LUMPERS

48 inch wingspan for 1·5—2·5 cc engines to take all types of single channel radio control equipment. Designed and proven through hundreds of flights

by G. L. HARBER

THIS 48 IN. toughie for single channel is the result of 3 years of development with the aim of producing the ultimate in simplicity and reliability. The original of this final design has, in 7 months, made over 230 flights with each flight averaging some 7 minutes, that is a total of some 26 hours airborne.

Visits to typical rough Common land pointed to the need for a really reliable R/C job which could be carried in a balsa box strapped to the back of an enthusiastic lad on a bicycle:—Hence the detail of the two piece wing shown together with the detachable fin. With this 2 piece wing the "give" in the rods connecting the two halves allows an increase in dihedral, but this, and the small extra weight have little adverse effect on performance.

Until the advent of *Terrytone* a *Kraft* was installed, both sets proving very reliable. The *Tommytone/Terrytone* pair give a range that is all that can be desired—still working perfectly with the plane a mere speck in the sky. The *Bonner Varicomp* is driven by 3/16 in. rubber which certainly gives a greater range of turns than the recommended $\frac{1}{4}$ in. rubber. 400 turns are normally applied to the rubber, which gives a safe number of 300 movements.

The conditions under which "Lumpers" is sometimes flown include over elephant grass country in Uganda where the blades are more like bamboo sticks and the leading edge to the wing needs some extra re-inforcement. The nylon "whaleboning" stocked by haberdashery shops as stiffening for corsets proves ideal for the purpose.

Commence construction by carefully cutting the formers from $\frac{1}{8}$ in. plywood. Cut out piece N 1 from $\frac{3}{8}$ in. sheet balsa and engine bearers to length. Place the cabin side of F 2 on greaseproof paper on a flat surface and apply P.V.A. glue to this, N1 and the bearers where necessary, to join and place together. Drop in F 1 for use as a spacer, but do not glue at this stage. Make sure that the bearers are square to F 2 between them and leave the dry whilst pieces N 2, 3, 4 and 5 are cut to shape.

Next, the pieces N 2 are glued to the insides of N 1 and F 2, and F 1 is glued into position, and again sufficient time is allowed for the P.V.A. glue to set whilst other tasks such as cutting fuselage sides and wing ribs proceed. The rugged nose assembly is then completed by screwing in the 8 B.A. screw through F 2 and bending this as shown and then glueing into position N 3, 4 and 5 followed by pieces of hardwood "chin". Triangular pieces of $\frac{3}{8}$ in sheet are glued into position forward of F 1 and underneath the bearers.

The fuselage sides having been cut, the top and bottom parts are cemented together, placed over the plan and the positions of the formers and actuator carefully drawn on to them. Then all the reinforcement doublers are cemented into position, checking that the space left for the actuator on its panel is of the correct width to stop it moving about. Continue cementing pieces to the sides until the sides appear as sketched.

With Bulldog clips, fasten the two side pieces with the outsides together, and ensure that the two sides are identical in every way, then drill all dowel holes. Now glue the sides to the nose and before pinning into position pull the tail end together to ensure that the sides really are parallel. F 3 can also be fitted at this stage. Next the tail end is chamfered and joined. F 4 can be glued into position together with the 3/16 in. square spacers.

Place the actuator into position and temporarily pin on the $\frac{1}{4}$ in. sheet underneath keeping the sides straight between formers 2 and 3. Add ply to reinforce the dowel anchorage where shown, also fix the tail skid.

Glue short pieces of $\frac{1}{4}$ in. square balsa to each end of the four pin socket using P.V.A. or *Evostick*. Connect the two and four pin sockets together with a short piece of red wire soldered on, doubled back and tied to the tags; put the 2 pin plug in its socket and using this unit as a guide for position cut a hole through the fuselage side just large enough for the plug to pass through. Solder suitable lengths of wire to the folded down tags of the sockets, double them back and tie firmly to prevent the soldered joint being moved.

Glue sockets into position. Solder the two wires black and green, to the actuator.

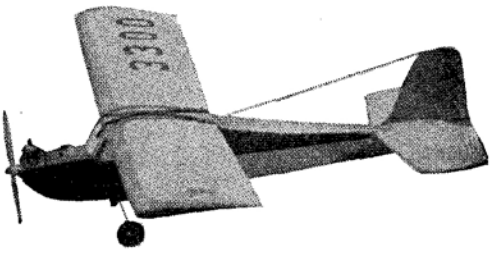
Glue the wiresa long the route to be followed with blobs of P.V.A. glue.

Prepare the winder hatch cover from a small piece of hardwood (bearer) and ply and cut a suitable hole in the fuselage side to accommodate it.

Cement the top of the fuselage, cut from 1/16 in. sheet. Glue on the ply undercarriage platform and the balsa pieces forward of this leaving them rough at this stage. Drill a 3/32 hole through the tail end to take the rudder actuating rod and prepare the complete torque rod as shown in detail on the plan. Place this rod into position, slip a short length of "whalebone", with a 1/16 in. hole which forms the bearing, on to the rear wire and glue to the tail end. 1/16 in. ply may be used for the bearing instead of the nylon whalebone if preferred. Bend the rudder actuating rod as shown.

Add all the balsa forming the underside of the fuselage with the exception of the $\frac{1}{4}$ in. piece which is left pinned in position; the Bonner Varicomp actuator cam follower must be well soldered to the actuating rod before this last piece of the fuselage floor is glued in.

Tie a reef knot in the ends of a 36 in. piece of 3/16 in. rubber and pull tight. Place into position in fuselage and put about 200 turns on to take up the slack. Clip the battery wires to a $4\frac{1}{2}$ volt battery, plug in receiver and shorting plug switch and check that the whole assembly is working smoothly with no friction anywhere when a signal is received. There is little in this layout to cause trouble except for the cam follower which must be absolutely square in its groove to prevent binding. The *Elmic Commander* escapement would act equally as well.



Simple; but very practical LUMPERS is the perfect subject for lone-hand modellers—hence our specially detailed plan description article.

When all is checked, remove the battery and switch (plug), remove the cam follower from the groove in the cam to enable the torque rod to rotate freely—this is to prevent undue strain—and remove the rubber drive. Cover the actuator with a piece of rag and start sanding to shape. Aft of the wing the fuselage may be sanded at the corners until the square stringers appear, when quite a slim looking fuselage results.

Drill the undercarriage retaining dowel holes and holes for the wing retaining dowels. Remove the dowels. Cement two pieces of $\frac{1}{8}$ in. sheet together and fabricate the "windshield". The wing retaining bands will hold this in place and the windshield in turn will hold the fuel bottle firmly in position when the time comes for operations. Dust the fuselage well and give a liberal coat of sanding sealer on the outside surfaces.

The main plane construction is in deBolt style. Cover the plan with greaseproof paper and lay the wing portion over a dead flat surface into which pins may be pushed *ad lib*—i.e. *not* a piece of furniture!

Pin down the bottom trailing edge sheet. Cement a 3/16 in. square spar on the edge of a 2 in. strip of 1/16 in. sheet and pin this into position, placing scraps of 1/16 in. sheet under the forward edge of the sheet. Cement on the 6, 1/16 in. wing ribs to leading and trailing edge.

Cement in the top spar. File very shallow slots into the $\frac{1}{8}$ in. by $\frac{1}{4}$ in. leading edge and cement on to the ribs and lower sheet. Cement the top trailing edge strip into position. Cement into position the 3/16 in. centre rib at the angle shown and then the top leading edge sheeting followed by the four cap strips. The centre section sheet can then be cemented on and the whole should then be left as long as possible to thoroughly dry the cement. Lift from the board and cut the overlaps of spars and sheeting so that they all finish at the centre of the 3/16 in. rib. Cement into position the 1/16 in. filling between the spars and the trailing edge in the inner bays. Fasten on the end plates to the spars and the end rib; sand to required shape and cover with sheet between rib and end plate. Finish the underside centre-section sheeting.

For the port wing half the centre rib (on the starboard section) is pinned at the roof position of chain dot drg. and the starboard tip rib is packed up 3 in. above the board. Repeat the procedure adopted on the first section, ensuring that the ribs and sheeting meet at the centre of the 3/16 in. centre rib, thus forming the wing.

If it is desired to build the two piece wing to facilitate transportation, continue as before until the top trailing edge strip is cemented into position. The 3/32 in. centre rib is cemented and the panel allowed to dry thoroughly before it is lifted from the board. The starboard tip rib is packed up $2\frac{1}{2}$ in. above the board. The port wing centre rib is pinned to that of the starboard wing and building proceeds as for the latter.

The two tubes must now be fastened very firmly into position and if the smaller tube is at all flexible it must be stiffened with a piece of hard balsa glued alongside. The space between the larger tube and the web between the spars is also filled with scrapwood and glue.

Patches of plywood are fastened to the ribs to close the tubes and prevent the rods going too far in. Glue all around the spars once again before adding the top

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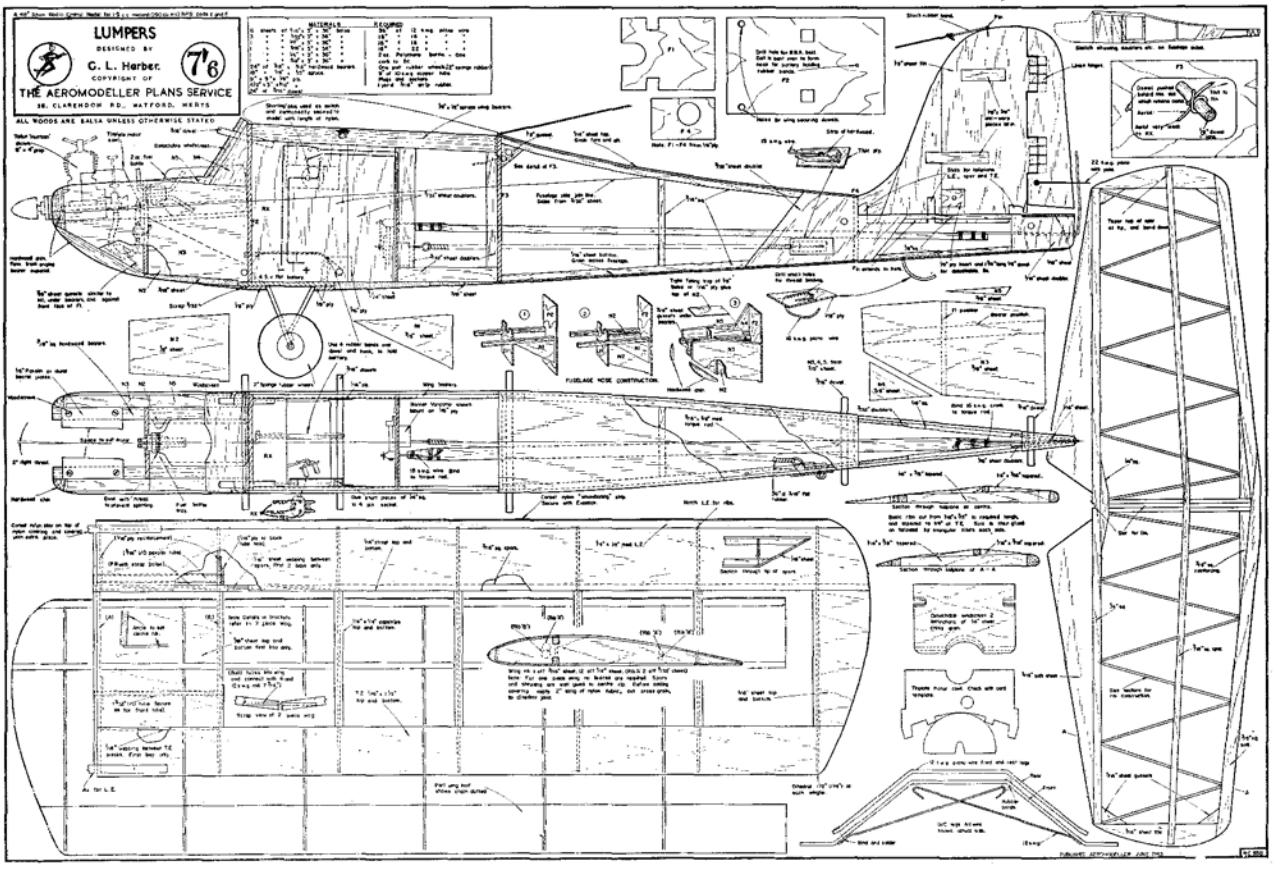

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leading edge strips and sheeting to the centre sections. Allow to dry thoroughly and then sever the tubes between the two centre ribs with a razor saw. Complete the sheeting on the starboard wing panel.

If the nylon strip is to be fixed to the leading edge this should now be done, otherwise a 3/32 in. by ¼ in. hard strip of balsa should be cemented on instead.

Sand the leading edge to shape checking frequently that the leading edge shape is being maintained. Sand wing all over, dust off, and apply a liberal coat of sealer to all parts the covering will touch.

Soft balsa should be used throughout the tailplane construction, which is a built up rib type. Cover the plan with greaseproof paper and pin down the ⅜ in. square leading edge and ¼ in. square trailing edge. Add the ¼ in. square reinforcement at the trailing edge centre where shown, followed by the two centre ribs which are tapered from ⅜ in. to ¼ in. in a straight line. Next add the ⅜ in. square reinforcement at the centre of the leading edge. Now cement in all the diagonal ribs, all of which are tapered from ⅜ in. to ¼ in. Cut the tips from 3/16 in. sheet and cement into position and then cement the spar to all ribs. Cut the dummy elevators and carry out as much shaping as is possible before cementing in place.

Next is the rather tedious business of cutting the 36 small triangular fillets from a strip of 3/16 in. by 1/16 in. balsa (⅛ in. at centre ribs).

Construction of the fin is very straightforward. The ⅛ in. ply insert is only used if the detachable fin is to be made. for its use is to anchor a piece of ⅛ in. dowel or bamboo over which the tailplane retaining rubber bands pass to hold the fin in place.

The fin and rudder are best covered with tissue but the whole of the remainder of the plane should be covered with nylon. Those "Lumpers" already flying, at 4,000 ft. above sea level, are all finished with two additional coats of dope and followed by Humbrol Plastic Enamel which is fuel proof. The total weight ranges between 2 lb. 6 ozs. for a model with a wing of lighter construction to 2 lb. 12 ozs. for one with the two piece wing. A tin plate cowl is well worth using as it keeps the plane remarkably clean. In the Uganda climate one can pack an English year of flying into a month. Here is a 'plane for many years use if you can resist the temptation to move on to multi!