

BROWN B-2 RACER

"Miss Los Angeles"

By Charles Swartz

A Sport Scale "Golden Age" racer that can fill the need for an "Every Day" flier.

The decade of the 1930's marked an era during which many of the world's most memorable propeller driven aircraft were developed. Among these were the Cessna, ME-109, FW-190, Zero, P-38, P-40 and P-47 which, justifiably, have been universally admired and extensively studied. This was also the time when my racing fascination with airplanes began.

During this same period, racing aircraft, many of which became classics, were capturing most of the pre-war headlines. In 1929, the Travel-Air Mystery Ship designed by Charles G. Beech, who later founded Beechcraft, set all of the current U.S. military flight records and three years later, the Gee Bee R-1, designed by Jimmy Doolittle, set a new world's speed record of 296 mph. "The Golden Age of Racing" had begun in earnest. Many are famous, but there were also many outstanding racers that are not as well remembered. Among these was the Brown's B-2 "Miss Los Angeles" and I think to many others was the best looking planes of all.

My racing career lasted for over 20 years as top performance aircraft. I finished in the 1934 National Races, the premier event in the world. With a top speed of



ABOUT THE AUTHOR

Charles Swartz was 67 in September 1994 and has been intrigued with airplanes of all sizes for about sixty of those years. He began building and flying engine powered, free-flight models about 1939 and actively competed air contests in the Houston area until he graduated from Rice University in 1949 with a mechanical engineering degree. His first engine was a Brown Jr. which was followed by all three sizes of Ohlsson's, flying Playboys, and his favorite, an Arden 19 in a Strato-Streak which was a consistent winner. Charles later tried to fly R/C with reed equipment and had little success until he got a Citizenship proportional radio.

He started his own company over 20 years ago which specialized in natural gas equipment and retired 3 years ago. The business required a lot of traveling and he did most of that, for more than 20 years, in their own aircraft. He holds a Commercial License with single engine, multi-engine, and instrument ratings and he is sure his earlier modeling experience greatly helped his full scale flying. Now, he is back to active R/C modeling and is thoroughly enjoying flying with the wonderful equipment that is available today.



270 mph from its 300 hp, 544 cubic inch 6 cylinder Menasco engine, this sleek, red beauty was beaten only by the legendary Roscoe Turner in a Wedell-Williams with a 1000 hp 1690 cu. in. Pratt & Whitney Hornet engine. The third place finisher was another Wedell-Williams with a 580 hp, 985 cu. in. P&W.

The original "Miss Los Angeles" was destroyed in a 1939 crash, but, fortunately, there exists an outstanding full-scale replica owned and flown by Bill Turner. I photographed this plane at Oshkosh a few years ago and have used these photos in the development of this model.

The long, slender fuselage of "Miss Los Angeles" with its inverted in-line engine, open cockpit, long headrest that fairs into a graceful tail, and brilliant red with gold trim finish is, to me, a classic design that begs to be modeled.

In designing this model, I wanted to keep it in the popular 40 engine size range and still retain as many of its scale features as possible without sacrificing flyability and durability. As a result, the model is scale, or close to it, in all major areas except wingspan. The wing, if built to the same 19% scale as the fuselage, would have a span of 43" and the wing loading would be an "interesting" 40 oz. per sq. ft. The model's wingspan was increased to 58", the chord increased slightly to 9-3/4", and the resulting wing loading is a very nice handling 24 oz. per sq. ft.

"Miss Los Angeles" flies like a typical low wing trainer but it sure looks better doing it!

The original plane had a wingspan of 19' 3" and a length of 19' 10". Exact scale outlines for the wing and stabilizer are shown on the drawings for anyone who might want to try them or enlarge the model to a larger scale. A 1/3 exact scale model would have a wingspan of only 77" and should have a reasonable wing loading.

The model's fuselage and vertical tail are exact scale in profile, but the following deviations from scale were made for improved flight performance and ground handling:

- Wingspan: increased from 43" to 58".
- Wing Chord: increased from 8.5" to 9.75".
- Airfoil Thickness: increased from 1" to 1.375".
- Wing Dihedral: increased from 0" to .5".
- Stabilizer Span: increased from 14.5" to 17.5".
- LG Wheel CL: moved 2.25" forward.
- Tail Skid replaced with steerable Tail Wheel.
- External wire bracing omitted.
- Wing Flaps omitted.
- Air Inlet in Engine Cowl enlarged.

The original design of the model had the landing gear centerline in the scale position, slightly behind the leading edge of the wing, but this made it virtually impossible to taxi

NAME
BROWN B-2
"Miss Los Angeles"

Designed by:

Charles Swartz

TYPE AIRCRAFT

Sport Scale

WINGSPAN

58 Inches

WING CHORD

9-3/4 Inches

TOTAL WING AREA

535 Sq. In.

WING LOCATION

Low Wing

AIRFOIL

Flat Bottom

w/Semi-Symmetrical Nose Section

WING PLANFORM

Constant Chord w/Rounded Tips

DIHEDRAL, EACH TIP

1/2 Inch

OVERALL FUSELAGE LENGTH

44 Inches

RADIO COMPARTMENT SIZE

(L) 10" x (W) 3-1/4" x (H) 2-1/2"

STABILIZER SPAN

17-1/2 Inches

STABILIZER CHORD (inc. elev.)

5-1/8" (Avg.)

STABILIZER AREA

90 Sq. In.

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

6 Inches

VERTICAL FIN WIDTH (inc. rud.)

5 Inches (Avg.)

REC. ENGINE SIZE

.40-.46 Cu. In. 2-Stroke

FUEL TANK SIZE

11 Oz.

LANDING GEAR

Conventional, Fixed

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa, Ply, Lite Ply, Maple

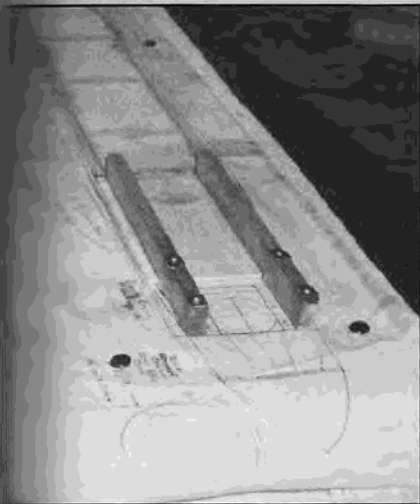
Wing Balsa, Spruce, Ply, Lite Ply

Empennage Balsa

Wt. Ready To Fly 88 Oz. (5-1/2 Lbs.)

Wing Loading 24 Oz./Sq. Ft.

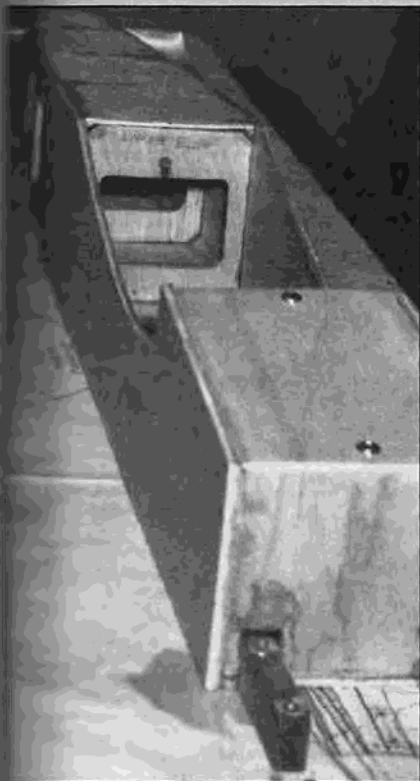




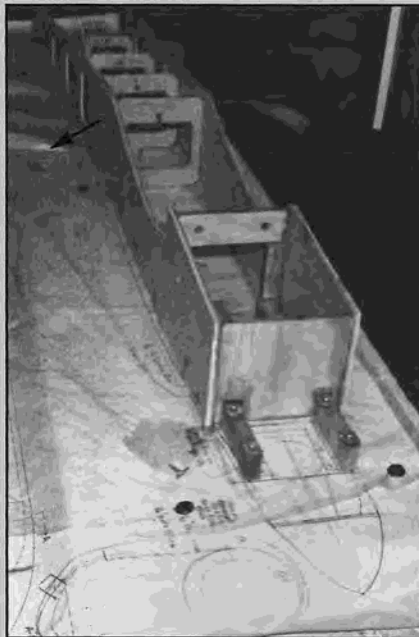
Top crutch with hardwood bearers glued in place.

without nosing over, particularly on grass. The wheel centerline was then progressively moved to the location shown on the plans which cured the problem. The original full-scale aircraft apparently experienced the same difficulties with a number of nose-overs reported.

The structural design results in a strong model that is able to withstand the normal wear and tear of regular weekend flying. In case of too hard of a landing, the wing is designed to separate from the fuselage with no more damage than a couple of sheared nylon bolts. The landing gear is strong, but if it should need any maintenance, the removable belly pan makes it easily accessible. The LG strut fairings, which conceal the LG wires, are kept in place with shrinkable covering material strips which are easily cut



Fuselage with bottom crutch and hatch cover installed.



Gluing sides to top crutch and formers. Note masking tape.

away and replaced if necessary. Wingtips are durable lite ply instead of balsa.

"Miss Los Angeles" will give you many hours of enjoyable flying and its beautiful scale lines make it a standout at any field.

CONSTRUCTION

Fuselage:

The fuselage is essentially a box with formers and stringers rounding it out. There are no compound curves. The first step is to build the top of the box which is actually a crutch with its top running along the thrust line. Build the crutch of 1/8" balsa with the grain at 90° to the centerline. Do not cut to final shape until the 1/4" triangular balsa strips are glued in place. The triangular strips serve as splines for drawing and cutting the final outline, as well as adding stiffness to an otherwise very floppy, cross-



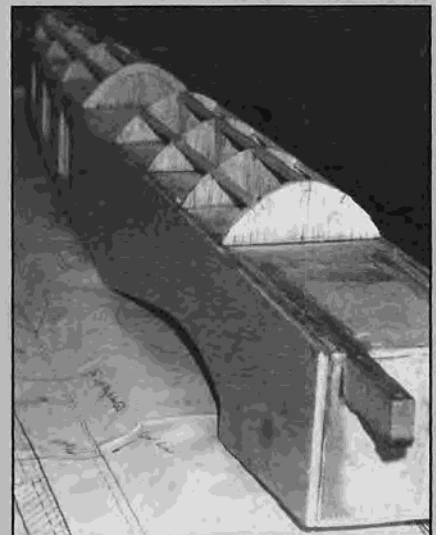
Fuselage sides glued to top crutch.



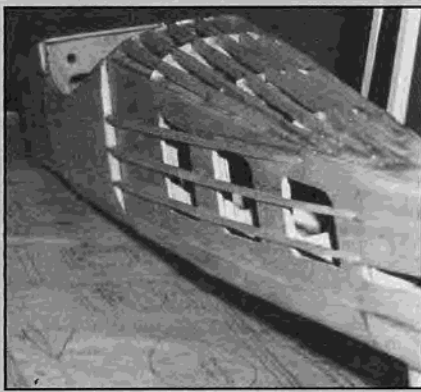
Bottom crutch and hatch cover before installation.

grained piece and providing a wide gluing surface. I have found it almost impossible to draw and smoothly cut a long, curved line without the help of splines. Cut the 3/8" x 3/4" maple engine bearers to size, epoxy the four 6-32 blind nuts on the bottoms per plans, and then epoxy the engine bearers to the crutch. It is much easier to install these blind nuts now instead of after the fuselage is built. The engine mounting plate will be bolted to the bearers. The crutch is the backbone of the entire plane, and when accurately cut, makes it practically impossible to build a fuselage that is not perfectly true.

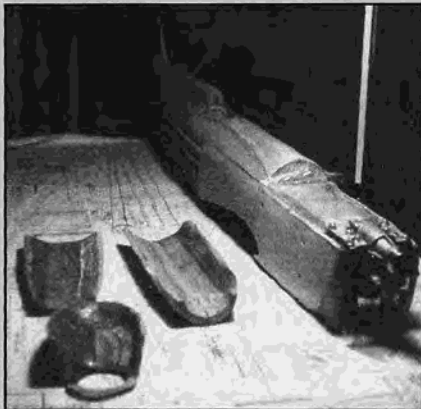
The completed crutch is pinned over the top view, upside-down. Prepare formers F1 through F7 as described below and then glue them in place, using a 90° triangle to insure they are perpendicular. The plans include location marks so the formers can be positioned with the top view covered by the crutch. F1, F2, and F3 are 3/16" ply. The front bottom of F2 is doubled with 1/8" ply with opposite grain. The 1/4" dowel holes in F2 should be drilled before it is installed. F4 through F7 are 1/8" balsa with vertical grain. 1/16" balsa doublers with horizontal grain are glued across the bottom back sides of F3 through F7. Be sure to drill the 1/8" holes in the bottom sections of F3 through



Top formers and stringers.



Bottom and side stringers and headrest details.



Top front deck and cowling parts can be built-up from balsa, or plastic cowling available from author.

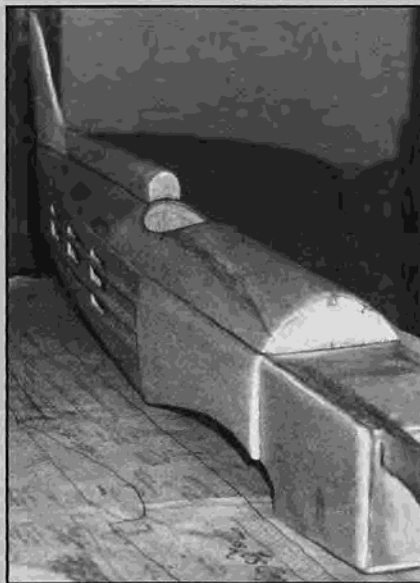
F7 before gluing them in place. These holes are for the antenna tube (an inner NyRod) which neatly conceals the antenna.

Cut two sides from 1/8" lite ply with lightening cut-outs between F4 and F7. Cut two side doublers from 1/16" ply and glue to the inside of the lite ply sides. Be sure to make a right and left side. I used aliphatic resin carpenter's glue and let it dry overnight, weighted down with stacks of books.

Epoxy the side assemblies to F1, F2, and F3 and the inverted top crutch. The sides are parallel from F1 to F3. After the epoxy is dry, glue the sides to F4 through F7 and the top crutch all the way to the tail. Masking tape strips with sticky sides up were laid under the crutch before it was pinned over the plans. These are a big help when pulling and holding the sides against the formers and crutch. Glue a triangular shaped piece of



Balsa cowling sides are drilled to allow access to button head screws during assembly.



Completed fuselage structure.

scrap balsa between the sides at the tail post.

The bottom crutch extending from F3 to the tail is built from 1/8" cross-grained balsa with 1/4" triangular balsa splines, the same as the top crutch. Glue 1/4" triangular balsa strips between F1 and F2 and against the sides.

Be sure these are positioned 1/8" above the bottom of the lite plywood sides. These strips will help support the 1/8" lite ply hatch cover.

Glue the antenna tube in place and then glue the bottom crutch to F3 through F7 and the sides. Glue hardwood blocks to the bottom rear of F1 and bottom front of F2. Fit the removable hatch cover in place and drill through it and into the blocks for the #4 x 1/2" self-tapping screws.

Cut lightening holes in the top and bottom crutches between formers aft of F3. The basic fuselage box is now complete and ready for final shaping.

Cut formers F8A from 1/4" balsa and (3) F8 through F12 from 1/8" balsa and glue in



Masking tape is used to pull parts together while glue sets.



Balsa cowl construction ply is mounted.

place on the top crutch. Add the 3/16" balsa stringers and sand smooth for a finish of 3/32" balsa sheathing.

Cut the vertical fin and rudder from medium hard 1/4" balsa and tack glue together for sanding. Separate and glue the fin only to the top of the top crutch and rear of F12. Be sure the fin is perpendicular to the top crutch and aligned on the centerline.

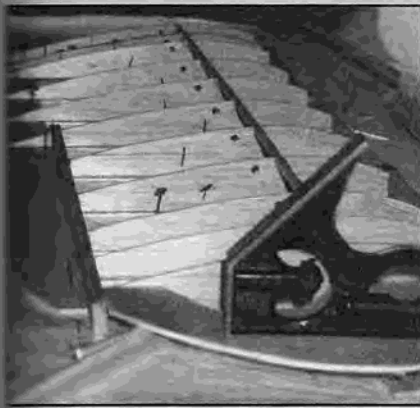
Sheet the top of the fuselage from F8 to F9 with soft 3/32" sheet balsa, using partial 1/8" doubler glued to the front of F8 to support the forward sheeting. Dampen the 3/32" sheet on the outside for easier bending. Sheet the rear turtledeck from F8 to F12 with 3/32" balsa in the same manner. Fair the rear of the turtledeck to the tail post and to the fin, per plans, with soft balsa block, hollowed for lightness.

Glue 1/4" soft balsa sheet to the sides from F8A to F3. Glue 1/8" x 1/4" hard balsa side stringers, tapered from front to rear directly to the sides without formers.

Glue F13, F13A, F14, and F15 to the bottom crutch and then glue the 1/8" x 1/4"



Gluing LE and spar joiners to first wing panel.



Installing wingtip.

Hard balsa bottom stringers in place in 1/8" x 1/8" notches (1/8" x 1/4" in F13A) cut in the formers. To ensure perfectly straight stringers, I did not cut the notches until the formers were glued in place and the stringer line marked using a straightedge. Nothing looks worse than wavy stringers, and I have much better success doing it this way. Note the 1/8" balsa gusset between F13A and the bottom crutch.

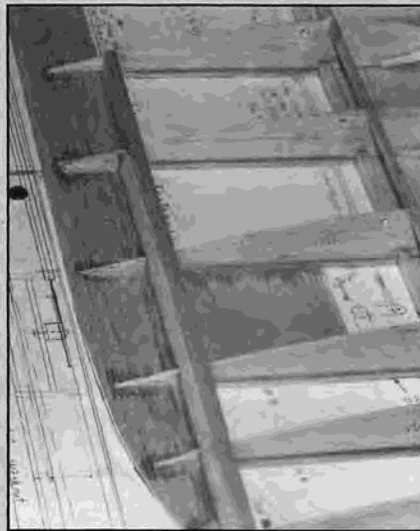
Make a 1/8" ply mount for the Du-Bro tail wheel bracket by cutting a triangular piece that will fit flush with the bottom crutch. Epoxy two 4-40 blind nuts in place, file the edges of the rear nut flange to match the ply mount, cut away a matching part of the bottom crutch, and epoxy the mount in place. A removable tail wheel assembly has proven to be very handy.

Make the long headrest, which extends from F9 to the fin, from soft 1/4" balsa. Close the front with F16, carve to shape, fit to the turtledeck by sanding, and glue to the turtledeck and fin.

Sand the completed fuselage with fin and headrest, to final shape. Round the front edges of the top and sides at the F8A position. This will create the desired separation line between the engine cowling and the fuselage, as well as providing additional inlet area for engine cooling air. After final sanding, make the cockpit cut-out, sand the edges, and harden with thin CA.



Join wing center section using epoxy and clamps. Total dihedral is 1".

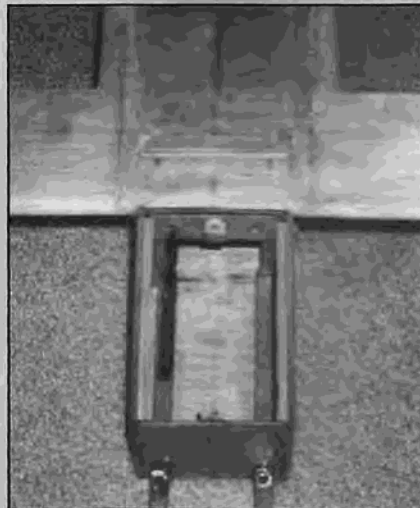


Aileron construction.

Engine Cowling:

The long, sleek cowling for the inverted, in-line Menasco engine is probably the most recognizable feature of "Miss Los Angeles." The model's scale cowling provides ample room for completely enclosing the engine, in-cowl muffler, and flexible exhaust tube extensions. The prototype model has an O.S. Max 46SF with a J'TEC "in-cowl" muffler. The two silicone tubing extensions are routed from the muffler outlets through the two forward exhaust stacks installed in the cowling. The other four stacks are dummies. To simplify this part of the project, I can supply a set of strong, vacuum formed plastic parts which includes the vertically split engine cowling, vertically split wheel pants, and one piece clear windshield. Price and address for orders are listed in the Materials List.

Assemble the cowling by cutting out the two sides, and from the scrap, two 3/4" x 10" strips and a 2-3/8" circle. Glue the circle inside the nose of each side with CA (Plasti-Zap is ideal). This sets the 2-1/2" O.D. of the nose and makes it easy to complete the assembly. Join the two sides with the 3/4" wide strips, CA'd inside the top and bottom.



After wing center section is glassed (including over landing gear blocks), locate and drill wing dowel holes.

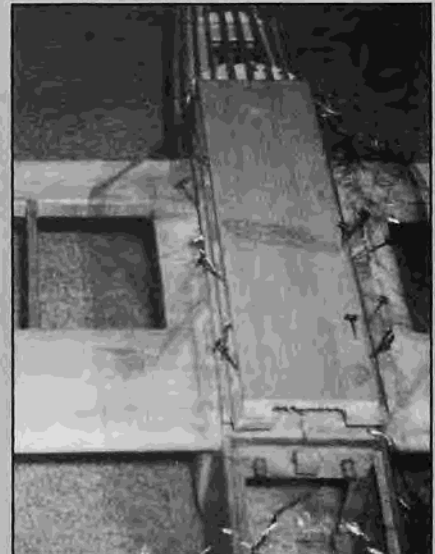


Sliding LE and spar joiners into second wing panel.

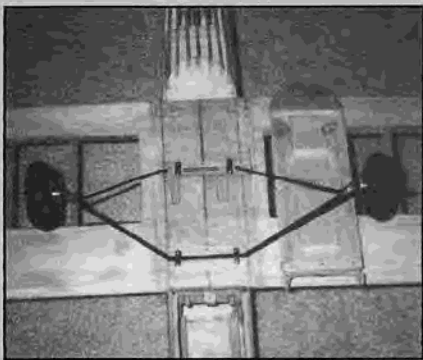
The cowling should be 4-1/8" wide at the rear. A gap of 1/8" to 1/4" between the sides is okay. Epoxy fiberglass inside the curved nose bowl joint. The gaps between the sides are filled with Bondo which easily sands for an invisible joint.

Cut the air inlet opening to the shape and size shown on the plans. This opening is larger than scale, but it provides more even air flow over the model's engine and gives needed access for the insertion of the flexible exhaust tubes into the forward two stacks. Cut a 1-1/2" diameter circle out of the nose ring.

Depressions in the right half of the plastic cowling, on 1-1/4" centers, locate the exhaust stacks. Drill **only** the forward two holes all of the way through with a 3/8" bit and then carefully ream for a tight fit for the 17/32" O.D. brass stacks. Cut two pieces of 17/32" brass tubing 11/16" long and one piece of .010" brass sheet 1" x 2-1/4". Drill and ream the brass sheet for a tight fit for the two 17/32" stacks. Bend the brass sheet to conform with the inside shape of the cowling at the stack location and solder the two stacks to the plate. The stacks should project 3/8"



Belly pan construction.



LG installation and belly pan interior.

from the outside of the cowling at the angle shown on the plans. This brass stack assembly will be epoxied in place on the inside of the cowling after all painting is completed. The four remaining stacks are 7/16" long, 17/32" O.D. brass, fitted into the depressions. File the ends as necessary for the same 3/8" projection and angle as the two forward stacks. Fit all six stacks in place, but do not glue until all painting is done.

For those who enjoy carving and sanding, a wood cowling can be made as I did for the prototype cowling plug. Begin by cutting two 1/32" cowling sides. Cover all of fuselage forward of F8A with transparent plastic kitchen wrap and glue temporary front cowling former AA-1 to the hardwood engine bearers. (AA-1 will be cut away before nose bowl is permanently glued in place.) Attach the two 1/32" cowling sides to the lite ply fuselage sides with #2-1/4" button head screws (four per side), which will be removed later. Glue the 1/32" ply cowling sides to AA-1. Cut two 1/4" soft balsa sides the same size as the 1/32" ply sides and press against the screw heads now in place to mark the locations. Drill holes at these marks large enough to permit removal of the screws after the cowling is complete. (These holes will be filled later with scrap balsa.) Glue the 1/4" balsa sides in place, using masking tape to hold them against the curves. Cut the top, bottom, and nose blocks to rough shape from soft balsa and tack glue in place. Finish the front to final dimensions and glue the 2-1/2" diameter 1/16" ply nose ring to the lower nose bowl. Tack glue only to the front of the upper block. Carve and



Belly pan mounting and balsa cowling plug.

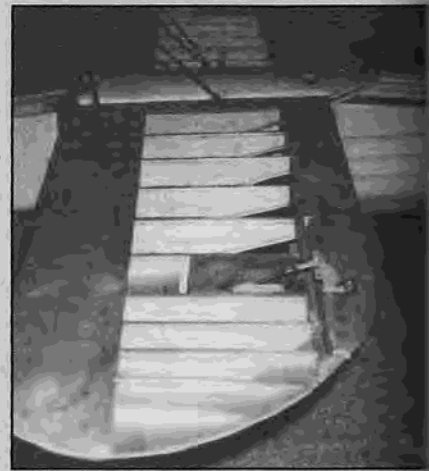
sand cowling to final shape, and then separate for hollowing. The nose ring stays glued to the lower bowl. Hollow blocks as much as practical, fuelproof insides with resin, and permanently glue back in place. After final sanding, remove the screws holding the cowling sides to the fuselage, and slide the completed cowling off. It comes off easily unless the plastic wrap had a leak. Fill the screw head holes with scrap balsa and reinforce the interior joints with fiberglass and epoxy.

The exhaust stack installation in the wood cowling is essentially the same as for the plastic cowling, with the exceptions that the two front stacks will need to be lengthened to allow for the additional thickness of the wood, and 1/16" deep 17/32" O.D. sockets will need to be drilled for the four dummy stacks.

The cowling is attached to the fuselage with two #4 x 1/2" button head screws on each side. Glue four 1" sq. 1/8" ply spacers to the lite ply fuselage sides at the attachment points. Drill and tap these with the attachment screws and harden the threads with thin CA. (If the wood cowling is used, the spacers are not required.)

Wing:

The wing is designed with a flat-bottomed, semi-symmetrical nose section airfoil that transitions to a symmetrical airfoil at the tip. This, combined with 2° of washout, gives both good slow flight and aerobatic performance. As it takes all of the landing loads, the wing is very strong. Its structure is traditional, double D-Cap, with 3/16" sq. spruce spars, 1/8" ply ribs W2 which support the landing gear blocks at the fuselage wing saddle position, and lite ply



Aileron pushrod trial fit prior to covering. Note wingtip detail.

wingtips. Full depth spar and leading edge joiners are 1/8" ply. Ribs W1 through W4 are the same outline and should be cut in a stack if possible. Material and notches are different, however, as follows:

- W1 — 1/8" balsa ----- 2 Req.
- W2 — 1/8" ply ----- 2 "
- W3 — 3/32" balsa ----- 6 "
- W4 — 3/32" balsa ----- 12 "

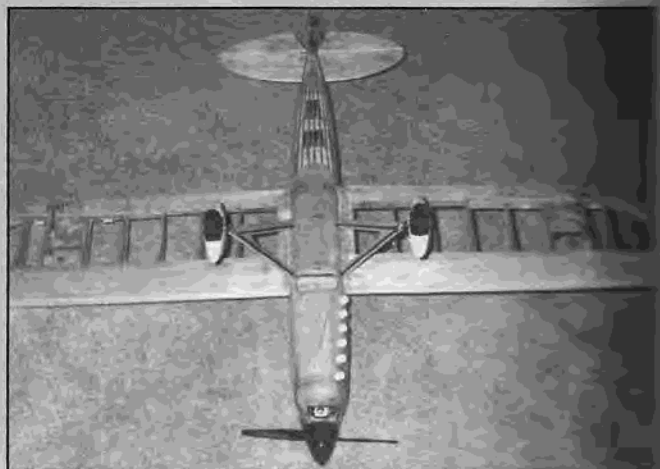
Drill all of these 3/16" for the aileron NyRods per plans. Notch or cut as shown.

Two each of the 3/32" balsa tip ribs, W5TR, W5TF, W5LR, W5LF, W6TR, W6TF, W6LR, and W6LF are required, and will be glued to the lite ply tips, top and bottom, after they are glued in place. Trim and sand these tip ribs to proper contour before gluing top and bottom leading edge sheets to the tips.

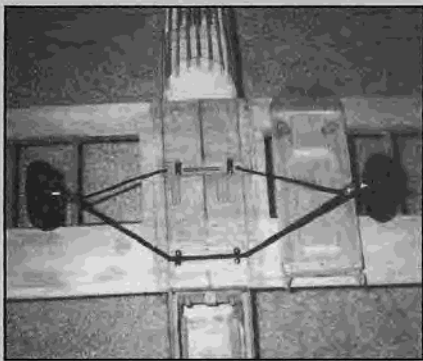
Cut the 3/32" bottom leading and trailing edge sheets to size and pin over plans. Cut leading edge at least 1/4" wider to allow for airfoil curvature. This will be trimmed later. Glue bottom 3/32" balsa center section sheeting to leading and trailing edge sheets between the centerline and outboard edge of first W3. Glue 1/4" x 5/8" balsa aileron spar between third W3 to outboard of last W4 per plans. The top and bottom of this spar will be even with the top and bottom of the ribs after the capstrips are added. Glue lower 3/32" x 1/4" balsa capstrips in place at the remaining W3 and W4 positions.



Completed structure with balsa cowling.



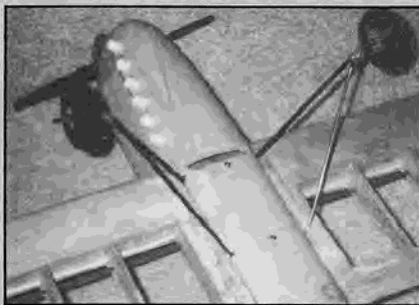
Bottom view of completed structure.



LG installation and belly pan interior.

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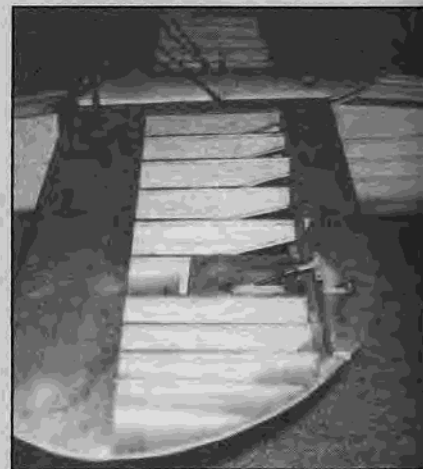
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- W4 — 3/32" balsa ----- 12 "

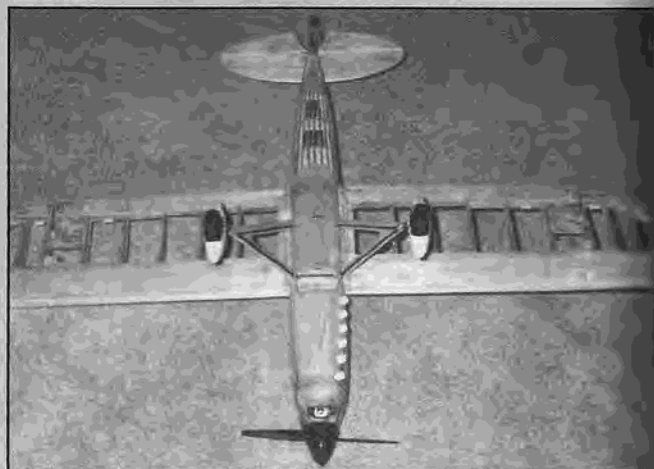
Drill all of these 3/16" for the aileron NyRods per plans. Notch or cut as shown.

Two each of the 3/32" balsa tip ribs W5TR, W5TF, W5LR, W5LF, W6TR, W6TF, W6LR, and W6LF are required, and will be glued to the lite ply tips, top and bottom, after they are glued in place. Trim and sand these tip ribs to proper contour before gluing top and bottom leading edge sheets to the tips.

Cut the 3/32" bottom leading and trailing edge sheets to size and pin over plans. Cut leading edge at least 1/4" wider to allow for airfoil curvature. This will be trimmed later. Glue bottom 3/32" balsa center section sheeting to leading and trailing edge sheets between the centerline and outboard edge of first W3. Glue 1/4" x 5/8" balsa aileron spar between third W3 to outboard of last W4 per plans. The top and bottom of this spar will be even with the top and bottom of the ribs **after** the capstrips are added. Glue lower 3/32" x 1/4" balsa capstrips in place at the remaining W3 and W4 positions.



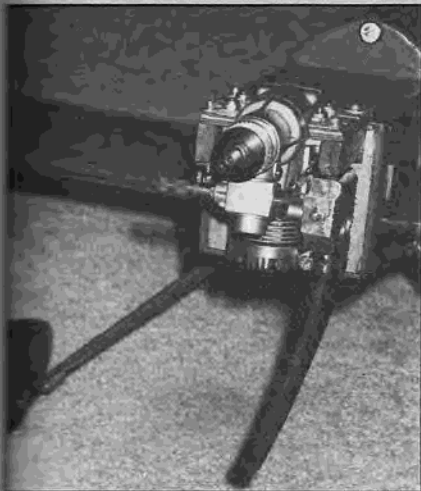
Completed structure with balsa cowling.



Bottom view of completed structure.



Bottom view with belly pan removed, showing LG installation. Unpainted blocks are 1/8" ply aileron servo screw anchors.

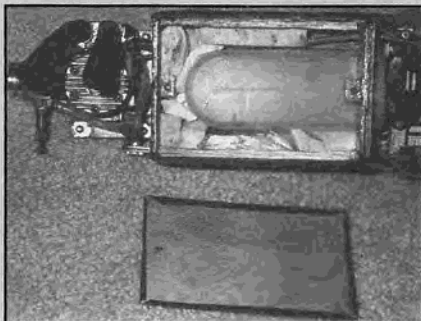


Muffler installation. Note that hardwood mount beam must be trimmed to clear muffler. Top cowl support on F8A is a soft grommet screwed in place.

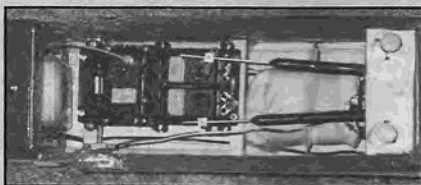
Glue lower 3/16" sq. spruce spar on top of bottom leading edge sheet along rear edge. Shaded sections of W1 and W2 will be cut away after ribs are glued in place, so cut through about 3/4 of the thickness before gluing in place. This will make it much easier to cut through later, particularly the



Windshield and cockpit detail showing instrument panel, switch/charger receptacle and power status diode.



Fuel tank and battery installation with hatch cover removed.



Ample space in radio compartment for all R/C gear. Receiver is held in place above pushrods/wing mount bolts, with rubber bands and hooks.

plywood W2's. Glue ribs W1 through W4 in place with rear of W4's butting into the aileron spar. Angle W1 slightly to allow for the 1/2" dihedral. Glue span-wise grained 3/32" balsa sheet between bottom W4 capstrips for the aileron pushrod exit. Cut the opening when the pushrod is installed. Glue upper 3/16" sq. spruce spar in place and add vertical grained 1/16" shear webbing between ribs and in front of spars out to third W4 per plans.

For the washout, shim up trailing edge 5/16" at a point 3-1/2" in from the outboard end of the aileron (where the tip curve begins). Pin down wing securely. Glue 1/8" lite ply wingtip in place, using a level to ensure wingtip is parallel to bottom of wing root rib W1.

Mark the aileron separation line with a large pin (I used an ice pick), so it can be located from the bottom. It is about to be covered up. Make the 1/4" x 3/8" balsa aileron leading edge, sanding the top to match the airfoil **without** top capstrips or sheeting. Glue this leading edge to bottom trailing edge sheet **only, not to the aileron spar**. Glue W4A, W4C, and W4D, which are



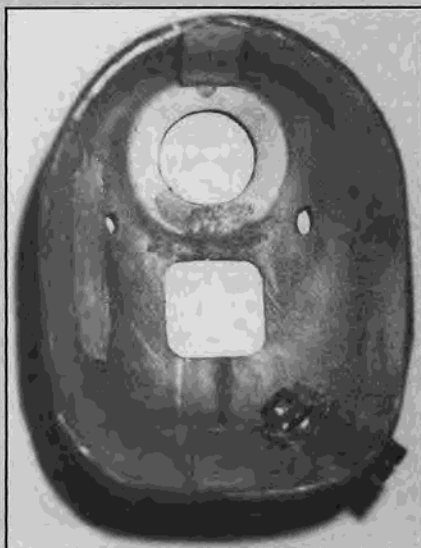
Finished cowl showing brass front exhaust stack assembly.



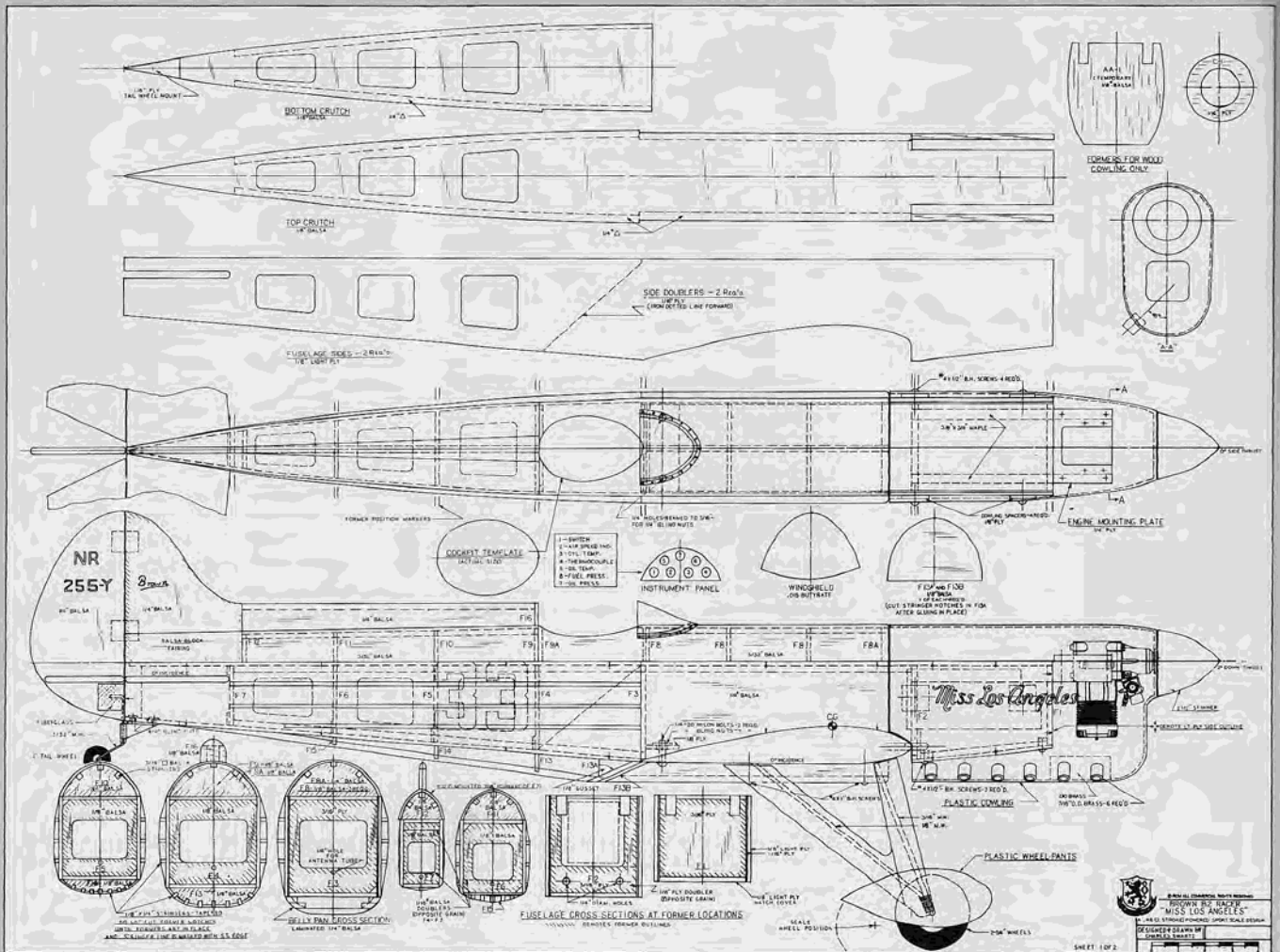
Engine installation showing exhaust tubes, fuel filler valve, and cowling spacer mounts.

the rear ends of W4's that were cut off earlier, to bottom trailing edge sheet and aileron leading edge. Add 1/4" W4B at inboard end of aileron and the small 1/4" balsa filler at the outboard end. Cut out a 1" square from the bottom sheet where the aileron control horn will be mounted, and epoxy the same size piece of 1/8" ply in its place. Glue a larger piece of scrap balsa on top of the ply and to same shape as aileron ribs.

Glue 3/16" balsa wingtip spar fillers between the spars and wingtip. Glue the top tip ribs in place. Sand both edges of the 1/8" x 5/8" balsa leading edge cap to airfoil shape and glue to the ribs and wingtip. Remove wing from plans and sand wingtip ribs and leading edge cap to shape. Stick masking tape strips to bottom leading edge sheet at each rib position. Leave enough tape so bottom leading edge sheet can be pulled against ribs for gluing. Sand trailing edge of bottom trailing edge sheet to a thin edge. Securely re-pin wing over plans **with washout shims in place**. Pull bottom leading edge sheet against ribs and leading edge cap with the masking tape strips and glue in place. Fill trailing edge between W1 and



Interior of finished cowl with exhaust stacks in place, and foil heat shield glued to cowl.



W2 with scrap balsa and sand even with top of ribs. This reinforces wing hold-down bolt area. Glue top trailing edge sheet to ribs, tapered lower trailing edge, aileron front leading edge, and aileron ribs (but not aileron spar). Cut away shaded sections of W1 and W2 and epoxy 1/8" ply J1 leading

edge jointer and J2 spar jointer to rear of leading edge cap and front of spars, respectively, using clamps.

Mark landing gear block locations in lower center section sheeting with large pin holes. Glue 3/32" balsa leading edge sheet to top spar, shear webs, ribs, and leading

edge cap. Add 3/32" top center section sheeting and 3/32" x 1/4" top rib capstrips. Glue 1/16" vertically grained shear webs to upper and lower trailing edge sheets between W3's to strengthen the hollow trailing edge against crushing.

Remove wing from plans and glue top

Materials List

- 1 — 1/8" x 12" x 48" Lite Ply
- 2 — 3/8" x 3/4" x 12" Maple
- 1 — 1/4" x 6" x 6" Ply
- 1 — 3/16" x 6" x 12" Ply
- 1 — 1/8" x 6" x 12" Ply
- 1 — 1/16" x 12" x 24" Ply
- 4 — 3/16" x 3/16" x 36" Spruce
- 1 — 1/4" x 12" Birch Dowel
- 1 — 1/2" x 1" x 12" 3/16" Grooved LG Block
- 1 — 3/8" x 3/4" x 12" 1/8" Grooved LG Block
- 1 — 1/6" x 4" x 48" Medium Balsa
- 4 — 1/8" x 4" x 36" Medium Balsa
- 2 — 3/32" x 4" x 36" Soft Balsa
- 9 — 3/32" x 4" x 36" Medium Balsa
- 1 — 1/4" x 4" x 48" Soft Balsa
- 2 — 1/4" x 4" x 48" Medium Hard Balsa
- 6 — 1/8" x 1/4" x 48" Hard Balsa
- 3 — 3/16" x 3/16" x 48" Medium Balsa
- 4 — 1/4" Triangle x 36" Medium Balsa
- 2 — 3/8" x 3/4" x 36" Medium Balsa
- 3 — 3/32" x 1/4" x 36" Medium Balsa
- 1 — 3/32" x 36" Music Wire
- 1 — 1/8" x 36" Music Wire
- 1 — 3/16" x 36" Music Wire
- 1 — Tail Wheel Bracket, Du-Bro 40 Size
- 1 — 1" Tail Wheel

- 2 — 2-3/4" Wheels
- 2 — Sig 3/16" Wheel Pant Mounts
- 2 — 3/16" Collars
- 4 — Landing Gear Hold-Down Straps
- 1 — Du-Bro Quik-Fill Fuel Fitting
- 1 — 11 oz. Fuel Tank, Hayes #026
- 2 — Dave Brown Fiberglass Pushrods
- 1 — Aileron Joiner, Du-Bro Ball & Socket
- 2 — Aileron Bellcranks
- 4 — Control Horns
- 2 — Sullivan 2-56 Gold-N-Rods
- 4 — 2-56 x 12 Threaded Rods
- 6 — Sullivan 2-56 Clevis'
- 4 — Hooded Pushrod Exits
- 2 — 1/4"-20 x 1-1/4" Nylon Bolts
- 2 — 1/4"-20 Blind Nuts
- 1 — Inner NyRod (24") for Antenna Tube
- 1 Pkg. — Sig Easy Hinges
- 1 — 17/32" O.D. x 12" Brass Tubing
- 1 — 2" x 3" .010" Brass Sheet
- 1 — JTEC "In Cowl" Muffler (.40 size) with 3/8" I.D. Silicone Tubes
- 2 — 1/2" Worm Screw Hose Clamps
- 1 — 2-1/2" Red Spinner, Great Planes
- 2 Rolls — Coverite 21st Century Fabric Light Red

- 1 Can — Coverite 21st Century Paint, Light Red
- 4 — 6-32 x 1-1/4" Socket Head Bolts
- 4 — 6-32 x 1" Socket Head Bolts
- 4 — 6-32 Blind Nuts
- 4 — 6-32 Lock Nuts
- 14 — #8 x 1/2" Button Head Screws
- 4 — 4-40 Blind Nuts
- 4 — 4-40 x 1" Socket Head Screws
- 4 — #2 x 3/8" Button Head Screws
- 2 — #4 x 1" Button Head Screws

Charles Swartz
9525 Bayou Brook
Houston, TX 77063

has the following items available:

*1 set — Vacuum Formed Plastic Parts consisting of: Engine Cowling, Wheel Pants, Windshield. Price, including shipping in contiguous U.S., \$39.95.

*1 Set — Vinyl Graphics by Model Graphic, including: 3" Wing Racing & Registration Nos., 2-1/2" Fuselage Racing Nos., 1/2" Tail Regis. Nos., 3/8" "Brown" script for tail, 1" "Miss Los Angeles" script for cowling. Price, including shipping in contiguous U.S., \$44.95.

ing the bellcranks. Be sure to remount them before covering the top of the wing.

Stabilizer & Elevators:

Cut from medium hard 1/4" balsa sheet, tack glue elevators to stabilizer, and sand to shape. Glue stabilizer in slots in fuselage sides at 0° incidence. Be sure stabilizer is perpendicular to the vertical fin and the hinge line is at 90° to the fuselage centerline. Join the elevators with 3/32" music wire as shown, and fiberglass MW and control horn area, top and bottom. Temporarily hinge elevators to stabilizer (the original model used instant CA type hinges). The control horn is positioned after the servo pushrod is in place.

Rudder:

The rudder, previously cut and sanded with the fin, is notched for the elevator joiner and the area where the control horn and tail wheel steering tiller will be mounted is fiberglassed. Where possible, I like to drill the tail wheel tiller hole in the rudder on the centerline of the control horn so the tiller is sandwiched between the base of the horn and its backup plate. The control horn mounting screws straddle the tiller which greatly strengthens this sometimes weak area. (It is best to defer drilling the tiller hole until the control horn position is set by the pushrod hook-up.)

Assembly:

The 1/8" ply wing hold-down plate is epoxied to the front of F3 as shown on the plans. The wing is carefully aligned to the fuselage and tail assembly, and securely taped and/or tack glued in place. The bottom of the airfoil should be parallel to the thrust line and stabilizer which are at 0° apparent incidence. (Actually the wing has a slight positive effective incidence due to the airfoil design.)

Mark the leading edge dowel locations by pressing a loose 1/4" drill bit through the holes in F2 into the wing leading edge. Remove the wing from the fuselage and drill the 1/4" dowel pin holes through the leading edge, ply LE joiner W1, and ply spar joiner W2. Remount the wing in the fuselage and realign. Cut two 1/4" x 4" hard dowel pins and slide into place through the open hatch. When satisfied with the alignment, glue dowel pins in place.

Mark centerline of two 1/4-20 nylon hold-down bolts on bottom of wing 3/4"

forward of trailing edge, again check alignment, and drill 1/4" holes through wing and ply hold-down plate. I used 1/4" blind nuts epoxied to the top of the hold-down plate, but it could be tapped 1/4-20 if desired. Drill hole diameters accordingly.

Belly Pan:

The balsa belly pan completes the bottom of the fuselage below the wing and is easily removable for access to the landing gear and its hold-down straps. The pan is made of laminated 1/4" sheet balsa per the cross-section on the plans. Build it in place under the wing after covering the bottom center section and former F13A with plastic kitchen wrap. Pin F13B to F13A and build up the pan with the 1/4" balsa. Remove from the wing and carve and sand to match fuselage lines. Trim and sand the interior and fill the front opening right behind the cooling air cut-out. Add 1/4" sq. balsa strips across the pan for reinforcement. These are located at the front of F13B, 1-3/4" forward of F13B, and 1" aft of the front filler. Add a 3/8" wide piece of 1/32" ply across the top of the front filler piece to serve as a guide for the front hold-down screw. Drill two holes in this piece to provide clearance for the LG strap screw heads.

The pan is held in place with two #4 x 1" button head screws screwed into the forward and aft hardwood LG blocks.

Drill 5/8" diameter holes at rear of pan for removal of the wing hold-down bolts. Harden all screw holes, and LG notches to be made for the MW struts after LG is in place, with thin CA.

Landing Gear:

Bend the 3/16" music wire front strut, and 1/8" rear strut to the shapes shown on the plans. When bending the 3/16" strut, incorporate a slight amount of toe-in in the axles. This will greatly help ground handling. Jig the struts in the slotted hardwood blocks in the wing with hold-down straps and screws. Position the front strut so the wheel centerline is 3/4" forward of the leading edge of the wing. Adjust and bend the rear strut so the bottom 3/4" aligns with the front strut. Tightly wrap the front and rear struts together with copper wire and solder while they are strapped in place. Be sure to protect the wing structure from the hot solder drippings.

Cut the 1/16" ply strut fairings per plans and tape to the struts. They are designed to minimize the forward slant of the struts. Glue 3/16" balsa to the ply fairings forward and aft of the struts, for a tight fit, then remove from the wire struts and sand to streamlined shape. After they are covered, the fairings are tack glued to the wire struts with epoxy and the bottom sides covered with 1/2" wide strips of the same shrinkable material.

The vertically split plastic wheel pants are assembled in the same manner as the engine cowling. Sig 3/16" wheel pant mounts are used and are ideal since they can rotate without damage in case of a less than normal landing. The wheels are held in place by the Sig mounts inboard, and 3/16" collars outboard.

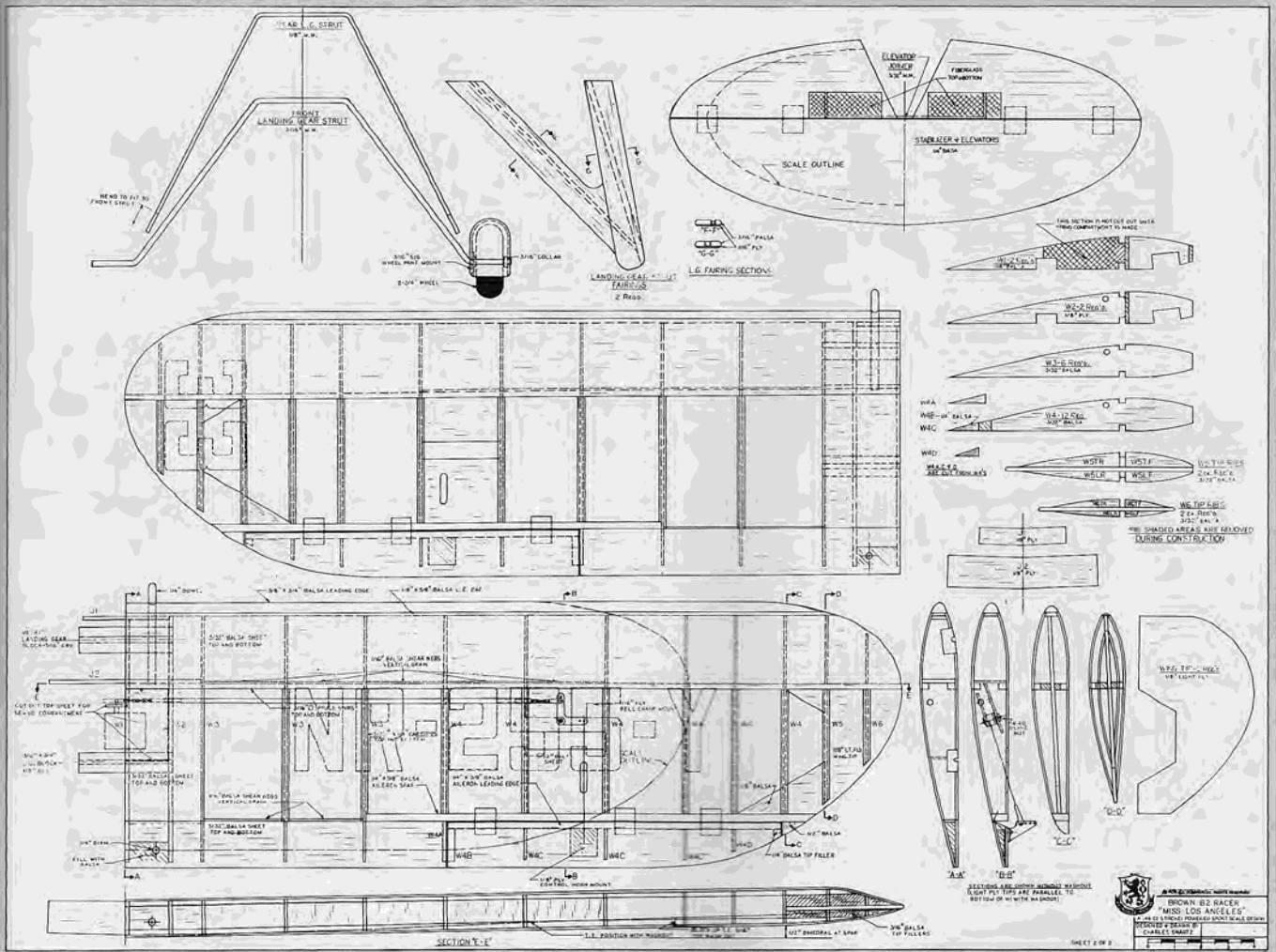
The 1" tail wheel is mounted with a removable .40 size Du-Bro bracket as previously discussed. This bracket comes with a 1/16" wire that is too weak for this application so, replace this with 3/32" wire and drill out the bracket to 3/32". The supplied collar also needs to be drilled to 3/32". Solder washers to the axle on both sides of the tail wheel. The collar is slid onto the vertical wire below the bracket and is adjusted later to take all weight off the rudder. The 90° bend for the tiller is made after the rudder control horn location is set. The tail wheel assembly is bolted to the fuselage after covering is completed.

Engine Installation:

There should be sufficient room to mount practically any engine in the .40-.46 cu. in. range. The inverted engine is bolted to the bottom of the 1/4" ply mounting plate with four 6-32 socket head bolts and lock nuts. This places the mounting lugs between the maple engine bearers and the centerline of the crankshaft even with the top crutch. Cut the mounting plate to fit your engine and the hardwood engine bearers. Position the engine so the face of the drive washer is 1/16" forward of the front of the cowling. Drill the mounting plate to fit the holes previously drilled in the engine bearers and bolt the plate to the bearers with four 6-32 socket head bolts. A 2-1/2" Great Planes spinner, which has a flat backplate, was used.

Mount the engine with thrust at 2° down and 0° laterally.

A JTEC 40 size "in cow1" muffler was



and bottom leading edge sheets to the wingtip. Dampening the balsa helps make these bends. Glue block balsa tip filler to aileron spar, but not aileron, outboard of the aileron, sand to shape, and harden with thin CA. Add 3/32" x 1/4" capstrips to the tip ribs. Trim and sand top and bottom leading edge sheets flush with leading edge cap. Glue 3/8" x 3/4" balsa leading edge to leading edge cap and sheets. then carve and sand to airfoil shape. Mark aileron line in top sheet by punching up through pin holes previously made in bottom sheet.

Sand completed wing panel and build other panel in same manner.

Before adding upper leading edge and center section sheeting on new panel, join first panel to new panel by epoxying protruding ply joiners J1 and J2 in place, again using clamps. Be sure to block up one panel 1" at spar, even with outboard end of aileron to create 1/2" dihedral in each panel.

Cut away 1" and 3/4" wide sections in bottom center section between W2's, using previously made pin holes for guides. Epoxy 3/16" grooved 1" x 1/2" maple landing gear block in front slot and 1/8" grooved 3/4" x 3/8" maple block in rear slot. Cut slots in W1's deep enough that the LG blocks lay flat in their slots. Use ample epoxy in gluing the LG blocks to W1's and W2's.

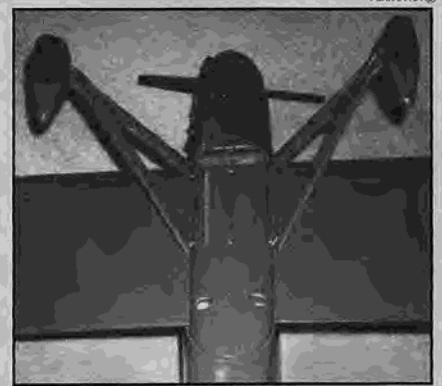
Cut out aileron servo compartment in top center section sheeting between W2's,

spars, and rear LG block. Fill open section above rear LG block with scrap balsa.

Cut out ailerons along previously marked lines. Cut and sand aileron leading edge to shape for top hinging per Section "B-B" on wing plan. Temporarily mount ailerons to wing with instant CA type hinges (do not glue until wing and ailerons are covered). Install outer Sullivan Gold-N-Rod in previously drilled rib holes between W2 and W4 per plans. Join the inner rods with a Du-Bro ball and socket type coupling. Bolt the ball to the servo wheel (epoxy nut to wheel after final linkage assembly).

Using a flat servo mount, mount aileron servo on a 1/8" ply mount and fit in servo compartment. Mount this assembly with four self-tapping screws into 1/8" ply blocks glued on the outside bottom of the wing. These blocks are covered by the belly pan. Shim the ply mount so the ball on the servo wheel aligns perfectly with the socket in the NyRod joiner.

Mount the two aileron bellcranks on 1/16" ply cut to a tight fit between W4's as shown. Install 2-56 all-threads in the inner Gold-N-Rods and attach the bellcranks with adjustable clevis'. With the aileron servo centered, adjust the clevis' so the bellcrank arms are at 90° to the NyRods. Mark the centerlines of the bellcranks on the 1/16" ply mounts, drill, and bolt in place using blind nuts epoxied to the bottoms of the mounts. Mount the aileron control horns by attaching



Cowling in place. Note cooling air outlet at rear of cowl.

each of them with two #2 x 3/8" button head screws to the ply squares in the bottoms of the ailerons. Be sure the aileron pushrod will be at 90° to the bellcrank. Cut the exit holes for the pushrods in the bottom sheeting. I cut these to fit plastic hooded exit guides glued in place after covering. Connect the ailerons to the bellcranks with 2-56 threaded rods with a "Z" bend at the bellcrank and a threaded clevis at the control horns. Set up bellcranks for maximum aileron throw. Adjust the positions of the ply bellcrank mounts until all parts of the aileron system are properly aligned and moving freely without play, then glue in place.

The aileron pushrods can be removed for covering the bottom of the wing by unscrew-

used with an O.S. Max 46 SF engine, and this combination has performed very well. It was necessary to trim 1/16" off the bottom of the left engine bearer forward of F1 to provide clearance for the muffler. The two exhaust outlets from the muffler are fitted with the supplied 3/8" I.D. silicone tubes which are clamped in place with worm-screw hose clamps. Insert coil springs in the two tubes to prevent crimping, and slide the cowling over the engine. Guide the two tubes into the two forward exhaust stacks in the cowling. After the cowling is in final position, cut the exhaust tubes flush with the exhaust stack outlets.

Fuel System:

The fuel tank is an 11 oz. Hayes #026 which was selected because its width allows it to fit between the engine bearers. This permits unlimited vertical adjustment so the fuel outlet can be level with the engine's fuel inlet, the ideal arrangement. A Du-Bro Qwik-Fill fuel valve is mounted in a ply bracket epoxied to the lower right front of F1. A pressure tap was made in the rear of the JTEC muffler for a Du-Bro connection. (It was necessary to drill and tap the muffler for 6-32 threads.)

Drill F1 for the fuel and pressure lines and run the tubing from the tank to the fuel filler valve and pressure tap. (The removable hatch cover will be appreciated.) Also run tubing from the filler valve to the carburetor. The tank is wrapped with foam rubber and is held in place with additional pieces of rubber.

Radio & Controls Installation:

There is ample room for practically any arrangement. The original model used the Futaba plastic mounting tray for the throttle, rudder, and elevator servos and the separate flat mount for the aileron servo. The 3-servo tray is attached to two hardwood cross-pieces glued between the fuselage sides. Mount these 3/16" below the top crutch to allow room for wiring. For balance, the servos were mounted as far forward as possible with the receiver mounted aft. The receiver is held in place above the pushrods by rubber bands stretched between two small screw hooks screwed into ply pieces glued to the fuselage sides. The flat battery pack is mounted in the forward part of the fuel tank compartment alongside the tank. The receiver and battery pack are wrapped in foam rubber and the battery is also wrapped with a small plastic bag. The receiver switch is mounted in a Great Planes combination switch/charger plug assembly which is installed in a removable 1/32" ply plate, held in place in the cockpit with two small self-tapping screws. I also installed a 5V Radio Shack green diode, mounted in a vinyl grommet in the ply plate. This is wired to a servo extension and plugged into a spare receiver slot. The diode flashes green when the receiver is turned on (a big help when your memory is bad), and the current drain is negligible. (This neat idea was found in an earlier issue of R/C Modeler.) The switch/charger plug and diode, if used, can certainly be relocated if a pilot figure is to be installed in the cockpit.

The throttle servo is connected to the throttle with a conventional NyRod hook-up. The rudder and elevators are connected to their servos with Dave Brown fiberglass pushrods. These were selected because the end fittings provide centerline pressure to the rods which eliminates any bending moments. Locate the rudder and elevator control horns so they align perfectly with the pushrods connected to the servos. Great Planes' pushrod connectors were used because their flat sides and socket head set screws make them easy to securely tighten. Cut the pushrod exit slots in the rear fuselage so the pushrods move freely. I cut these slots to fit plastic hooded rod exits which were glued in place after covering.

Now that the rudder control horn has been positioned, the tail wheel tiller hole can be drilled as previously described.

The aileron servo installation is covered in the wing construction section.

Finishing:

The model, like the original "Miss Los Angeles," is solid bright red with gold graphics. It was covered with Coverite 21st Century light red fabric which has a texture that closely simulates the hand-rubbed, doped fabrics of the 1930's. It is tough, easy to work with, accepts trim without bubbles, and doesn't wrinkle with changes in weather. After covering, hinge all control surfaces and seal the aileron gaps with "V's" of the fabric ironed in place. Drill access holes in the engine cowling for the needle valve, long glow plug clip, and fuel filler

probe. The engine cowling, wheel pants, control horns, and pushrod exits were painted with Coverite's matching paint applied over Coverite white primer. A 2" x 3" piece of aluminum foil was glued with silicone sealer to the inside of the cowling opposite the muffler to reduce the chance of scorching the paint.

The gold wing and fuselage racing numbers were originally cut from Mono-Kote trim sheet. The gold script and small lettering for the cowling and tail are thin vinyl, rub-on graphics, supplied by Model Graphics. All of the graphics, including the wing and fuselage numbers, made by Model Graphics, can now be purchased from the writer at the prices listed in the List of Materials.

The cockpit interior was painted with fuelproof flat black. The exhaust stacks were painted with fuelproof gloss black before mounting in the cowling.

Fuelproof the front of F1, the engine bearers, engine mounting plate, and the interior of the fuel tank compartment with epoxy thinned with alcohol.

The cockpit coaming was made of split 3/16" neoprene tubing. A scale instrument panel per the layout on the plans was installed. The panel consists of 3/8" paper instruments glued to 1/16" balsa, a piece of clear plastic, and the panel face of stained 1/32" ply with 3/8" diameter cut-outs. Obviously, this was a plane intended only for racing as the only flight instrument was the airspeed indicator. The others were basic

engine instruments.

The windshield was cut from clear butyrate per the pattern on the plans. It is held in place with a 1/2" wide piece of covering material cut to fit the bottom and ironed to the windshield and fuselage, and straight pins, cut to 3/8" and heads painted red, CA'd to the fuselage on 3/8" centers. This nicely simulates the riveted installation on the original.

A molded windshield is also available as part of the optional plastic parts set in the List of Materials.

The wing to fuselage joint was sealed with silicone sealer by covering the wing center section with plastic kitchen wrap, coating the fuselage wing saddles with the silicone, and mounting the wing with its hold-down bolts. Let dry for 24 hours, and then trim away the flash.

Flying:

The Center of Gravity should be 3" behind the leading edge of the wing. Shift the battery and/or receiver locations, if necessary, to ensure the C.G. is as shown on the plans.

The control surface throws

should be as follows:

Rudder: 1" each side.

Elevators: 5/8" up and down.

Aileron: 1/2" up and down.

As with any plane of any scale, that has a clockwise rotating prop and long nose moment, considerable right rudder trim is required until the tail is flying, so crank in at least half of the available rudder trim and hold full up elevator while taxiing. Bring

power in slowly and relax elevator pressure as the tail quickly comes up. Once airborne, neutralize the rudder trim and enjoy a pleasant flight. "Miss Los Angeles" flying characteristics and aerobatics are very smooth, but don't expect a rapid roll rate or snap maneuvers. Remember, the main purpose of the design was to go fast and turn left. Stalls, power on and power off, are straightforward with a gentle nose drop and can be arrested with slight down elevator. Landings are easy, due to the good slow speed characteristics of the wing, but be sure to carry a slight amount of power until the flare. This is not a "chop the power and float it in" airplane.

The old aircraft designer's adage "If it looks good, it'll fly good" is certainly true in the case of Lawrence Brown's "Miss Los Angeles".

P.S. I would like to hear from anyone who builds this model, and comments and photos would be appreciated.

Reference Material

Lawrence W. Brown Aircraft Co. Plans, Copyright 1934, Supplied by John Pond. The Golden Age of Air Racing, by S.H. Schmidt and Truman C. Weaver, Copyright 1991 by EAA.

