NEIGHVION

scale effect (it is difficult to scale down air), but Neighvion performs like a much larger model. The wind has little effect on flying and landing. The Ace throttle sleeve makes the .049-powered airplane taxi and handle on the ground almost as well as a .60-powered bird. In the air it is a beautiful flying airplane.

Full house with the Kraft KPS-18 servos, it will do almost anything a Pattern machine can do—and do it well. With standard size servos it would be a good idea to go to a 225 mAh battery pack to keep the weight down. There is more than enough room in the cabin area for the larger servos, and as long as the weight is kept to 25 oz. or less, the performance will be sparkling.

In addition, the original Neighvion has been flown on 10% nitro fuel, which makes the operation of the .049 engine quite inexpensive. The snuff can tank shown on the plans holds enough fuel for almost 15 minutes of flight at full throttle, even longer at reduced power. Build one and see just how much fun a small airplane can be.

CONSTRUCTION. The only difficult part is the nylon bolt wing hold-down. It can be replaced by the good old dowel-and-rubber-band system. The plans show both, so take your choice. Build light. The original weighed 15 oz. complete (without radio), and that is on the beefy side. Careful wood selection and the use of rubberbands to hold on the wing could reduce this by 2 oz. or more.

It is always a good idea to acquire the materials and assemble a kit prior to starting a project. There are no exotic goodies required for this airplane, so the kit can be assembled from the average scrap box. The photos should answer most questions that arise.

FUSELAGE. Use the plan side-view as a template, and cut out the two fuselage sides from 1/16 medium sheet balsa. Glue the doublers, longerons and uprights in place. While the glue sets, build up the two cabin formers as shown on the plans. Glue the two formers to one fuselage side. They should be vertical to the side; use a square as a guide. Glue the other side to the formers directly over the first. Make sure the sides are in alignment and everything is square. If the bolt-type wing mounting system is used, install the hardwood hold-down at this point. The dowels for the alternate system are added when the fuselage is covered.

If your engine mount does not have provisions for a nose gear, cut a 3/16 plywood disk the size of the mount, and epoxy it to the firewall behind the mount. Drill it for the 3/32 wire nose gear. Drill the firewall for the fuel and overflow lines as well as the throttle line and engine mounting bolts. Install blind nuts, and epoxy the firewall in place between the fuselage sides. The snuff can tank (if used) can be epoxied to the firewall at this time.

Bring the sides together at the tail, and glue them. Check the fuselage alignment by sighting down it, and make any adjustment necessary before the glue sets. Sheet the bottom of fuselage from

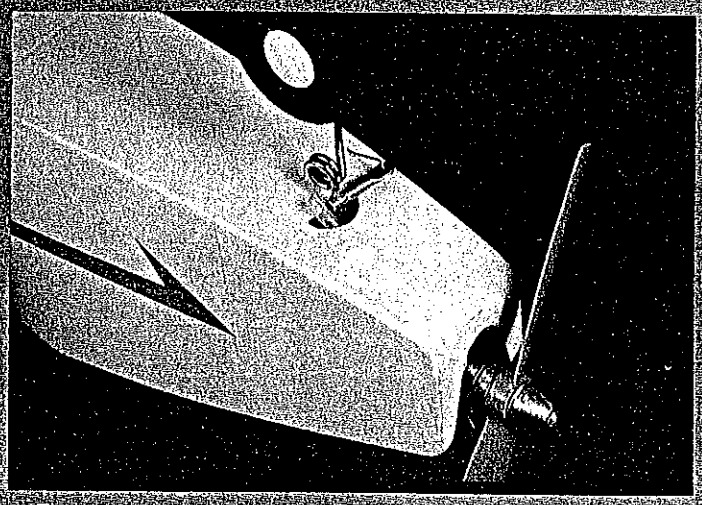
Want a simple, easily built, great flying airplane? Here it is, taxiing out for takeoff. Steerable nose wheel and throttle sleeve on the engine make it easy.

This semi-Scale RC ship is patterned after the Ryan Navion, a likely but neglected candidate for modeling. It is easy to build, and with the Ace throttle on the .049 engine, it is just as flyable as any larger bird. Economical, too.

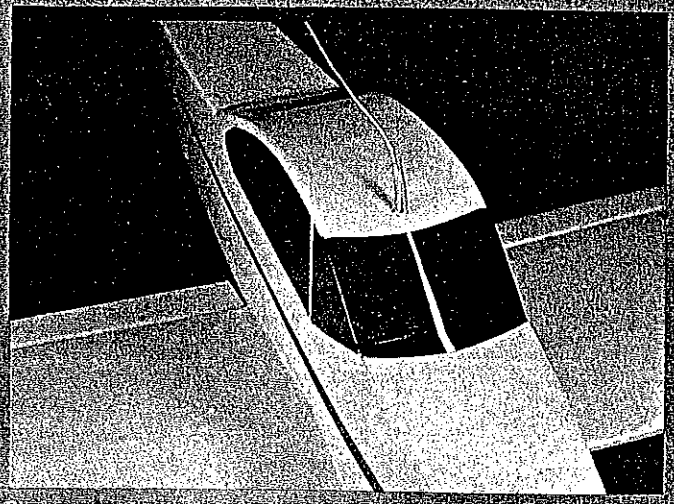
L. F. Randolph

THE NAVION as designed by Ryan and built and sold by North American should be an ideal Scale subject because of its lines and flyability, not to mention ease of documentation, but somehow it has been neglected. Neighvion was designed as sort of a "reminder Scale" of this neglected airplane. Its slab sides and imitation tapered wing make it quite inexpensive as well as easy to build, and it still maintains the flavor of the big brother.

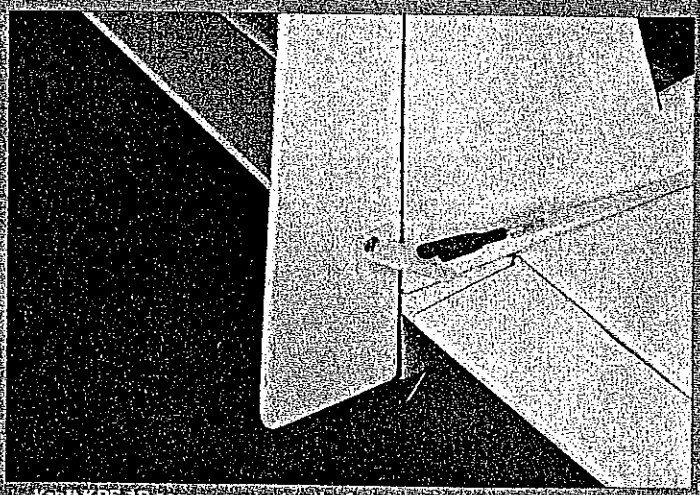
Most small airplanes suffer from



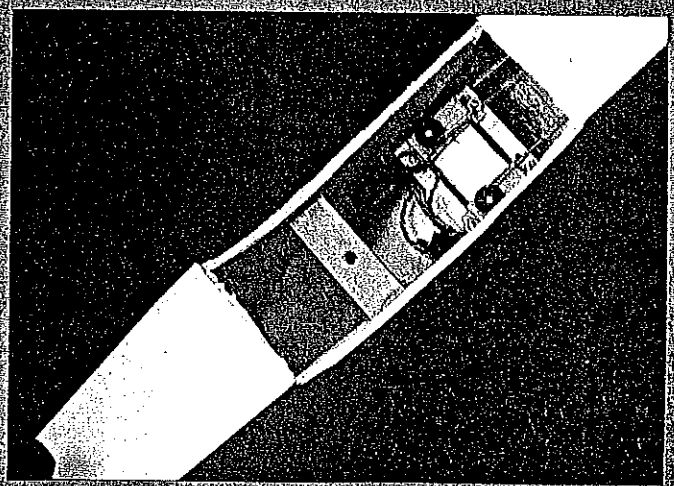
The antenna is routed through a bit of fuel tubing which is epoxied through the cabin roof. Cabin windows are dark glare MonoKote.



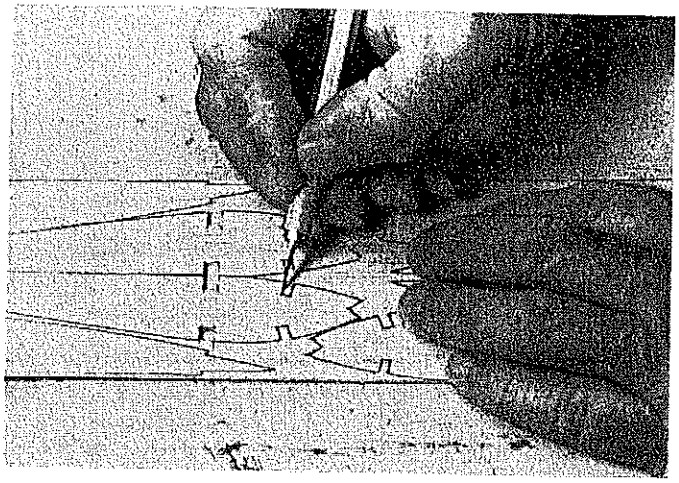
Steering arm for the nose gear is a flattened piece of copper (not brass) tubing. It's soldered to nose gear after linkage is attached.



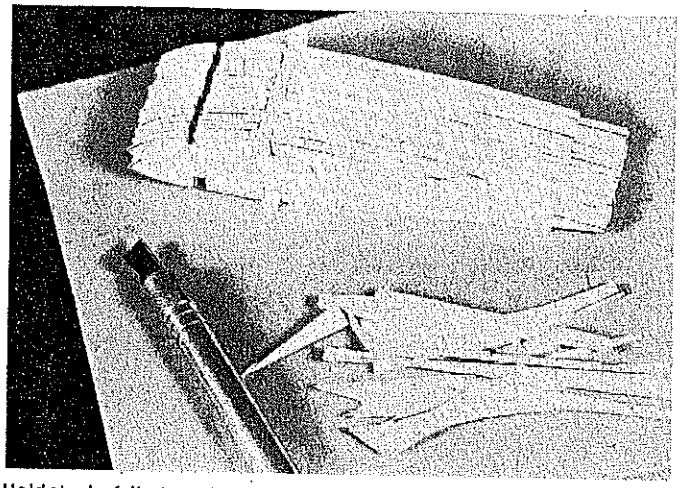
Kraft KPS-18 servos are lost in the fuselage—plenty of room. If you must use larger servos, use a smaller battery pack to save weight.



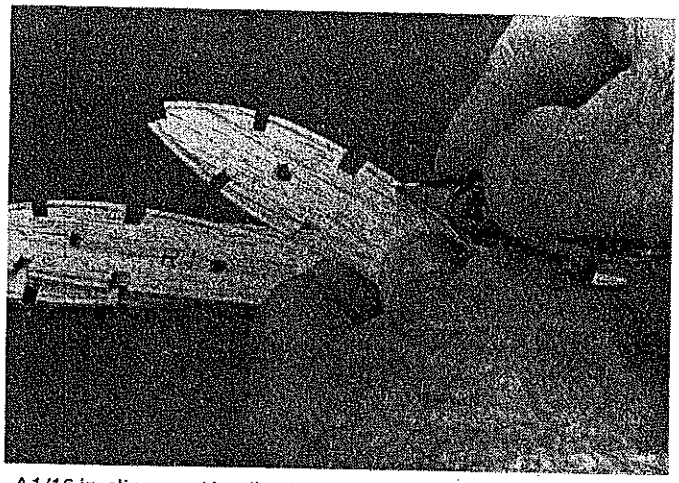
Rudder and elevator horns are linked to servos with clevises and Nyrods. Note the fill between the elevators, under the rudder.



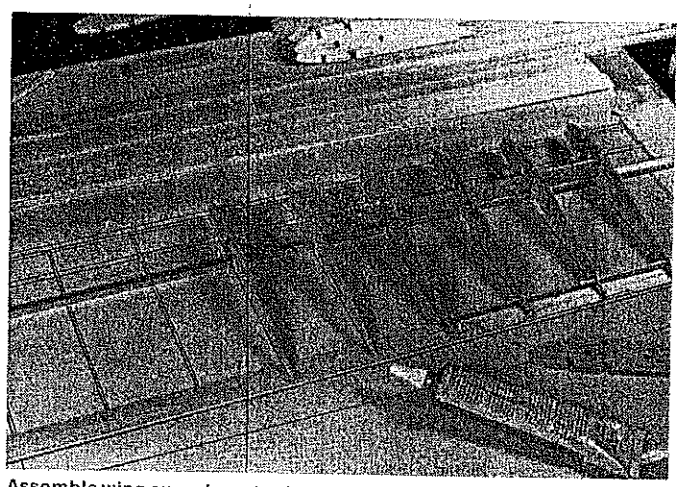
Make a template of the wing rib, trace around it on 1/16 balsa sheet (note grain direction), and remove ribs with sharp knife.



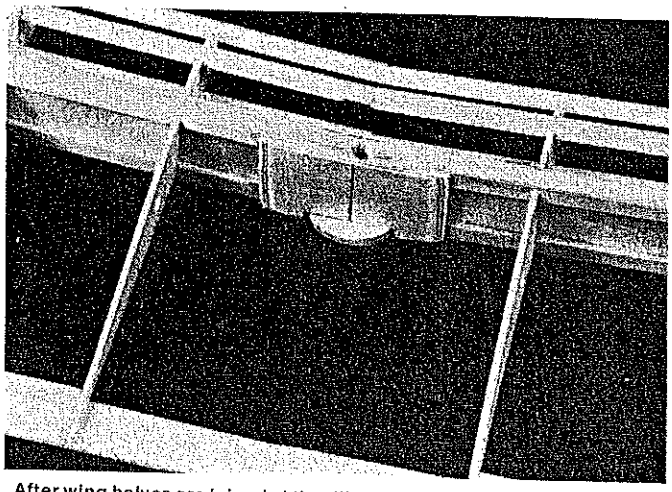
Hold stack of ribs together with scraps of spar material, and sand them to final shape with a sanding block.



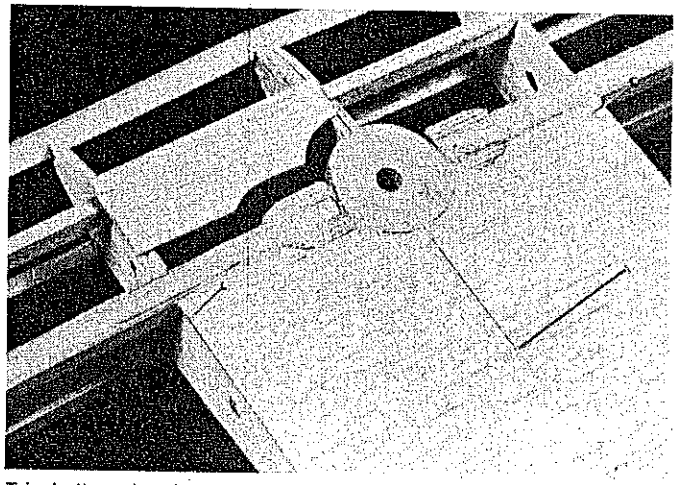
A 1/16 in. sliver must be sliced from top and bottom of the center ribs. A compass is an ideal tool for marking the ribs for cutting.



Assemble wing over plan, starting with second rib from center. Work out to tips, installing ribs and webs on spar and trailing edge.



After wing halves are joined at the dihedral break, supplemental braces and bolt bearing pad are added. Spar is trimmed to match.



Trim bottom sheeting to fit around bottom bolt bearing pad and between spars. Note that ends of supplemental braces are beveled.

the wing mount forward, and install the Nyrods for the nose gear steering and throttle lines. If a commercial fuel tank is to be used, install it now on a bed of foam. Glue the Nyrod guides for the rudder and elevator in place, and finish the top and bottom sheeting. The inside of the cowl area is finished with Hobbypoxy Formula 2 to keep oil and fuel away from the wood. Sand the completed fuselage.

Wing. The wing ribs can be cut as individuals by making a template of the section and tracing the outline on 1/16 sheet balsa with a fine-tipped pen, then cutting them out with a razor knife. They can also be bandsawn from a solid block and sliced. Select four of the ribs, and trim 1/16 from the top and bottom of each. These are the center section ribs. Select four more, and glue the 1/16 plywood landing gear braces (RL) to them, two left and two right. Trim the notch for the landing gear mount in each. Slice the spars from 3/16 sheet, the leading edge from ¼, and the trailing edge cap from 3/32. The trailing edge sheet and the spar webs are 1/16 medium sheet.

Cover the plans with plastic wrap, and build the wing right over the drawing. Pin the trailing edge sheet, cap strip, and main bottom spar in place. Starting at the center, add ribs and webs all the way to the tip. Add the top spars and leading edge. The top trailing edge sheet will be added after the trailing edge dihedral brace is in place. Turn the plan over, and build the other wing half on the back side. While the glue is setting, cut the dihedral braces from 1/16 plywood and the supplemental braces and the plywood screw bearing disk from ⅛ ply. If the dowel and rubber-band mounting system is used to hold the wing to the fuselage, only the dihedral braces need to be made.

1/8" X 3/16" FIN FRAMING

1/8" SHEET BALSA RUDDER

BRASS TUBE FOR M. WIRE

3/32" SQ. BALSA FRAMES AND TOP AND BOTTOM LONGERONS

1/8" SHEET DORSAL

1/8" X 3/16" BALSA STABILIZER FRAME

1/8" SHEET BALSA ELEVATORS JOINED WITH MUSIC WIRE

1/16" SHEET BALSA INSIDE DOUBLER FROM NOSE TO F-3

NYROD SUPPORTS

F-2 1/16" SHEET BALSA DOUBLED

1/16" PLYWOOD L.E. AND SPAR BRACES

1/16" SHEET BALSA TOP, SIDES AND BOTTOM

F-3 DOUBLED 1/16" SHEET BALSA

1/16" PLYWOOD T. EDGE REINFORCEMENT

1/16" PLYWOOD REINF. MAIN SPARS FRONT, BACK, UPPER AND LOWER

1/16" BALSA SHEET FILLERS AT SPARS AND TR. EDGE

1/16" SHEET BALSA TR. EDGE TOP AND BOTTOM

3/16" SHEET BALSA AILERON AND TR. EDGE

1/16" SHEET BALSA RIBS

3/16" BALSA TIP

3/16" SQ. BALSA MAIN SPARS UPPER AND LOWER

1/4" SQ. BALSA LEADING EDGE IN RIB NOTCHES

COX T.D. .049-.051 WITH ACE THROTTLE ON CYLINDER

ACE ENGINE MOUNT

STEERING ARM TO RUDDER SERVO

1 3/4" NOSE WHEEL ON 3/32" MUSIC WIRE

F-1 1/8" PLYWOOD IS FIREWALL

WING HOLD DOWN DOWEL

-OR-

USE 1/4-20 NYLON BOLT INTO 1/4" X 3/4" HARDWOOD ANCHOR IN 1/8" PLYWOOD

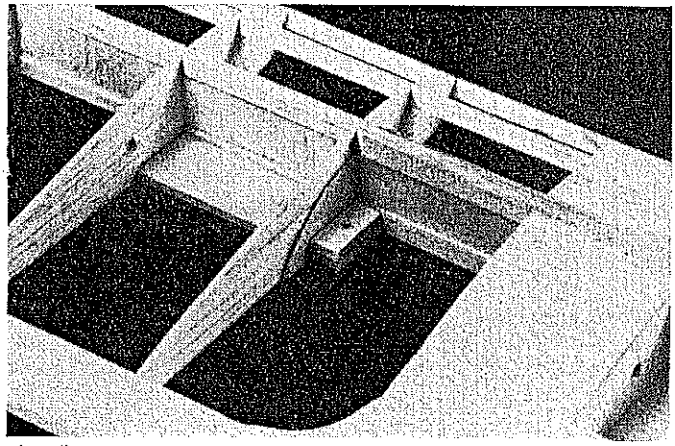
1/8" PLYWOOD BRACES AT CENTER SECTION AT LEAST OUT TWO RIB BAYS FRONT AND BACK

1/16" PLYWOOD REINF TO RIB FACES FOR L.G. BLOCK MOUNT

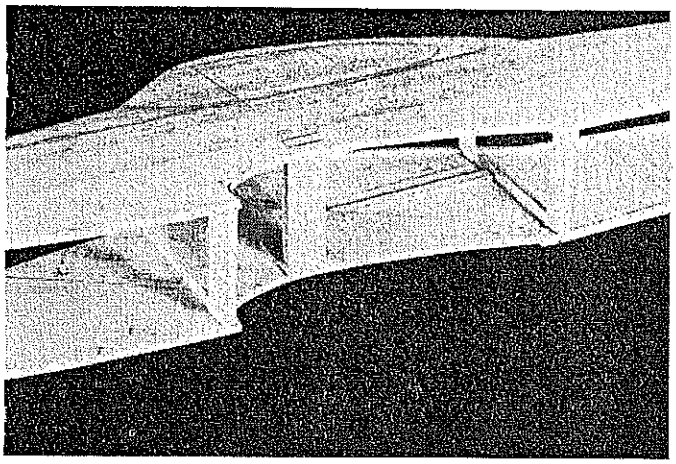
1/8" PLYWOOD MOUNT FOR LANDING GEAR ACROSS TWO RIB BOTTOMS

1 3/4" WHEELS ON 3/32" MUSIC WIRE

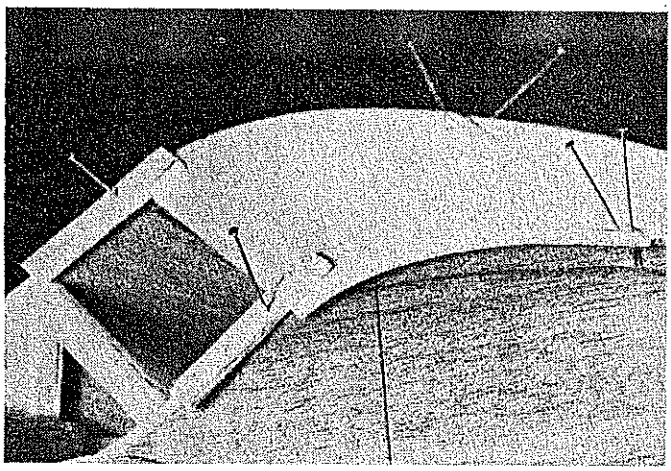
1/8" X 3/16" BALSA L. EDGE STRINGERS TOP AND BOTTOM



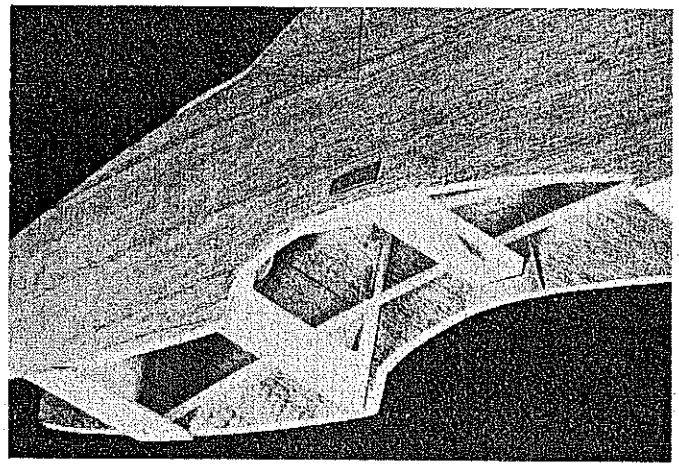
Landing gear mounts are assembled, drilled, and glued in place. Gussets at corner of sheeting and leading and trailing edges will keep covering from wrinkling at these spots when applied later.



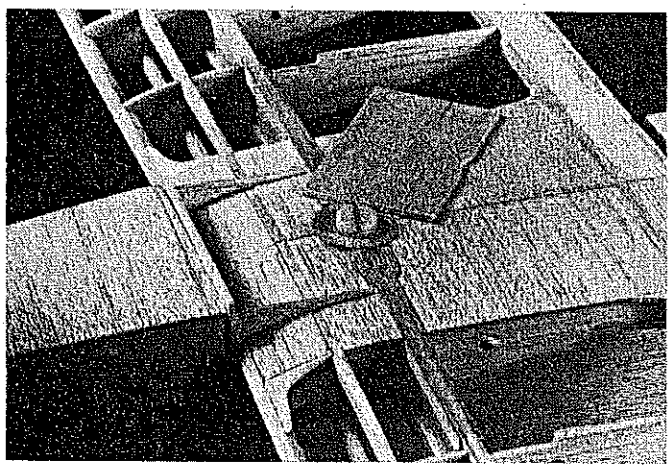
Fuselage sides, with longerons and uprights installed, are joined by formers F2 and F3. Add hardwood wing mount now, drill it later.



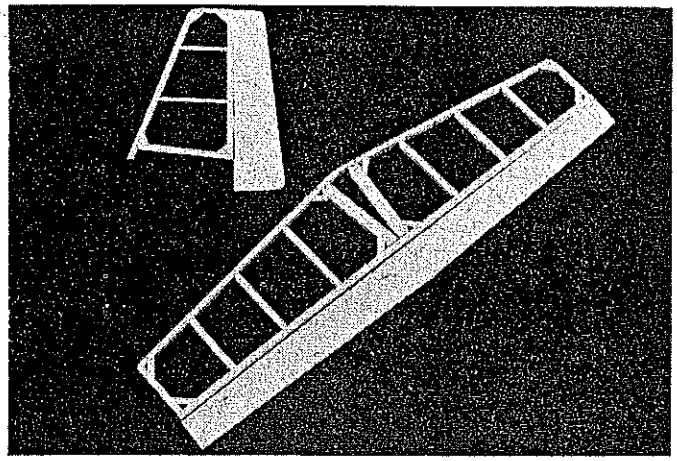
Fuselage sheeting is glued cross-grain. At cabin front the bend is quite sharp; use scrap to pin sheet down to avoid splitting the wood.



Once the firewall is epoxied in place, the Nyrod guides for nose gear steering and throttle can be installed.



Bottom view shows nylon bolt through wing into wing mount. Gap between wing and fuselage should be filled with silicone.



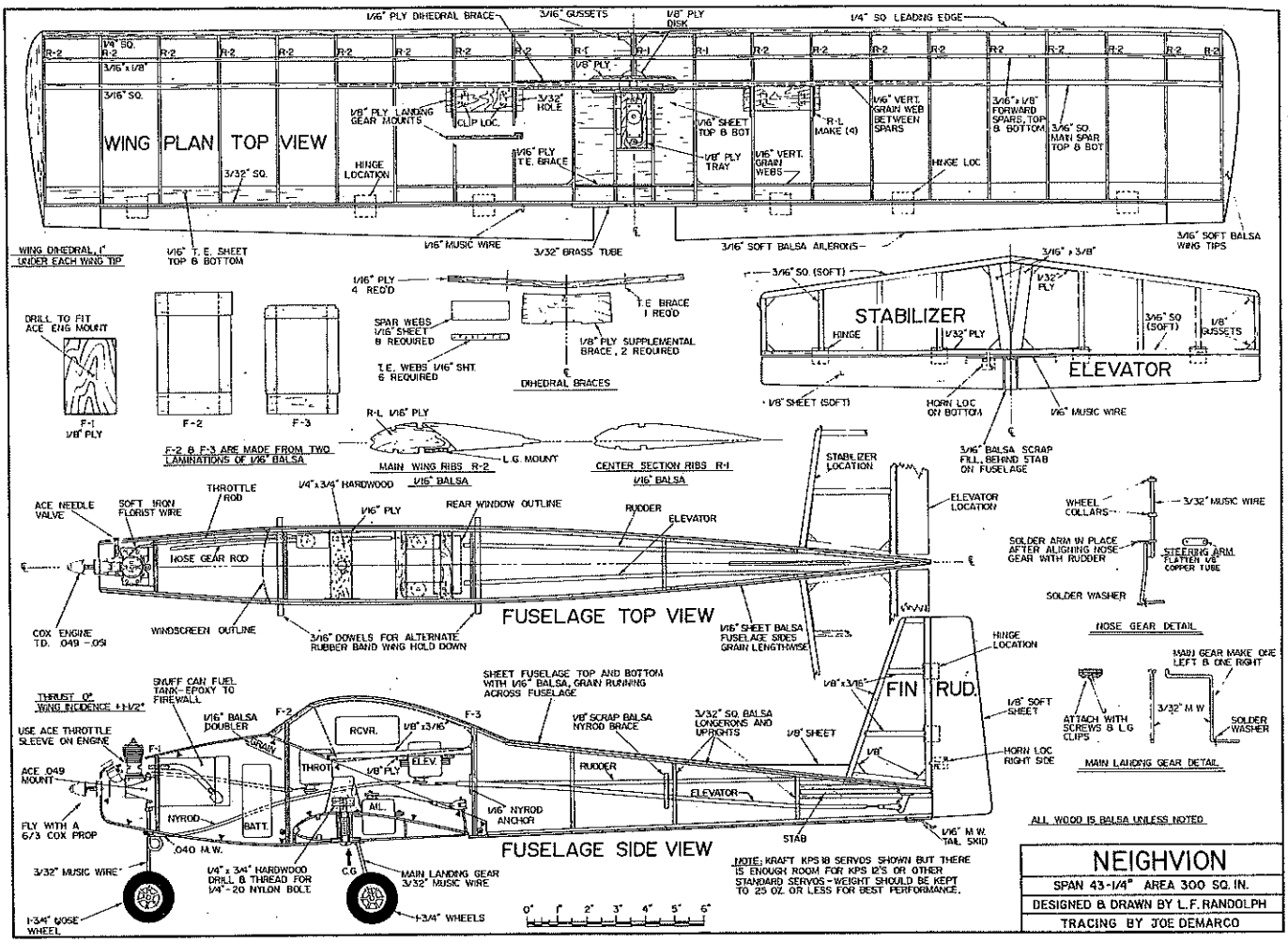
Tail surfaces are built over plan, sanded and covered. Gussets at corners of stab help keep covering from wrinkling as it is shrunk.

Bevel the spars, leading edges and trailing edges to match the dihedral angle, and notch the center section ribs to receive the dihedral braces. Join the two wing halves at the proper dihedral angle, and add the supplemental braces. When the glue is dry, install the top trailing edge sheeting by sanding a bevel into the trailing edge cap to match the ribs; glue the sheeting in place. Trim the bottom of the bottom spars to match the notch in the supplemental braces, and glue the bolt plate in place. Sheet the top and bottom of the center section with 1/16. The sheet goes between the spars and around the bolt plate. When the sheeting is complete, drill a 7/32 hole through the center of the plywood bolt plate and through the wing. Mount the wing to the fuselage with rubberbands, check for trueness, then drill through the wing into the wing mount in the fuselage with the same 7/32 drill. While the wing is in place on the fuselage, build the fairing in front of the bolt from scrap 1/16 sheet. Remove the wing from the fuselage, and thread the hole in the hardwood wing mount with a ¼ x 20 tap. Enlarge the hole in the wing with a 9/32 drill to clear the ¼-in. nylon bolt.

Install the ⅛ plywood landing gear mounts on each wing. Slice the ailerons from soft 3/16 wood, and sand them to the cross section shown on the plans. Cut the tip section from each, and glue it at the tip trailing edge on each side as shown. Add the wing tips. Sand the completed wing, and epoxy the aileron torque tubes (3/32 brass) to the trailing edge at the center. Don't allow any glue to enter the tubes with the torque rods. The ailerons will be mounted when the wing is covered.

Tail surfaces: Build the fin and stab right over the plan just as you did the wing. Use light wood. Don't forget the 1/32 plywood spar doublers at the center of the stab. Cut the rudder and elevator from soft ⅛ sheet. The elevator linkage, 1/16

FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 164



music wire, should be epoxied in place before the elevator is notched in the center. It is a good idea to harden the spot on the elevator and rudder when the horns will be mounted with a drop of one of the instant glues. The dorsal fin is added when the fin-rudder is epoxied to the fuselage after they are covered.

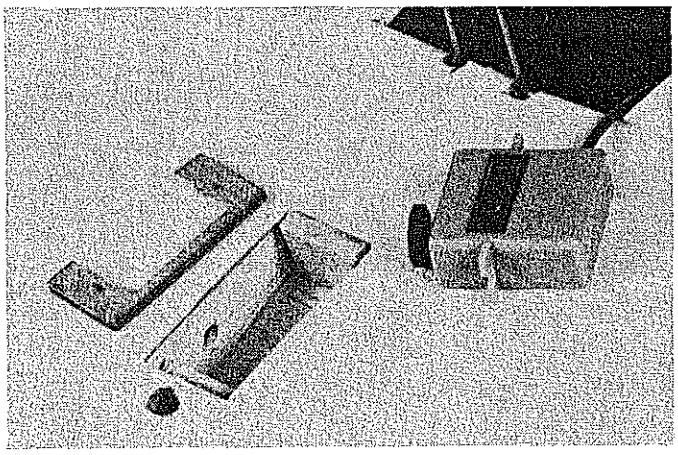
Covering. The entire airplane is covered with one of the heat-shrink plastic coverings, and the hinges are made of the same material. Cover the surfaces as described in the instructions that come with the film. Then cut away the material where parts are to be joined to the fuselage or to themselves. The ailerons should be covered before notching and drilling at the forward edge to match the torque rods. Epoxy the torque rods to the ailerons, and hinge the ailerons in place on the trailing edge of the wing. Hinge the stab-elevator and the fin-rudder, and install the horns before gluing them to the fuselage.

Assembly. Bend the main landing gear from 3/32 music wire (one left and one right), and mount the wheels. The gear is attached to the wing with brackets and wood screws. Mount the nose gear, but don't solder the steering arm in place just yet. Mount the engine, and install the receiver battery. Use two-sided servo tape to mount the throttle servo in alignment with the Nyrod from the firewall.

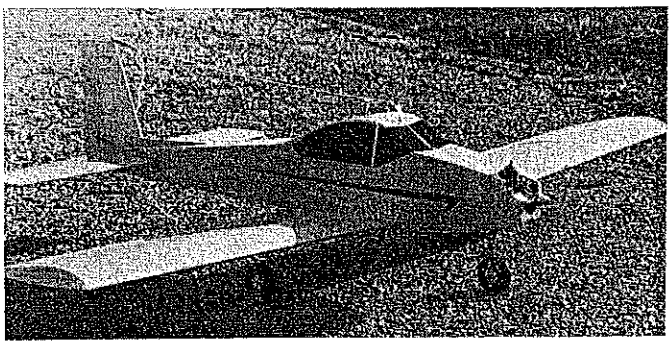
Mount the elevator and rudder servos on a plywood tray, and slide them back and forth along the mounting rails until the airplane balances at the point shown. Glue the tray in that place. Install the switch and receiver, and activate the system. Center all trims on the transmitter, and retard the throttle so that all servos are in neutral and the throttle servo is in idle. Mount the aileron servo on a plywood tray in the servo well in the wing, and connect it to the receiver so that it, too will center. Connect all linkages. Center the wheel on the nose gear, and solder the steering arm in place. The connections between the small servos and the Nyrods, as well as the clevises in the aileron system, are made by soldering a 2-56 screw to a straightened paper clip. This arrangement works beautifully. The fuselage-wing joint should be a close fit; if not, use wing saddle tape or silicone seal to keep oily exhaust from entering the fuselage.

Flying. When at the field, again check all controls for proper movement. Start the engine, and adjust the throttle sleeve for best idle. It should be within the trim range on the transmitter.

Continued on page 128



Aileron servo mounts in the well in the wing, on a plywood tray supported by balsa blocks glued at front and back of the well.



Thanks to throttle sleeve, Neighvion idles, taxis and handles on the ground like a much larger bird. Takeoffs are easy.

frequency) of the receiver. Jack Albrecht, of the AMA Frequency Committee, has taken image problems into account when making the draft Phase-In Plan for frequency usage. If the plan is followed, you won't be able to buy systems which suffer from image problems. That leaves the 72.08/72.96 problem, with which we are all familiar. It will go away in five years. Till then, you know about it, so be careful.

Some folks already have scanners for non-RC bands. The question is bound to be asked, "Can I use my scanner for RC?" The answer, according to John Lange, is, "Yes, with the proper converter!" Once again, contact John at the address or call sign given early in the column for the precise information you need.

Finally, I direct your attention back to the *cheapest* solution I could come up with . . . the Electronic Bird-Dog, which was published in Radio Technique, January 1982. It will *only* monitor the channel your receiver is on, but it will monitor it very well. It draws about 300mA, in order to be heard above the noise of engines on the field, so I wouldn't want you to leave it plugged into your flight pack very long. *It will completely discharge the usual 500 mAh pack in less than two hours.* If you intend to do continuous monitoring with the Bird-Dog, put a 100-ohm resistor in series with the loudspeaker, which should cut the current drain down to about 35 mA.

Keep the letters flowing.

George M. Myers, 70 Froehlich Farm Rd., Hicksville, NY 11801.

SAFE FLYING
IS NO ACCIDENT

Neighvion/Randolph

Continued from page 35

You will find that you can taxi out to a spot, stop, and apply power for takeoff just as you would a larger plane.

Don't be in a hurry to rotate on your first flight. Apply slight back stick, and let Neighvion fly off. Climb straight out, level off, and trim it out. The original required a slight up and left trim on the initial flight.

Landings are quite easy. Come back on the power, fly the pattern, and ease off on all the power just before touch-down. Smooth every time! Neighvion is a smooth, solid flier.

Props/Brownlee

Continued from page 37

P_I/P_N. As we shall see later, performance will not be affected critically by pitch as long as the diameter is correct to let the engine develop its maximum power, so for computation purposes a value of 1.25 is suggested.

Results obtained using Eq. 2 will be no better than the mph value used, which leads into purpose number three. The starting point is the equilibrium condition where available thrust equals total airframe drag. In engineering terms,

$$\text{Efficiency, } E = \frac{\text{Power Out}}{\text{Power In}} = \frac{\text{Thrust} \times \text{Velocity}}{550 \times \text{hp}} \quad (4)$$

$$\text{therefore, } T = \frac{550 \times \text{hp} \times E}{V} \quad (4a)$$

$$D = C_D \times .00119 \times V^2 \times S. \quad (5)$$

where C_D is airframe drag coefficient based on wing area, V is velocity in feet-per-second, and S is wing area in square feet.