



T-56 rubber job made from these plans

3 Vagabonds

By JERRY REISS

WHILE many clever "compromise" airplanes have been worked out both in full scale and in miniature, designers of both know that such ships seldom match the single purpose machine in its specialty. In our field particularly, the development of such power plants as CO₂ engines and baby gas engines, has led to all manner of combination deals with two or even three of these basic methods of propulsion.

It is not possible usually to prepare an original design expressly for each type of power plant without having wide variations, particularly in size, that result in as many entirely different layouts as there are power plants. Yet the Piper Vagabond is one airplane that is suited to designing for various power plants without radical departures for each power plant. It has large wing area and general proportions that make for a good sport U-control. By taking liberties with the tail area it can be made into a stunt scale model. With a light wing and some dihedral it performs very well as a rubber-powered flying scale airplane.

This version should fly free-flight, too, with the Infant. The small rubber- or Infant-powered Vagabond was scaled up 50% for U-control with engines of .199 to .29 displacement. Our local hobby shop says these are popular engines so why not give their owners a break? We'd just love to say engines of from .09 to .45, and so on, but frankly our Ohlsson 23 with hot fuel makes all the rumpus our fragile nerves can stand! You may be a real hot-rock flyer who can cope with a faster job. One important feature of this three-in-one deal is the duplication of construction to the greatest practical degree in all ships. The fuselage is identical in both little models; the materials are heavier in the bigger ship, with a few points beefed up to stand the greater abuse. The big ship varies from its little K&B brother in that a semi-stunt airfoil is employed, and its tail area has been increased for quick, positive control. Excepting a slight increase in landing gear length, the Infant job is exact scale. If you increase its tail area 50%, using a non-stunt airfoil, the big ship will be exact scale, too. The rubber job uses a light built-up wing with added dihedral and oversize tail area for stability. At any rate, they are three entirely different yet closely related Vagabonds, which will compete strongly against specialized airplanes. Also, since completion of the plans, the Baby Spitfire at .045 and the Herkimer Cub .049 have become available; presumably these power plants would turn the Infant sport job into a hot performer. Use of a stunt



O&R 23 U-control plans on next page

airfoil and larger nippers should make stunting easy and practical.

As for construction, let's first consider the fuselage. The two small models employ 1/32" sheet sides, and 1/16" sheet bulkheads; the big job uses 1/8" sheet sides and bulkheads, with the two bulkheads beneath the wing being laminated from double thicknesses to give rigidity and resistance to crack-ups. Note that the scale fuselage tapers slightly from the window-line up to the top of the cabin, and down to the bottom of the cabin. For the big airplane it is necessary, therefore, to use two separate pieces of sheet for each side, one above the window line, and the other below. One sheet is used on both small ships, the taper being achieved by creasing the thin wood

Here is Infant-powered c.l. Vagabond



Three Vagabonds

along the window line. In making the O&R job, assemble the bottom side sheet to the bulkheads, then the upper side pieces, and finally add the top and bottom sections. Since there is a rascally bend on all models between formers 1 and 3, follow this procedure. Assemble the fuselage from bulkhead 3 back to the tail. This portion of the fuselage has a straight taper to the rudder post. When dry wrap a rubber band around the front to pull the sides into position, then glue in bulkhead 1, followed by 2. Bulkhead plans are provided for all airplanes. Note that the rubber job is quite light in this respect while the bulkheads for the big control-liner are simply holed for the push rod. Another point is that the little twins have a sheet balsa cabin roof cemented to the tops of bulkheads 2, 3, and 4; the big ship is left open at the top.

The 23 is mounted on 1/4" x 1/2" hardwood bearers which enter the fuselage back to bulkhead 2. The bearers also glue into notches cut in the rather solid lower cowl block. For the Ohlsson job, the large Veco bellcrank is mounted on a balsa block (faced on top with plywood), which glues to former 2, one motor bearer, and to a special 3/16"-square cross-piece that extends across the cabin. The Infant bellcrank is cut from 1/32" plywood and mounts on a piece of sheet balsa that lays flat across the cabin, being notched at either end to fit around the sides of bulkhead 2. Nose construction varies with all three airplanes.

On both control jobs the nose is cut from a soft block; on the rubber job it is built up from pieces of 1/4" sheet balsa (though a block can be hollowed out if preferred) with the familiar nose-plug arrangement for

winder use. The drawings show not only these variations but the basic method of making all three noses. Note that the top and front of the big airplane's nose attach as a removable unit by means of dress snaps. It pulls off to the front for engine removal, although the prop must be removed first. The top of the Infant cowl block is attached with snaps and pulls straight up for removal without bothering the propeller. The Infant is mounted by means of two 2-56 machine screws holding it to a circular piece of 1/32" plywood which, in turn, is glued to the solid face of the inside of the nose block. Hot fuel proofer must be used with both control ships.

The landing gear design is the sandwich type with a one-piece music wire axle. This sandwich cements to the front of bulkhead 2, with its edges glued to the insides of the fuselage sides. The gusseting for each ship is visible on the side views. Although scale-type wheels may be used on both little jobs they should be made from balsa for lightness. Weight must be watched with a hawk's eye on the Infant job for it is a "maximum sized" airplane. The struts are streamlined from sheet balsa, gouged out with the sharp end of a wire to take the axles. It is advisable to wrap these struts with thread or with silk to prevent the axle springing out on a hard landing. Be sure to get the gear in place and all other internal details installed on the little ships before closing in the cabin! Once closed, you are locked out for good.

All the airplanes use sheet balsa throughout the tail construction. The small twins employ 1/32" sheet for lightness (rubber) and 1/16" sheet for strength (control) in their stabs, and both use 1/32" sheet in

the rudder. Sheet balsa will be tough and will not warp if coated with a mixture of clear dope and castor oil. Use about a half teaspoonful of oil to one large (two ounce) bottle of dope.

The big job uses rather soft 1/4" thick sheet for both stab and rudder, the latter because of the impact in turnovers. On the suggestion of the hobby dealer a unique hinge consisting of 3/16" dowel and ordinary screw-eyes was tried successfully. The dowel glues into a groove gouged into the leading edge of the flippers, the four screw-eyes go into the stab. Cut out around the heads of the screw-eyes to permit movement of the flippers. This system works smoothly and, easily. Hinges for the Infant model were rolled from thin shim brass, with .010" music wire engaging the tubes. The tubes attach to the stab, the wire to the flippers. In all cases, the stabilizers glue direct to the step in the fuselage top and the rudders glue down on the stabilizers.

The rubber-model wing is entirely built up with a 3/32" square leading edge, 1/16" x 1/8" spars, and a trailing edge cut from 3/32" sheet to a width of 3/8". Ribs are 1/32" sheet and covering is Japanese or American tissue, water-sprayed and given one coat of clear dope. Build the wing in one piece then, for dihedral. Remove the center section top spar, install the dihedral with blocks supporting the panels, and replace the spar pieces previously removed. Of course the bottom spars crack at the dihedral break (it may be necessary to score them with a razor blade first). These breaks are covered with cement. The finished wing glues to the top of the fuselage and is supported by streamlined balsa struts (from 1/8" x 1/4") that glue to

fuselage and wing. Scrape away the paper where the glue joints are made.

The K&B wing is the usual one-piece control-line deal. The leading edge is 1/4" x 1/2" and the trailing edge 3/16" x 1". Use soft but firm wood. Avoid rock hard stock because this is the heaviest part of the airplane. Ribs are 1/16" sheet fitted into notches cut in both edges. A slight amount of dihedral is used for scale effect and this does not detract from performance. Crease the spars at the dihedral break and cement the cracks after the tips have been suitably elevated. Two pieces of 3/32" dowel serve as joiners but these are not essential.

The big ship's wing is made in the same manner, using 3/8" x 1" leading edge and a 1/2"x1-1/2" trailing edge, with ribs of 3/32" sheet. These are odd edge sizes, true, so it may be necessary to glue them up from, say, a 1/2" plus a 1/4" thick piece for the leading edge, or from several thicknesses of sheet balsa for either or both edges. The tips are 1/4" sheet. The center section is covered top and bottom with 1/16" sheet balsa. Cover with heavy Silkspan or with silk, wet cover for best results. The paper will take several coats of dope, silk at least five before the pores are filled. Glue the wing to the fuselage top and add the 1/8" x 3/8"

supporting struts.

Note that the lead guides on both control ships are made from aluminum tubing, flattened at the point of contact with the struts, and where the wires go through. Small holes are drilled in the flat spots for the leads and the guides are then cemented to the wing struts. Bind the joints with thread and fill in for extra strength. Grommets take the leads through the fuselage sides on the little model. Cut slots in the celluloid on the big ship to keep the leads from binding where they pass through the windows, although grommets might be installed here, too, with a little care.

The sheet balsa sides of all models are filled with Tester's sanding filler and then sanded with wet and dry sandpaper. This gives a smooth foundation for painting. The big airplane may be given a coat of this filler over its entire surface, paper and all. For lightness, the rubber job should not be painted, although colored tissue may be used on the wings and for trimming. The K&B job was left unpainted but it could be given two coats of thinned down chrome yellow dope. Finished weight will run between 3-1/2 and 4 ounces so painting this ship is a borderline affair—take it easy! The big ship may be painted to your heart's content. Use as many as five coats

of colored dope if necessary. One full-strength coat, followed by a half-and-half coat over the filler should be sufficient, however.

The rubber model requires solder ballast in the nose. About 1-1/2" should be plenty for balance. Don't hand glide over a hard surface, for first test glides may stall abruptly. Wind in a couple of dozen turns and let the ship run along the ground unassisted. Add five turns at a time until it takes off. Correct stalls with weight until balance is obtained. Power is 4-6 strands of T-56 1/8" flat rubber. Five strands are ideal if you want to bother. Torque takes the ship into a slight left climbing turn, followed by a straight flight, and a slight right glide. Slight right rudder holds against torque and produces this glide.

The K&B job operates on 20-foot .008" lines. Glow Flite fuel was used. The ship flies like a goat which, of course, it is. The new Herkimer Cub and Baby Spitfire should make it into a real stunter. The big Vagabond requires no special notes. Just fly it. The original was tested on 50-foot .012" lines. The pivot point is 1/8" behind the c.g., so if you wish a different setup move the bellcrank more to the rear.