsiveness. If too high, continued turn to port (with torque) will spiral the model down.

From then on, experience will be your best guide.

DO NOT FORGET that to operate radio you require a licence. £1 for five years.

Apply to :— Radio Branch, Radio and Accommodations Department, G.P.O. Headquarters, London, E.C.1 for a " Model Control Licence "

AND HAPPY LANDINGS !