BOEING F4B-4

At Last, One Of The Most Beautiful Of All Military Biplanes – In 1/6 Scale.

I guess I'm like most modelers when asked about their favorite airplane, they are stumped. It's almost impossible to name one, there is always more than one. It may be planes of one era, two eras, or just a lot of different airplanes from anytime.

Like a lot of modelers, there are certain planes that have a soft spot in the heart. The Boeing F4B-4 is one of those for me.

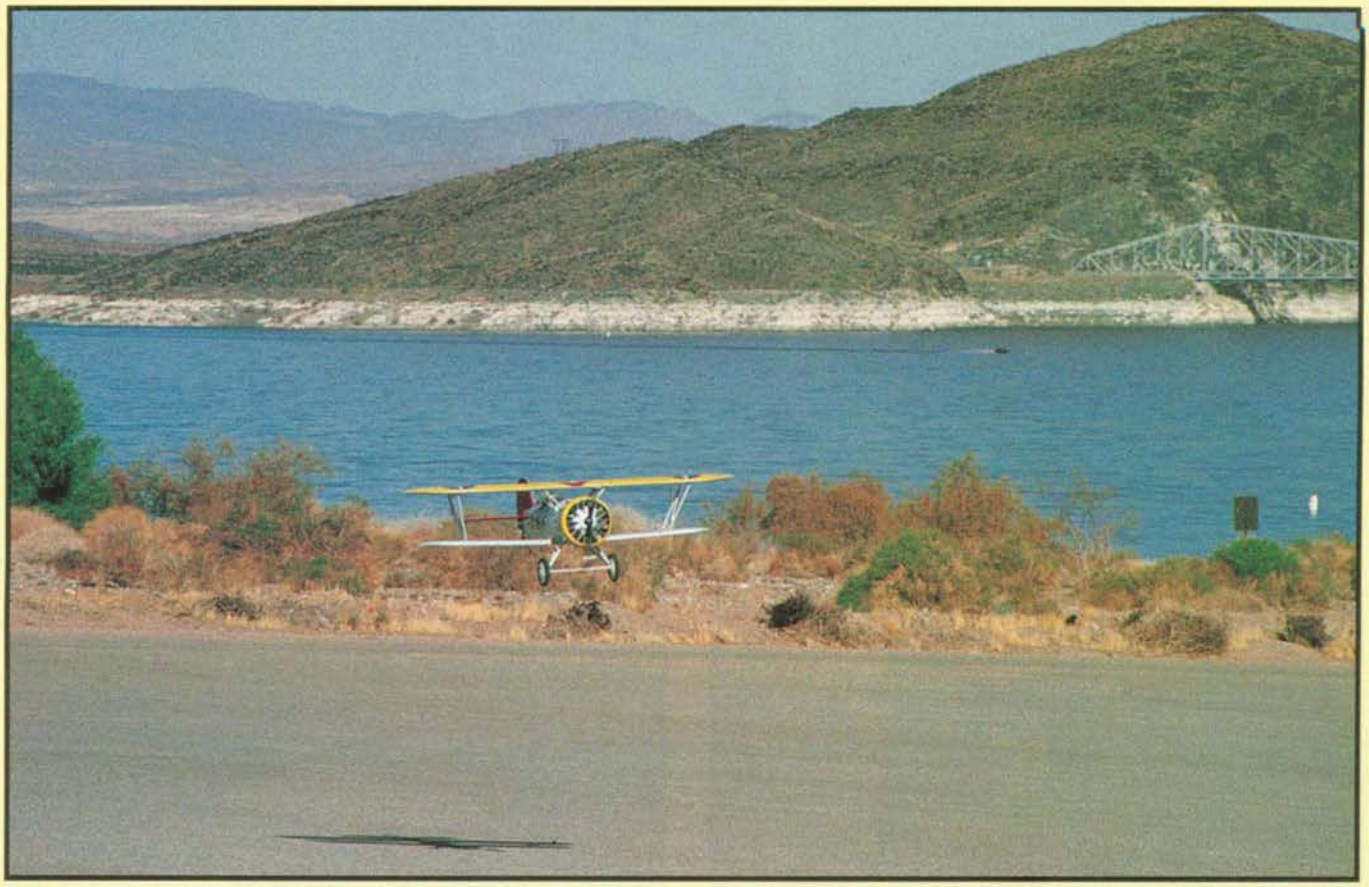
The Boeing F4B-4 evolved from a line of Boeing aircraft that were very successful. The F4B-3 and 4 were used by the U.S. Navy and Marines in the early 30's. At the beginning of WWII some were still in service for training and for pilots to get flying time. The Army Air Corps version was the P-12.

The pilots said of the P-12, F4B series fighters, "One of the most maneuverable fighters ever built." They were the forerunners of the modern carrier fighters.

The basic design was copied by many countries including Russia and Japan. There are still a few, very few, of these planes in some air museums.

The F4B-4 was a heavier, better armed, upgraded F4B-3 and many of the parts were interchangeable. If you build this plane for any competition, pick a particular airplane and copy it.

This model is very close to scale, as close to scale as I could make it with the reference material available to me. I used the Peter Westburg drawings and Aero



Publishers, Aero Series Book 5. The model is 1/6 scale, 2":1', after one belonging to VF-18, the High Hats squadron from the USS Lexington, about June 1933. If some of the photos don't match the plans, follow the plans. Some changes were made during construction, all improvements.

I installed a Saito 65 4-stroke in my plane and it flies it very well, at what looks like scale speeds. The plane would probably fly satisfactorily with a good .40 2-stroke, but I'm very partial to 4-strokes. It should take up to a .90 4-stroke well.

CONSTRUCTION

Start the construction with the wings, as you need the lower wing to complete the fuselage.

Lower Wing:

Taper the rear spar from 3/8" to 1/4" as shown on the plan; 4" from the end of the spar. The wing is made in two halves. Put ribs R-2, R-3, and all of the R-4's on the spars. Pin the trailing edge and the leading edge in place. The leading edge has to be raised to match the ribs. Glue everything in place.

Put the 1/8" brass torque rod through the ribs and make sure there are no binds. Solder the aileron control fitting on the torque rod, the one near the wingtip. When installing the torque rod permanently, put three or four pieces of plastic tubing on the rod to act as bushings. Solder the Goldberg 3/32" aileron control rod into the brass torque rod at 90° to the aileron fitting at the wingtip end. Glue the plastic bushing in place, making sure there is no end play in the torque rod, by pushing the bushings against the fittings.

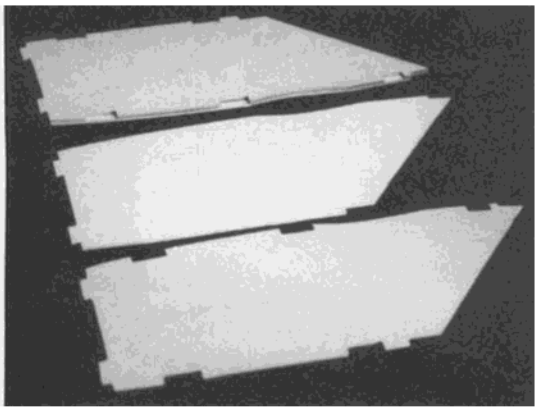
Put ribs 5, 6, and 7 in place and the 1/4" sheet balsa wingtip pieces. The wingtip pieces should match the trailing edge and raise to match the height of the front of the leading edge. Use scrap 1/16" balsa on the top and bottom of the tip to form rib 8. The last four ribs are sanded to shape after they

NAME
BOEING F4B-4

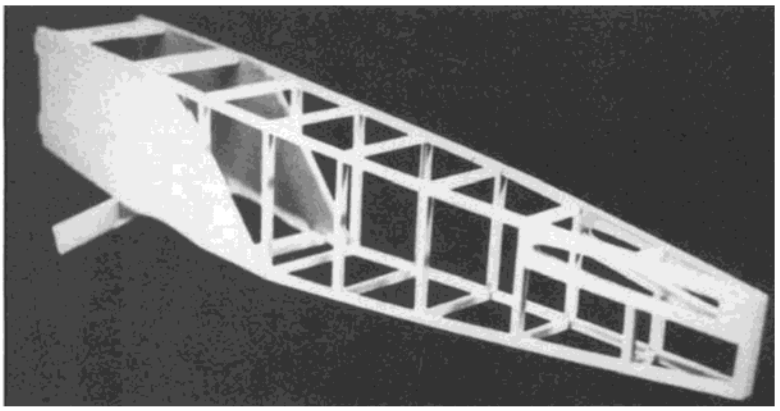
Designed by:
Bob Rich
TYPE AIRCRAFT
Sport Scale
WINGSPAN
60" Top/52-3/4" Bottom
WING CHORD
10" Top/7-1/2" Bottom
TOTAL WING AREA
908 Sq. In. (Approx.)
WING LOCATION
Biplane
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
0" Top/2° Bottom
OVERALL FUSELAGE LENGTH
40 Inches
RADIO COMPARTMENT SIZE
(L) 6" (W) 4" (H) 3-1/2"

STABILIZER SPAN
24-1/4 Inches
STABILIZER CHORD (inc. elev.)
6-1/2 Inches (Avg.)
STABILIZER AREA
148 Sq. In. (Approx.)
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Top Of Fuslage
VERTICAL FIN HEIGHT
10 Inches
VERTICAL FIN WIDTH (inc. rud.)
8-3/4 Inches (Avg.)
REC. ENGINE SIZE
.50-.65 2-Stroke/.65-.90 4-Stroke
FUEL TANK SIZE
12 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4

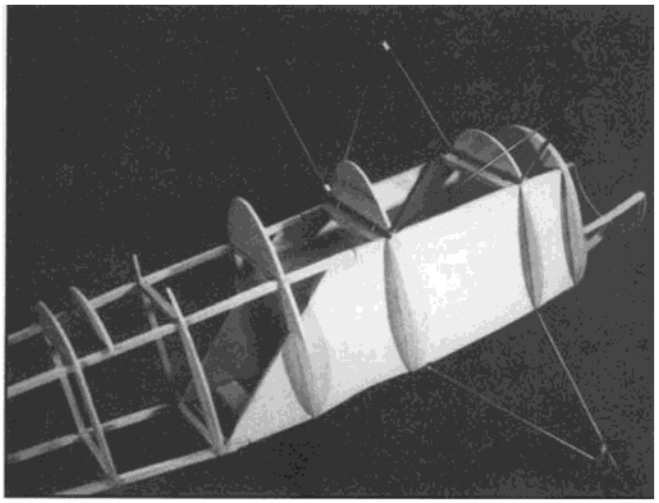
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
C.G. (from L.E.)
3-1/2" (Top Wing)
ELEVATOR THROWS
1/2" Up — 1/2" Down
AILERON THROWS
1/2" Up —1/2" Down
RUDDER THROWS
3/4" Left — 3/4" Right
SIDETHRUST
2 Degrees Rt.
DOWNTHRUST/UPTHRUST
3 Degrees Down
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Plywood
Wing ..... Balsa, Spruce
Empennage ..... Balsa
Wt. Ready To Fly ..... 140 Oz.
(8 Lbs. 12 Oz.)
Wing Loading ..... 22.2 Oz./Sq. Ft.



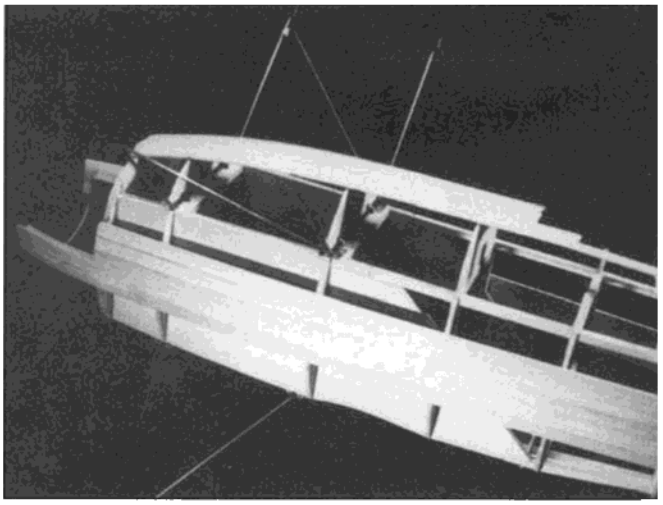
Fuselage sides ready for gluing.



Fuselage ready for formers and wires.



Formers, landing gear, and cabanes in place.



Fuselage partially planked.

are glued in place.

Construct the other wing half in the same manner.

Before joining the wing halves in place with the doublers, put the R-1's on the spars but do not glue. Glue the wing halves together with the doublers installed, raising the tips to the proper dihedral. Add the 1/8" aircraft ply piece to the front of the center section. Glue the rear wing hold-down reinforcements in place, allowing for the 1/16" sheeting.

Trial fit the aileron servo in the wing center section and glue the R-1's in place. Sheet the center section with 1/16" balsa.

Top Wing:

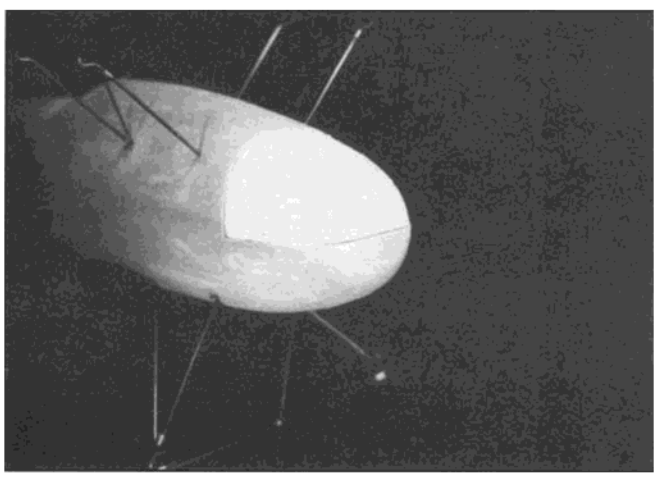
On the full-scale plane, the ailerons and tail surfaces were covered with corrugated aluminum. I chose the easy way out by not making the corrugations and saved weight. If you want to simulate the corrugations, be my guest. (Sig Mfg. Part #RPCP 404.) The top wing is built directly over the plans: flat, no dihedral. The rear wing spar is tapered from 3/8" to 1/4" to match the 1/4" sheet tip. When hinging the ailerons, the cut for the hinge clearance is not all the way through the aileron on top or bottom, unlike the tail hinging. Round the aileron leading edge to allow for proper aileron movements. Make the aileron drive connector from a cut-down Goldberg small control horn as shown on the plans. Use 1/6" ply for the connector support and glue securely.

Install all of the strut and rigging fittings on both wings.

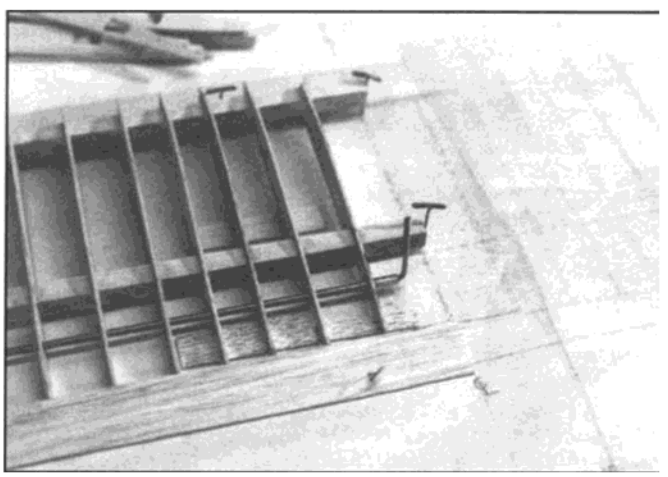
Fuselage:

Cut out the ply and balsa sides using the patterns. The right side pieces are shorter for the built-in right thrust. When cutting them out, make very sure you cut one right balsa side and one doubler, and one left side of each. Make sure they are glued together correctly. If they are made wrong you could end up with 2° of left thrust and that's a real no no!

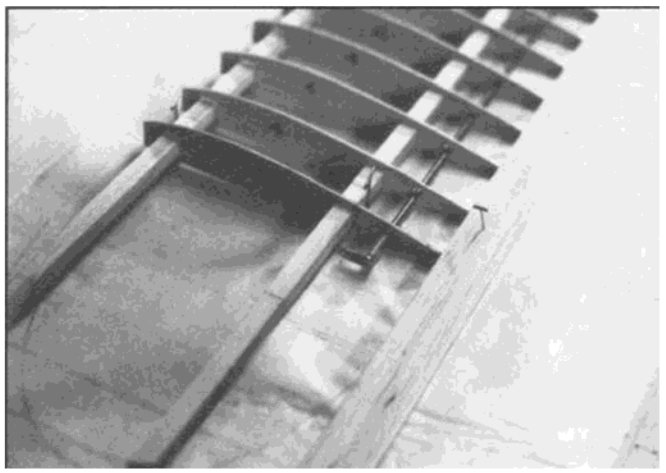
When the sides and doublers are dry, lay one of the sides on the plan and build the rear section with 1/4" sq. balsa. Build the other rear section directly over the first, with



Styrofoam form slightly smaller than finished cowl.

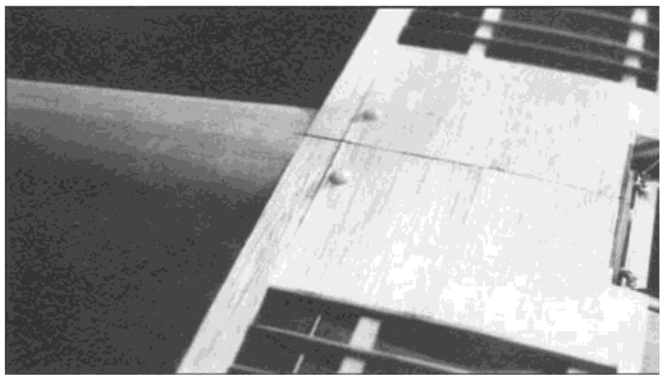


Aileron horn installed on torque rod.

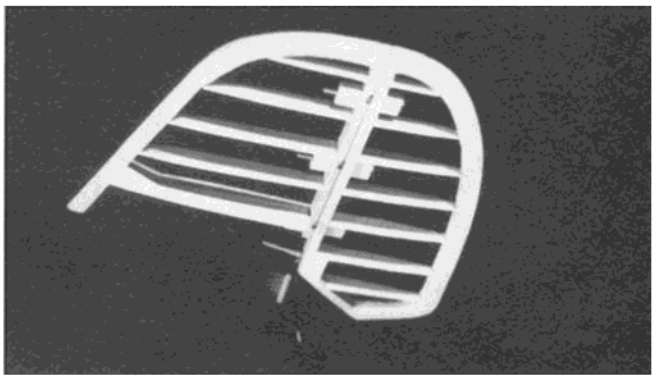


Aileron drive fitting soldered on torque rod.

Rib R-8 added and tip ready for sanding to shape.



Bottom of lower wing with hold-down bolts installed.



Vertical fin & rudder finished, ready for mounting to fuselage. Note trailing edge of fin rounded. (See plans for details)

wax paper between the two sides; this ensures your two sides are identical. Join the two sides together starting with the five 1/4" ply pieces using epoxy. Use the fuselage top view to ensure the sides are brought together evenly. When the fuselage sides are joined, add a piece of 1/8" balsa to the tail post to make the overall length correct because of the curvature.

Bend the wire landing gear and the cabane struts to the patterns. When installing the wires to the ply braces, center them on the ply pieces. Fasten the wire to the ply braces with "J" bolts or spade bolts. If you use spade bolts, be sure you put them on the wire pieces before soldering the wires together.

Glue all of the formers in place except the lower forward ones. When gluing the top and bottom formers in position at C and D, glue them in front of the wire, relieving the places for the bolts. Glue former 1D in place very accurately, as it locates the lower wing position.

Place the lower wing on the fuselage, measure, and position it correctly. Glue former 1F in place.

Drill the 1/4" hole in former 1D and the wing for the front hold-down dowel. Drill the holes for the two nylon wing hold-down bolts.

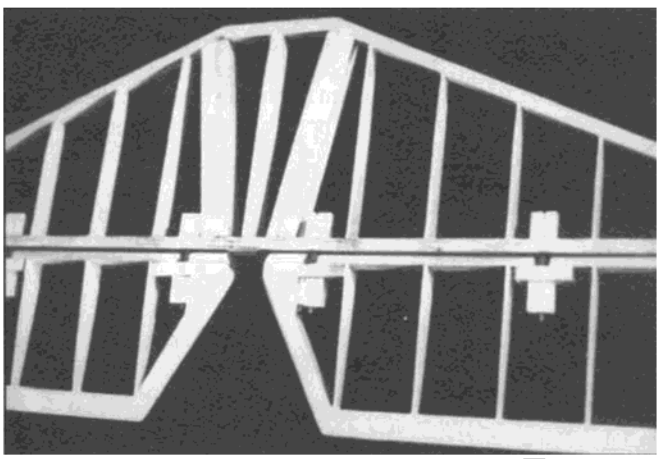
Glue the lower front formers in place.

Before epoxying the fire wall in place, it would be wise to decide on your engine choice. Measure and drill the engine mounting holes. Don't forget the side and down thrust so the prop shaft ends up in the right place. Putting in the blind nuts is also a pretty good idea. Mount the rigging wire fittings, .032" x 1/2" brass. The rigging wire holes should be about 3/32" inside of the finished 3/32" planking, so make the allowances.

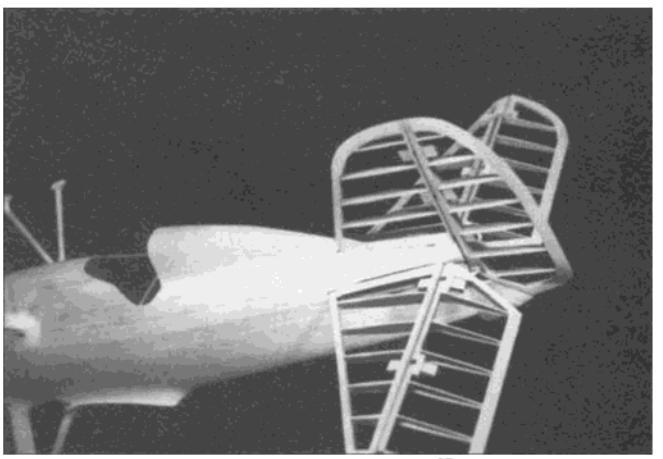
Install the fuel tank supports.

Install the cowl frame pieces to the front of the fire wall.

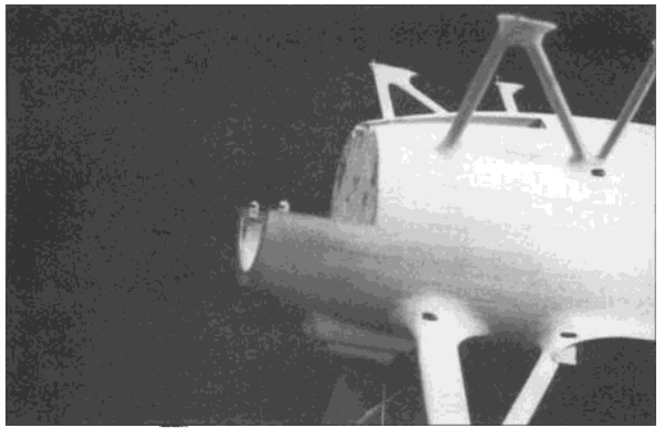
Now we come to the good part where things really begin to take shape — planking the fuselage. I guess everyone has their own system for planking fuselages, but I will explain what works for me. All of the planking is 3/32" balsa. I cut the wood into strips



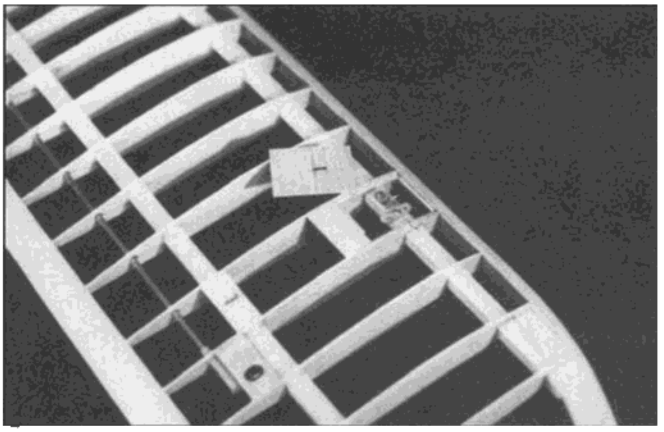
Stab joiner wire mounted on hinge line. Elevator leading edge rounded.



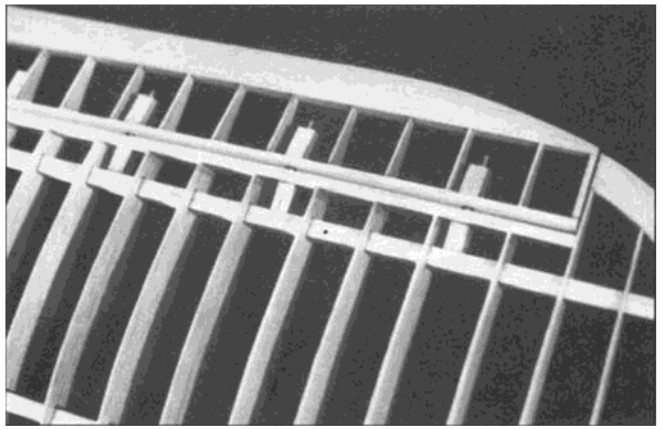
Tail pieces mounted on fuselage.



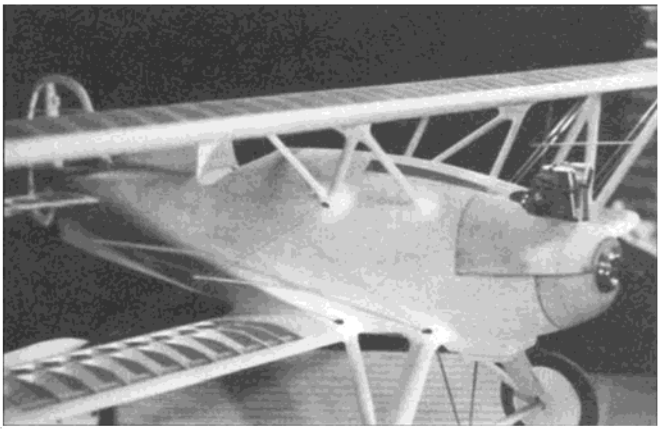
Front of fuselage ready for covering.



Lower wing with strut and rigging fittings installed.



Aileron hinging on upper wing.



All parts checked for proper fit.

about 3/8" wide. This width will follow the curves and bends better than wider strips.

Start by gluing a piece on each side, about the center of the fuselage sides. This keeps the fuselage square, so it won't pull to either side. Use pieces long enough to support the nose section in front of the fire wall. When laying each piece along the fuselage side, carefully check to make sure the contour is followed to get an even curve, no raises or dips. If the transition along the fuselage is not even, trim or shim as necessary. It's easier to fix minor errors now rather than later. Add pieces on each side of the fuselage evenly for three or four pieces, making sure the fuselage stays square. Now, add the rest of the planking. Extend the planking over the cockpit opening so it can be trimmed later. Extend the bottom planking over the lower wing mounting hole so it can be trimmed to fit the wing.

The lower nose part is a soft balsa block carved to shape.

Cut the fuselage for the gun troughs and line them with 1/64" plywood. The ply bends easily to shape when soaked with Windex with ammonia.

I used Goldberg's Model Magic to form all of the fillets. Be sure to shape them while applying the Model Magic and soon after it hardens. After it really hardens, it gets extremely hard and strong. I used 1/64" ply laid over the top of the bottom wing, glued to the fuselage, and formed the wing fillet. Use wax paper or plastic wrap between the wing and the fillet.

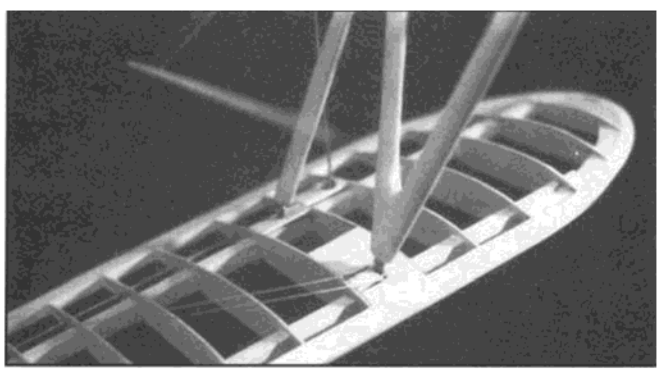
The tail wheel cover may be carved from balsa or formed out of Styrofoam and fiberglassed.

To mount the wing to the cabane struts, place the 1/4" ply wing mount pads at the proper location and press them down to the spar. The distance above the pad to the bottom of the ribs is the amount of fill required to raise them to the rib height. Use 3/8" wide ply **glued to the spar** to raise the pad to rib level.

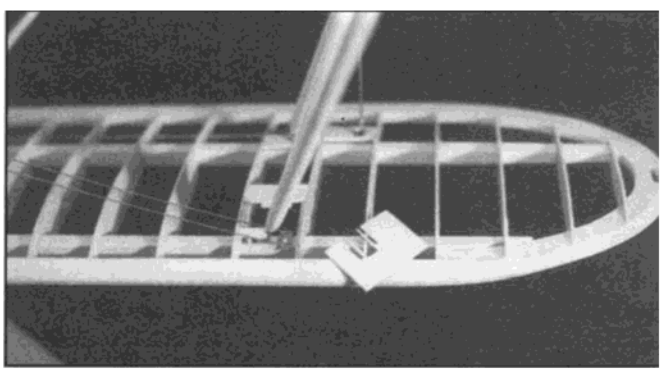
Place the fuselage over the wing with the cabane struts on the ply pads. Carefully measure the fuselage and the wing to correctly locate the mounting holes. When the holes are drilled, route out the pads so the bottom of the cabane struts' horizontal section fits in the groove flush with the bottom of the mounting pads. I used a Moto-Tool with a small round bit to route the groove. Use small landing gear straps to mount the cabanes to the wing.

Tail:

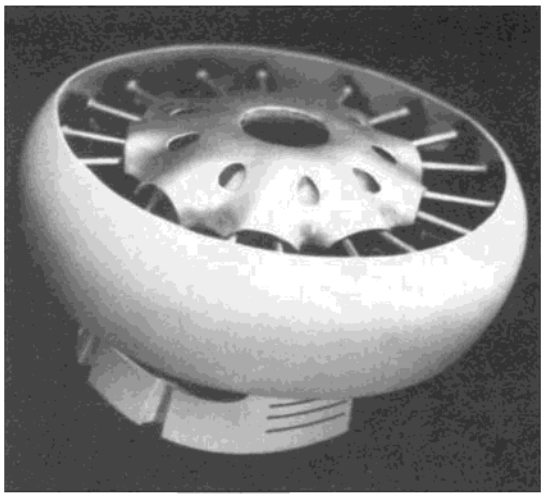
The tail surfaces are built directly over the plans. Don't forget to shim the leading and trailing edges to center them. The ribs are 1/6" x 1/2" balsa and sanded to the airfoil shape after removing them from the building board. The hinge supports are 1/4" balsa except for the lower one for the rudder,



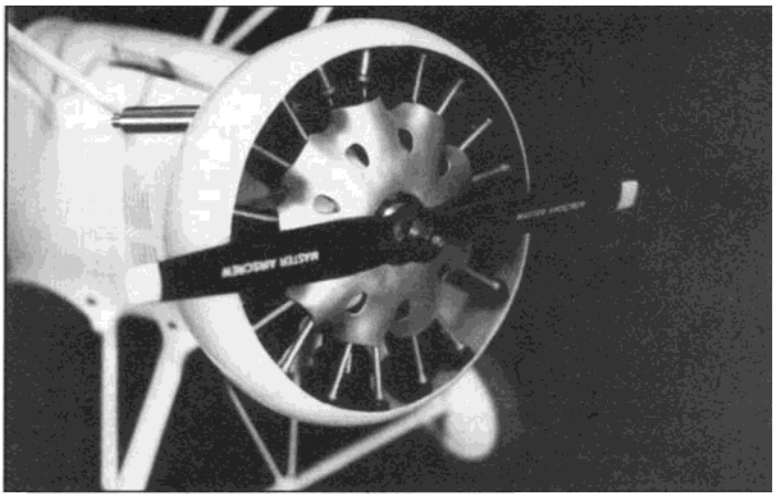
Left lower wing, struts, and rigging in place.



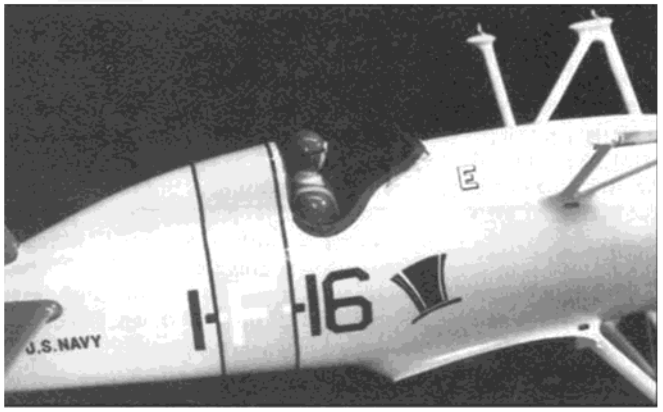
Rigging fitting cover held in place with two drops of RC-56.



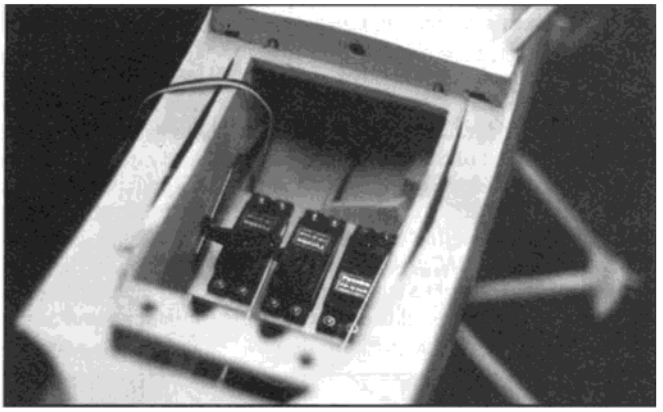
Finished cowl.



Front of finished fuselage.



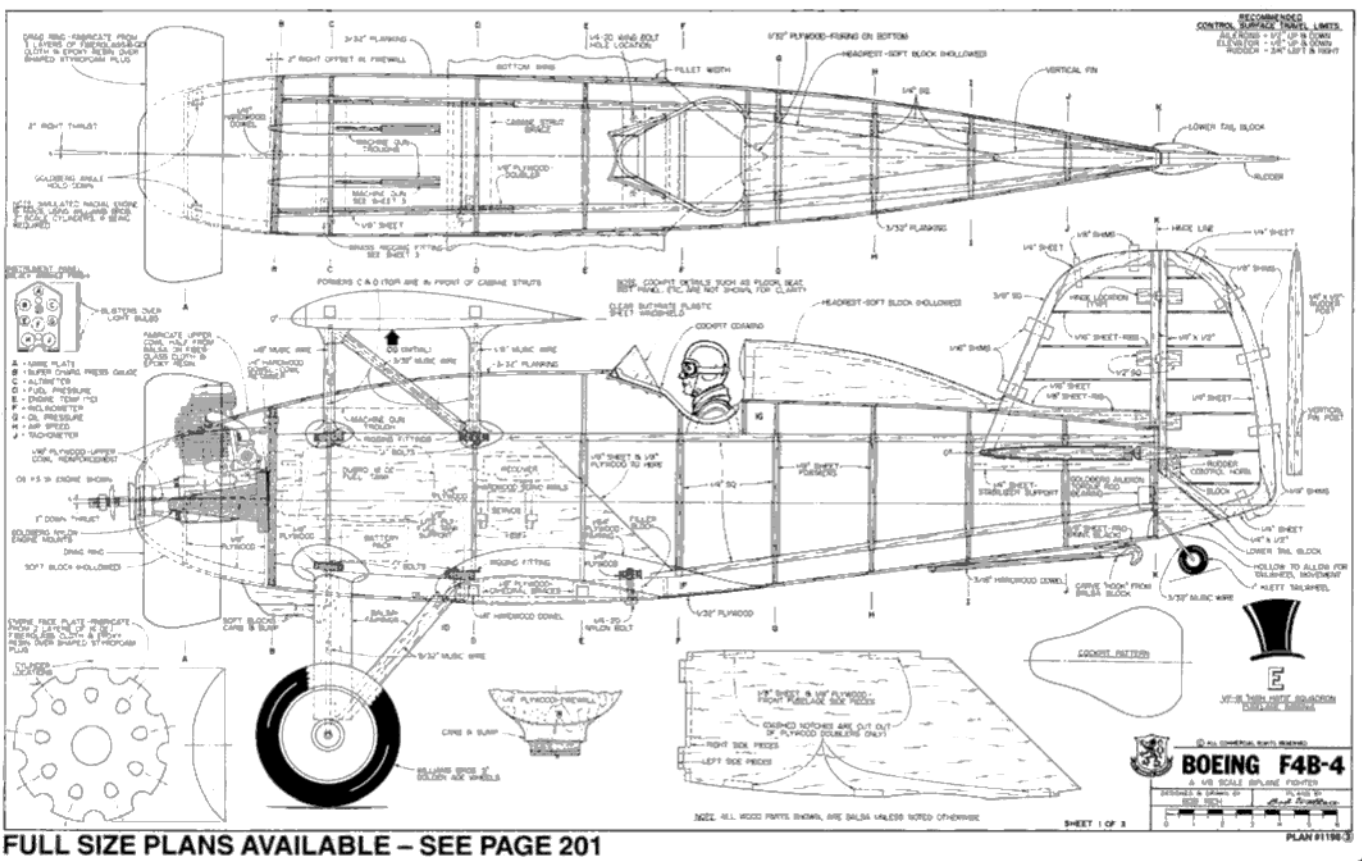
Side view of finished fuselage.



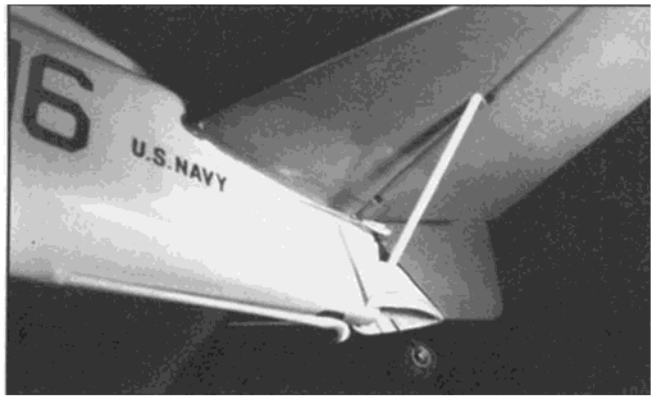
Lots of room for radio installation.

it's in the fuselage tail post. The Goldberg horn bearing in the fuselage for the tail wheel support must be countersunk so the hinge line is correct. After the fin is sanded, trim 1/16" off of the bottom fin rib for the 1/16" sheeting pieces to be glued to the lower part of the fin.

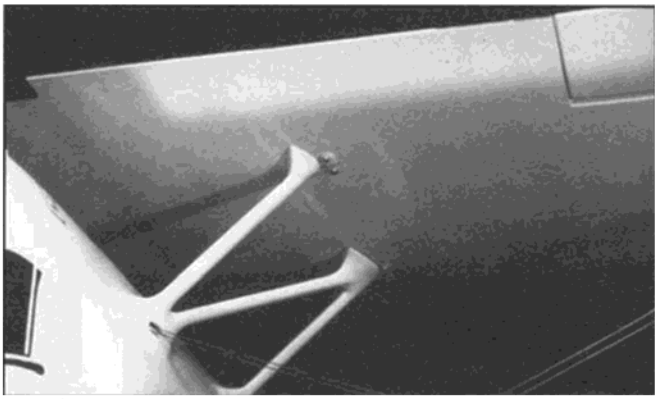
The stabilizer center ribs are trimmed 1/16" to allow the 1/16" sheeting to be applied. Be sure to install the 3/32" wire joiner at the hinge line on the elevator. The rudder and elevator hinge line as shown on



FULL SIZE PLANS AVAILABLE – SEE PAGE 201



Rear of fuselage, stab struts mounted.



Cabanes and wing mounting.

the plans, is close to the scale hinge line. I used Robart's hinges throughout. If you don't want to go for the scale hinging, use a conventional hinging method at the spar lines.

The tail wheel is not scale in action, but it's close. It could be made scale with extra effort.

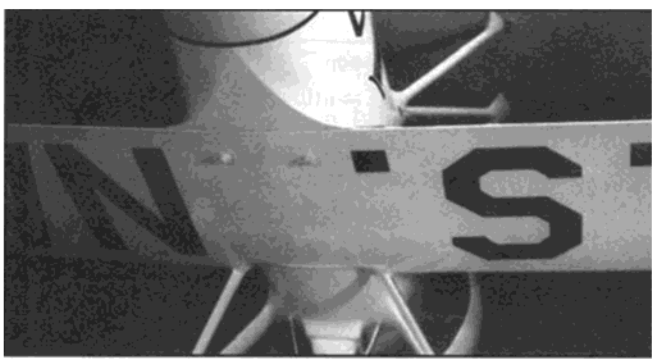
The incidence angle on both wings is 0° in relation to the stab.

I made the upper nose cowling piece by making a form out of Styrofoam and using epoxy resin and fiberglass cloth. Use enough layers of cloth to make the upper cowl very solid. The dummy engine and the drag ring mount on it. I used 1/16" plywood as a facing for the nose pieces to get a smooth fit and to hold its shape. I mounted the upper nose cowling with Goldberg angle hold-downs. Use whatever method you like. I like the hold-down because the cowl snaps on and off and is secure. The drag ring is made from fiberglass over a Styrofoam form. Three layers of heavy cloth made a solid drag ring. The radial engine is made using Williams Bros. 2" scale cylinders, eight are required. The cylinders are carved at a slope at the rear to match the cowl. It's a cut and try method to get the right slope and height for the drag ring to fit. I used Zapadapa Goo to hold the drag ring to the cylinders. The silver face plate was also carved and shaped out of Styrofoam and fiberglassed. Two layers of cloth were used.

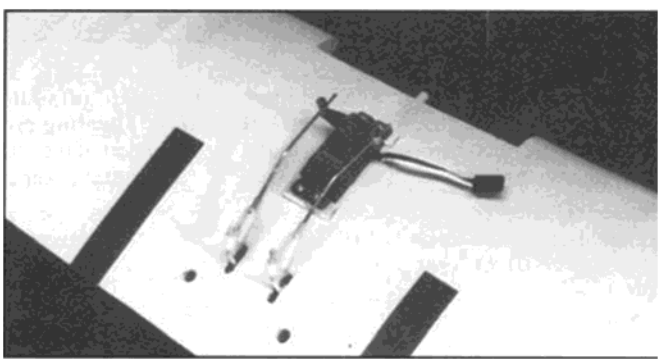
I covered the fuselage with lightweight silk span and nitrate dope. The wings and tail surfaces were covered with Color-tex. The entire plane was given three coats of clear nitrate dope. The fuselage was primed and sanded to make it look like metal.

Super Poxy was used for all of the color. The light gray was mixed by adding some black to the white Super Poxy. The insignia, large letters, and numbers were cut from Goldberg's UltraCote Plus. The F4B-4 on the tail is Letraset letters, and the U.S. Navy is vinyl lettering.

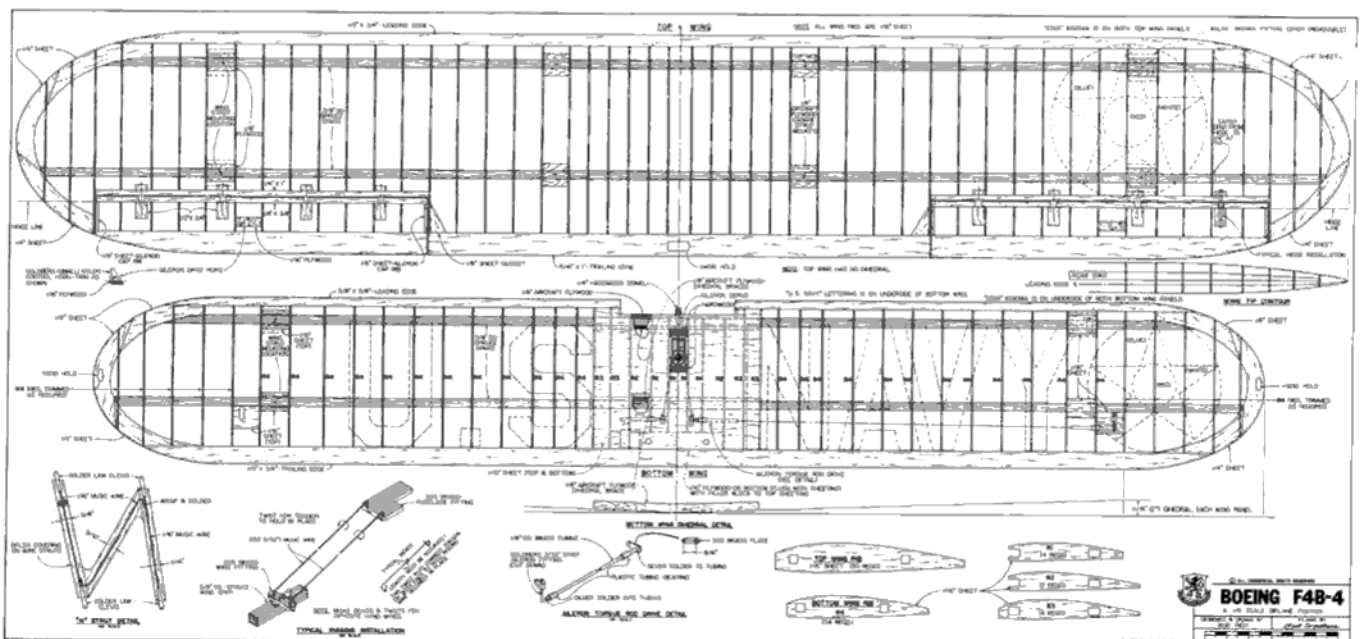
When everything is put together and checked out for proper operation, set up the control surface throws. My throws were set up as follows: elevator — 1/2" up, 1/2" down; rudder — 3/4" right, 3/4" left; ailerons — 1/2" up, 1/2" down. Check for balance as shown on the plans.



Transition from lower wing to fuselage.



Aileron servo mounting.



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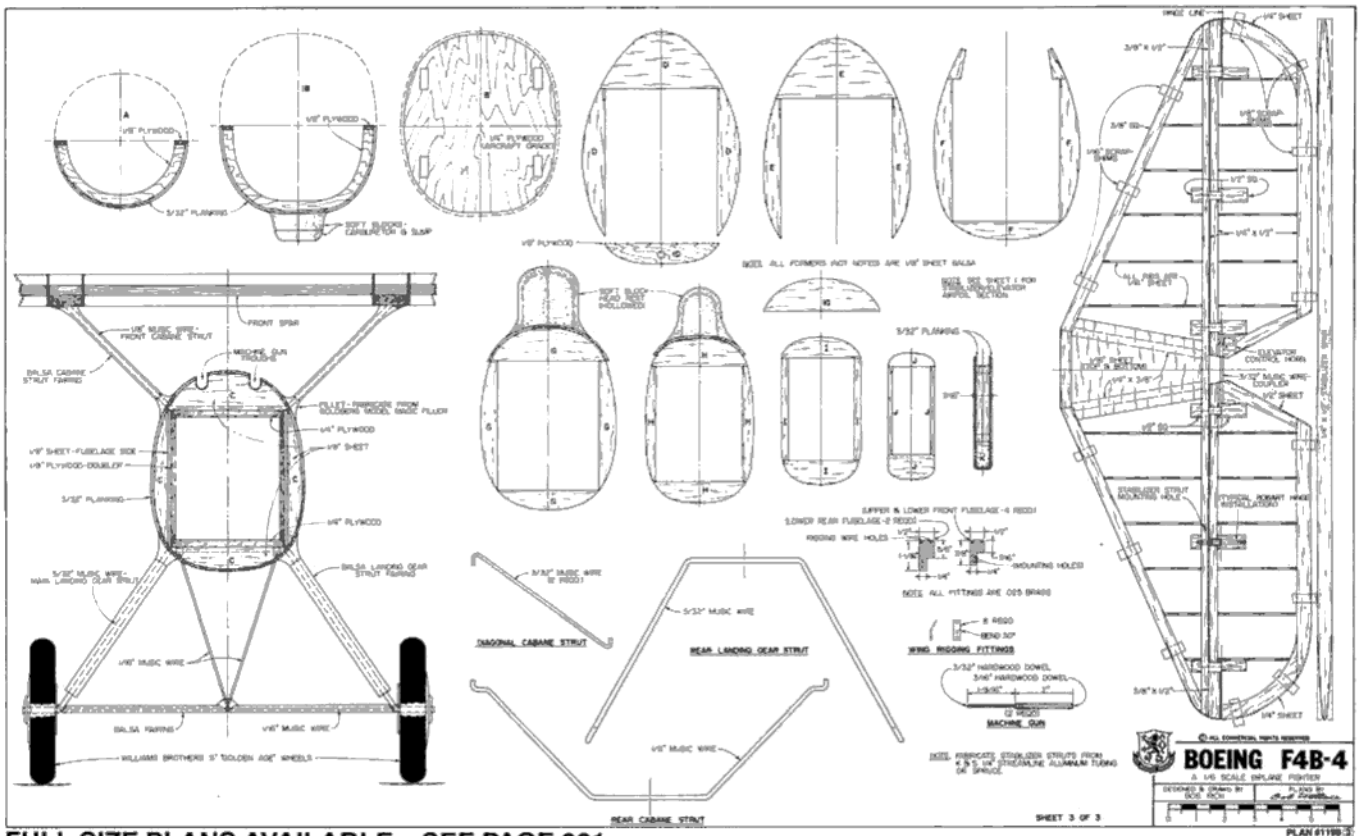
Now it's time for the moment of truth.

Flying this plane was a very pleasant surprise. It's very stable and should do everything the full-scale plane can do. It is a little tricky on take-off because it is quite short coupled. A little toe-in and lots of rudder throw helps a lot. When you get used to it, I'm sure you will get as much pleasure from this plane as I have.

If you build this plane I'm sure you will be happy with it -- a nice looking plane that flies well. What more could you ask for?



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