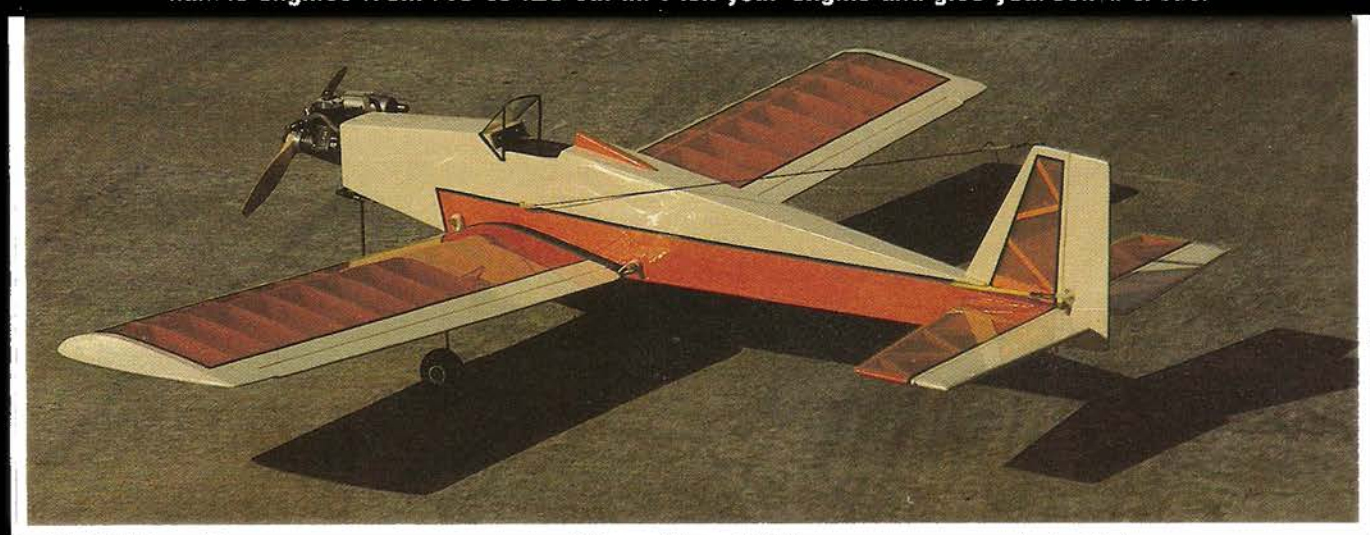
HOMER

Designed to help the beginner, the Homer is for anyone. The simulated open cockpit sport trainer will handle engines from .10 to .20 cu. in. Pick your engine and give yourself a treat.



By L.F. Randolph

Homer is suppose to look something like a home-built airplane, just a little mind you; to convey the idea. Some years ago I built, or almost built, a Flybaby (I sold it just before it was finished because it was just too small for my new wife and me at the same time — I still have the wife and she is a lot more fun than **any** airplane) and ever since I have had a warm place in my heart for open cockpit airplanes. Models with open cockpits have clean up problems so, to correct that, Homer has a closed open cockpit that retains the flavor without the mess. Homer is easy to build and although it is a generous size for a .15 engine it is light and the performance is just what it should be for a solid Sunday flying airplane.

From a full throttle pass, Homer will climb straight up for a good two hundred feet before pausing to catch its breath, and at a climb angle of 60 degrees it will go out of sight. Although the airfoil is not designed for it, Homer is comfortable inverted and will do almost any of the outside stuff other than snaps. Spin recovery, both inside and out, is almost instantaneous with the relaxation of rudder and elevator. Slow flight is just great; in fact, I spend most of my time at one-half throttle or less doing lazy loops and rolls in close where they are easy to see and enjoy. I honestly believe the landings are so easy that a dedicated effort has to be made to foul them up. The touch down is nose high and the airplane almost tip-toes down the runway, no tendency for a wing to drop at the last minute, and complete aileron control till roll out. Knife edge is not good because of the power available, but slips all the way to touch down are easy and recovery is rapid with no inkling of a snap. I would recommend Homer to anyone from a beginner on.

A word about construction --- build light. Homer is strong without any changes; in fact, during one of the test flights it did a full throttle split-S into a concrete runway and lived to fly again. Any R/C aircraft structure should be built to fly --- never to crash --- but, should that happen, the lighter they are the softer they fall!

CONSTRUCTION

Wing:

Cut out all the parts before starting the assembly and everything seems to go easier. The ribs can be traced on sheets of 1/16" balsa and cut out as individuals, or they can be stacked up and sawed at the same time. The template-tracing method uses less wood but either way is fine. Select four of the ribs and trim 1/16" from the top and bottom of each and trim the main spar notches 1/16" wider on each side; label these RC. Select four more and glue the 1/16" plywood landing gear mount braces to them at the main spar notches and trim them for the landing gear mount; label these RL. Note, there are two left and two right.

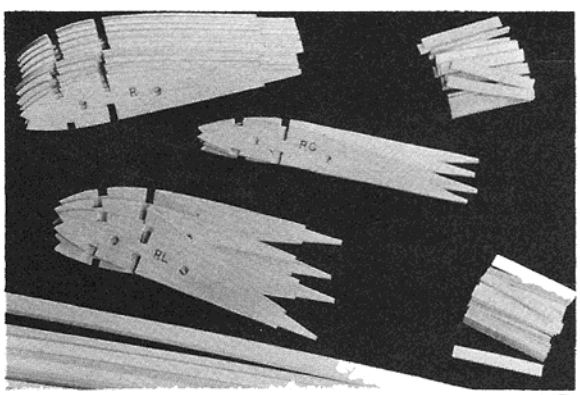
Strip the spars from good firm, not hard, 3/16" sheet balsa; be sure the grain is straight down each spar. Slice the trailing edge sheeting from medium 1/16" sheet and the trailing edge from firm 1/8" stock. The leading edge is 1/4" sq. balsa. The strip stock can, of course, be purchased from your local hobby shop rather than being stripped. Use a straight-edge and a good sharp knife to cut the dihedral braces from 1/16" plywood. While you are at it, cut the stab spar doublers from 1/32" plywood. Cut the spar and trailing edge webs from medium 1/16" balsa with the grain running vertical to the longest side.

Pin the plans to a good flat building board and cover them with waxpaper or plastic wrap. Pin the trailing edge sheeting and the bottom main spar in place over the plan. If the main spar is cut a little longer than the plan length it can be pinned at each end right through the spar and into the work board without damage because that part of the spar will be trimmed away later. Start gluing ribs to the bottom spar and the trailing edge sheet with the second RC. The sequence goes like this. Glue in the spar and trailing edge webs at the center section followed by the second RC, more webs, the first RL, webs, the second RL, more webs, the next rib, etc., on out to the tip. Installing the webs as you go along keeps the ribs vertical to the spars as well as equally spaced. When all the ribs are in place, add the top main spar and the top front spar as well as the leading edge and the

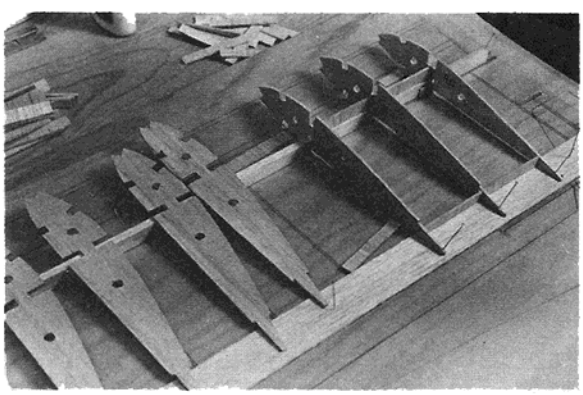
HOMER
Designed By: L.F. Randolph

TYPE AIRCRAFT
Sport-Trainer
WINGSPAN
49½ Inches
WING CHORD
7¾ Inches
TOTAL WING AREA
380 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
NACA 4312 (Mod.)
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1 Inch
O.A. FUSELAGE LENGTH
32¼ Inches
RADIO COMPARTMENT AREA
(L) 9" x (W) 2¼" x (H) 2¾"
STABILIZER SPAN
20 Inches
STABILIZER CHORD (incl. elev.)
4½" (Avg.)
STABILIZER AREA
87 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
5½ Inches
VERTICAL FIN WIDTH (incl. rudder)
4½" (Avg.)
REC. ENGINE SIZE
.10-.15 Cu. In.
FUEL TANK SIZE
4 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., & Ail.
BASIC MATERIALS USED IN CONSTRUCTION

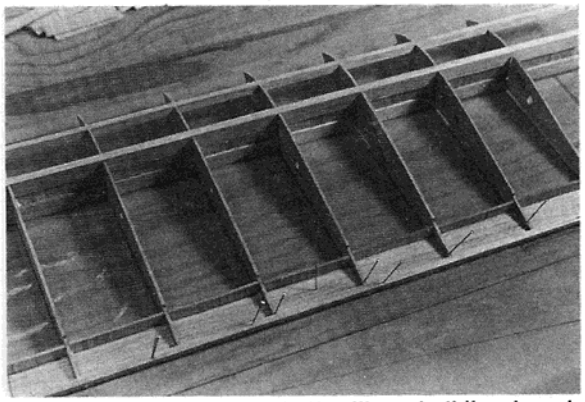
Fuselage	Balsa and Ply
Wing	Balsa and Ply
Empennage	Balsa and Ply
Wt. Ready To Fly	**35 Oz.**
Wing Loading	**13.25 Oz./Sq. Ft.**



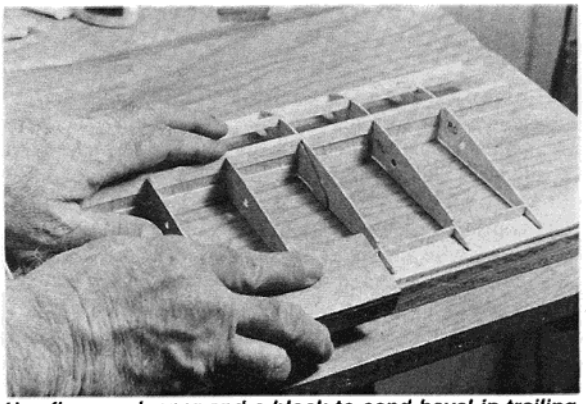
Wing kit, spars, ribs and webs. RL's and RC's are all made from regular ribs.



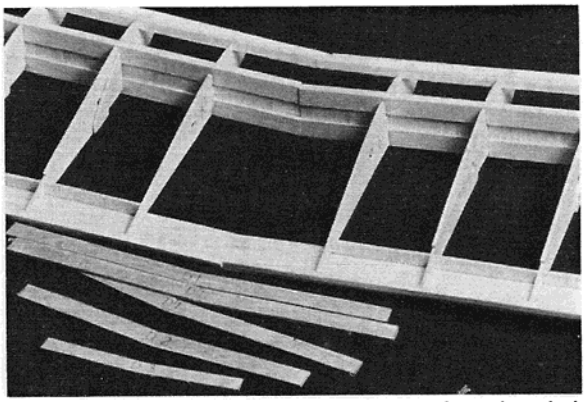
Pin bottom main spar and trailing edge sheeting to building board and assemble wing by adding ribs and webs from the center out to the tip.



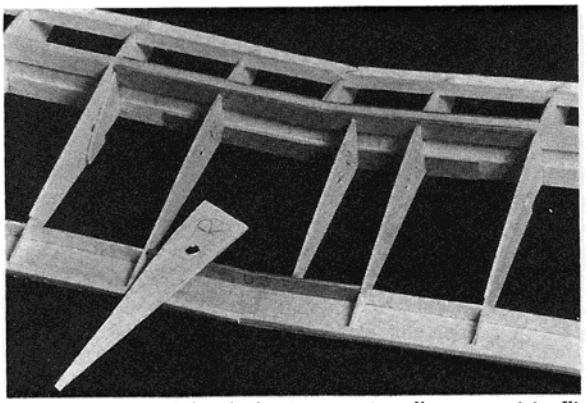
Partially completed wing half still on building board, leading edge and bottom front spar will be added when wing is removed from board.



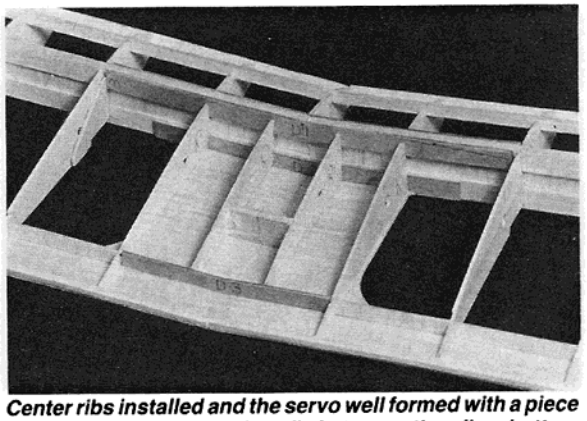
Use fine sandpaper and a block to sand bevel in trailing edge to prepare it for top trailing edge sheet.



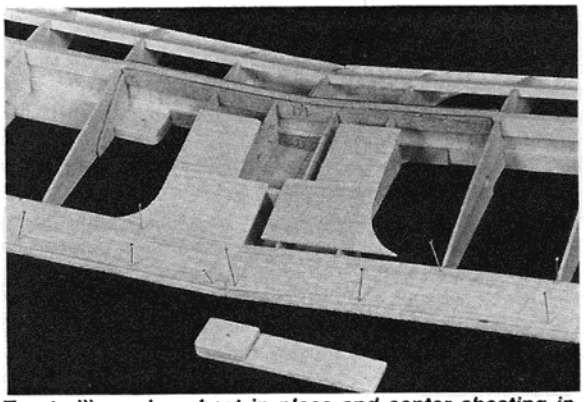
Spars, leading edge and trailing edge have been beveled to fit the dihedral angle and are ready for dihedral braces and joining.



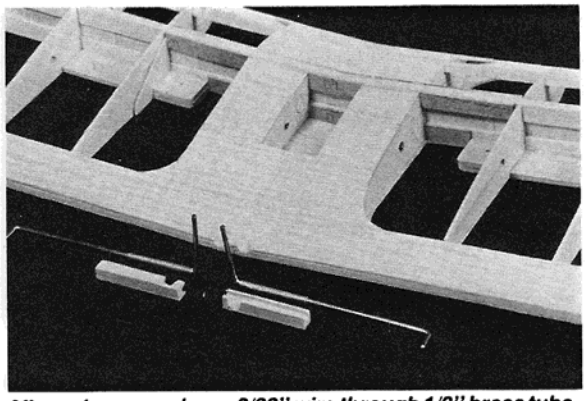
After wings are joined, the two center ribs are cut to fit between the spar and trailing edge and the spar and leading edge.



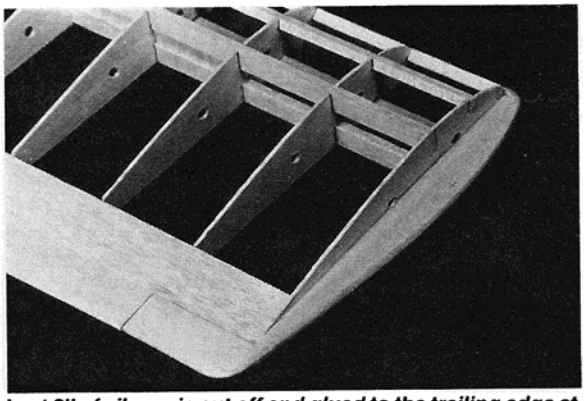
Center ribs installed and the servo well formed with a piece of scrap balsa trimmed to fit between the ribs, bottom sheeting in place.



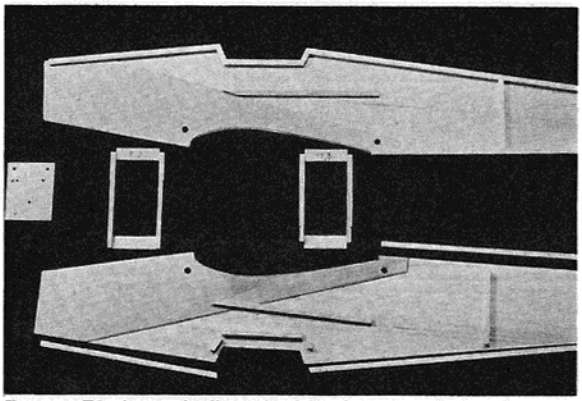
Top trailing edge sheet in place and center sheeting in progress, landing gear mounts shown assembled and installed.



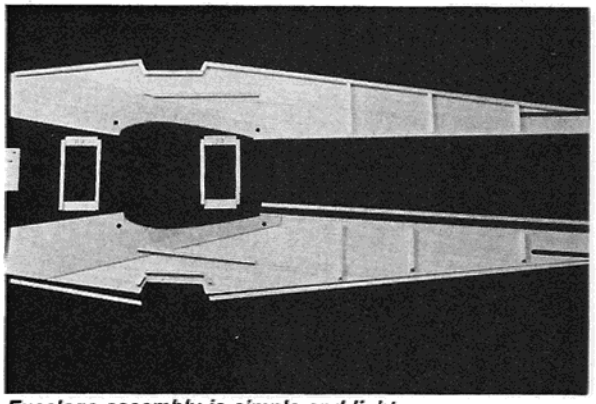
Aileron torque rods are 3/32" wire through 1/8" brass tube. Brass tube is epoxied to the trailing edge and covered with the fairing made from 1/4" sq. balsa. Note relief notches trimmed in trailing edge.



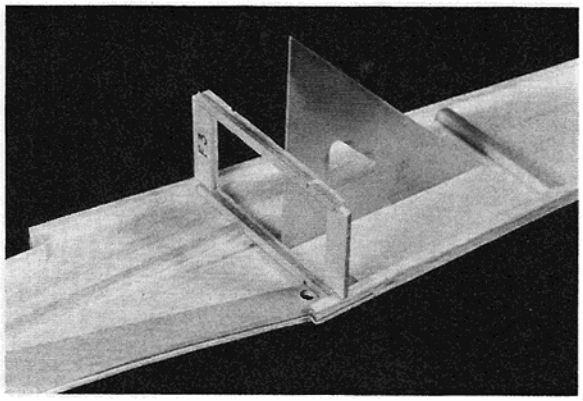
Last 2" of aileron is cut off and glued to the trailing edge at the tip. Holes in ribs allow plastic film to breath when shrunk with a heat gun.



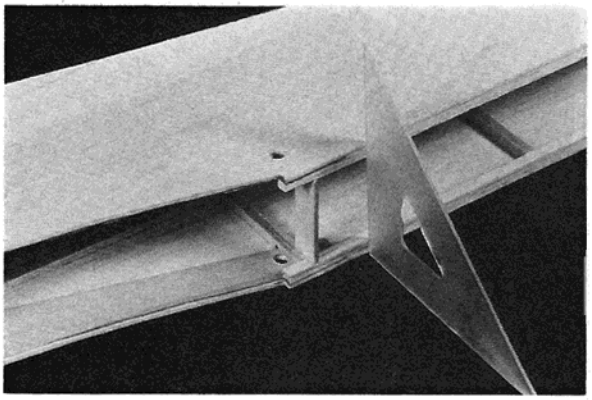
Former F2 shown built up in this photo was later changed to plywood as shown on plans.



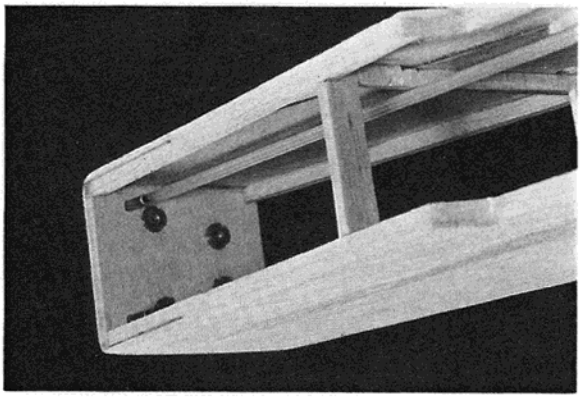
Fuselage assembly is simple and light.



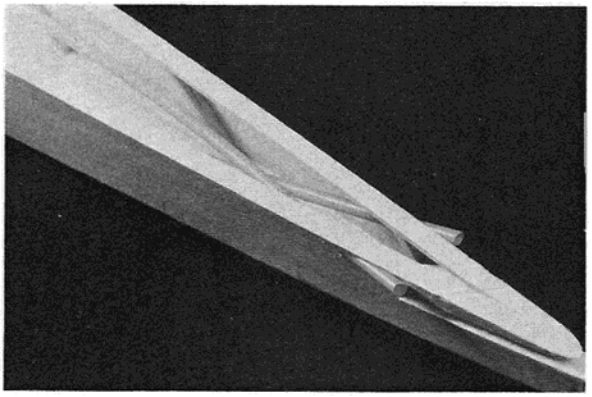
Glue formers to one side of fuselage and use a square to hold them in place, Hot Stuff works great here.



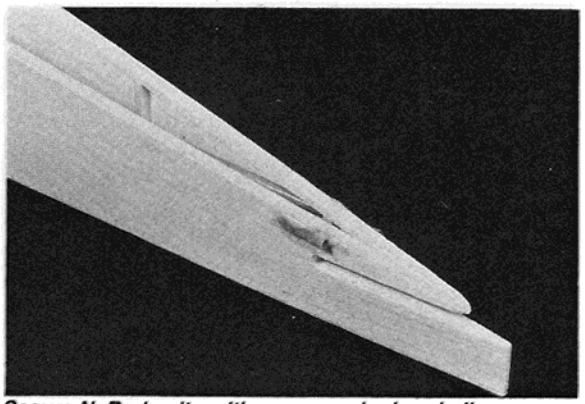
Glue the second side on the formers right over the first, use a square to align both sides.



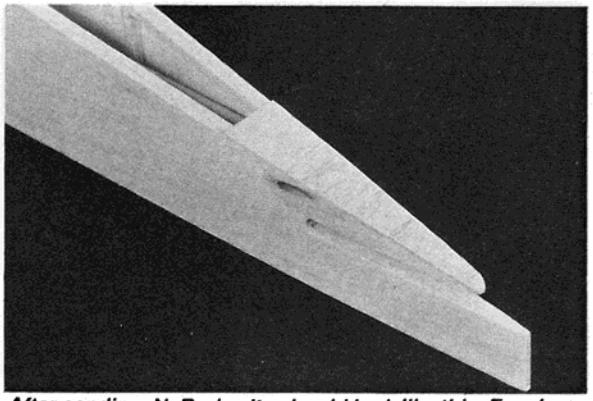
Firewall with blind nuts, fuel and overflow lines as well as throttle line installed.



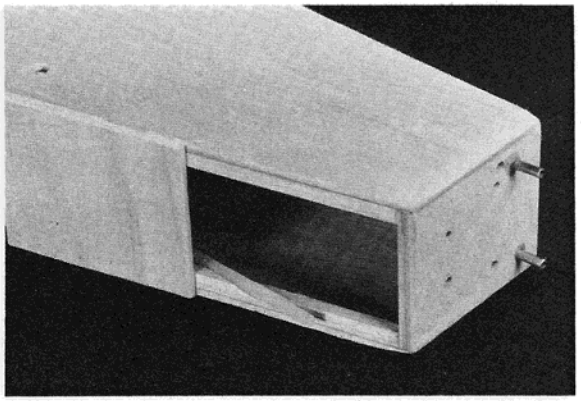
Outer NyRods are installed in fuselage before top sheeting is in place.



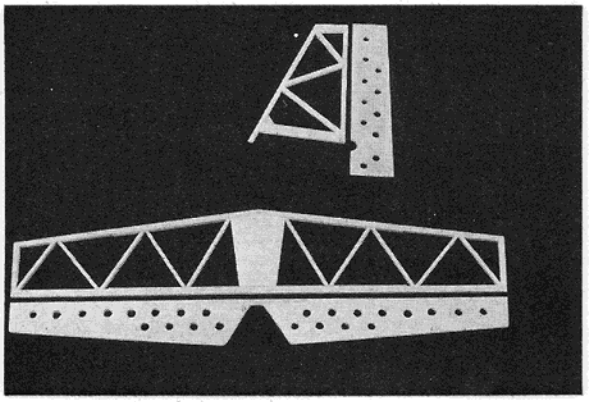
Secure NyRod exits with epoxy and micro-balloons.



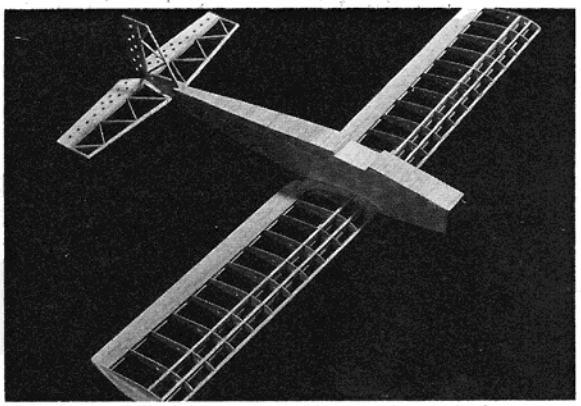
After sanding, NyRod exits should look like this. Fuselage top sheeting can now be completed.



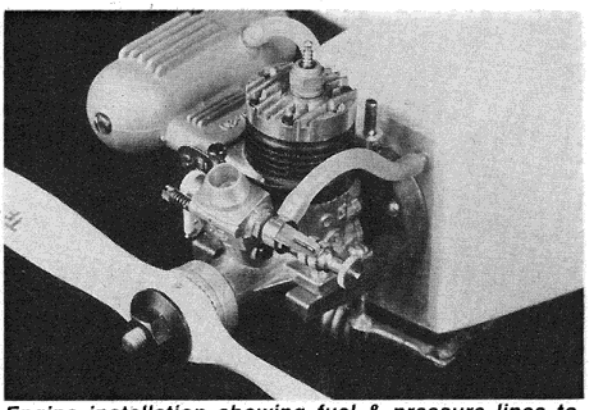
Nyrod to nose gear steering is fitted in slot thru bottom longeron prior to addition of bottom sheeting. Brass fuel & overflow lines ready for installation.



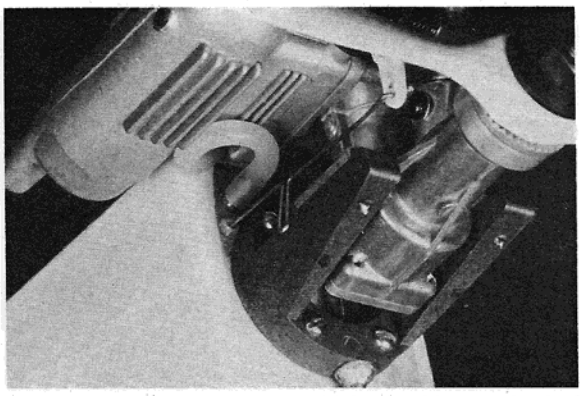
Completed fin-rudder and stab-elevator assemblies ready for cover. The lightening holes in rudder and elevator are not necessary if soft stock is used.



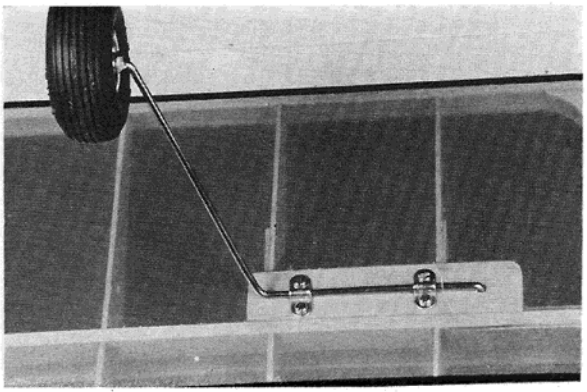
All structure is complete and Homer is ready for cover. Wing should be fitted to saddle at this time.



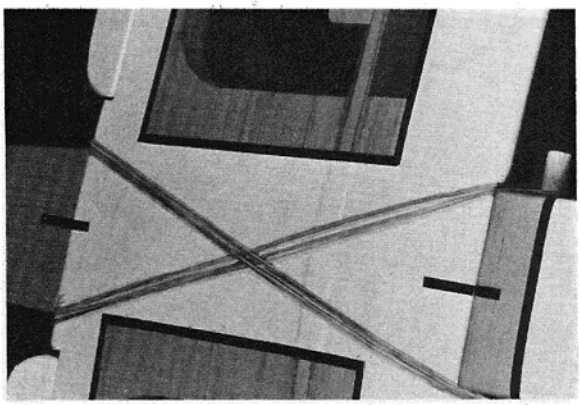
Engine installation showing fuel & pressure lines to engine & muffler, as well as detail of nose gear steering arm. Plans show Goldberg nose gear steering arm.



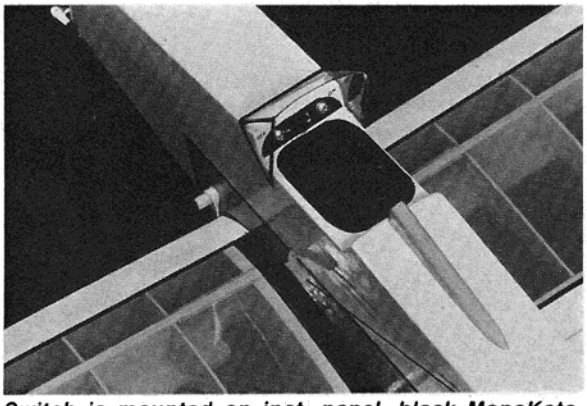
Close-up of throttle linkage which provides method of adjustment as well as override protection for servo.



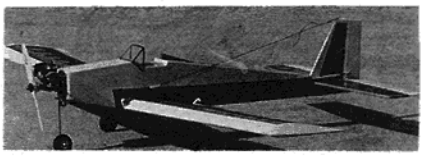
Main landing gear is held in place on the gear mounts with brackets and small wood screws.

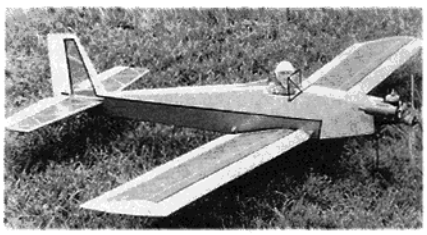


Small strips of pin-striping is used for alignment marks on the fuselage and wing.



Switch is mounted on inst. panel, black MonoKote simulates cockpit. Windshield is cut from a piece of florist box and pinstriped.





1/8'' sq. trailing edge. Do not add the top trailing edge sheet at this time. Remove the wing half from the board and add the front bottom spar. The other half is built in the same manner.

Join the two wing halves at the center with the four dihedral braces at the main spar and the single brace at the trailing edge. The short main spar brace goes on the aft side of the bottom main spar. Use a good aliphatic resin glue and hold everything in place with clothespins until it sets up. When everything is dry, slice the two remaining RC's at the main spar notches and fit them in place at the center section. Trim the trailing edges of each to fit against and behind the trailing edge dihedral brace. Bevel the 1/8'' sq. trailing edge and add the top trailing edge sheeting. Cut and install the 3/16'' gussets on each side of the center rib at the leading edge and sheet the center section with 1/16'' balsa top and bottom except for the top of the servo well.

Slip the 1/8'' brass tube, cut as shown, over some 3/32'' music wire and bend the two aileron torque rods, one left and one right. Epoxy the torque rod bearings (the brass tubes) to the trailing edge as shown and add the 1/4'' balsa fairings. Trim the 1/4'' aileron stock to fit from the torque rod bearings all the way to the wing tip and cut off and glue the last 2'' of each to the trailing edge at the wing tips. Notch the root end of each aileron to accept the torque rod ends and then lay it aside. The ailerons will be installed when the wing is covered. Cut the wing tips from soft 1/8'' balsa and glue them in place with the soft balsa gussets as shown. Install the landing gear mounts and sand the completed wing.

Tail Section:

The stab and rudder are built just like the wing, over the plan. Be sure to add the 1/32'' ply spar doublers to the leading and trailing edge of the stab; they add very little weight and a lot of strength. Note the stab is made from 1/4'' balsa and the rudder from 3/16''. The leading edge of the fin should be hard balsa and the rest medium soft — be conscious of weight in this area. The elevator and rudder are cut from the corresponding sizes of soft balsa. Notch and glue the 1/4'' hardwood dowel into the leading edge of the elevator before cutting the rudder clearance indent in the trailing edge. Sand everything well and round all edges; the mating surfaces will be hinged when they are covered.

Fuselage:

Cut the fuselage sides from a slab of 3/32'' medium balsa that is made by gluing two sheets of 3'' x 36'' stock along their edges to form one sheet 6'' wide. Use the sides as templates to cut the 1/32'' ply doublers and epoxy them in place, one right and one left. When the glue has set, pin the two sides together with the plywood inside and edge sand them to the same outline. While they are pinned together, drill the two 1/4'' holes for the wing holding dowels. Use fairly soft balsa for the 1/8'' longerons and uprights aft of the wing and fairly hard balsa for those forward of the wing. Use medium balsa for the servo mounting rails. Cut and drill the 1/4'' plywood firewall for the engine mount, fuel and overflow lines, and the throttle line. Install T-nuts on the aft side to engage the engine mount bolts and epoxy them in place. Cut former F2 from 1/8'' plywood and build up F3 as shown.

Use a small square to check alignment and glue formers F2 and F3 to the inside (ply doubler side) of one of the fuselage sides. Again, using the square, glue the other side directly over the first on the two bulkheads. When everything is dry, bevel the two sides at the tail and join them, now bring the sides together at the front and epoxy in the firewall. Check overall alignment.

Before the sheeting is installed on the top and bottom, the following steps should be taken: Install NyRods from the servo area to the elevator and rudder as well as inner NyRod through the firewall for the throttle line. Glue a piece of 1/16'' sheet balsa under the nose at the firewall and install the inner NyRod for the nose gear steering. Glue 1/8'' brass tube fuel and overflow carry-throughs into the firewall and install the lines and tank. The tank rests on a bed of foam and is wedged in place with the same material. Cut the 3/16'' soft balsa bulkhead to fit tightly against the back of the tank. Place a wedge of foam over the tank to hold it in place and sheet the fuselage top and bottom with crossgrain 1/16'' sheet balsa. Sand the completed fuselage.

The airplane was designed to be covered with one of the plastic films; follow the instructions packed with the film for covering procedures. The same material makes excellent hinges, or the more conventional type hinges can be used. Epoxy the aileron torque rods into the ailerons after they are covered and when they are hinged to the wing.

Final Assembly:

Cut a slot in the top of the fuselage where the leading edge of the fin makes contact and remove a strip of the covering material from the area covered by the fin. Remove the covering from the center of the stab in the area covered by the fuselage cut-out and epoxy the stab in place. The bottom of the fuselage is flat and can be used to align the stab, and the stab, in turn, can be used to align the fin-rudder assembly. Use epoxy sparingly in this area.

Bend the main gear from 3/32'' steel wire and the nose gear from 1/8'' wire if a commercial unit is not available. Drill the engine mount to fit your engine and the 1/8'' hole through the mount for the nose gear and install the mount on the firewall. The nose gear steering arm is a 1¼'' piece of 1/8'' copper tube flattened on both ends, one end is drilled to fit over the 1/8'' nose gear and the other to fit a clevis soldered to the steering cable. Solder the arm in position just above the coil as shown. *(Plans show a Goldberg 1/8'' nose gear and steering arm.)* Slip a wheel collar above the steering arm and place the gear up through the hole in the engine mount and hold it in place with another wheel collar above the mount. Adjust the two collars until the gear is positioned as shown, and tighten them. The main gear is installed in the gear mounts with small wood screws and mounting straps. The wheels can be held in place with wheel collars but I prefer solder and washers. Bend and install the tail skid and mount the engine.

The servos are mounted on plywood trays. In the fuselage the tray accepts three servos and is glued to the rails previously installed. Before the servos are mounted, it is a good idea to temporarily put the batteries, receiver and servos in place and check for balance. The C.G. should fall in the range indicated on the plans. If it does then complete the installation. The throttle line shown on my aircraft is a length of florist wire from the servo to the throttle arm through the inner NyRod. I like to bend a V-shaped kink in this wire between the firewall and the throttle arm to act as an adjustment and also as an over-ride to eliminate servo stalling. The nose gear steering cable is attached to the rudder arm with a swivel link and it is used to adjust the nose wheel centering. NyRods are used to the elevator and rudder with L bends at the servo end and clevises to the elevator and rudder horns; threaded rods and clevises connect the ailerons. Adjust all controls to neutral when the transmitter sticks and trims are centered; adjust the throttle for full idle. Range check the system and let's fly.

Flying:

There should be no surprises here, make sure that the C.G. is in the right place, there are no warps, the surfaces move in the proper direction with the transmitter sticks and that the engine will hold a good solid idle.

Homer will not take-off by himself so apply some back pressure on the sticks when you are ready to rotate. This is a groovy airplane and will pretty well stay where it is aimed; the control response is solid and smooth and it is a very pleasant airplane to fly. Landings are nearly automatic and can be almost walking slow. The ailerons are effective into the stall, so control is positive all the way to touch down. With a good instructor, Homer is an excellent trainer and the fuel mileage is such that the student should be trained before the first quart is consumed, fuel that is! □