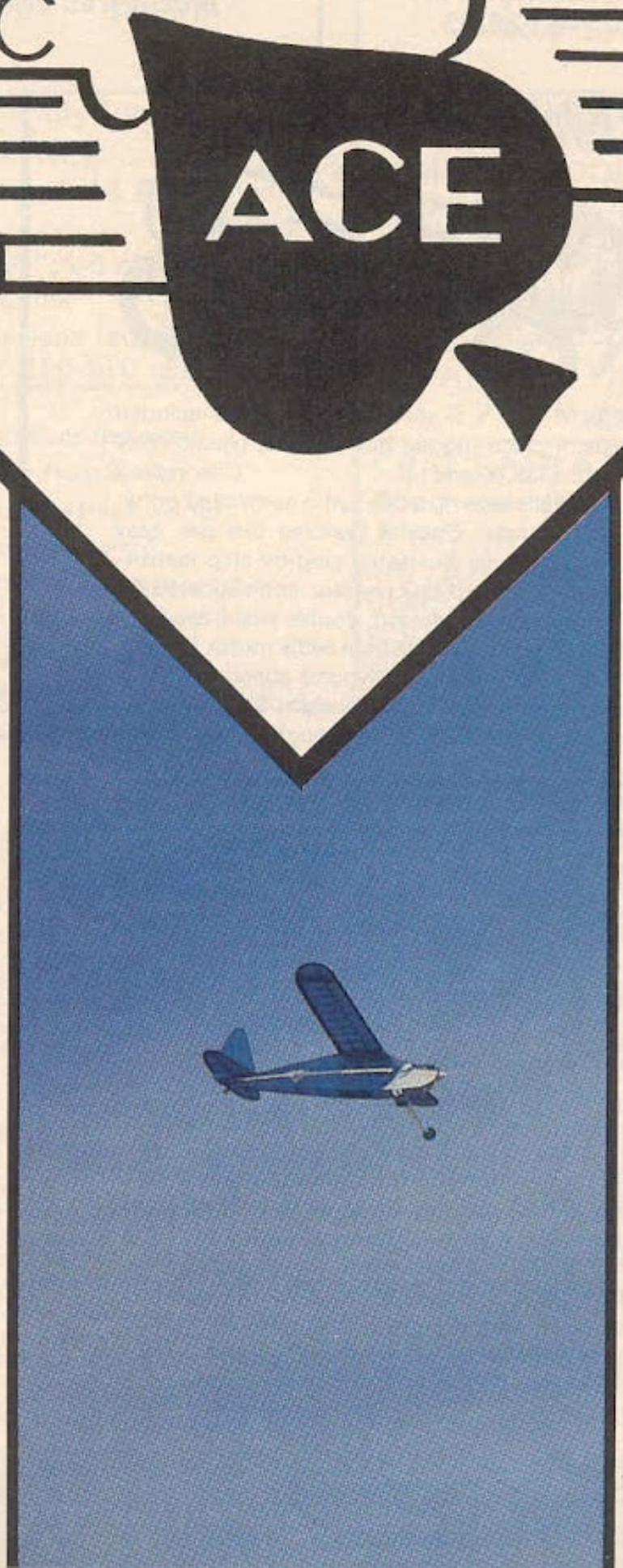
The PACIFIC ACE

This 2.5 times version of the 30" span old-time rubber powered Pacific Ace is a joy to fly. Putts around at 1/4 throttle and when you want altitude, hit full throttle.

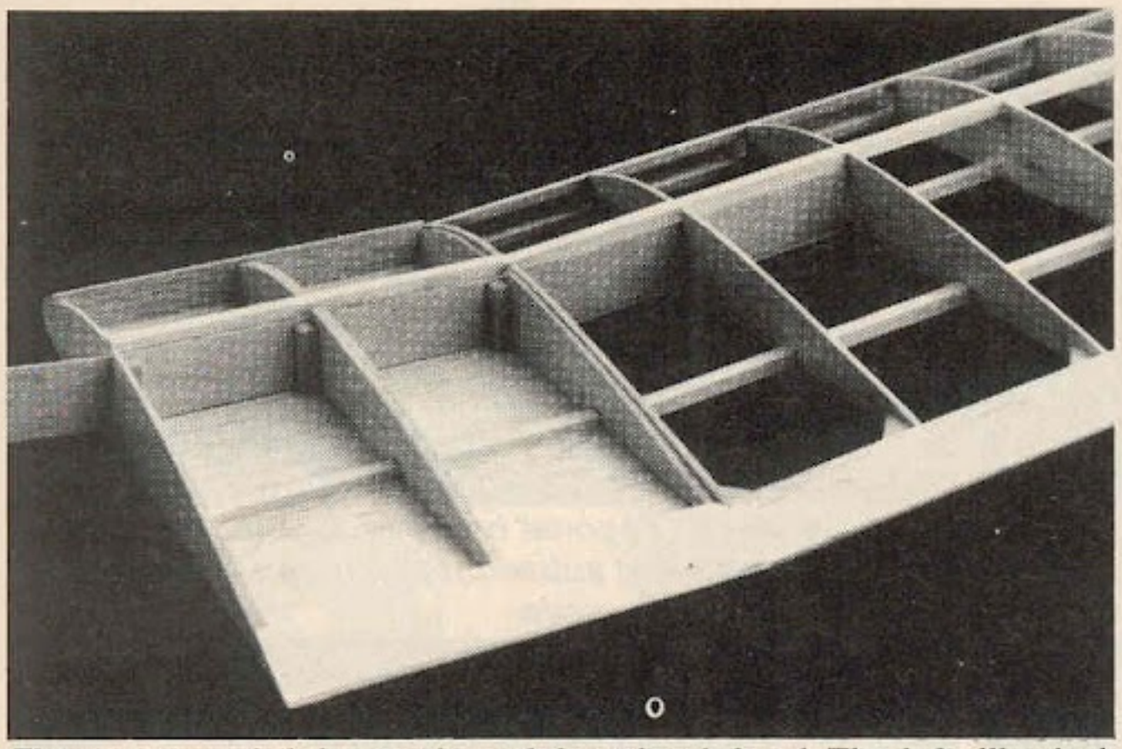
By Paul F. Denson

In our early teens, we built a great number of the then popular model airplanes. As most kids did, we started with solid models then moved up to the very inexpensive rubber powered models. At this point we still had not really gotten a model to fly but the experience gained in construction and covering lead us to the grander more expensive models which looked somewhat like real airplanes and really were designed to fly. We are sure our models did not even approach the excellence of the Pacific Ace shown here but one thing for sure, in spite of the wrinkled tissue and glue bumps sticking out everywhere, they flew and we were introduced into the realm of free flight.

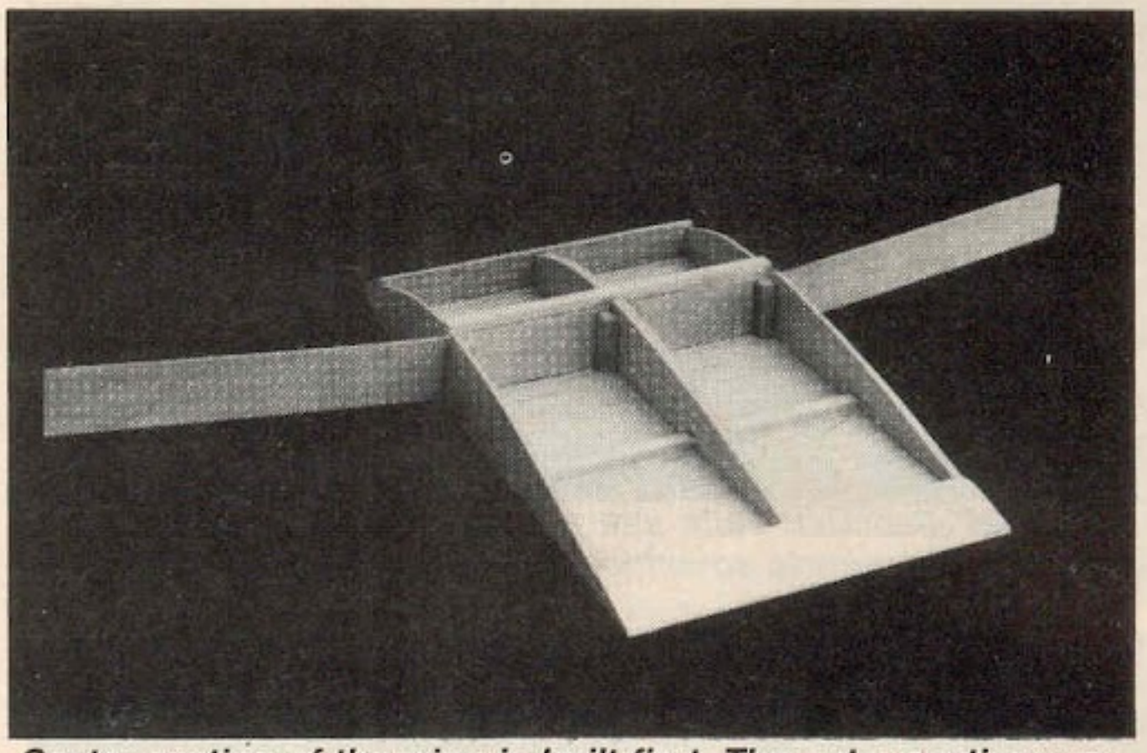
A few years ago, the Pacific Ace again came to our attention so we looked up one of John Pond's catalogs and sure enough there were a bunch of different sizes mentioned therein. We ordered the plans for the Pacific Ace 30", the Pacific Ace 20" and the Pacific Ace Jr. At the time, we were involved with other projects so they were filed away for future use.



Recently one of our flying buddies showed up at the field with a brand new transparent blue Super Quaker which he powered with a Saito .45 4-stroke engine. When we saw all the fun he was having with his new "big beastie" nothing would do that we had something similar. Out came all the research materials and weeks were spent looking for an old-timer that would fit our needs. This class of plane was not new to us. When we transitioned from gliders to power, we did it via old-timers among which were two Miss Americas, two Buzzard Bombshells, a Super Buccaneer, and we tapered off with a Playboy Sr. We considered most of the old free flighters, but, when push came to shove, we just didn't want to build a



The center and right section of the wing joined. The left dihedral brace is extended for the left section. Note small blocks used to close up gaps.



Center section of the wing is built first. The outer sections are slid on the extended dihedral brace and epoxied into a unit.

PACIFIC ACE
R/C Version Designed By:
Paul F. Denson
TYPE AIRCRAFT
Old-Timer
WINGSPAN
74 Inches
WING CHORD
10 Inches
TOTAL WING AREA
720 Sq. In.
WING LOCATION
High Wing
AIRFOIL
Clark Y
WING PLANFORM
Constant Chord
Rounded Tips
DIHEDRAL EACH TIP
4 Inches
OVERALL FUSELAGE LENGTH
46 Inches
RADIO COMPARTMENT SIZE
(L) 12" x (W) 4½" x (H) 5½"
STABILIZER SPAN
27 Inches
STABILIZER CHORD (incl. elev.)
7½ Inches (Avg.)
STABILIZER AREA
202 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
14 Inches
VERTICAL FIN WIDTH (incl. rud.)
8½ Inches (Avg.)
REC. ENGINE SIZE
.20-.25 2-stroke
.20 4-stroke
FUEL TANK SIZE
4-6 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Elev., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Spruce, Balsa & Ply
Wing ..... Spruce, Balsa & Ply
Empennage ..... Spruce & Balsa
Wt. Ready To Fly ..... 3 Lbs. 8 Oz. (51 Oz.)
Wing Loading ..... 8 Oz./Sq. Ft.

kit or use someone else's plans --- it was scratch or nothing. When that decision was made, the Pacific Ace plans were remembered, located, and plans were made.

It had to be large enough to see way up there when you shut down the engine and it turned into a soaring machine, but not so large that common stock could not be used in construction. Since the 30" Pacific Ace had the best detail, it was decided that R/C version would be a multiple of the 30" one. Two times would be too small and three times would be too large to fit common building stock so we split the difference and decided upon 2½ times. That would make the wingspan 75", if we used a 6" center section, each outer section would be no longer than standard 36" length balsa and spruce.

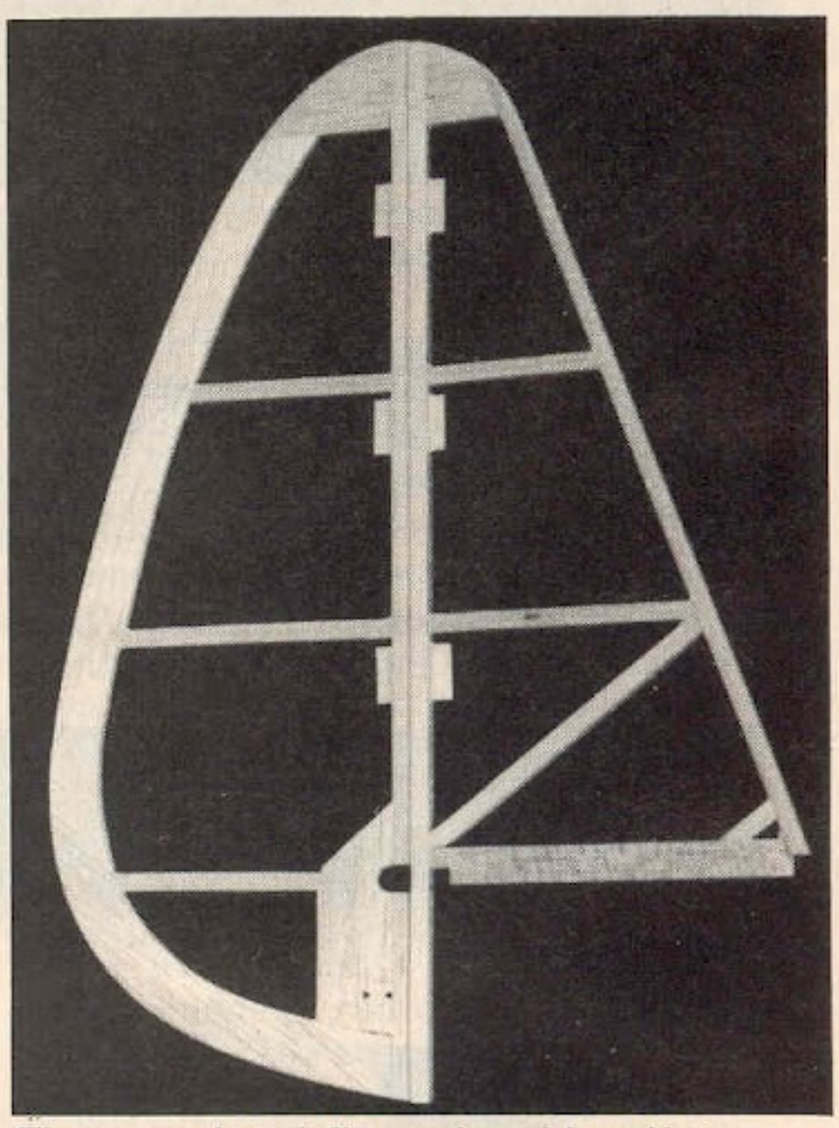
We normally cut our own hardwood from white pine which is easier to work and much less expensive, but if we expected someone else to build the plane, it would be to their advantage if they could use readily available materials. What about the fuselage — it is 43" long? Note, all of the fuselage forward of the TE of the wing is spruce except for a couple of cowl pieces. Aft of the wing, the fuselage is all balsa with the two longerons on the bottom of the fuselage being spliced where spruce transitions to balsa --- voila, standard stock. Get yourself a bunch of 1/4" square spruce and balsa. The balsa should be medium hard as you do not have to worry about making the tail light. We had to add weight to the tail to get the plane to balance at 1/3 of the wing chord.

This is an excellent beginner's airplane. It is extremely easy to fly and if you get into trouble, all you do is take your thumbs off the sticks and the plane squares itself away (more about that later). It really isn't all that difficult to build and we will give you all the help we can. If you have built a few kits such as the Eaglet or the Eagle, you are ready for this scratch-built plane.

CONSTRUCTION

Wings:

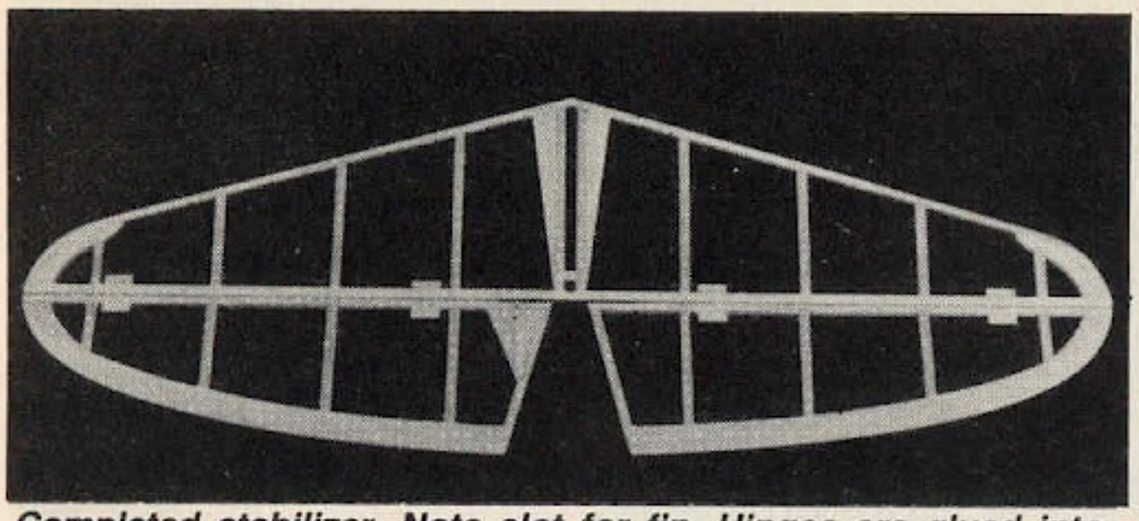
We like wings, so let's start with that part. Please note right off that the wing as laid out on the plans is only 57" long. There is a 6" center section and just to the right of that is a 34½" right outer section. Those are two of the three sections of the wing. Then, there is a 34½" left outer section that



The completed fin and rudder. Note bottom of fin which is notched to fit the slot in the stabilizer. Hinges are glued in fin only prior to covering.

starts at the tip of an arrow labeled "left outboard section" and goes to the left until you get to a wing tip near the margin. We purchased three lengths of Sig 5/8" x 3/4" leading edge stock. We were unable to locate 3/8" x 1" trailing edge stock so we had to cut our own from standard 3/8" x 1" balsa sheets. There is a 3/8" x 1½" standard stock which could have 1/2" cut off and, when wing is completed, sand to correct airfoil.

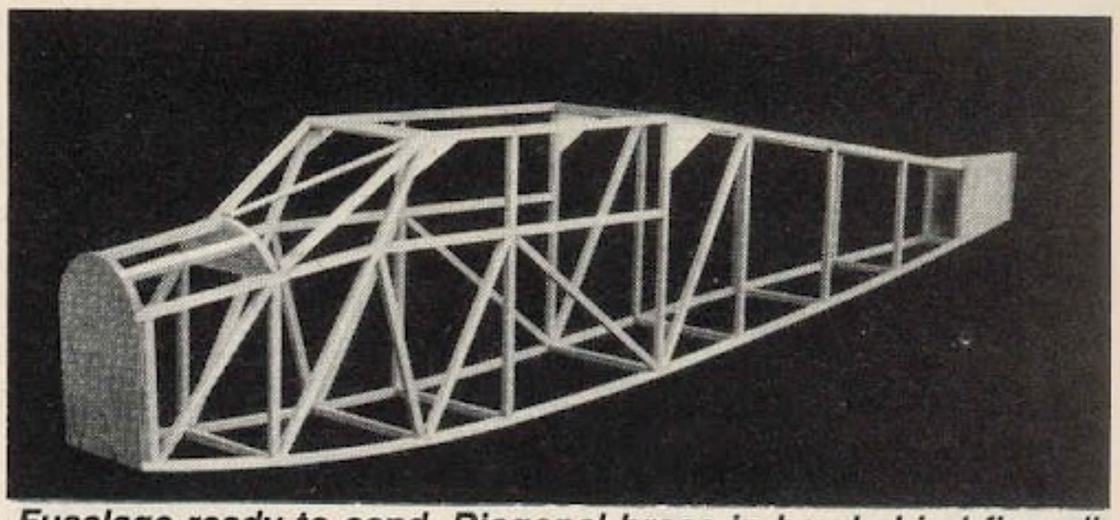
Using the rib patterns on the plans, make 1/32" ply or heavy cardboard



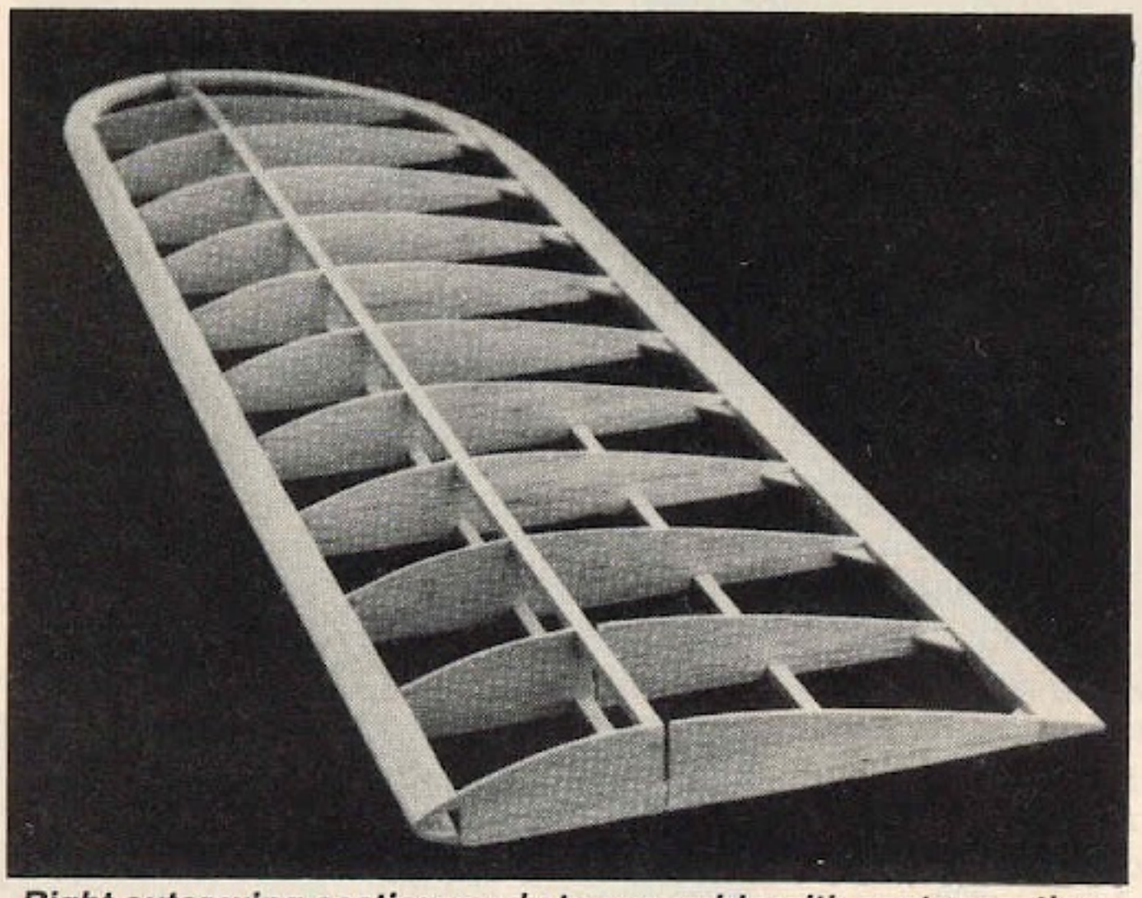
Completed stabilizer. Note slot for fin. Hinges are glued into stabilizer only prior to covering.

templates. Do not cut the spar notches until all the ribs have been fabricated, then cut the notches in the templates and use them to notch the wing ribs. Two of the center section ribs are cut of 3/16" stock, all others are 3/32" balsa.

After cutting the two dihedral braces from 1/16" ply, you can start

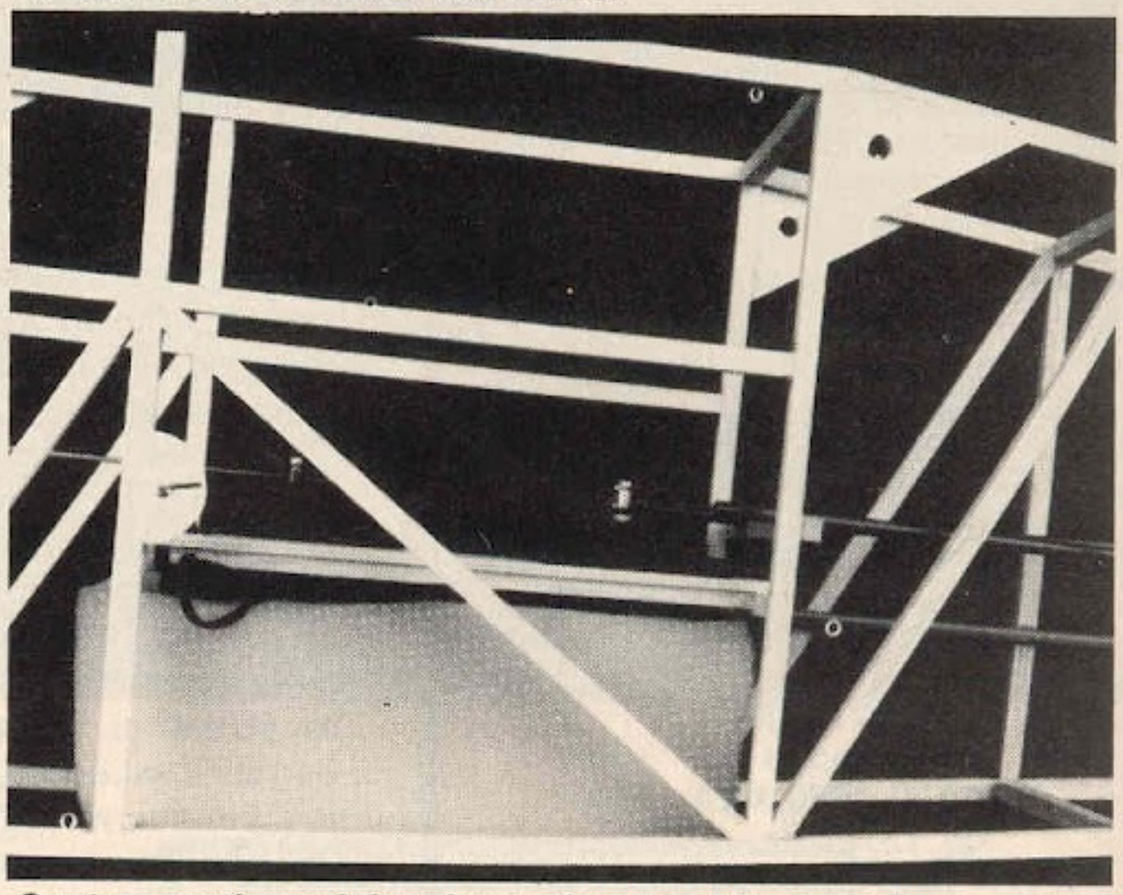


Fuselage ready to sand. Diagonal brace in bay behind firewall was eliminated on plans and subsequent model when decision to sheet in this section was made.



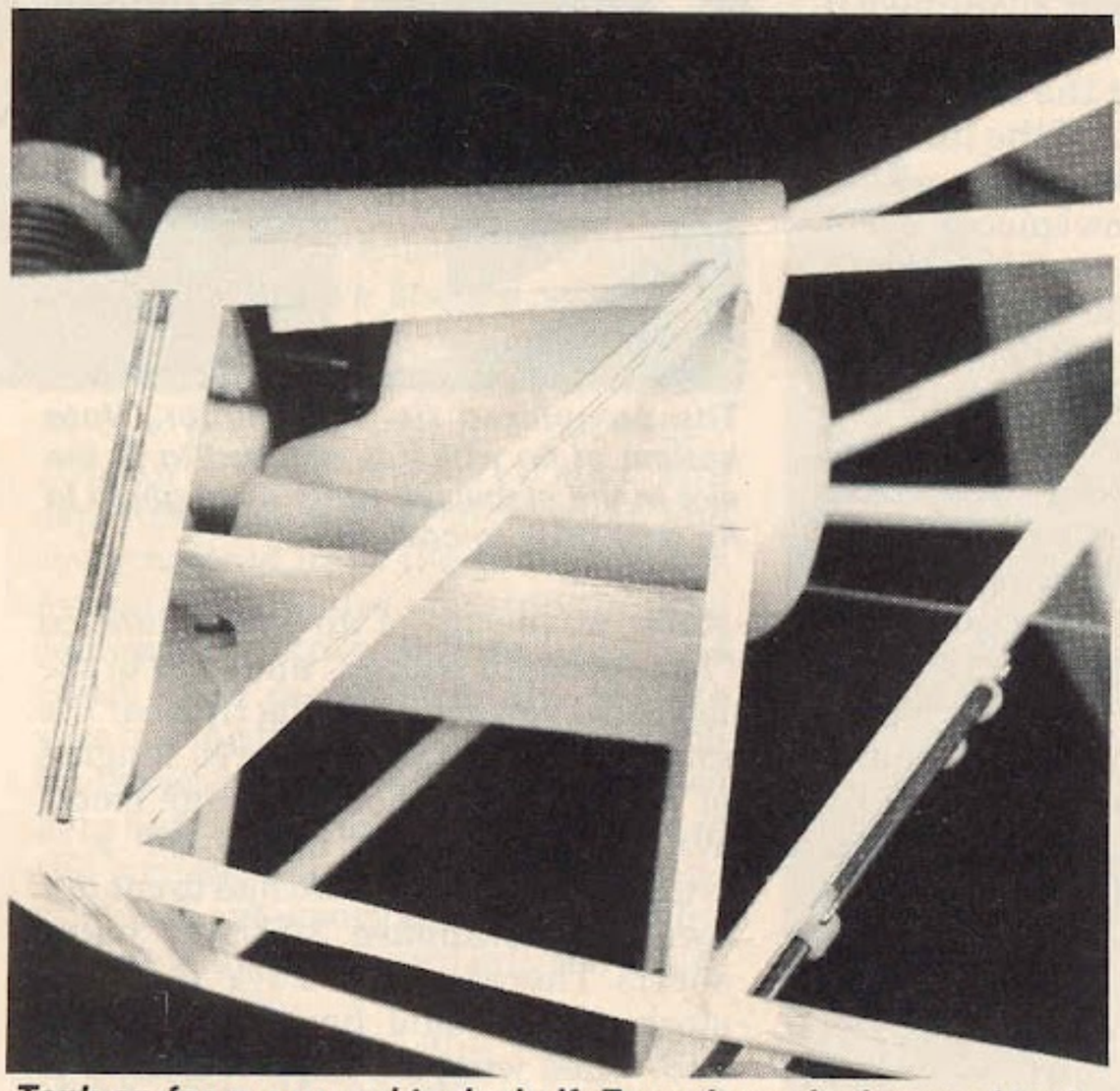
Right outer wing section ready to assemble with center section. Note slot cut behind spars to take the dihedral brace.

with the center section of the wing. Cover the plans with wax paper or plastic wrap. Pin the trailing edge to the plans. Using the two center section ribs, locate the bottom spars and pin into place. Lay down the 1/16" bottom sheeting between the trailing edge and the spars. Place a scrap of 1/16"

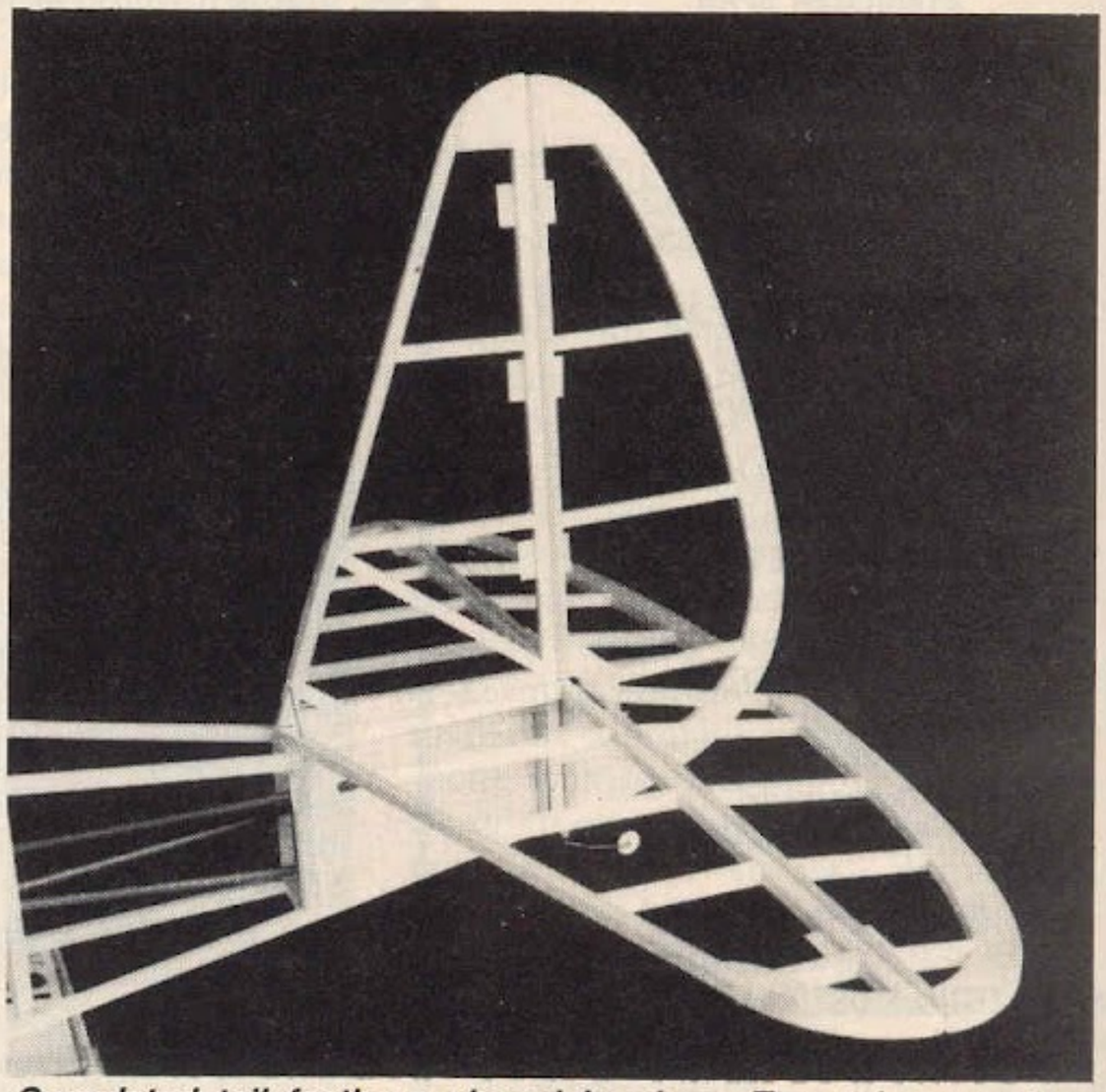


Center section of fuselage showing block of foam which contains receiver and battery.

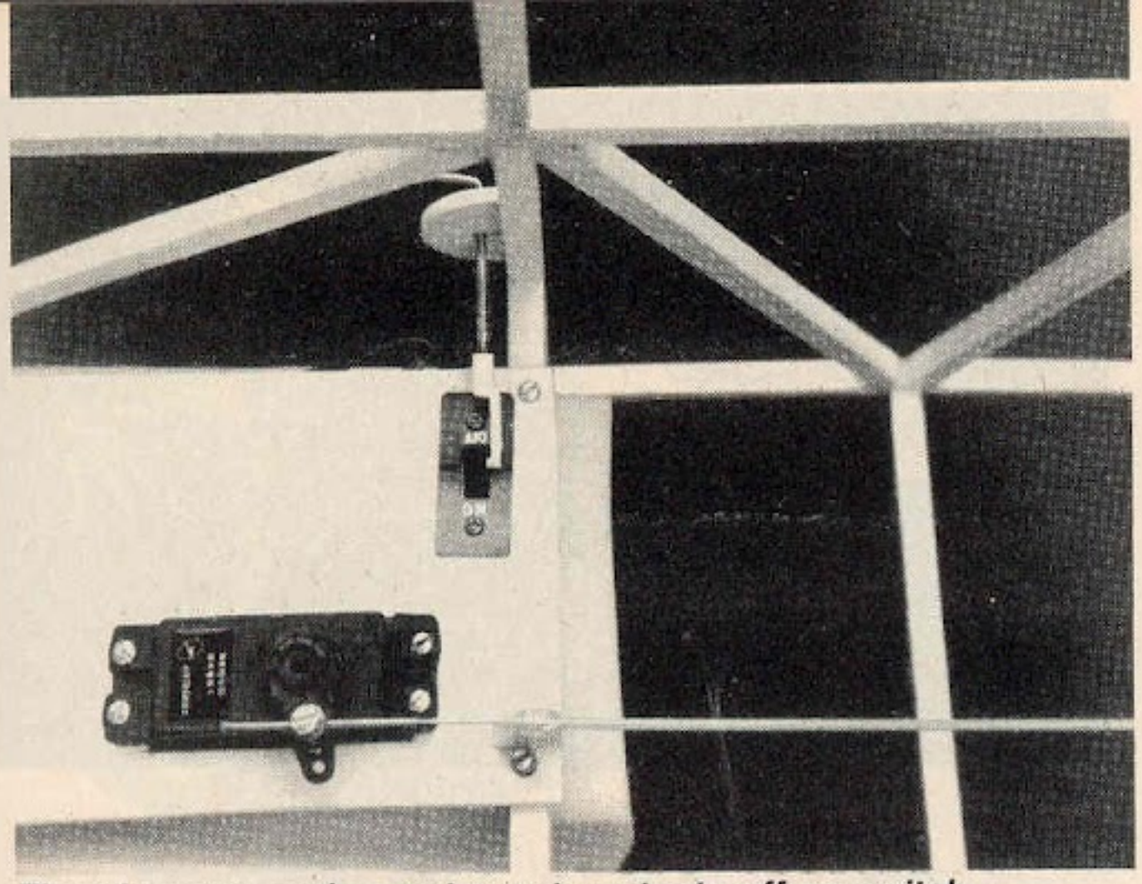
balsa forward of the spar as a rest for the ribs. Because of the forward upsweep of the bottom of the airfoil, it is difficult to put on the sheeting forward of the spar at this time. Put all three ribs in place, the outer ribs are 3/16", the center one is 3/32". Fasten them in place with Hot Stuff™.



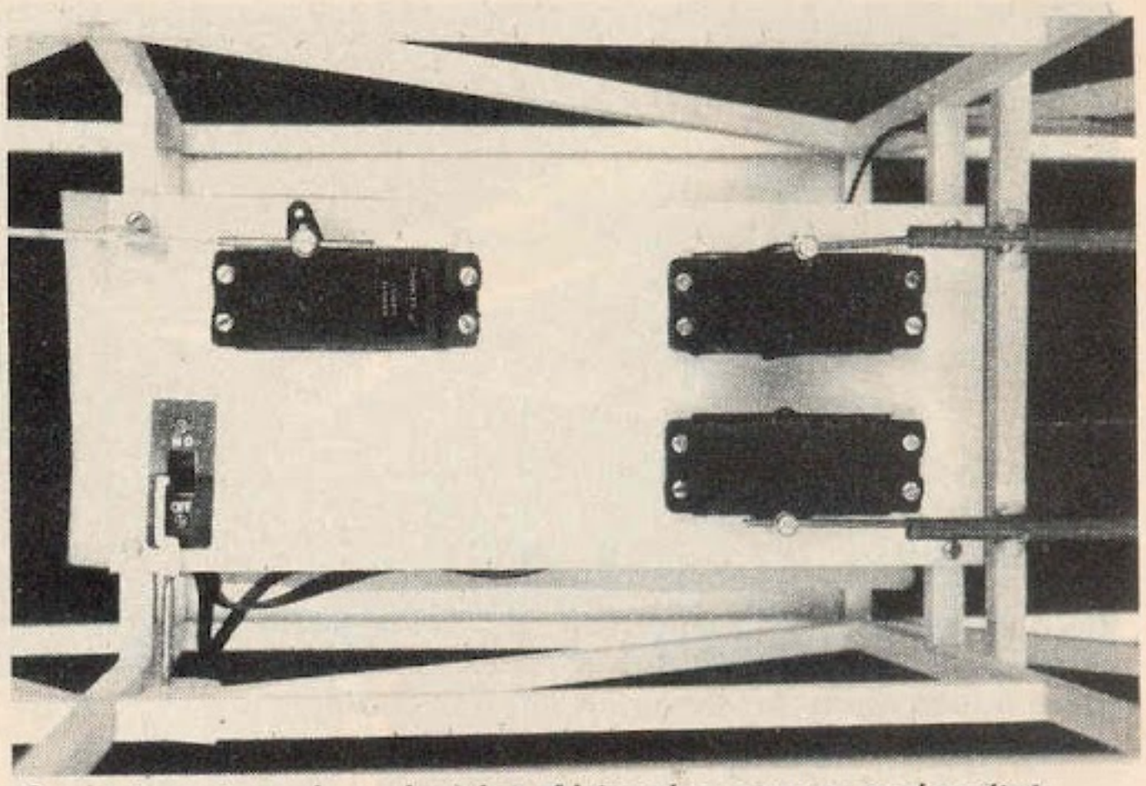
Tank on foam covered tank shelf. Foam is packed around tank top and sides. Bay is easier to sheet without diagonal.



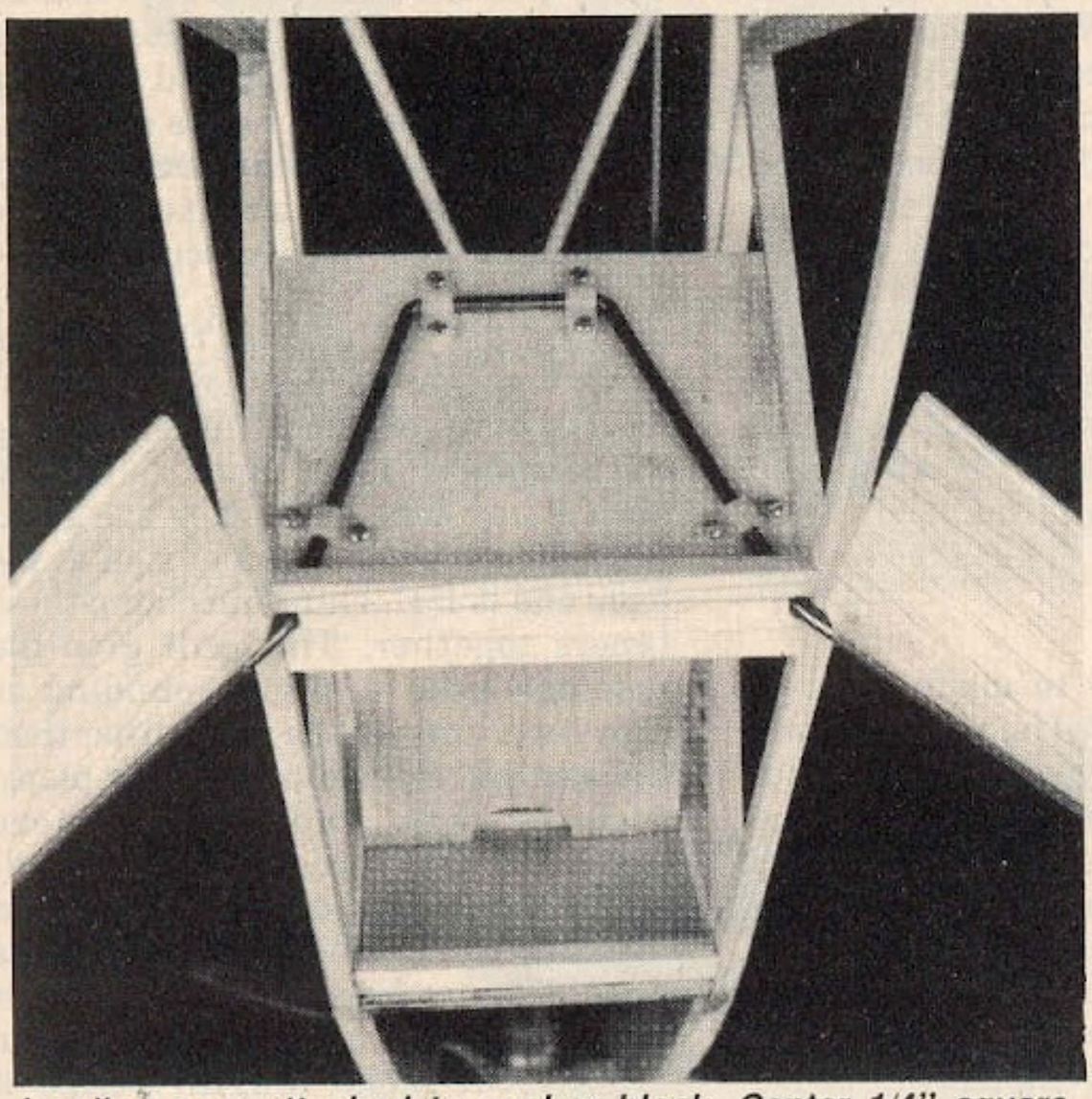
Completed tail feathers pinned in place. Two tubes running through next to last compartment are rudder and elevator pushrods. The third is for the antenna.



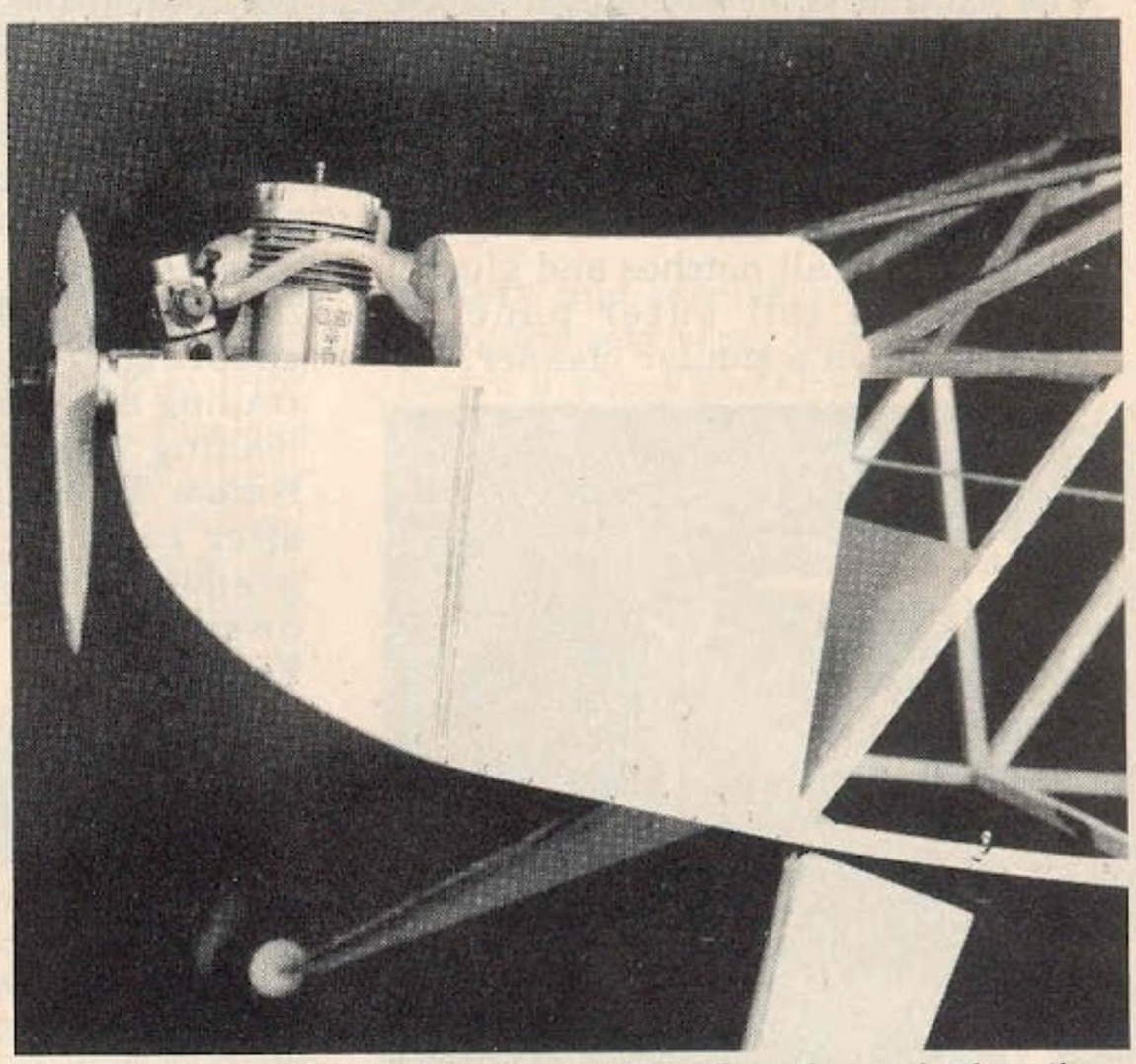
Throttle servo and a neat way to actuate off-on switch.



Servo tray, top view showing Airtronics servos and switch.

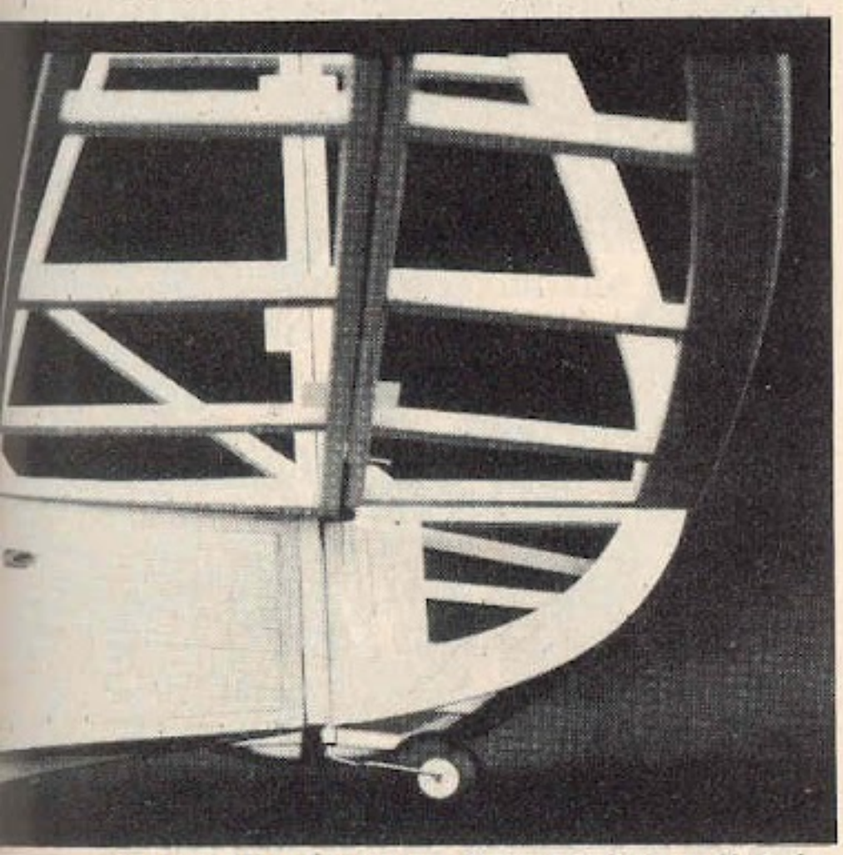


Landing gear attached to anchor block. Center 1/4" square spruce cross member has been eliminated from plans, allowing easier removal of landing gear from plane.



Up front, O.S. .25 FSR R/C with muffler. Run the grain the other way on cowl cheeks. Shown is two layers of 1/8" balsa laid together cross grain. Look closely and you can see the lightweight glass tape covering joint between landing gear wire and fairing.

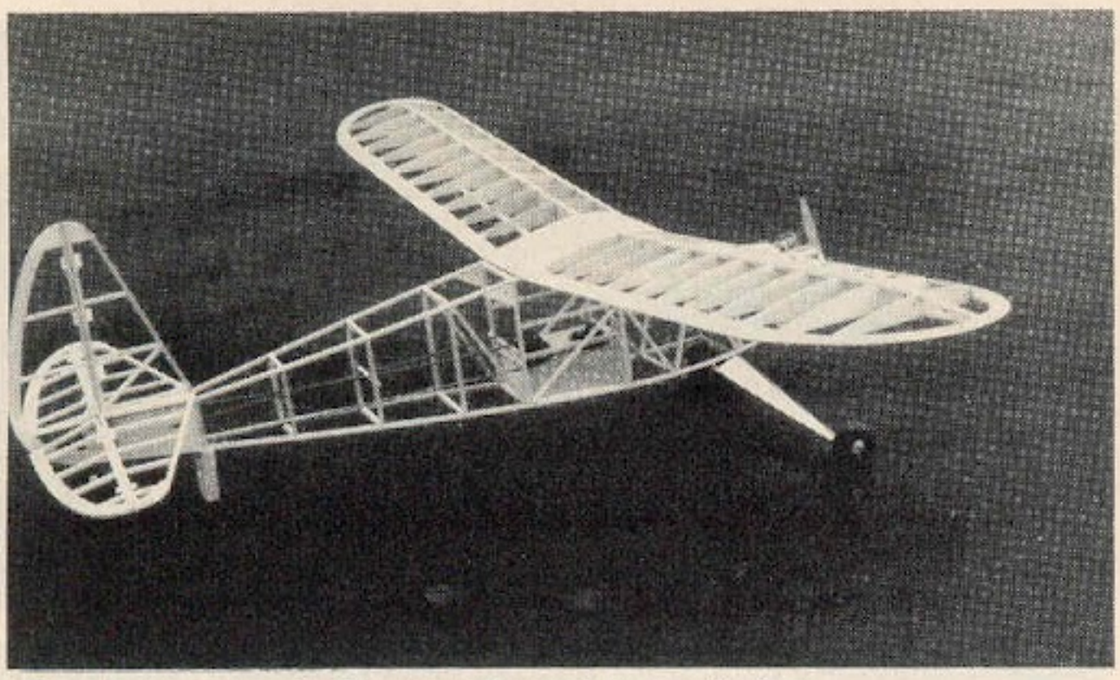
Add the top spar and glue it in place. Place the leading edge on balsa shims until the top edge clears the top surface of the ribs by 1/16", pin and glue in place. Cut a dihedral template from scrap balsa to match the pattern on the plans. Remove the center section from the plans and, using a sanding block, sand the outer 3/16" ribs of the center section to a bevel. This is done so the outer panels will make the appropriate dihedral angle when the wing is joined as a whole. Sand and check with the template until the bevel is correct. Pin the center section back onto the plans. With an X-Acto saw, or a single edge razor blade, remove the 1/16" of material from each rib just behind the spars. The dihedral brace fits into this slot. The bottom of the dihedral brace rests on the bottom sheeting and will extend up even with the top surface of the wing ribs. When the dihedral brace fits properly, using clamps, epoxy it directly to the back surface of the spars. Check the picture of the center section of the wing if you have any questions. If you cut the gap too wide, use small blocks of balsa to bridge the gap.

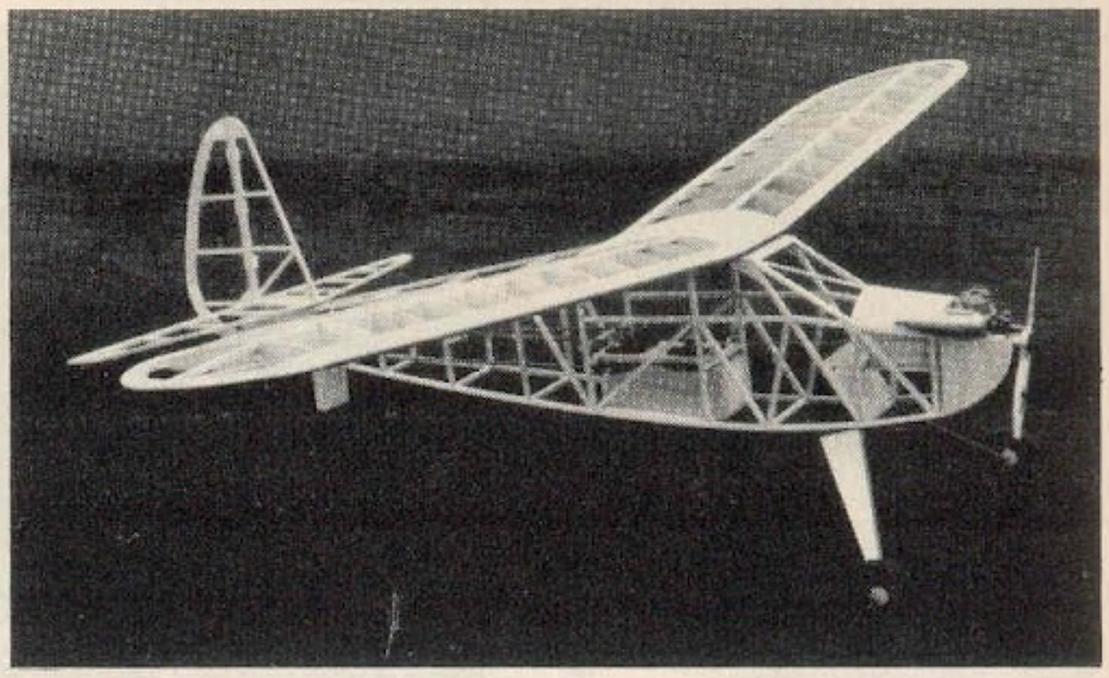


Detail showing how fin and stab maintain structural integrity. Tail wheel sleeve is epoxied to rear of vertical fin member.

Leaving the center section in place, construct the right outer wing panel. The bottom spars terminate at the inside edge of the wing tip. Glue the sections of the wing tips together over the plans. Allow them to dry in place while you are adding ribs. Put all the ribs in place except the outermost one, then glue to the spars and trailing edge with Hot Stuff™. Add the leading edge which is shimmed even with the top surface of the ribs, pin in place and cement with Hot Stuff Special 'T'™. Remove the wing tip from the plans and glue it to the bottom surface of the trailing edge with the front blocked up to be centered on the back surface of the leading edge. The bottom spar is notched at the second rib in from the wing tip and bent up to meet the inside curve of the wing tip.

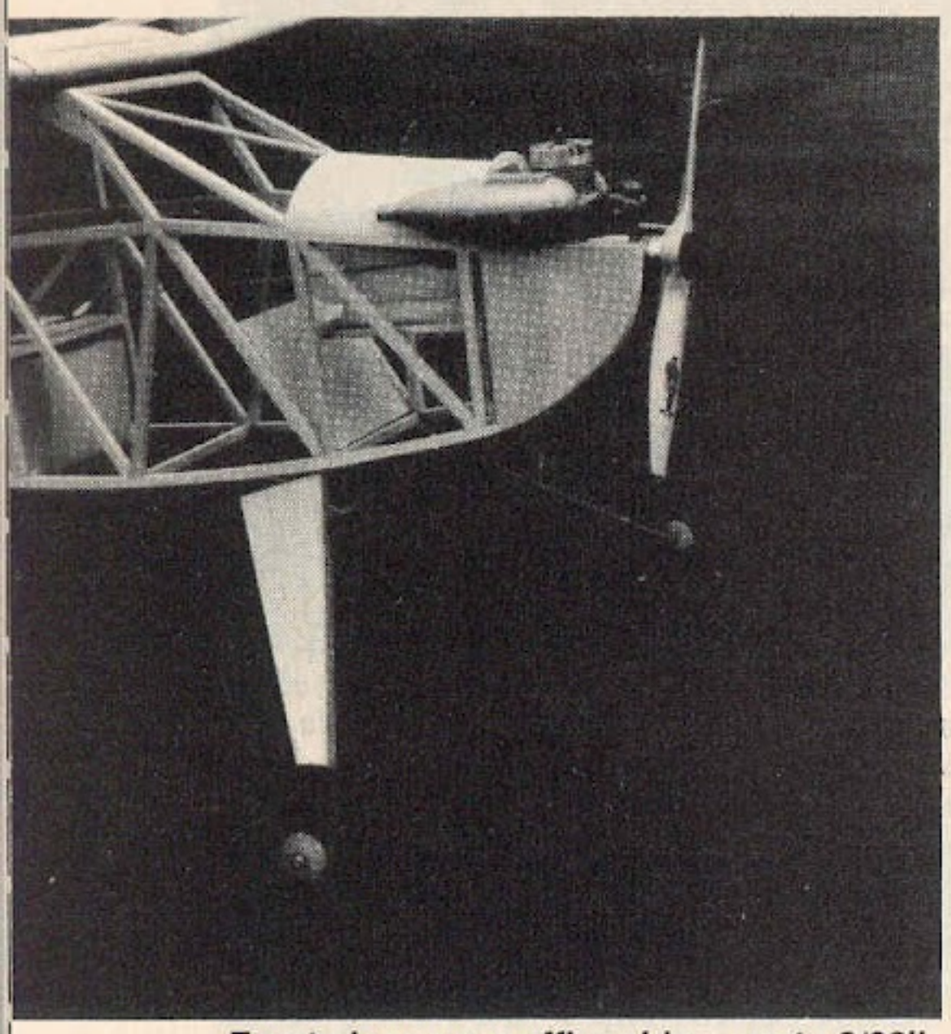
Add the outermost rib; a small bit may have to be removed from the bottom notch in order for it to meet the leading and trailing edge properly.





Bare bones ready for covering of your choice.

The top spar is installed next. At the outer end it will have to be notched and cracked in two places where it passes over the two outer ribs and will have to be tapered where it comes in contact with the top of the wing tip. Insert it into all notches and glue in place. The left outer panel is constructed in a similar manner.



Front close-up muffler side — note 3/32" fill not yet installed in front bay.

Assembling the wing into a single unit is quite simple. Again, the 1/16" must be removed from the first two ribs in the outer panel just behind the spars as you did in the center section. The outer panels will slide on the outer ends of the dihedral brace; the root ribs should come together flush when the outer ends of the panels are blocked up 4" each. Some sanding may have to be done for everything to fit. When it does, 5-minute epoxy is applied to all meeting surfaces. Clamps should be used where the dihedral brace is epoxied to the center spars. We used clothespins to hold the root ribs in contact.

The back dihedral brace is now added. Notches similar to those for the main dihedral brace are cut forward of the spar in the center section and in the outer panels. When the dihedral brace will slide into place, epoxy and clamp in place until dry. Add the top sheeting on the center section. The top sheeting will cover over the top of the dihedral brace and fit flush against the top spar. Add the forward bottom sheeting. Taper the leading and trailing edges into the wing tip. The leading edge tapers both top and bottom. This completes the wing, and, after carefully sanding with finer grades of paper, it is ready for covering.

Fuselage:

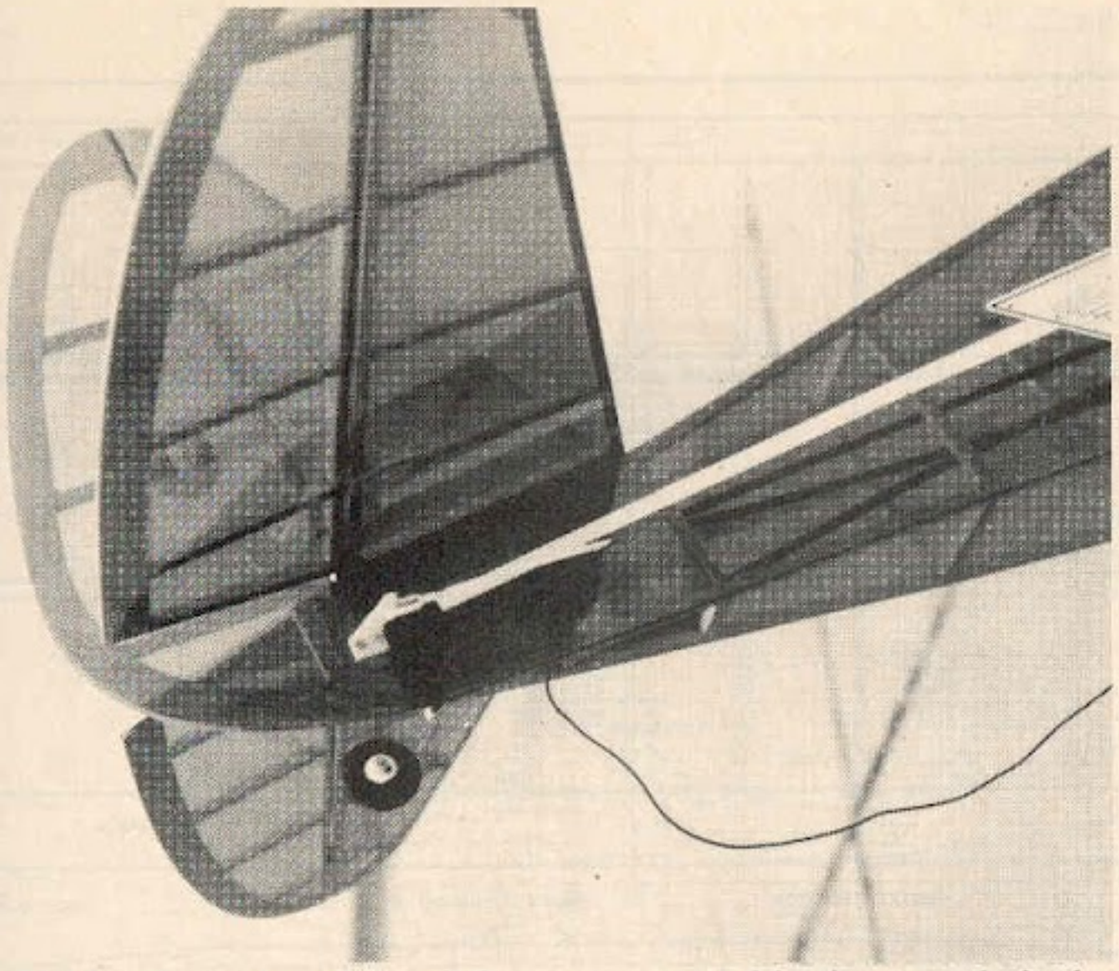
The first step is to make the two bottom longerons. Using whatever sanding method you have at hand, sand long bevels on the ends of a piece of 1/4" sq. spruce and 1/4" sq. balsa. Glue and clamp this splice until the adhesive sets. Wet the spruce end of the longeron with hot water then pin it down to the wax paper covered plans. Allow the forward end of the spruce longeron to stick out in front of the nose about 4" as this end is also to be pinned to the shape of the bottom curve. When doing it this way, the longeron is less likely to spring away from the lines on the plans. Do not cut off this extra length until the glue in this side is thoroughly dry.

Using the cutting and fitting method, add all the other longerons, uprights and diagonals to the fuselage sides. Remember, everything forward of the trailing edge of the wing is spruce, everything aft is balsa. If you inlay the sheet balsa forward and aft, do not make the two sides identical, there is a difference in the left and right side. While the glue is drying during side construction, you should cut out the firewall, the instrument panel, and the landing gear anchor block. Erect the two sides upside down over the top view so they rest on the wing saddle; pin to the workbench. Cut thirteen (13) pieces of 1/4" sq. spruce and one (1) piece of 1/4" x 1/2" balsa all exactly the same length. The length of these pieces is the distance between the two fuselage sides. Keep them in a safe place, you will need all of them. Install all of the cross braces between the leading and trailing edges of the wing. It makes a big box. We checked the sides occasionally with a square just to insure everything was perpendicular to the building surface.

Bring the tail ends of the fuselage sides together to see how they will have to be beveled for a flush fit. Using the sandpaper block, taper the ends in such a way that when they are glued together the outside dimension at the back end is 1/4". Glue and clamp these tapers together. This will give the fuselage sides a slight rounding as they taper toward the tail, rather than the straight lines shown on the plans. This is okay and will be more aesthetic. The cross members will have to be cut to fit rather than making them the exact length as shown on the plans. I measure and cut one to fit then make the other one exactly the same length. Strips of masking tape from side to side hold the cross members in place until the glue dries.

Bring the two nose sides together with the firewall in-between and check for fit. Using epoxy with masking tape acting as clamps, install

We are now proudly sporting the O.S. FS .20 4-stroke and 3½" Trexler wheels.



Tail feathers showing exit for antenna, rudder horn and clevis.

3/4 front view showing the O.S. .25 FSR with muffler and oil goo remover. Three inch Trexler wheels.

the firewall. As soon as you can get in there, line the front corners with 3/8" triangular stock again using epoxy.

Erect the instrument panel on the cross member just aft of the firewall. When the glue is dry, insert the three 1/4" balsa longerons to form the cowl. Note: If you cut the firewall and instrument panel to exact dimensions, there will be a ledge on each longeron where the 1/16" balsa cowl covering can seat. It will then fair into the fuselage sides. Using two pieces of balsa, cover the cowl and sand smooth.

Cut, bevel, and sand the two 1/4" dowels, then insert them between the instrument panel and the front upper corners of the wing cradle. Cut the wing hold-down dowel fillets from 1/8" lite ply, drill a 1/4" hole in each, insert and glue in place.

Glue the landing gear anchor block in place. There are two cross members located where the landing gear penetrates the fuselage. The rear cross member is doubled with a piece of 1/4" sq. spruce 1" long. Slide the landing gear into place and fasten to the anchor block with nylon landing gear clamps and sheet metal screws. Check to see that all cross members and diagonals are correctly installed and fill where indicated with 3/32" or 1/16" sheet balsa. Go over all of the fuselage and make fillets with aliphatic glue or Hot Stuff Special 'T'™. Cut the front cowl cheeks which go alongside the engine from 1/4" sheet balsa and bevel the rear edges and epoxy in place. A piece of 3/8" triangular stock in the corners will hold these pieces firmly in place.

Pacific Ace sitting on runway.

Remember, you were told to keep the extra cross members in a safe place; well now you should have two that have not been used. These are the pieces on which the 1/8" lite ply servo tray will rest. Insert and glue in place. Cut and fit another piece of 1/8" lite ply to fit between the longerons and cross members under the servo tray. This forms the bottom of the radio compartment. We took a piece of 4" foam and cut it to fit between the servo tray and the bottom of the radio compartment. We then cut holes in the foam to take the battery and receiver. In this case only (because we needed the weight to the rear), the battery goes to the rear of the receiver. Put the battery and receiver in place, then bring the servo tray down on top and insert a sheet metal screw in each corner of the servo tray. This will hold everything firmly in place.

Cut the landing gear fairings from 1/8" hard balsa using the pattern shown in phantom lines with the landing gear drawing. Tack them in place with Hot Stuff™. There is going to be quite a bit of stress on the landing gear fairings every time the landing gear flexes. To make sure they stay in place, we put lightweight glass tape around the joint using 5-minute epoxy. When installing the windshield, we cut a paper pattern to make sure the windshield will fit. After the pattern has been tailored, we use it as a pattern to cut the clear plastic. Drill the necessary holes in the firewall for fuel tubing, throttle pushrod, and engine mount. Install the blind mounting nuts on the reverse side of the firewall and secure with a drop of Hot Stuff™.

Empennage:

Cut the curved parts from 1/4" sheet

Pacific Ace logo close-up The material and lettering were not fuelproof and were destroyed on the left side by cleaner. Good decals are being considered.

balsa and pin and glue together in place on the plans. Next add and glue the spruce and balsa verticals and cross members.

A lot of thought was given and we finally had to concede that we just could not keep the original lines of the empennage of the Pacific Ace 30". Since the rudder did not move, it passed through a slot in the elevator. This really posed no problem as the elevator could move up and down on each side of a permanently mounted lower rudder. However, this dictated the movable rudder would have to be far enough above the elevators so there would be no interference. It could be done but all that pushrod material up and over the stabilizer became a very ugly bunch of hardware so we condescended to go to the method presently used.

The two halves of the elevator are connected with a piece of 5/64" music wire. Fill the left half corner with 1/4" sheet balsa to take the elevator horn. Another slight difference in standard construction is the attempt to build strength into the fin. Both of the spruce longerons in the fin and stabilizer are kept intact full length, therefore the fin upright must pass through the stabilizer.

Fully cover the empennage and insert hinges in the fin and stabilizer, gluing in place. Assemble in this order: Cut away the covering on the bottom of the stabilizer and epoxy to the fully covered fuselage. Check that the stabilizer is perpendicular to the fuselage. Insert the fin through the stabilizer and epoxy in place,

including the portion to the rear of the fuselage.

Make sure the fin is square to the stabilizer. (Epoxy the tail wheel sleeve into a groove cut into the fin upright. Using fairly heavy fiberglass cloth or Goldberg Nylon Reinforcing Tape and epoxy, overlay the tail wheel sleeve. The fiberglass should extend at least 1/2" forward.) Do not get any epoxy into the ends of the sleeve — add the elevator, then the rudder and glue all hinges.

Engine:

The engine mount is secured to the firewall using 4-40 hex head machine screws into blind mounting nuts. We pushed 18" lengths of fuel tubing through the firewall, under the instrument panel and into the radio compartment where we could attach them to the tank. The tank was pulled back under the cowl where it rested on a foam covered shelf, then more foam was packed all around the tank to keep it in place. The ends of the fuel tubing were cut to exact length after the engine was installed. The throttle pushrod runs alongside the tank and exits through the firewall in alignment with the throttle arm.

The first engine used in the prototype was an O.S. Max .25 FSR R/C and is more than enough engine for this plane. It takes off at 1/2 throttle and cruises around at an adequate speed on 1/4 throttle. When given full throttle and pointed at the sky, she climbs like a free flight with the torque causing beautiful turning, climbing circles.

The second engine used was a K & B

Sportster .20 which also proved to be completely adequate. The only difference, more throttle is necessary and, at full throttle, it does **not** have the same performance. It will get way up there but it takes a bit longer. This engine is highly recommended, it has an excellent muffler and is the quietest 2-stroke .20 engine we have ever heard.

The third engine, and still in the plane, is an O.S. FS .20 4-stroke. This engine almost never had a chance of powering the prototype Pacific Ace — because we just really didn't think it had what it takes. However something told us to give the FS .20 a chance which we finally did and now it is our favorite engine for the Pacific Ace. We use full throttle to take off and fly it around the field at 1/2 throttle. It does **not** bore holes in the sky, but it will get it way up there as fast as the Sportster does and they both run at approximately the same noise level.

A fourth engine, the O.S. .20 FP, comes just as highly recommended and is the equivalent to any of the .20 engines previously mentioned.

Flying:

Take-off was accomplished in less than 20 feet at full throttle. Normal relaxed flying around the field is done at 1/2 throttle. You can have a lot of fun flying circles, figure eights, low level fly-bys and touch and go's. When you get tired of this fun flying then apply full power and wander way up among the thermals, cut the engine and you have a full fledged soaring machine. After all, isn't that what these planes were designed to do? At least you have the choice of bringing it back with the rudder instead of having to chase it over hill and dale like the free flighters do.

In addition to loops, we found a rather different aerobatic maneuver that it can do. The question, "Will it fly upside down?" The answer, "No." When we tried, we found that as soon as you got it in that position, it started flying around in large circles which might be interpreted as an upside down flat spin. That maneuver became quite fun until one day we tried it too low. As the ground got closer, we panicked and gave it full up which put it into the ground nose first. Perhaps, from the pictures, you will see that Pacific Ace II flies just as beautifully as number one did. If you are going to try the inverted flat spin, be absolutely sure that you are at least three mistakes high.

We hope you have as much fun with your Pacific Ace as we have had. For those of you who belong to SAMS, check with John Pond or Doc Matthews as to eligibility. For the rest of us, we will fly our old-timer and enjoy the beautiful way it looks as it flies by. □