PHOTOS BY AUTHOR AND KEN LITTLE

FOKKER TRI-MOTOR "AMERICA"

An out-of-the-rut Classic Era scale design that is an easy and stable model to fly, by the creator of the Navy Flying Boat (Nov. '75 MB) and the Waco SRE (Dec. '74 MB) . . . GEORGE CLAPP

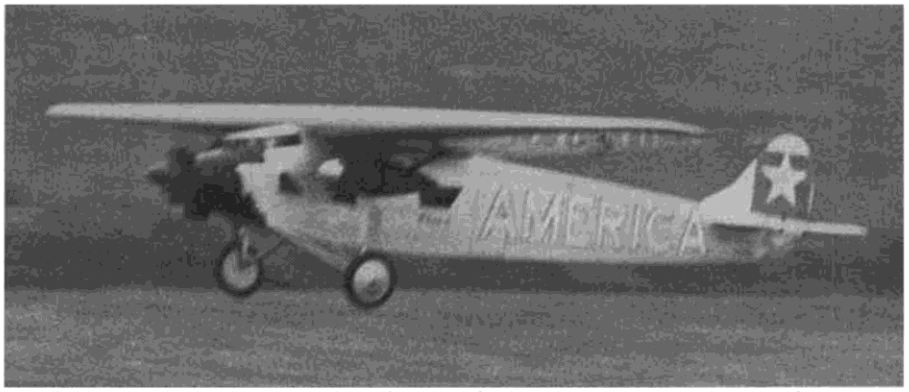
• The aircraft "America", a tri-motor Fokker, has been an interesting subject to me since I first laid eyes on it in a brand new copy of "Aviation" in 1928. I wasn't too far from being new either, at the time, being just 12 years old. I have had the issue ever since.

The following is not verbatim, but derives in large part from that 1928 magazine.

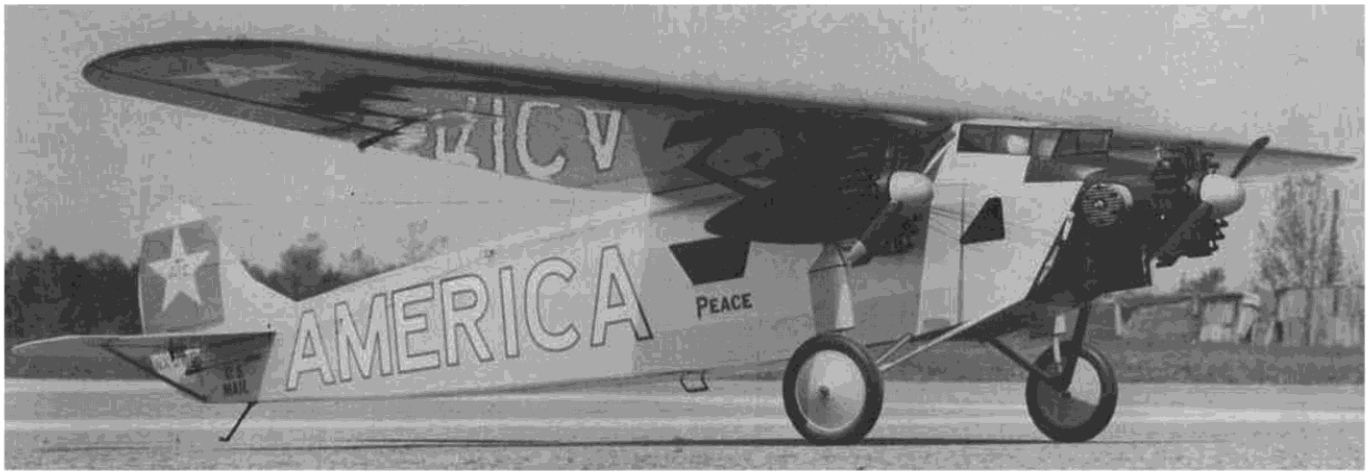
At the beginning of April 1927, at Roosevelt Field on Long Island, Lindbergh, Chamberlain and Livine, Rene Fonch of France, and others, including the then Cmdr. Richard Byrd and his crew . . . Bert Acosta, George Noville and Bernt Balchen . . . all waited for weather over the Atlantic to clear well enough for the flight to Paris. A prize of $25,000 was to go to the first to accomplish this feat. Of course, as history has recorded, Lindbergh was the first, and winner of the then quite large sum of money. Then Chamberlain and Livine flew the Atlantic, and landed just short of Berlin with a new distance record non-stop.

Of course this left Byrd, who at the start had been given the best chance to make the trip at all, in sort of a funk. He decided to wait until Lindbergh's return to make the flight. He did not think it proper to drop in as the Lone Eagle was then the host of all Europe.

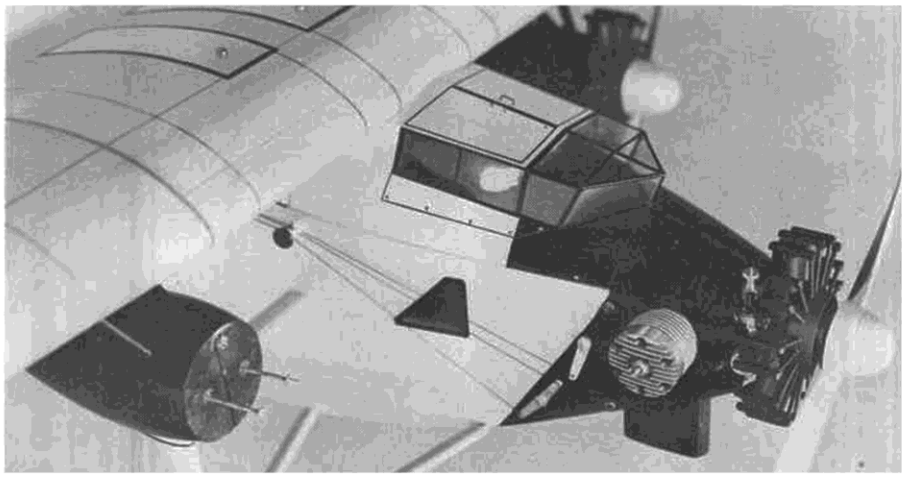
To begin with, the America Transoceanic Company was formed, and obtained Byrd and his crew to fly their new longwinged Fokker tri-motor to Paris. Roosevelt Field adjoined Curtiss Field, which was about 20 feet lower. The company rebuilt some hangars and built a ramp for the "America" to get a better start. Thus, when a ship ran out of the length of Roosevelt field, it



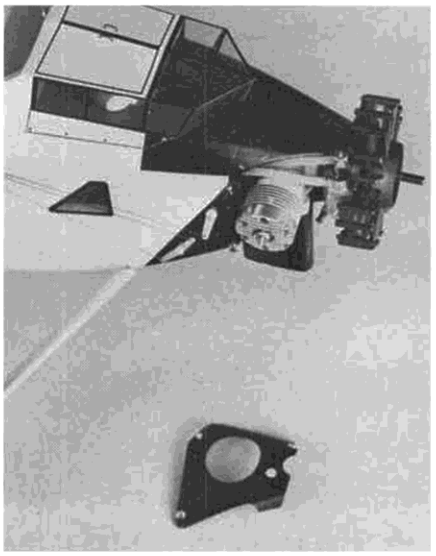
The Fokker required only minor trim adjustment for it to become a smooth, stable flier. Shock action of the landing gear struts is very realistic during ground operation.



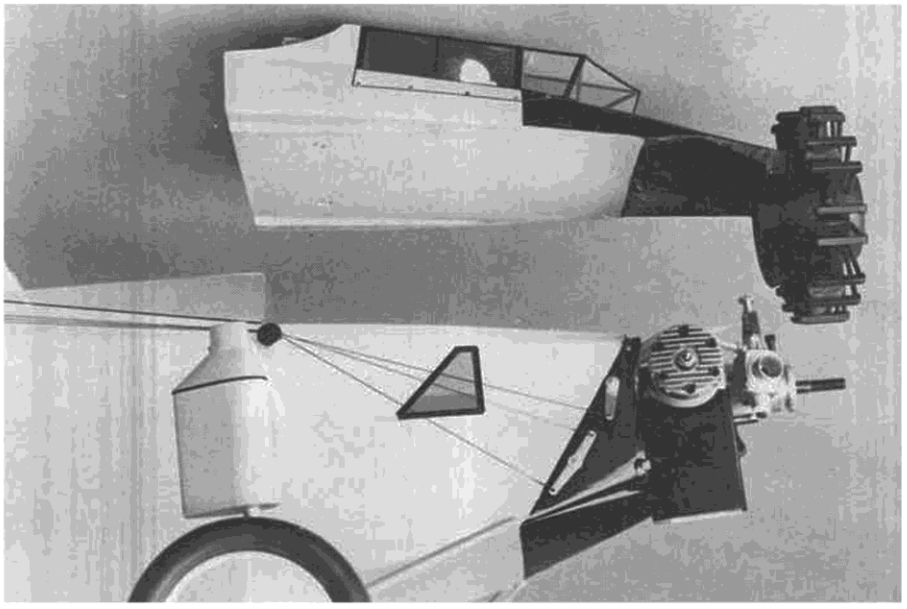
The "give-away" side of the Fokker, showing the head of the OS .40 engine in the nose. Of course, the outboard engines are dummies, with the scale-like props being allowed to free-wheel. High pitch on these reduces drag. Note external control cables (scale only).



Close-up of pilot's "greenhouse." Masochist author scratch-built the dummy, radial-engine pistons. Williams Brothers have a way of simplifying the job!



A portion of the cowl has been removed to show the snug engine installation.



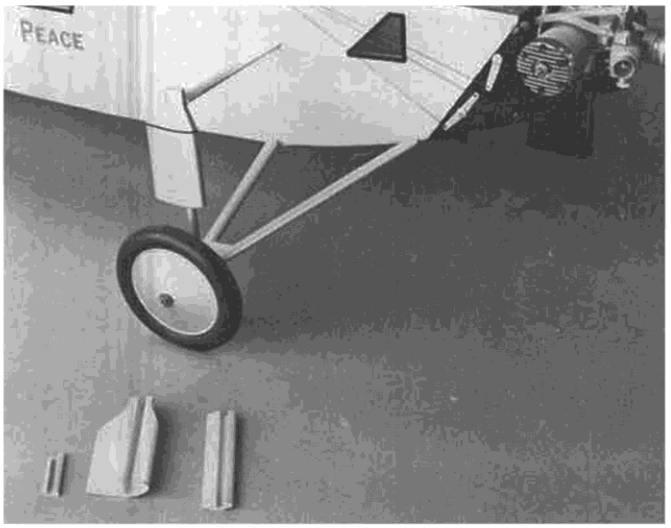
Pilot's cabin and center engine cowl form a single-unit hatch for access to the fuel tank and engine compartment. Rear of cabin fits under leading edge of wing.

could rely on Curtiss Field for more distance on takeoff.

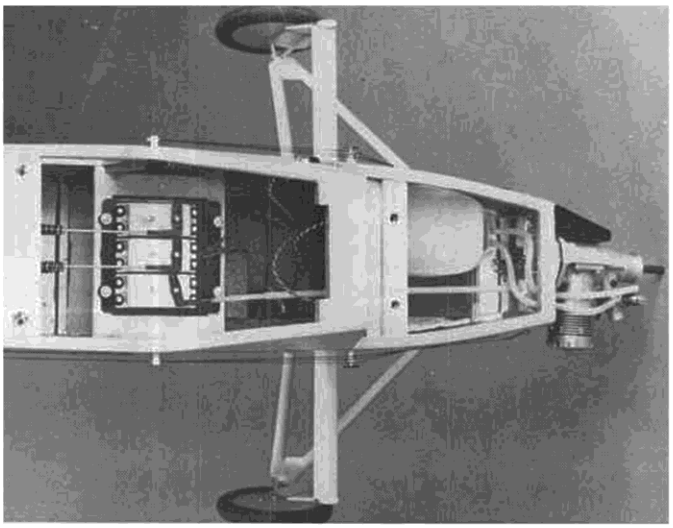
Byrd had considered Rome as a new goal and distance record, but before takeoff decided on the original goal, Paris.

The flight had trouble right at the start, for as Acosta was warming up the engines and checking the magnetos, the rope that was tied to the tail skid broke, and the Fokker started down the ramp. Acosta decided the engines were okay, so opened them all up and took off. Of course, the rope was to have been cut with all engines at full R.P.M.

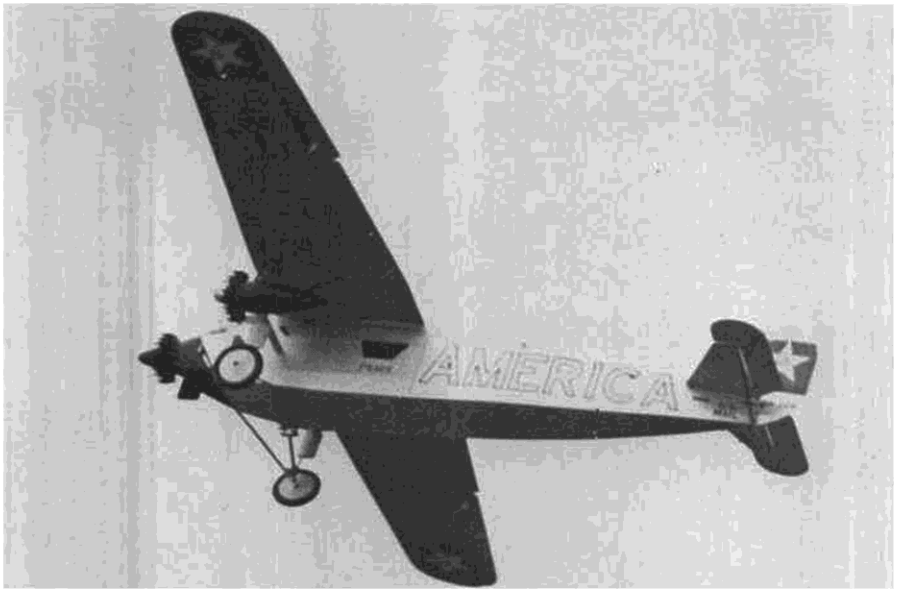
After numerous other problems, they did reach the coast of France the following early evening. With Balchen at the controls, he asked Byrd's permission to fly straight to Paris as the crow flys, as he knew the terrain. They knew by radio that fog might close in Paris shortly after dark, but Byrd took over the controls and made the decision to fly up the coast to the Seine River and follow it to Paris. By the time they got there, it was socked in with fog. Balchen then asked to take the controls and fly back to the coast for new bearings and to make a second try. They again reached Paris, but it was still fogged in. By this time, the fuel was getting low and Byrd gave the order to fly back to the coast and ditch the aircraft along the Normandy coast. The "America" was wrecked in



Strut fairing construction is shown. Also note exhaust extension and prop shaft extension.



Main cabin has plenty of room for radio installation. Too many modelers bury equipment, make it hopelessly inaccessible.



The Fokker rumbles overhead after takeoff. Long tail moment makes up for the small surface area of the horizontal and vertical stabilizers.

Two of the author's grandsons, Brad Sheldon (left) and Adam Sheldon, pose with the Fokker to give an idea of its size. Taken at Central Square Airport, upper New York state.

the landing. Acosta broke his collar bone; the rest of the crew came out okay.

I first thought of building the model when I came across a copy of Jim Dunavent's 3-view drawing for M.A.N., published in the Dec. '64 issue. I first saw it in Dec. of '74 and became aware that it did not contain any color information on the ship. So a year later, just before Christmas '75, I sent to the Smithsonian in Washington and got the color information. But after scaling it up to Dunavent's drawings and starting construction, I came across Bjorn Karlstrom's 4-view drawing in color. It shows nose and nacelles blue, while the Smithsonian says they were black. I now have four different sources of information and all are different in some respects, both as to color and details. *(Welcome to the club of frustrated documentation searchers. wcn)*

Most say that the wing was birch plywood finished with valspar varnish. So I came to the conclusion that, since back then varnish was preceded by several coats of orange shellac, that Bjorn Karlstrom's orange wing was probably about right. As for the nose and nacelles, I went by the Smithsonian black.

CONSTRUCTION . . . FUSELAGE

The shape of the fuselage in the cockpit area is very unusual, as the photos will bear out. The sides are built of 1/4 sq. hard balsa. The 1/16 plywood doubler in front goes between the longerons and flush with the outside of them. Vertical 3/16 x 1/4 pieces are then glued on the inside of the doubler, making one R.H. and one L.H. fuselage side. The 1/16 balsa outside is glued on at this time. The fuselage is the same width from bulkhead "C" back to the vertical behind the plywood doubler.

Starting with bulkhead "C", install the 1/4 sq. cross pieces in this area with a couple of 1/4 sq. temporary diagonals to hold the shape. Let this dry thoroughly. Then bring the tail end together, making sure it is straight. The nose, to be brought together with alike curves, will have to be well soaked with water forward of bulkhead "C" and weighted in a bit of an over-curve (because of spring back) and separately, or in other words one at a time, left to dry overnight. Then the nose cross pieces are installed along with plywood firewall. The back half of the top is then covered with 1/8 balsa. The bottom is covered with 1/8 balsa up to a point just rear of the landing gear (this shows on drawing). From here forward, it is covered with 1/8 plywood.

When covering the bottom front, leave 1/8 inch slots for landing gear wire at the 1/4 x 1/2 hardwood cross pieces. The two short pieces of longeron and 1/8 cover are then tied into bulkhead "C" at the top. Stringers of 1/16 x 1/8 balsa are now added to fuselage sides as

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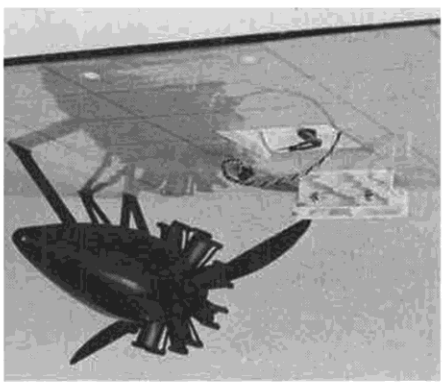
Author/designer George Clapp preps the OS engine for flight. Note pushrod showing through aft cabin window.



Underside of center section. Plywood wing retainer fits under notch in top of main cabin.

Fokker . . . . . *Continued from page 12*

shown. But at bulkhead "C", A 1/16 x 1/4 piece runs vertically to provide a covering joint around the landing gear. Don't forget V-shaped sheets of 1/16 at front, as this is part of the metal cowl on the real ship. Also, 1/16 pieces will have to be placed around windows for covering. The block that forms the top front of the fuselage is now laid out. It is 1-1/2 x 6 x 10 inches. Carve the block to sections, starting at nose ring "D", section "A", section "B", and to fit against Bulkhead "C".

I will deal with the assumption that an OS-40 is used. Mount motor as far back as possible in Tatone mount. Glue ring "D" to block, using center-line on both. Spot-glue block to fuselage. Now make 1/8 plywood thrust shim, tapered to nothing on one side. Rotate it on back side of mount so you have equal down and right thrust. Then in this position, shape it to back of mount and lightly glue it to mount. Now position mount and motor against firewall. Center motor shaft with "D" ring. Do this by viewing motor shaft *end* from *directly* in front, then carefully mark around motor mount as far as possible. Remove block and motor from mount. Mark holes in shim and remove it and drill holes same size as holes in mount. Make sure all holes match. Now take shim and place it on firewall where it was marked, and mark holes for blind nuts in firewall and drill firewall (be sure bottom of block is hollowed as shown on print, for motor clearance). Epoxy blind nuts to rear of firewall plywood. Now fit and epoxy 3/8 plywood wing hold-down piece, also 1/4 x 1/4 pine under and against bulkhead "C".

LANDING GEAR

The landing gear has shock absorbers built in vertical legs. The 3/16 wire is lightly epoxied to bulkhead "C" so that it can be swung back after removing 5/8 at point shown on drawing. But *before* doing this, fully assemble all wire members of landing gear. The 3/16 music wire will not cut easy, but I did it with 2 new hack saw blades *(A Dremel with cut-off disc is less work and less nerve-wracking wcn).* Now swing back top of 3/16 legs and slide on both sections of brass tubing and ball-point pen springs. Swing back down and solder brass tubes at top, and all positions shown on drawings. Don't forget to round off top of bottom half of 3/16 wire. The fairings as shown on the drawings are needed on vee-struts of landing gear to stiffen them so they only flex at fuselage, thus helping ball point springs bear landing loads. You will note landing gear clears nacelles with cutout in bottom of nacelles. I did not want these landing loads transferred to wings as on the real ship. Remember these cutouts later when building them around nacelle hangers and before assembling wing sections.

WING

The wing is foam-cored. I got my foam at an insulating supply house. It was 3 inches by 8 ft. long by 2 ft. wide. As the wing is 71 inches long and center section core 12 inches, there was some waste. It is made in 3 sections, the center section, right wing panel, and left wing panel.

Since full details on a foam wing could be an article in itself, I will only touch on points that may be different from some others. The method I used will require a table saw. Rip from original block a *precise* piece 14 inches wide. We now have a block 2 inches wider than core at root-cord, and 3/4 inches thicker. Now, cut two outer wing panels to length and one center section. Cut these a little long as ends are hot wired to size. Cut slots in them for spars and aileron controls as per drawing on table saw. An 8 inch saw blade will make a 1/8 slot. Remember 1 inch excess at leading edge of block and 3/8 on bottom. Both to be hot wired off later. Now make plywood templates for hot wiring foam. Two root templates and 1 tip template.

At this point or maybe before, if you have never made a foam wing, it would be wise to get some help from someone who has had some "hot-wire" experience. The side view of the wings on Sheet One shows washout at tips, also relative positions of root and tip templates on foam block.

Take the top parts of the foam that are cut off of the core and glue them together for a jig to later assemble all the wing parts. The aileron parts are installed before covering foam with 1/16 balsa. Notice the 1/2 inch balsa pieces, which are cut down the middle when the ailerons are finally cut out. Cover all three panels with 1/16 balsa, carefully sanding edges so as not to remove any foam (I used 3M No. 77 spray-on adhesive). After sanding edges, epoxy leading edges and wing tip blocks in place. Shape wing tips and sand leading edges of outer panels to shape but leave final shaping near center section until later, as all three have to match after assembly.

Because the outboard motor hangers have to go between the 3 sections at assembly, build nacelles to hangers, shape, sand, and paint nacelles and struts to final finish. *Be sure* to mask off airfoil section of hangers before painting. As I used monocote on wing, this saved masking wing. The nacelles would be hard to make any other way, since they are part of plywood hangers. Now very carefully cut out ailerons. Angle for down deflection will have to be cut or sanded on ailerons (see cross section on Sheet Two). Do not install ailerons now.

Take center section, determine center at trailing edge, and cut out area for hardwood block. Now carefully cut back the 1/16 balsa covering (as shown on plans) on both top and bottom. Remove this, trying not to disturb the foam. Now fit and epoxy bottom piece of plywood on wing. Make pine block and epoxy that in place, leaving room for the final plywood top cover.

Now you should be ready to assemble all parts of the wing. You should have a flat surface for the foam jig. If the unsanded areas of leading edge interfere, sand back this part of foam jig slightly. Leading edge overhangs jig anyway.

Now the 20 inch spars are epoxied into center section. Make sure spars butt in center by laying them out first. For wing epoxy, use only the slow-setting kind, not 5-minute type.

Now the motor hangers are slid on and epoxied to foam ends of center section. Now push small (whole wing has to be done at one time . . . don't try to do part of it and leave) pins through spars next to motor hanger so spars will not move in center section when outer panels are pushed on. Cover spars generously with epoxy when pushing them into both center section and outer panels. Now check whole wing to make sure it is flat, with no one corner high or low, you may need to shim foam jig. If you do, make sure that what ever you use has enough area not to push into foam. When all is as it should be, put on weights and leave it overnight.

Now the servo area has to be cut out. There are many ways this can be done. I simply took a sharp, thin knife and cut out foam all the way down to the top balsa skin. Work it out slowly, a little at a time, keeping sides vertical. Make sure the hole you cut out will work with your servo and is lined up with slot in wing. As noted on plan, layout is for KPS-15 servo. The KPS-15 on mine is completely down into the wing, as wing is so thick at this point. Line this servo compartment with 1/32 balsa all around. The bellcrank cutout was done the same way. Then cut pieces to fill in below bellcrank to give angle back to aileron horn. On both sides of servo (cutout), remove balsa over slot in foam to bellcrank cutouts. Make each cut at an angle so that cross-section is smaller at bottom and will reglue back in without falling through. As noted on plans, 1/16 M.W. pushrods slide in 16 inch long pieces of Golden Rod. After servo is installed, hooked up to push rods and bellcranks, and all works free, epoxy Golden Rods for most of full length, then reglue cut out pieces over push rod slots.

The front hold-down, "F", on wing, is carefully centered. Balsa covering is removed on front side of spar and foam removed down to top of spars, allowing part "F" to fit down flush with bottom balsa skin at ends. Now epoxy ends of spars very well to part "F", using slow-setting epoxy. Make sure this is a good joint, as it is all that holds front of wing to fuselage. Screw on part "G", adjust

for fit on fuselage, and epoxy it.

My wing is covered with transparent orange monocote to simulate the varnished birch plywood of the Fokker wing. After covering, install ailerons and hinges. Hook up pushrods to aileron horns. At this point, extra struts shown on print are added to nacelles. These are set into wing and nacelles so as to make good bond. Use slow setting epoxy for this.

TAIL SURFACES

These are made of 1/4 sheet balsa with 1/16 x 1/8 simulated ribs glued to them, to give built up effect. Sand leading and trailing edges to streamline shape before gluing on 1/16 strips. After these strips are added, sand leading and trailing edges.

DUMMY MOTORS

In the beginning, it was planned to use Williams Bros. 1 inch scale Whirlwind cylinders. But as I had not started the drawings until after Christmas '75, time became a big factor if I was going to make it a Bicentennial project. Also, after pricing 27 Williams Bros. cylinder kits, I decided I just might make stand-off Whirlwinds a lot faster and less expensively.

They really are not hard to build (of course mine are all done). The main crankcase is cut from 5/8 inch plywood. The cylinders are also 5/8 dowel part "C". They are epoxied together on flat surface. If you care to (I wish I had) wind cylinders with heavy thread for fins, crankcase will have to be raised the thickness of the thread. For the notch in the top of the cylinders, I made a small aluminum jig with curve to fit diameter of cylinders and a notch in top to mark off each top of cylinder on all 3 motors after joining crankcases with cylinders. If you wind thread on cylinders, cut notch after winding, as fins go up sides higher than notch. I then cut notches on my Dremel saw.

"D" section is only needed on nose engine. "B" section is needed on all three, with the center cut out on nose engine only. As noted on plans, both "D" and "B" parts were cut out on my Dremel saw with table tilted. Now glue parts "B" to front of each engine. Do not attach parts "E" yet.

To position and attach the pushrod housings (nails), I made a very simple jig out of .020 steel. This lays flat against part "B" with 90° bend that fits against cylinder. With jig against front of motor and cylinder, put whole thing in vise, drill hole short way into part "B". Jig will wear a little before you get to number 27 cylinder, but not bad if you are careful.

After these holes are drilled, epoxy on parts "E", or rocker arm boxes. Then epoxy pushrod nails in place. Of course, as plans show, center engine has to have hole cut through it for OS-40. Also parts of 7, 8, and 9 cylinders are removed on back side. The outboard dummy engines are attached with 4-40 continuous thread, epoxied into nacelles and held on with 4-40 nuts, so they can be removed in case of damage.

STATIC SCALE PROPS AND SPINNERS

The props were cut from Rev-Up 9-6 props as shown on plans. It is important to recarve pitch from original leading edge down to modified straight trailing edge to increase pitch. This will reduce drag if flown with these on. Also 1/8 has to be cut from rear of scale props so they will fit William's spinners.

The spinners are William Bros. No. 115. Four were modified, 3 for static display and 1 for flying prop on OS-40. I put a 1/4-20 bolt in spinner rear half, tightened nut against rear, attached front half, chucked bolt in electric drill, and with drill running, cut 3/4 inch off front half with hacksaw.

Then epoxy balsa (pine would probably be better) blocks onto front with grain going straight ahead. Rechuck them in drill, and shape them as per drawing with coarse file, followed by sandpaper block.

PILOT'S CABIN

Glue a small block to rear of already-formed front top block to form rear of cabin. Notch this block for wing leading edge and flush with top of fuselage. Now form rear cross section of cabin from line "A" on side view to shape shown on front view of ship where cabin joins wing. (Note angle at this point on side view).

The two halfs of 1/16 plywood that make top of cabin are now fit and epoxied to back top of cabin. These are supported at front by 2 pieces of flat toothpicks pushed down into block and epoxied.

Now glue 1/16 plywood piece back of cabin for screws to go through to fasten main block to nose of ship. Also 3/16 plywood piece between longerons for blind nuts. Drill through block to locate blind nuts. Epoxy blind nuts and fasten down block with screws. Leave room on each side of these screws for fill-in between cabin rear and bottom leading edge of wing. To do this, install wing with wax paper taped around leading edge. Make 2 small pieces of 1/32 balsa that fit into this area. Glue these to back of cabin and block about 1/8 in from sides. Also, because wing curve will not fit straight against cut behind cabin, glue small dam-like piece horizontally between these two pieces, low enough to clear wing. Fill in these areas with plastic wood, both top and sides, against wax paper on wing. It will take a second application to cover shrinkage of first. After dry, remove wing and front block from fuselage. Sand plastic wood-filled areas, using cabin sides and top as guides.

As you will notice on drawing, windshield projects beyond side windows. The real ship had this feature. All corners on mine simply connect (see photos). Now make 1/16 ply pattern (two halves, with center angle) of top front glass and tack-glue to permanent ply top (it will later have to be removed). Carefully cut window groove into sides and front of block. Use top of cabin and temporary front glass pattern to keep angle correct.

Now inside area of cabin has to be painted flat black and rest of nose gloss black. Next, pilots are glued in. Make sure painting is finished on block so you won't have to mask windows later.

Post card patterns are made of side and front windows. With slots in block, no glue is needed on bottom; also patterns and windows don't need to fit so exact. Now temporary ply front top is removed (touch up edge with black paint). Cut windows from patterns out of .010 plastic. Insert sides and front pieces in grooves. They should fit well at corners. Take Hot Stuff, and with a toothpick, place small drop at top inside of 3 joints and let run down and set. This will also attach them at bottom. Now, holding block upside down, run Hot Stuff along top of side windows at plywood junction. If done right, very little will show on joints.

The front top piece is cut out, leaving about 3/16 extending beyond front and sides. This will have to be bent down the middle to match plywood rear. Make good joint for fit against ply. Now take transparent Scotch tape and place it on back of plastic so it will half lap on plywood when put on. Run Hot Stuff along front edge of 1/16 plywood permanent top and place top plastic (centered) against it, rubbing down Scotch tape. This will make a flush joint here (tape will come off after Hot Stuff is set). Now turn *upside down* again and do each of four joints, one at a time. Hold top firmly against side and front windows. Run Hot Stuff along outside joint. If done one at a time and held tight, it will not run inside. Trim off 3/16 excess and add 1/8 D. J.'s Multi Stripe for framing. Now pilots are entombed forever . . . we hope.

FLYING

The ship was test-flown by Lon Sauter, who claimed, "Trimmed out, it flys hands off." Shock absorbers and free wheeling props make takeoffs, flight, and landings quite realistic (no wing tip bounce on landing).

It is quite a building project, but well worth it once you see it in the air. This bird tracks!

CONCLUSION

I would like to thank and give credit to the club members and friends who have helped. Lon Sauter and his wife, Marge, of the Syracuse Thunderbirds Aero Radio Society, cut the foam wing parts. He is President of the club, and Marge is editor of our club's newsletter Plane Prop Wash. My good friend Ken Little, took all of the pictures and also found some data on the ship from his collection. Others include, Walt Throne, Frank Hogg, both of the A.R.C.S. (Aero Radio Club of Syracuse), Karen Schulz who typed up this mess, and my good wife Rena, who has put up with this (too short in time) project. ●