EARLYBIRD

● Everything I've ever designed or built was for a need — usually because I needed something to fly. I don't use up a lot of airplanes, but I've "bought the farm" with (at least) my share over the years. It was never my fault, of course! Either I ran out of up (or down) and gravity got 180 degrees out of phase, with the ground coming up to meet my ship turning a figure 8 into a figure 9, or something . . .

The Earlybird wasn't designed just to have something to fly. At the time of its conception, I had three or four presentable, fine-flying birds ready to go, but I hankered for something a little different. Different is easy. Lots of ships are different — like green hair. But I wanted more than something different. I wanted a ship that was aerobatic, quick to build, and one with enough eye appeal to impress the crew at the local flying site — something with the flair and glamour of antique aviation — a new classic. And it had to be a bird which a new RC'er could assemble easily and quickly to use as a flying platform on which to build that (essential) 100 flights or so, leading to self-reliant RC proficiency.

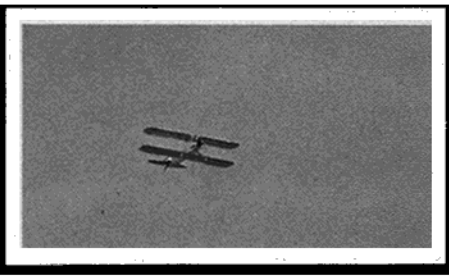
Anything a beginner can keep together for that first 100 flights is an acceptable trainer, but "controlled", overly-stable (almost) free flights don't really teach anybody to fly. Although many mild pattern ships make fine first RC's, most newcomers are afraid of them. There are those fledgling pilots, of course, who want to start with a 4-engine amphibious flying boat or a bomber with retractable landing gear, operating gun turrets and bomb bay doors! If you're new to the sport, trust me. That ain't the way to go — honest!

I believe a newcomer to RC is entitled to a really jazzy, good flying first RC. Something that has enough eye appeal to ensure acceptance and maybe even a bit of admiration from one's modelport peers. A little shot for the ego - - - an attractive soul orchid, if you please. EarlyBird's open Warren-Truss fuselage fills the bill and turns heads at every

Leroy Myers with EarlyBird bipe and low wing monoplane used by the M.A.R.K.S. Barnstormers Air Show Team for Eastern Shore shows. The EarlyBird bipe is a show-stopping winner for newcomer or expert.

BIPE

BY
HOBIE STEELE



An easy-to-build, aerobatic beginners bipe which experts enjoy - - - and with the classic appeal of a full scale antique. A two-winger, simple to construct for the inexperienced and docile enough for a first RC aircraft. Yet, the EarlyBird is agile aplenty for grandstanding barnstormers - - - mainstay of the MARKS Air Show Team.

flying field I've been to, but mainly, we ended up with a fantastic flying machine for beginners and barnstormers alike.

EarlyBird is designed around a .19-.40 engine for a balance between transportability, economy, and consistent flight performance in even moderate winds. (If you're new, you might as well know — it's always windy on Sundays — unless you decide to take a day off from flying to go sailing, as we occasionally do down here on the Chesapeake Bay — then it's calm.

The first rough sketches were for a monoplane and were hardly finished before Wild Don Reynolds said he had to build one as a bipe. Some scissors and tracing paper quickly produced the EarlyBird Bipe and then it seemed everybody wanted to get in on the act, so the monoplane went on the back burner for a while. Anyone who saw EarlyBird asked for plans and we soon had several bipes flying. Incidentally, the Sullivan PDQ foam wing (clipped) was used on one prototype and performed very well indeed. After slight fine-tuning of the prototypes, the design was finalized with ideas from several M.A.R.K.S. (Mid-Atlantic Radio Kontrol Society) members and here you are. I must say that I'm deeply grateful to Harold Ruark, Leroy Myers, John Chapis, Fred Adkins, Sam Fluharty, Chick Allen, and Bert Belt for all their help and encouragement on development of the design concept.

OK, you're sold. Get the goodies together and let's start building.

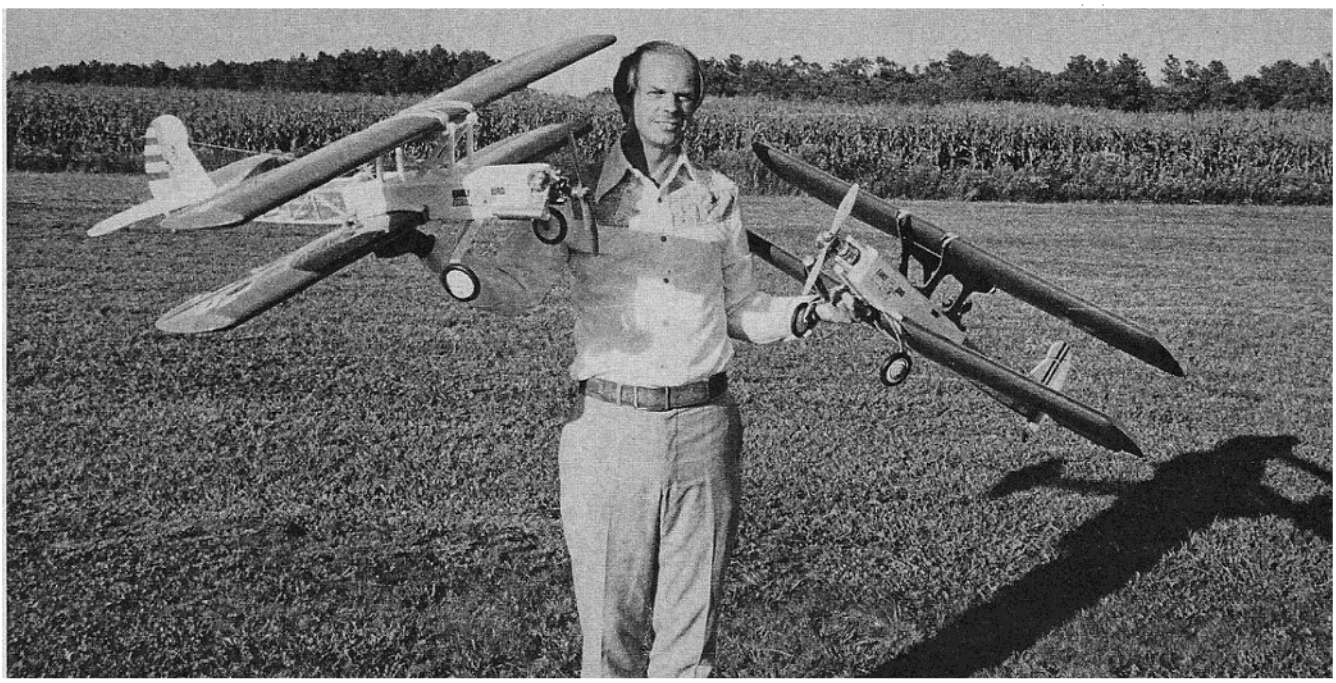
FUSELAGE

Cut out 1/16" fuselage sides, 3/16" doublers, 1/4" balsa formers, and 1/4" ply firewall F-1. Then cover the fuselage side shown on the plan with plastic wrap or wax paper before starting assembly. Build the right side by pinning down one doubler and gluing the 3/16" square spruce longerons to it, pinning to shape over the plan. Next, cut and glue the 3/16" square uprights and 3/16" x 1/8" diagonals, allowing the entire assembly to dry thoroughly.

When dry, carefully remove the pins from the framework and lay another piece of plastic wrap or wax paper on top of the open framework of the completed right side and build the left side directly on top of the right side and allow to dry. *Note* that the diagonals of the left side run in the opposite direction from those of the right side for the "X" effect of two (opposite) Warren Trusses.

Cut the 3/16" square top and bottom cross braces and 3/16" x 1/8" diago-

Hobie's "first wife" shows an EarlyBird bipe with low wing monoplane. EarlyBird of similar open fuselage construction on the ground. All three are barnstorming beauties.



Hobie with two M.A.R.K.S. members EarlyBird Bipes –one with balsa wings and the other with Sullivan P.D.Q. foam wings (clipped). They are gentle yet magnificently maneuverable aerobatic cow pasture performers –even fly knife edge. Some are being flown in impromptu pylon races.

nals, then assemble the firewall, formers, and sides over the bottom view on the plan, checking alignment carefully. When dry, pull the fuselage sides together at the tail and glue in the bottom, then the top cross braces and diagonals, alternating the direction of the 3/16" x 1/8" diagonals as on the fuselage sides. If you cut the top and bottom pieces alike — at the same time — you'll end up with a square box (instead of a weird triangle). Check alignment and symmetry very carefully, allow to dry, and remove the structure from the plan. The 1/16" fuselage sides may then be laminated to the doublers and longerons with contact cement or epoxy.

The bottom is sheeted with 1/16" ply and the top with 1/16" balsa (applied with the grain running across instead of fore-and-aft). The tank hatch is 1/16" ply and held at the four corners with screws into the spruce longerons. The firewall is reinforced with triangular balsa stock. Drill for the wing hold-down dowels or install your favorite wing "holderoners". Drill for the landing gear dowel and hold your bit *straight* so the holes are exactly the same on both sides.

Sand your EarlyBird's fuselage smooth being careful not to round off the corners too much. It's easy to get carried away at the corners resulting in a weak structure.

7/8" diameter circles can be cut from poster paper or thin cardboard for gussets, if desired. The cabane is assembled as shown on the plans and glued to the inside (or outside) the fuselage *exactly as drawn*. (If you're experienced, you can set them on an angle at the top fuselage corners but alignment and reinforcement is more difficult.)

EMPENNAGE

The stabilizer, fin, rudder, and elevator are all made from 1/4" sheet balsa as indicated on the plans. Add aerodynamic balance "bumps" and round off all corners nicely. Note that the elevators are notched and joined with hardwood at the center.

The fin must be glued on the stabilizer absolutely square and reinforced as shown on the plans with balsa gussets. Use drawing triangles to be sure it is precisely perpendicular to the stab.

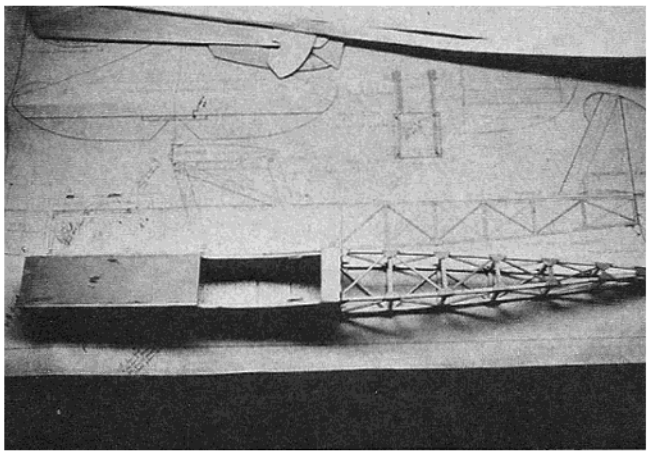
WING

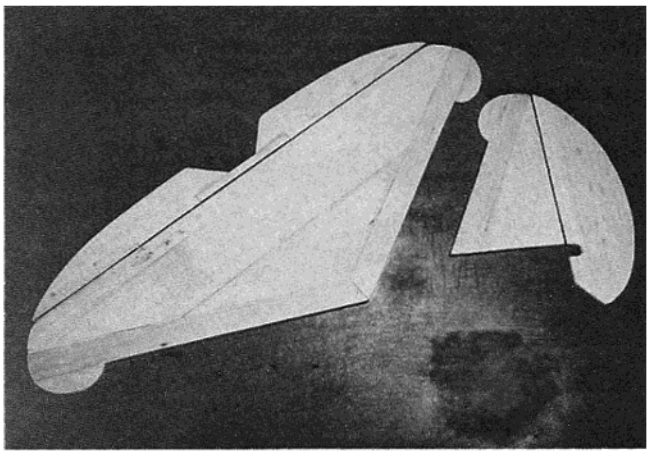
The wing is constructed with a unique I-Beam spar (courtesy of Jim Newman) which is unbelievably strong.

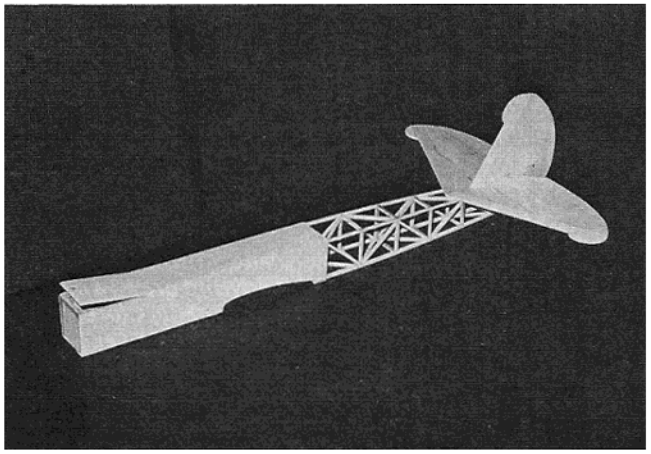
With the 3/32" wing ribs, 1/16" balsa (1" & 2") sheeting, 3/32" webbing material, 1/16" x 1/4" cap strips, balsa tips, 1/16" x 1/2" plywood spars, triangular balsa leading edges (l.e.), 1/8" square trailing edge (t.e.), plus 1" tapered t.e. stock, you're ready to start.

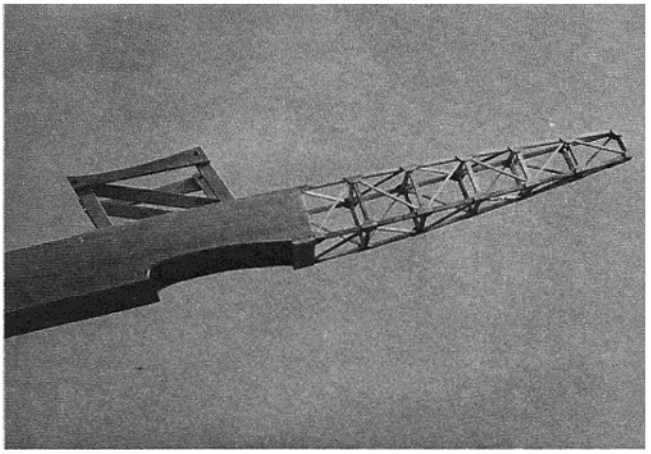
Both wings are identical except for movable ailerons on the bottom and I recommend that both the top and bottom wings be built perfectly flat with no dihedral. You can build the right and left panels in one piece on a suitable (straight) building board. (Up to 3° dihedral may be used in the bottom wing but will affect looks more than anything else — and doesn't even help the looks. EarlyBird is stable enough with zero dihe-

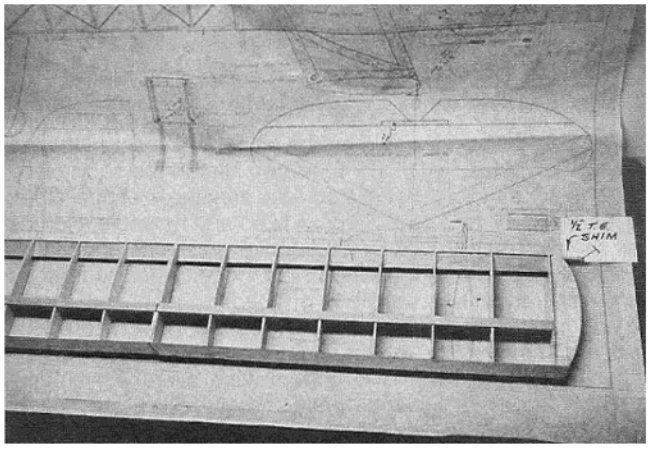
TYPE AIRCRAFT
Sport Biplane
WINGSPAN
46½ Inches
WING CHORD
8 Inches
TOTAL WING AREA
740 Square Inches
WING LOCATION
Biplane
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
None
O.A. FUSELAGE LENGTH
36 Inches
RADIO COMPARTMENT AREA
(L) 10½" X (W) 2½" X (H) 3"
STABILIZER SPAN
21 Inches
STABILIZER CHORD (incl. elev.)
5¾" (Avg.)
STABILIZER AREA
121 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7 Inches
VERTICAL FIN WIDTH (incl. rudder)
5½" (Avg.)
REC. ENGINE SIZE
.19 — .40 Cu. In.
FUEL TANK SIZE
6—12 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Four
CONTROL FUNCTIONS
Rudder, Elevator, Throttle, Ailerons
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply & Spruce
Wing ..... Balsa and Ply
Empennage ..... Balsa
Weight Ready-To-Fly ..... 72 — 80 oz.
Wing Loading ..... 14 — 15.6 oz./sq. ft.

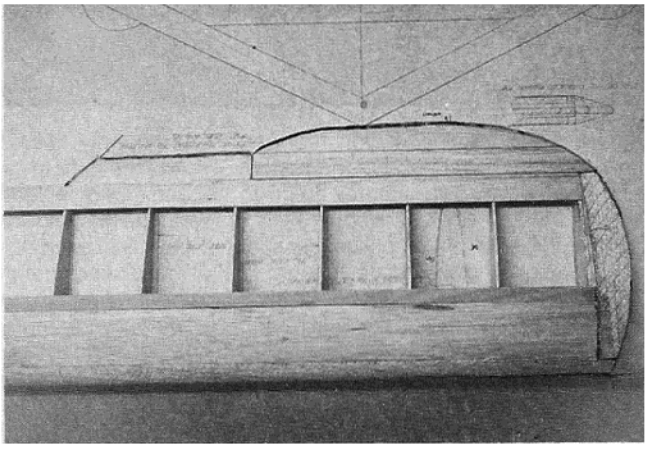




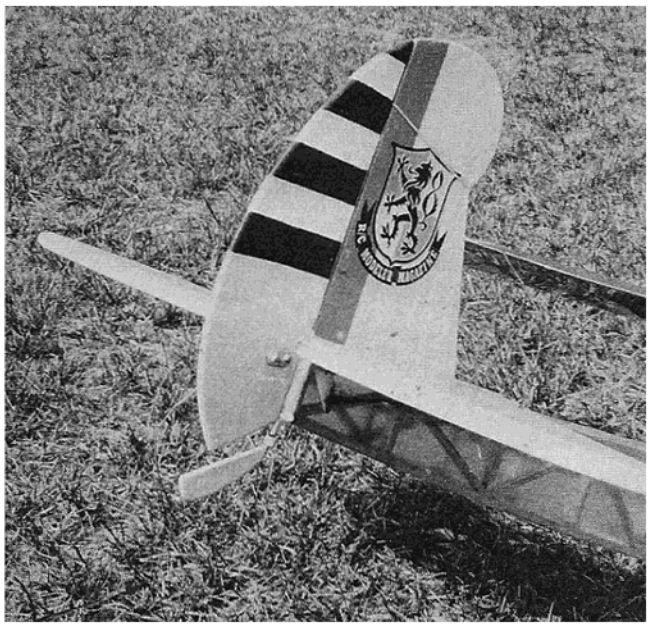


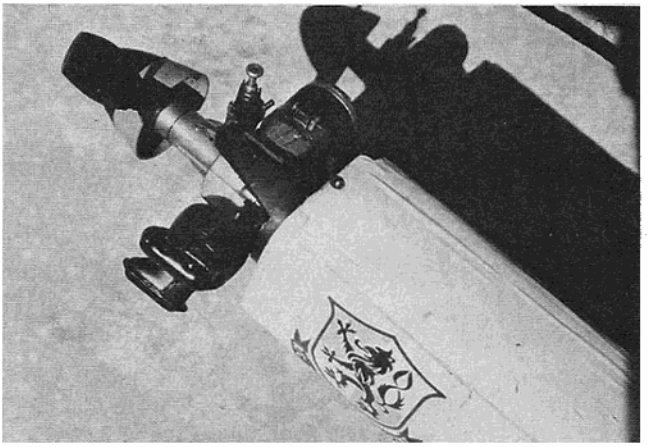


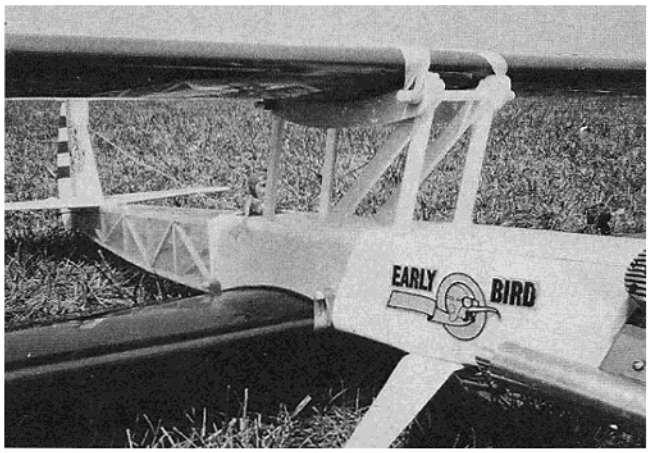




1ST ROW: (L) Fuselage sides are constructed over plans, one on top of other, then assembled with bulkheads, cross braces, and diagonals over bottom view on plan. Reversing of diagonals on right and left sides, top and bottom, add eye appeal and structural rigidity. (R) Stab and fin are constructed of 1/4" balsa. Elevator halves are joined with dowel. 2ND ROW: (L) Completed fuselage with stab and fin pinned in place. Hatch partially open as if snapping at a mosquito which can run large around the Chesapeake Bay. One M.A.R.K.S. member put 6 oz. of fuel in one before he found it wasn't an aeromodel! (R) Fuselage with cabane installed. Dowels hold the assembly together. 3RD ROW: (L) Wing is built flat (no dihedral) and begins with bottom ply spars laid over plan. Bottom trailing edge sheeting is propped up 1/2", then ribs added from center out (right then left), alternating with 3/32" webbing. Then top spar, 1/8" trailing edge spar and top sheeting is added. This wing is quickly constructed and is incredibly strong. When properly built, it cannot be broken in the air – even on purpose – we tried! (R) Here sheeting has begun and ailerons assembled. Ailerons are movable on bottom wing only and may be of the strip variety, made from 1" T.E. stock or conventional. Barn door ailerons look better and are easy to make. They are cut from 1" T.E. stock for curved outboard section which is glued to 1/4" x 1" balsa and hinged to T.E. on bottom wing; glued to top wing T.E. 1" T.E. stock is glued inboard of fixed and movable ailerons on both wings.







ABOVE, LEFT: Tail skid looks better than wheel and steers quite as well. Bend from 1/16" diameter music wire and make optional plywood skid from workshop scrap. Add wheel if you like, omitting ply. ABOVE: One or more large William Bros. plastic cylinders can be attached to your power plant's crankcase with Velcro to be removed for flying like this one on a K & B .35. It can be further jazzed up with interplane struts, flying wires and other early aeroplane drag. EarlyBird draws a crowd at every flying site – good for the ego. LEFT: Close up of wing hold-down. Muffled K & B .40 is on 45° angle. In flight, the EarlyBird's maneuverability defies its nostalgic look. Flys like the barnstormers it resembles and can do a respectable pattern, including knife edge. EarlyBirds are also being flown as slow pylon racers by some of use whose reflexes aren't quite up to 500 Class racing.

dral even for training. If you feel you must have some dihedral in the bottom wing, cut a plywood dihedral brace to replace the center balsa webbing.)

Place the 1/16" x 1/2" ply bottom spar on your board and shim up the bottom 1" t.e. sheeting (so that the ribs will sit level on the spar) and pin in place. The left and right spars may be butt joined and doubled at the center with the excess cut from the tips to make a one piece wing.

Next, notch the center ribs to go over the center spar doubler and place the center ribs in position, gluing to the bottom ply spar and bottom t.e. sheeting, remembering to leave 1/8" space at the t.e. for the 1/8" square t.e. spar to sit on the bottom 1" sheeting and against the ribs.

Insert 2 pieces of 3/32" x 3" balsa webbing, cut to proper length, and glue (vertical grain) — one to each side of the center ribs. Glue the second rib to the bottom ply spar, bottom t.e. sheet, and to the webbing already in place. Continue until all ribs are installed out to the tips.

Now add the 1/8" square t.e. spar, top t.e. sheeting, center section sheeting, top ply spar, top leading edge sheeting and top cap strips. Allow to dry thoroughly, then turn over, re-pinning. Add the bottom t.e. sheeting, cap strips, and triangular leading edge (block sanding the ribs and sheeting, if necessary, to insure a good fit. Check the alignment with a ruler, straight-edge, and eyeball. If the leading edge has any twist, or isn't perfectly straight, pin to a straight shim fastened to the building board at the l.e. Absolutely true, perfectly straight flying surfaces are imperative to this (and any) aircraft. Take your time and do it right.

Allow the wing to dry thoroughly and construct the other wing in the same manner.

Now decide whether you want to use strip or conventional ailerons. EarlyBird's "barndoor" ailerons are as easy to rig as strip, but the choice is yours.

With strip ailerons, the tapered trailing edge stock is affixed to the t.e. of the wing after construction and actuated on the bottom wing by regular strip aileron hardware following the hardware manufacturer's directions. The top wing strip ailerons are glued in place unless you're going for aerobatic competition in which case you know what to do, right?

Conventional ailerons require only cutting the tapered t.e. stock as indicated on the plans, then cementing the 1" x 1/4" aileron filler to the short piece of t.e. stock and sanding to shape. Note: 1/8" "up" in fixed and movable ailerons gives washout for great slow speed performance. The longer piece of tapered t.e. stock is glued to the inboard t.e. of the wing, being careful to align it properly so that you don't end up with "flaps".

The bottom wing ailerons are functional while the top ones are simply glued in place after shaping. The bottom ailerons are hinged conventionally and can be actuated by bellcranks or Sullivan flexible pushrods which work really fine. Cut the servo opening in the center section of the bottom wing and add the servo mount to fit your installation. This sounds like I'm passing the buck, but if you're new to RC, an experienced friend should advise you on your control installation and hook-up. There are some good publications for newcomers from RCM's Anthology Library (see ad in this issue) which can make complex problems like control set-up pretty simple if you're a loner. Now, temporarily install the aileron horns.

Check the controls with your transmit-

ter and be sure you have 3/8"-5/8" up and down throw (or more) with conventional ailerons (which may require a fairly long servo arm or large output wheel on some servos.) Strip ailerons need only 1/4"-3/8" throw.

Remove the servos and sand the wing carefully, removing as much as necessary to achieve the proper shape and no more. Lightly sand with fine sandpaper to receive the covering. It's often easier to wait for hinging surfaces (ailerons) until covering is completed, but everybody has their own favorite method. If you don't have a favorite method, ask someone if you can use theirs.

Fiberglass or nylon reinforcement epoxied over the center section and where the rubber bands contact the leading and trailing edges of the wings will prevent the rubber bands from cutting into the wing structure.

FINISH

Cover and finish to your own taste. This is sort of a cop-out, but we do recommend an iron-on, such as Permagloss Coverite for that antique look. The stab and fin may be covered prior to assembly but keep the covering and finish off of the parts to be glued together so that your glue will stick. Coat the inside of the tank compartment with epoxy for strength and to prevent fuel soaking. The open structure may be brushed or sprayed with epoxy, urethane varnish, or dope, but keep it off the wheel sides if you plan to use an iron-on cover there. Some have covered the open structure with clear MonoKote which keeps the structure clean without detracting much from the old time look.

FINAL ASSEMBLY

Glue the stab to the fuselage and check the alignment carefully, ensuring that the vertical fin is straight with the center of the fuselage.

The tail skid bearing is wrapped with string and epoxied to the tail. Insert the tail skid strut through the bearing at the tail; bend aft on top to fit the hole drilled in the leading edge of the rudder so that the rudder horn will hold the aft-extending wire for steering. You may use a tail wheel or a plywood skid which looks better and steers fine on the ground. Install the rudder using hinges carefully notched into the surfaces with toothpicks inserted into a hole drilled right though the balsa and hinge material to hold sercurely. Or, simply use epoxy to anchor the hinges, but keep the epoxy out of the tiny space between the surfaces so that the controls will move easily. When dry, ensure that the rudder and steerable tail skid work smoothly with no slop or binding, then slip a washer over the bottom of the strut, up to the bottom of the bearing and solder carefully in place.

Using the same procedure as on the rudder, install the elevator and aileron hinges. Install hardwood or plywood servo rails to fit your particular servo tray, then install your servos and hook up the Sullivan pushrods to the servos and to the rudder and elevator horns. Fasten the horns to the rudder and elevator — again ensuring that all controls work smoothly with no binding or slop. Do the same with the aileron linkage. If your controls don't work perfectly, fix the problem *now.* You should have 1/2" engine. Don't correct the thrust adjustments now, just make a note to do so before flying (then remember to do it, for goodness sakes!).

With the stab still level, measure from the table surface to the center of the leading edge of the bottom wing and from the table to the center of the trailing edge. Are the fore and aft vertical measurements precisely the same? They must be! The only deviation permitted is like to slip plastic freezer bags over the receiver and the batteries, securing them, where the wires come out, with rubber bands. Install your fuel tank and associated necessary "plumbing". Finally, install the wheels.

NOW STOP!

Before we wind up (and for those of you who read only the beginning and the end of articles) let's try a famous admonition: *When all else fails . . . try following the instructions!* Or, as Bob Dunham stated in his early Orbit (tube-type receiver) instructions "skip the instructions . . . you can read them by the bright blue flash of B-Plus to filament!" In short, B.L.D.G.P. (Build Like The Dad-Gummed Plans). This next step is the single most important element in the entire assembly procedure. Please don't skip it.

FINAL SET-UP

On a level surface like the kitchen table, prop up the tail of your EarlyBird until the top of the fuselage is level with the table surface by measuring from the table to the top of the fuselage just aft of the tank hatch and, again, just forward of the stab. To be sure it's level, measure from the table to the center of the stabilizer leading edge and the center of the elevator trailing edge (with the elevator precisely in neutral, of course). The measurements at the center of the stab leading edge and elevator trailing edge should be exactly the same — if not, adjust the prop under the tail so that the stabilizer is level (0 degrees).

Now eyeball your engine from the side. If it's pointing straight ahead, or slightly down, great. If not, make a note to add washers as necessary to achieve straight (or slightly down) thrust. Next, eyeball the engine from the top. It must be straight ahead or have a touch of right thrust; that is, your prop nut should point ever so slightly to the right when looking from tail toward nose and down onto the engine. Don't correct the thrust adjustments now, just make a note to do so before flying (then remember to do it, for goodness sakes!).

With the stab still level, measure from the table surface to the center of the leading edge of the bottom wing and from the table to the center of the trailing edge. Are the fore and aft vertical measurements precisely the same? They must be! The only deviation permitted is that the *leading edge* of the bottom wing may be 1/32" higher (longer measurements from table top) than the trailing edge, but no deviation is preferable. Anything else is unacceptable and must be corrected by trimming the fuselage wing saddle as necessary, then rechecking, as above, until the wing is 0 degrees angular difference (decalage) with the stabilizer — or no more than 1/32" positive incidence. The same is true for the top wing. Do it!

Now eyeball the top and bottom wing from the front, nose-to-nose with your engine prop shaft. Is the alignment correct laterally? You can check by measuring from the right and left tips of the bottom wing to the table top, then check the top wing the same way. To be sure the landing gear isn't throwing you off, center the fuselage laterally, measuring for equal spacing between the right and left stabilizer tips and the table top.

Make any engine thrust adjustments necessary and balance your EarlyBird at the point shown on the plans. The nose may hang slightly down when balanced at the point shown, *but the nose may not point up even a little bit.* If it does, shift the batteries or add weight to the nose as necessary for balance.

One hour spent on the preceding set-up will be worth many hours trying to fly an out-of-trim or unbalanced airplane (or rebuilding a splattered mess).

FLYING

Tell all the guys gathered around that it's an EarlyBird and ask them to leave you and your instructor alone for a while, then perform a radio check following your radio manufacturer's instructions and another with the engine running. Be certain your engine is properly broken-in with a reliable idle. If you're a newcomer, get an experienced flyer to make the first flight, giving you the box when your EarlyBird is trimmed out and high enough to keep you out of trouble (at least two mistakes high). Tell him to hold some up elevator and simply keep it straight ahead until it takes off, then *ease* the elevator off to neutral. He'll tell you when you're ready to take-off by yourself and (later on) let you know when you're ready to flare out to your first smooth landing. He might even explain why you stretch a short, power off landing by *dropping* the nose a bit and shorten a possible over-shoot by holding a bit more back pressure on the stick than for a normal landing.

When you're tired of impressing the local troops by boring holes in the sky, try practicing the AMA "A" pattern. You may find you're better than you thought.

Enjoy! □

From RCModeler Feb. 1977