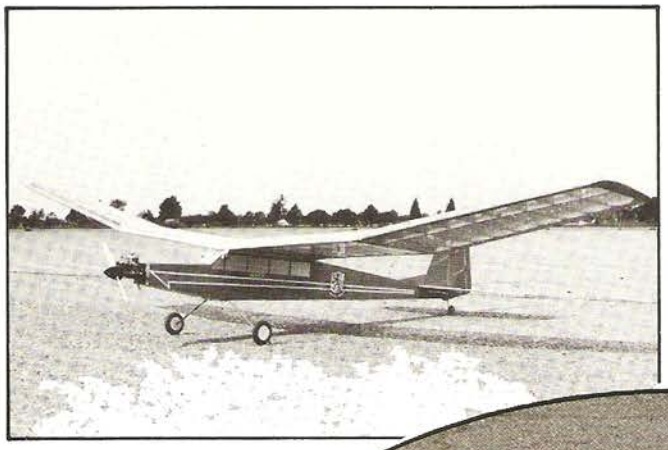
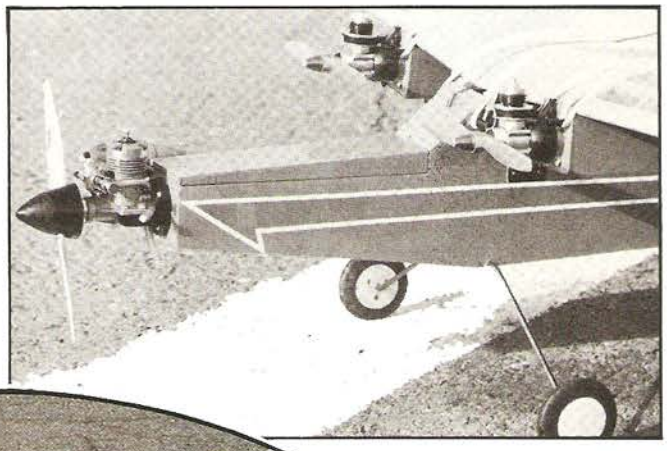
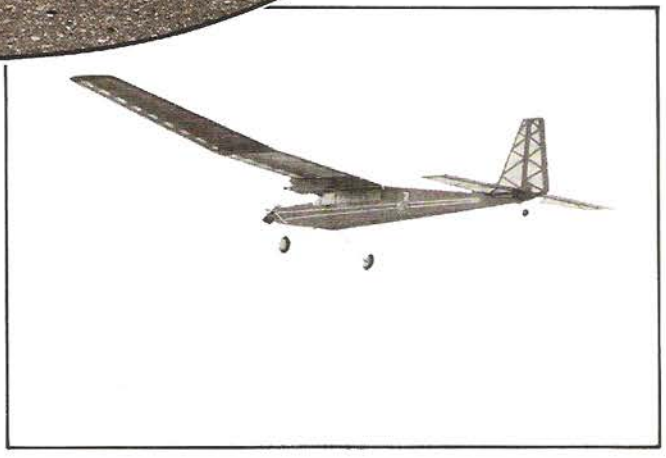
If you don't want to win a pylon race, build a Big Bird. If you don't want to win a pattern event, build a Big Bird. If you are tired of towlines, build a Big Bird. If building scale takes too much time, build a Big Bird. If helicopters frustrate you, build a Big Bird. If R/C costs too much, get more fun per buck, build a Big Bird. If flying R/C makes you nervous, build a Big Bird. If you want to learn to fly R/C quick and easy, build a Big Bird.





RCM

BIG BIRD



The RCM Big Bird was conceived from the realization that we did not have an aircraft design to meet a much needed requirement. From the hundreds of plans that we have available, what could be missing?

It happens to be a powered aircraft that could be recommended as the first radio controlled airplane project, particularly for a person who either does not have, or does not want an experienced R/C'er to assist him.

We are thoroughly aware of modelers who will assemble their first aircraft and go out alone to make their very first R/C flight. The probability of success on this first unaided attempt is very low with the majority of the "trainer" type aircraft.

Dozens of trainers are available with varying degrees of complexity of construction. The Big Bird is simple to assemble even though there are a goodly number of detail parts. It was designed in this manner in order to keep it light, yet strong as weight is a key factor in the Big Bird concept.

Our approach is to combine low weight with generous wing area and a small throttle equipped engine to obtain a forgiving, slow flying aircraft. This allows the new pilot ample time to correct his mistakes before the craft smashes into the ground. In fact, with the craft at a reasonable altitude, if the pilot has managed to get the airplane into an awkward situation, he merely has to throttle back the engine, return controls to neutral, and the ship will right itself.

There are those people who will immediately say that the RCM Big Bird is a powered sailplane with a landing gear. Well, it is, in a way. The wing is a shortened version of the Bridi Big Birdy sailplane wing. The fuselage, however, is pure airplane, designed to be easy to build and rugged enough to withstand lots of abuse. The sturdy landing gear is usually found on aircraft weighing twice as much as the Big Bird.

The rank beginners aren't the only ones who can enjoy the Big Bird --- several of our experienced flying friends have had a ball with it. Unbelievably small consecutive loops, tight turns, and wallowing barrel rolls, all in slow motion, have brought on lots of giggles. Because it is difficult for some of us to play a straight game, we dreamed up the engine pods for Cox .049 QRC engines to strap on the wings and have lots of fun with the phony Ford Tri-motor approach. Somehow we feel that having fun is what R/C is all about.

Speaking of fun, the Big Bird should appeal to those daring model aviators around Dallas, Texas. These dashing pilots have a slow combat event using .15 power and have crepe paper streamers attached to the tail of their aircraft with a length of string. The Big Bird is easier to build than the machines that they are now using. Maybe a Texan will be the first Big Bird ace.

Another aspect of the RCM Big Bird is the low cost of both building and flying. We have been using a Speedie .10 engine from Hobby Shack with excellent results. It is an economical medium performance engine that seems to run forever on 4 ounces of low nitro fuel. There is also the Fuji, O.S., Thunder Tiger, and other suitable engines in this .10 cu. in. size, all are good, just take your choice, you will get more go per gallon.

The construction details shown in our photos graphically describe the assembly of the RCM Big Bird. However, to assist the inexperienced beginners, we are presenting a much more comprehensive set of building instructions than usual.

Our recommended construction sequence begins with the tail feathers. The wing panels are constructed and joined at the polyhedral joint, then the fuselage is built. The aircraft is covered and, finally, with your R/C equipment installed, you are ready to fly. Please read through the instructions before you begin work on each section so you'll know what's coming before you get there. With these few minutes of preparation you can better adapt our notes to your own ways of working.

Our basic adhesives in building the Big Bird was Jet and Super Jet. We also used Wilhold white glue and 5-minute epoxy in higher stress areas.

Tail Surfaces:

The fin, rudder, elevator, and stabilizer are constructed of balsa strips. We reommend that you cut the larger pieces first, using the left-overs for the smaller pieces. The plans have been designed so the fin, rudder, elevator, and stab can all be built at the same time.

Working directly over the plastic kitchen wrap covered plans, cut, glue, and pin all of the outside pieces in place for the fin, rudder elevator, and stab. Add the triangular shaped piece, cut from 1/4" x 1" balsa to the front center of the stab and the center 1/4" x 1" piece. Also add the 3/16" x 1" piece to the bottom of the rudder. Do not add the dorsal fin to the fin at this time. Also add the 1/4" dia. dowel to the leading edge of the elevator.

After the adhesives on the fin, rudder, elevator, and stab have set up, these pieces may be removed from your building board. With the stab resting flat on your workbench, relieve the back of the bottom of the dorsal fin as necessary for the stab. See the plans. Then, with the fin and dorsal fin resting flat on your workbench, glue the dorsal fin to the fin.

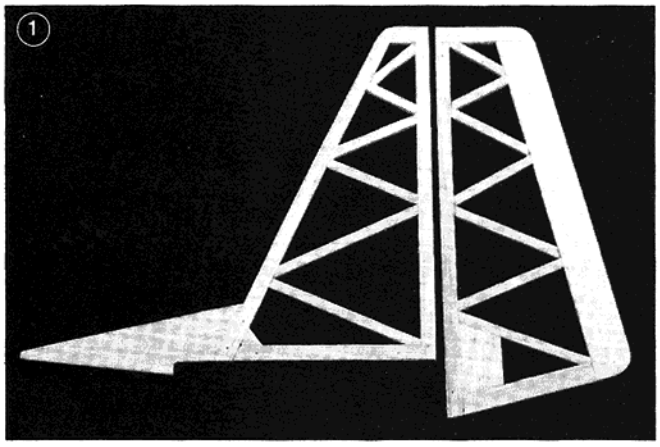
Cut the hinge slots in the stab, elevator, fin, and rudder. Then sand the stab leading edge and tips and fin leading edge and tips to shape. Shape the leading edge of the rudder and elevator to a slight "V" shape as shown on the plans. Sand the elevator tips and rudder tip to shape. Do not taper the trailing edge of the rudder and elevator. Use a sanding block to slightly round the trailing edge of these control surfaces. Finally, use a sanding block to sand the top and bottom sides of the fin, rudder, elevator, and

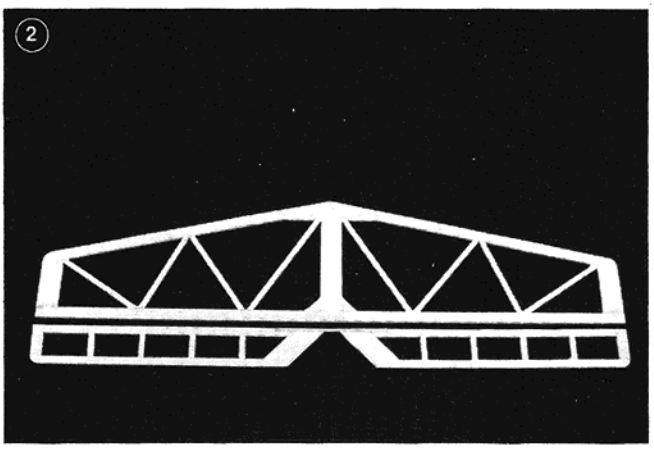
RCM BIG BIRD

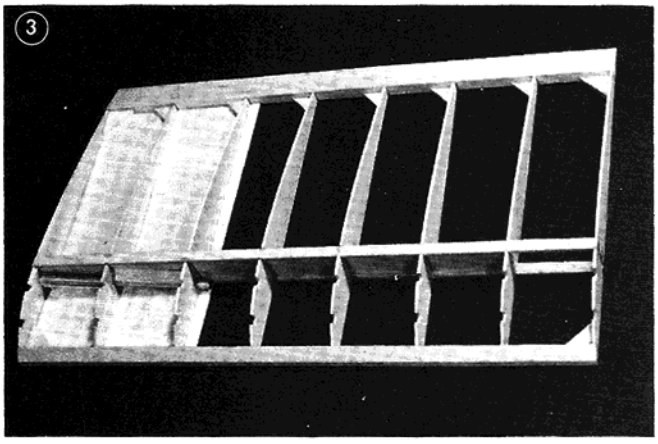
Designed By: Dick Tichenor

TYPE AIRCRAFT
Sport/Trainer
WINGSPAN
84 Inches
WING CHORD
11½" (Max)
TOTAL WING AREA
1360 Sq. In.
WING LOCATION
High Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Straight Center
Tapered Outer Panels
DIHEDRAL EACH TIP
6½ Inches
O.A. FUSELAGE LENGTH
52¼ Inches
RADIO COMPARTMENT AREA
(L) 11¾" x (W)2" x (H)4½"
STABILIZER SPAN
26½ Inches
STABILIZER CHORD (incl. elev.)
6½" (Avg.)
STABILIZER AREA
177 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
8¾ Inches
VERTICAL FIN WIDTH (incl. rud.)
7" (Avg.)
REC. ENGINE SIZE
(1) .15 - (2) .049 (opt).
FUEL TANK SIZE
4 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Elev., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa, Ply & Spruce
Empennage ..... Balsa
Wt. Ready To Fly ..... 56 Oz.
Wing Loading ..... 16.25 Oz./Sq. Ft.

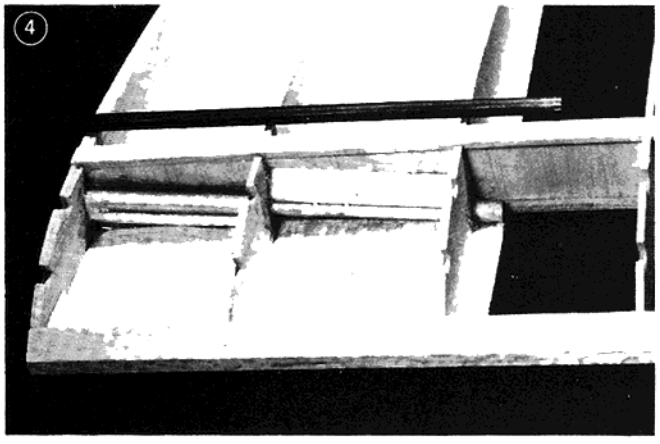
BY DICK TICHENOR

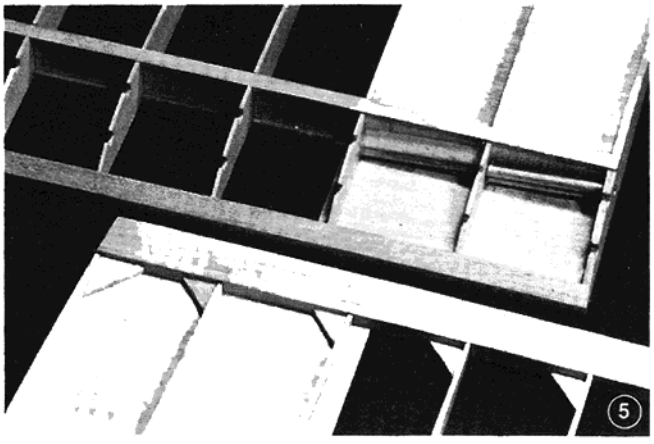






1. Fin and rudder construction.
2. Stabilizer and elevator construction.
3. This portion of inboard wing panel is assembled directly over plans.
4. Detail of wing joining tubes. Note the triangular reinforcements.
5. Inboard wing panel leading and trailing edges.





stabilizer. Sand a notch in the leading edge of the rudder as clearance for the elevator dowel.

Wing:

Because the right and left wing panels have polyhedral, each wing panel is constructed of an inboard and outboard section. As you study the plans we want to call your attention to some design features to keep in mind as you build. First, the first two bays of both the inboard and outboard wing sections are wider than the other bays. Second, the webbing used throughout the wing bays is installed on-center between the spars to offer a sturdy "I" beam spar configuration. Note, however, that no webbing is used in the bays adjoining the polyhedral joint; a ply polhedral brace is used in these wing bays.

To join the right and left wing panels at the center, a 1/4" steel rod is used. The rod slides into an aluminum tube glued in place in each wing panel. To provide a good glue surface for the aluminum tube in each wing panel, an additional piece of webbing is added in the first two bays of the inboard wing sections. These added webbing pieces are glued in place so they are flush with the front of the top and bottom spars.

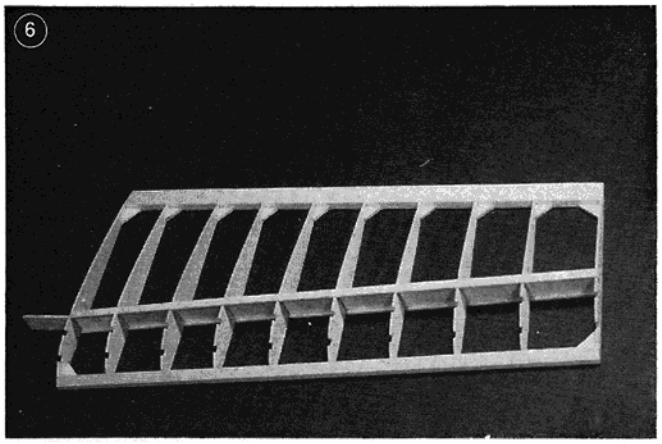
As is normally done, the wing sections are built directly over the plastic kitchen wrap covered plans on a flat building board. Begin work on the inboard section of the right wing panel by preparing the spar webbing pieces. From a 3" wide sheet of 1/8" thick balsa sheet, cut 1" long pieces (the grain must run in the 1" direction). Check plans for distance between ribs and cut webbing to fit.

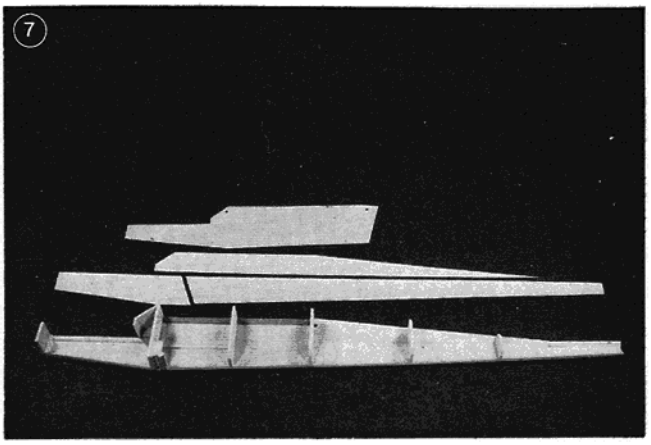
The webbing pieces for the root bay should be cut to the dihedral angle at which the root rib is installed. Use the dihedral gauge ⊗ provided on the plans as a guide to cut the angle on the root rib end of the webbing pieces for the right and left inboard wing sections.

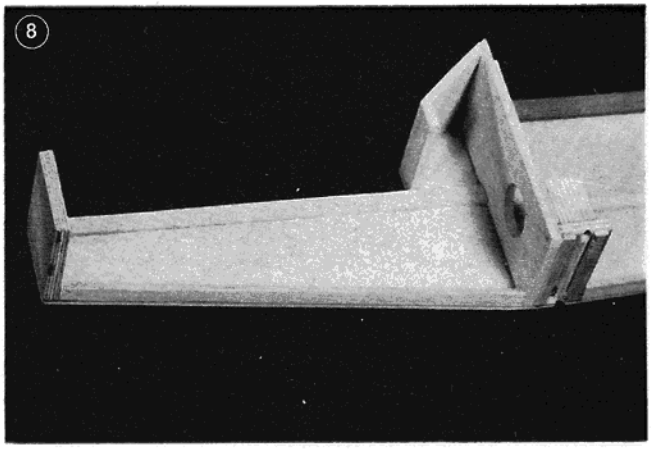
To hold the spar down until the ribs are pinned down, groups of three pins may be used. That is, two pins are used on one side of the spar with one pin located mid-way between them on the other side of the spar.

Cut and glue the bottom sheeting pieces together and to the spar. Pin them in place.

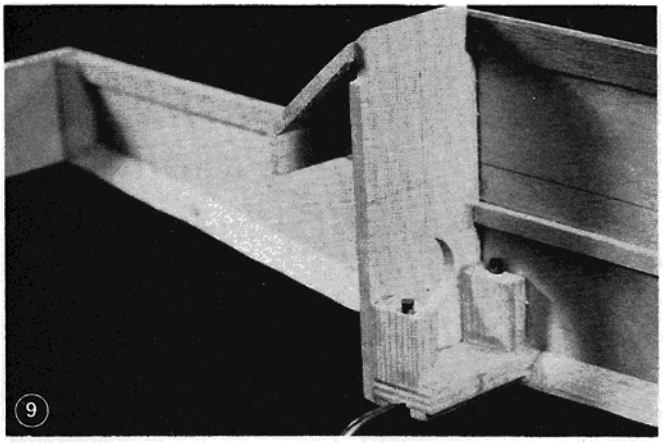
Note that the root rib and second rib are smaller from top to bottom to allow for the sheeting in the area of the root bay. Working from the balsa root rib outward (the ply rib is to be installed later), glue a rib in place, then the webbing, then the next rib, webbing, rib, and so on. Each webbing piece must be glued to the ribs on each side as well as to the center of the spar. Use the dihedral gauge cut end of the webbing for the root bay to get

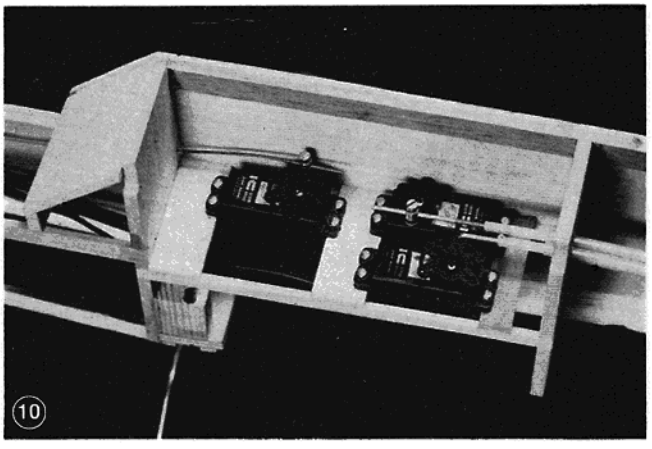






6. Outboard wing structure. Note polyhedral splice plate.
7. Details and first fuselage assembly.
8. Nose assembly details.
9. Landing gear mount details.
10. Radio servos are most easily installed at this stage.





the desired angle of the root rib. Use the dihedral gauge as a guide when you install the rib at the polyhedral joint. The top edge of the root rib should be tipped toward the other end of the wing section. The top edge of the rib at the polydral joint is angled toward the root rib. As you work in this way, using the webbing to locate the ribs, you will find that some of the ribs may be off slightly from their location shown on the plans. That's okay, just as long as the rib at the polyhedral joint is at the location shown.

Glue the leading and trailing edge in place to each of the ribs. Use the dihedral gauge when gluing the root rib and the rib at the polyhedral joint to the leading and trailing edge to assure they are installed at the proper angle. Remove excess adhesive from the glue joints so it won't get in the way of the gussets to be added later.

Glue the top spar in place to the ribs and to the top edge of the webbing pieces. Again, use the dihedral gauge on the two end ribs. Install the gussets.

After the adhesive has set up, the wing section may be removed from the building board. The leading edge, sub spars, and trailing edge should be cut off flush with the end ribs. The top sheeting will be added later after the aluminum tubing is installed.

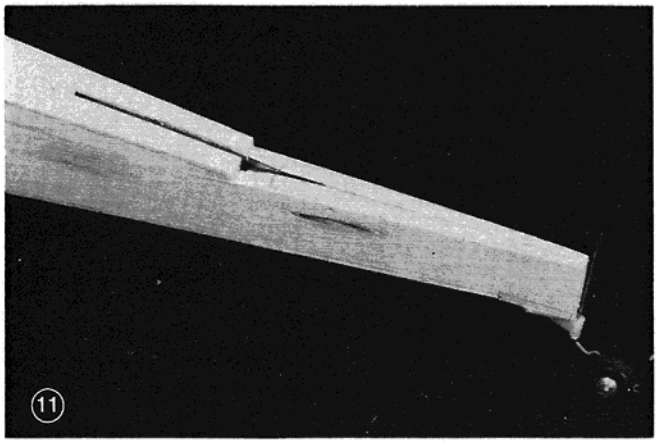
To build the left inboard wing section, the plans must be turned over so that you are working on the back side of the paper. By applying a light coating of vegetable cooking oil (swipe it from the kitchen when your wife isn't looking), the lines will become sufficiently visible for building.

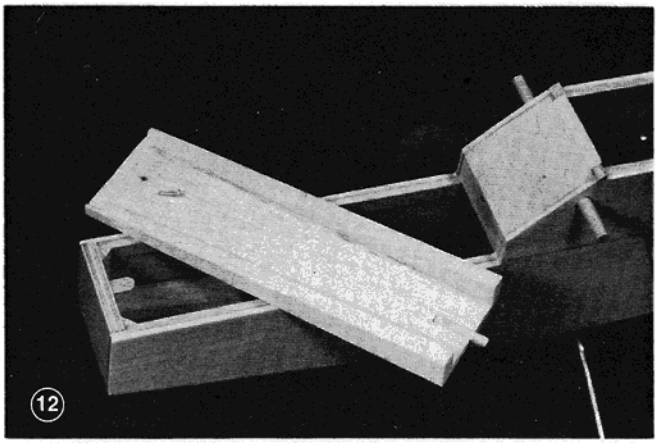
When building the right and left outboard wing sections, a separate gauge is provided on the plans for the rib at the polyhedral joint. This rib is installed so the top edge of the rib is angled toward the wing tip. Note that no balsa webbing is used in the bay at the polyhedral joint. The ply polyhedral brace is installed at that location.

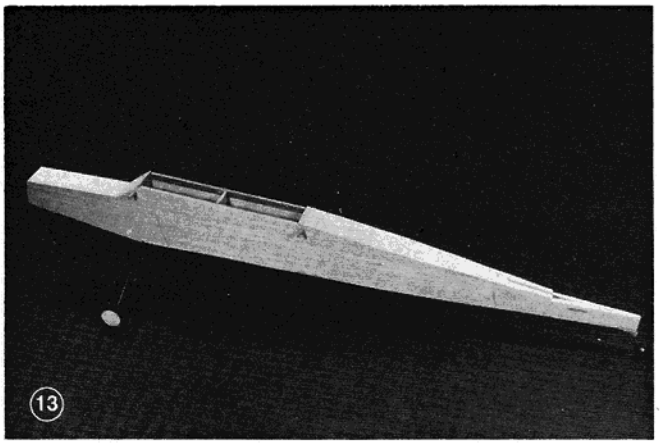
After the ribs, spars, leading edge and trailing edge are installed and the adhesive has had enough time to set up, cut the wood off flush with the rib at the polyhedral joint and at the tip rib. Glue the triangular stock tip block in place so the bottom edge is aligned with the bottom of the tip rib. Sand the tip block to the rib contour and it will assume the top view shown on the plans.

With the wood cut flush with the balsa root rib on both inboard wing sections, hold the wing sections together to check the fit at the center for the desired dihedral as shown on the plans. Sand for as good a fit as possible without sanding away too much of the balsa.

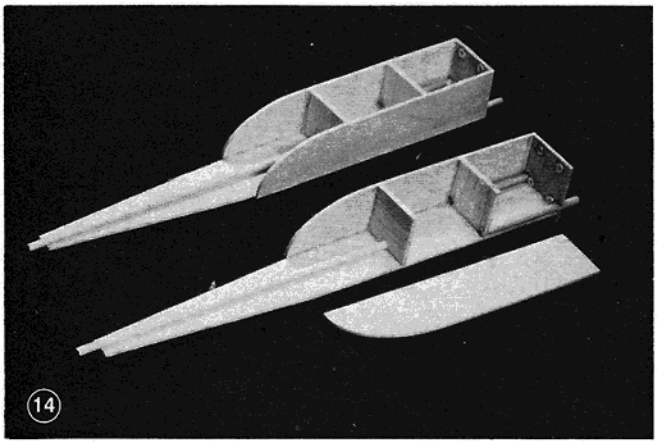
Next, use a tiny drop of 5-miute epoxy at the leading and trailing edge of the ply ribs

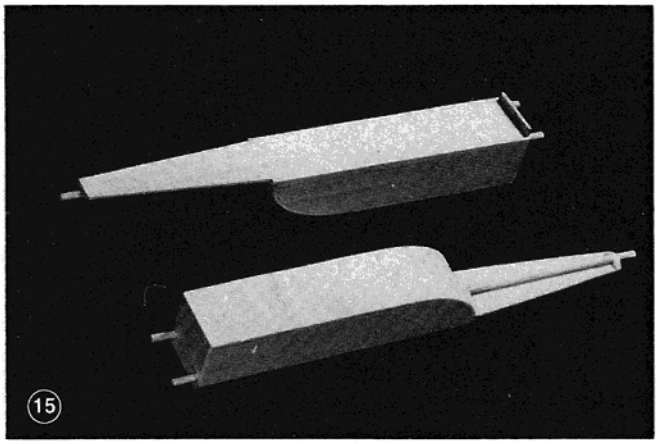






11. Aft fuselage details.
12. Nose hatch details.
13. Fuselage structure completed.
14. Assembly steps for optional nacelles.
15. Nacelles ready for covering.





to tack glue them together, making certain that they are perfectly aligned. Apply 5-minute or slower set up epoxy to the outside of the root ribs on both inboard wing panels. With the ply ribs between them, clamp the wing panels together, making sure that the wing sections are perfectly aligned with each other and that the ply ribs are aligned to the wing panels.

After the adhesive has set up, remove the clamps and cut the tac-glued ply ribs apart. Any gaps between the ply cap ribs and the balsa root rib can be filled with epoxy or epoxy and micro-balloons.

This technique should give you a perfect, no gap fit of the wing panels when they are plugged together.

To provide a sturdy connection between the left and right wing panels, a 1/4'' steel rod is used. A 5/16'' O.D. (9/32 I.D.) aluminum tube is installed in each wing panel to receive the steel rod. By checking the wing plan front view and top view, you'll find that the aluminum tubes are installed so they are glued to the front of the spars and extra webbing piece. If you didn't do so earlier, add the second webbing piece in the first two bays in each inboard wing section so the front of the webbing is flush with the front of the spars.

The holes shown on ribs W1, W2 and W3 are to locate the aluminum tubing. Rough-up the outside of the aluminum tubing with some coarse sandpaper and slide one tube in each inboard wing section so the end of the tubing is flush with the outside of the ply cap rib. Tack glue the tubing to the inside of the root rib.

To check the alignment of the aluminum tubes, slide the steel rod into one wing panel and join it to the other one. Adjust the tubes as necessary by slotting the hole in the ribs so the wing panels mate squarely at the center. When you've adjusted the aluminum tubing so the wing sections mate properly and with the steel rod still in place, clamp the wing sections together at the center. Tack glue the aluminum tube to the front of the spar. After the adhesive sets up, remove the clamp at the center and slide the wing sections apart and back together again to make a final check of the alignment. If it all looks okay, slide the wing together again and glue the aluminum tubes to the ribs and the webbing. Add the triangle stock braces as shown on the plans. Glue a piece of scrap hardwood from the spars at the outboard end of the pieces of aluminum tubing to act as a stop for the steel rod.

Glue the top wing sheeting in place onto the first bay of the inboard wing sections. The balsa sheeting should butt up to the ply

cap ribs.

To prepare to join the wing inboard and outboard wing sections at the polyhedral joint, cut a slot in the area of the ribs to be joined between the top and bottom spars. The slot should be 1/8" wide and at the center of the spars. Then fit the ply polyhedral brace into both wing sections, checking to assure that the leading edge, trailing edge, spars, and ribs mate as they should for a good glue joint. Then glue the ply brace into one wing section. The brace should be glued to the top and bottom spars and to the ribs. After the adhesive has set up, use slow set up epoxy down the ribs, spars, leading and trailing edge and in the slot and top and bottom spars to which the brace is to glue. Slide the wing sections together. Make absolutely certain that the wing sections are perfectly aligned to each other. Clamp the mated ribs together, block up the outboard section and let it set up overnight.

Finish sand the wing leading edge and ribs and sheeting by using a sanding block. Shape the wing leading edge as shown on the plans. Perform a tip-tip balance of the wing by mounting the wing panels onto the steel rod and tape them together at the center. When holding the wing upside down, balance the wing panel at the center. Add weight to the tip of the light wing panel as necessary. We balanced our wing by gluing a medium size nail to the inside of the tip rib of the light panel.

Fuselage:

The fuselage sides are made of three pieces of 3/32" sheet balsa. Three are used because it would cost an arm and a leg to buy a sheet large enough for a one piece side even if you could find it. On the inside of each side sheet is a 1/16" plywood doubler. The outer edges of the doubler are noted on the plans with solid triangles.

Cut out the side pieces and assemble them over the plans. Cut out the ply doublers. The doublers are then attached to the side sheets making sure to **make a left and a right side.** Epoxy is recommended for this assembly to prevent warping. The easiest procedure is to smear the epoxy close to the edges all around the doubler. Then spread beads of epoxy in a zig-zag pattern generously across the doubler. Next, position the doubler on the side sheets being careful to line up the edges and press them together firmly. You did make a left and right side didn't you? If not, you can start making another side correctly.

Mark the location of all formers, strips, and triangle stock with a soft pencil on the right hand side sheet. Glue the strips and triangle stock in their respective locations. Next, the formers are glued in place making sure that they are correctly located and square to the side panels. Use epoxy to attach F1 and F2. Also, use epoxy to attach the landing gear mounting blocks. When the glues have set up, drill holes for the landing gear struts through the 1/4" ply bottom plate and the 3/8" pine blocks. Trim a radius on the edge of the holes to allow the wire struts to seat completely in the groove. Goldberg or Du-Bro landing gear straps are used to retain the struts in position.

This is the most convenient time to make the servo installation. Glue the 1/8" x 1/4" strip between F2 and F3. Next, glue the 1/8" x 3/8" strip and the 3/8" triangle stock between F1 and F2. Install the servo mounting rails, 1/8" plywood, to fit your servos. Follow the radio manufacturers instructions and use the hardware provided to install the servos.

Locate and bolt the engine mount to F1, blind nuts on the back side of F1 and 4-40 screws make a neat installation. Bolt engine to mount and rig the wire pushrod between the servo and the carburetor arm.

The Sullivan Gold'N-Rod pushrods to the tail surfaces can be fitted to the servos at this time. Do not cut the pushrods to final length or secure them in place. Remove the pushrods and set them aside. Also remove servos, engine, and landing gear so that we can finish the fuselage structure.

Install the 1/4" x 1/2" strip at the top left side between F2 and F4. Check to assure that all the structure on the left hand side of the fuselage is even and in a straight line between F1 and F5.

Glue the 3/8" triangle stock to the left hand side sheet aft of F2, top and bottom as shown on the drawing. Check for fit with right hand side and make any adjustments needed for good fit. Measure the plans on the top view of the fuselage at the rear end for the bevel trim of the triangular stock. Trim and sand to fit.

Prepare for assembly the left hand sheet by mixing epoxy and spreading it on the edges of F1, F2 and the landing gear mount. Quickly lay a bead of Wilhold on F3, F4, F5, and the forward structure. With the right hand side resting on a flat surface, carefully place the left side in position, check alignment, and hold in place by weighing it down with any heavy objects that you have handy.

The rear end is glued together and held with pins, clothpins, rubberbands or what-have-you, until the glue sets. Slip the outer tubes of the pushrods back into place and secure with a couple of drops of Jet at each hole where a tube passes through the structure. Trim and sand the tubes flush with the fuselage sides at the rear end.

Attach the 1/16" plywood bottom panels fore and aft of the landing gear groove with epoxy. The 3/32" sheet balsa top and bottom sheeting can now be glued in place. The 1/4" ply tailwheel mount must have a slot sawn to accept the Goldberg tailwheel bracket. Cut notch in bottom of fuselage so that the top of plywood is parallel to stabilizer mount. Epoxy the plywood in the proper position.

Lay out and cut 3/16" wide slot along top centerline for dorsal alignment. Lay out and drill 1/4" diameter holes for wing mounting dowels. Make trial fit with dowels but do not glue in place until after covering is applied.

The nose hatch is assembled from a top piece and two tapered side pieces. A 3/16" dowel is imbedded in the center of the top piece at the aft end. The dowel fits in a matching hole in the cross member below the windshield. The hatch is secured with a #2 x 3/8" screw through the top and into a Goldberg angle bracket that is mounted on the back of F1. A scrap piece of the outer tube of the Gold'N-Rod pushrod is used to bush the screw hole.

If you wish to build the engine nacelles for the Tri-motor version, you will find the plans quite self-explanatory. About the only comment necessary is to suggest that the 2-56 blind nuts needed to mount the engines be epoxied to the aft side of N1 prior to starting assembly.

Now that you have completed all of the structure for the RCM Big Bird, take a few minutes to examine everything and to smooth up all the surfaces with #150 grit, or finer, sandpaper. The smoother the surface, the smoother the covering.

The fuselage, hatch, fin, stab, elevator, rudder, and wing may be covered at this time. Any of the iron-on film covering materials may be used. Follow the instructions that are included with the film. It is easy, just have patience. Then, with the covering material removed from the areas to be glued, the stab and fin are glued in place onto the fuselage being sure that the alignment is true and square. Once the fin and stab are glued in place, the elevator should be hinged. Then, the rudder is added.

Check the wing and tail surfaces for warps and correct as necessary by gently twisting while applying heat to the film. Slip the landing gear into position and install the retaining straps.

Final installation of the radio equipment is now in order. Cut a hole to fit the radio switch in the left hand side of the fuselage, opposite the engine control servo and below the servo mounting rails. Install switch (push forward for on). The servos are secured in position and the pushrods are connected between the servos and the horns on the control surfaces as shown on the plans. Pass the servo and switch wires forward through the hole in F2 and plug into their respective connectors in the receiver. Wrap the receiver loosely with 1/2" thick foam rubber and insert it into the receiver compartment as indicated on the plans. Connect the proper switch lead to the battery, wrap the battery with foam rubber and place it forward of the receiver.

A four ounce fuel tank fits in the nose with pieces of foam rubber wedged in around it. Run fuel feed and vent lines through holes drilled in F1. Install engine and connect throttle pushrod and fuel line. Make sure that the throttle goes from full open to low within the complete travel of the servo with **no binding or stalling of the servo.** Adjust as necessary by moving the pushrod to inner or outer holes in the servo arm.

Make a reassuring check of the radio operation by standing behind the tail surfaces with the transmitter in hand. When you move the rudder control to the right, does the trailing edge of the rudder move to the right? When you pull the elevator control toward the bottom of the transmitter case, does the trailing edge of the elevator move upward? When you move the throttle control toward the top of the transmitter case, does the throttle move toward the open position? If the answer is no on any of the above, you have something installed incorrectly and this is the time to correct the problem.

Secure the hatch with the #2 sheet metal screw.

Flying The Big Bird:

It is much safer and most practical for the beginner to have an experienced flyer to assist with the first test flights. He can usually prevent disaster by recognizing and reacting to unexpected conditions that invariably occur, particularly on the first flight.

For those who go it alone, we can only make some basic suggestions. For take-off, use full power, keep it headed directly into the wind, and use very little (if any at all) up elevator to get it airborne. At low altitude you should not make a steep climb or steep turn. Keep the airspeed up by holding the nose down and apply elevator and rudder gently.

If you do not have a suitable place for a usual take-off and must hand launch the Big Bird, keep the following in mind. Launch with the nose level or slightly down, **never with the nose pointed upward.** Launch with enough force to obtain as much airspeed as you can.

When you reach an altitude of 100 feet, or more, go ahead and do what ever you want as it is slow enough to give you time to react for corrections, or just neutralize the controls and it will right itself.

For landing, keep the nose down to maintain flying speed. Steer to line up with the runway, you may need to feed in a bit of up elevator when applying rudder on the landing approach to keep the nose from dropping too much. Level off when the Bird is a couple of feet from the ground and let it settle down. Keep in mind that this machine has a pretty flat glide angle so set up the landing to use the down wind end of the runway.

Fini:

This article has been much longer than usual in an effort to assist the newcomer to R/C. Even so, there simply isn't enough space available to cover every detail. We strongly recommend the RCM Flight Training Course, Vol. I, as the most comprehensive book available on how to build and fly an R/C aircraft. You will find it to be an invaluable aid toward your success in R/C. Flight Training Course, Vol. I, with ordering instructions is shown in the RCM Anthology Library ad in the back pages of every issue of RCM.

We hope that you enjoy your RCM Big Bird as much as we are enjoying ours. □

Editing By Hlsat.
RCModeler
Sep.1980.