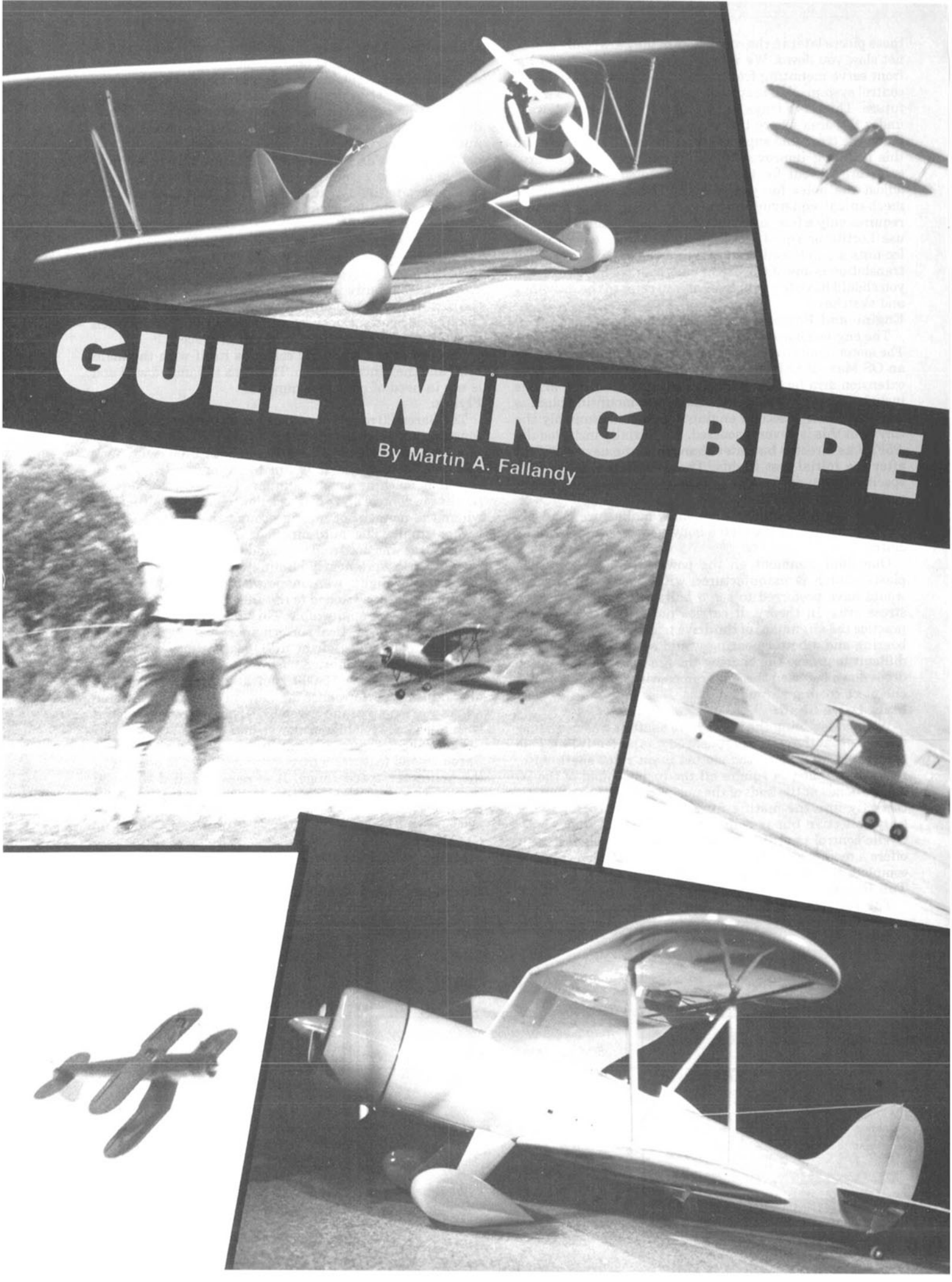


GULL WING BIPE

By Martin A. Fallandy

A .60 powered sport biplane with a Golden Age flavor

It all started early last summer. I had just returned from Sepulveda Basin, where we fly here in the San Fernando Valley. As I was unloading my gear, my ever-loving wife handed me a bottle of my favorite vitamins. I was about to twist off the top when my neighbor Felix came running madly over, shouting, "Wait Marty, wait, try this first." He extended a half filled glass of clear liquid. Being an adventuresome type I took the glass, I sniffed it, it was odorless, I tasted it, it was tasteless, I poured the rest out on the driveway and handed the empty glass back to Felix, saying, "I don't know what you call it Felix, but it will never sell." "Why it's water, Marty," he came right back, "folks all over the world drink it." In an instant I knew why the world is in such a mess. Then my ever-loving wife chimed in with, "That's right dear, I even use it in my cooking." Now this brought me up short, as my wife has got to be the world's best cook, bar none. "Come on in the kitchen," she said, "I'm using some right now." I haven't been in the kitchen in years, I figure when you have a good thing going, don't mess with it. But I followed her in. Sure enough, there on the stove she had some potatoes boiling. She stuck a fork in one, and it fell apart. So that's how she makes those creamy mashed potatoes from those rock hard nuggets, I thought. One of life's mysteries solved. It's like those midgets we have running around the house, everytime I ask her about them, she just smiles and says, "Why, those are our children dear." Well a dedicated modeler can't be expected to know everything. What really caught my attention was the aluminum pan she was using. Straight sides, generous radius at the bottom, a perfect cowl for a .60 size engine. "Where did you get the pan?" I asked. "Oh, you can pick them up at any variety store," she answered. "Pick one up for me, next time you see one, please," I said. "No problem," she smiled. Sure enough, a few days later there on my bench was a bright shiny new Comet 9 quart sauce pan, complete with lid. How she got across the moat and by the dogs I'll never know, but she is clever that wife of mine. I sailed the lid through the open door, knocking one of the crocks back into the moat, and drilled out the three rivets holding on the handle. Next a 3/4" piece of plywood was chucked up and turned to the I.D. of the pan, leaving a 1/8" lip on the plywood for the pan to butt up against. The pan was then secured to the plywood with three sheet metal screws, the base turned out to just short of where it starts to turn up the wall, then parted off at a little past the nine cup mark. Four right angle clips were then pull-riveted to the inside 1/4" from the base. Some 1/16" sheet balsa contact cemented to the outside covered the graduation marks, rivet holes and pull-rivet heads. A light sanding and fairing the balsa into the curve at the base of the pan and it was ready for paint. I painted it red, I like red.

Now that I had the perfect cowl all I needed was an airplane to drag along behind. I like biplanes, but don't appreciate fooling around with the cabin struts. So from ye old drawing board, designed to Chuck Cunningham's basic design rules, emerged the "Gull Wing Bipe."

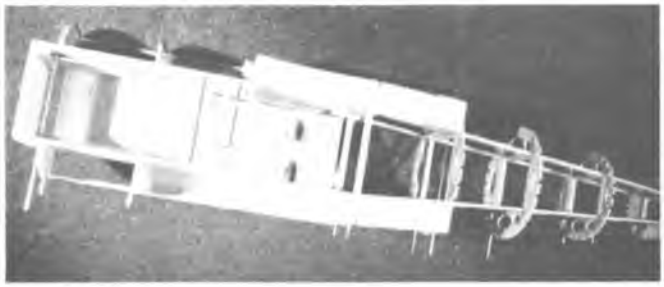
Construction

Whether you're an experienced scratch builder or this is your first time, if you look over the print thoroughly and cut out the parts accurately you should be successful.

Fuselage:

The fuselage is basically an 8" diameter cylinder back to the windshield then gradually changing to an elipse back to the tail. This form is built around a box section. First make the two sides of the box. I like to contact cement 1/64" plywood to both sides of a sheet of 3/32" balsa wood. This makes a very strong section. If you decide to use 1/8" balsa sheet instead, I suggest you double with 1/16" plywood back to the middle of the wing saddle and reduce the size of the lightening holes in the after part of the fuselage. Whatever you use, when you have the two slabs ready, glue them together in two or three places with a drop of glue in places that will fall out as lightening holes. Cut out the two halves as one, and note the position of the small 1/16" diameter holes along side all bulkheads, full tank support rails, wing saddle, etc. Drill these holes while the two halves

Fuselage sides are assembled using RCM Fuselage Jig (Feb. '72).

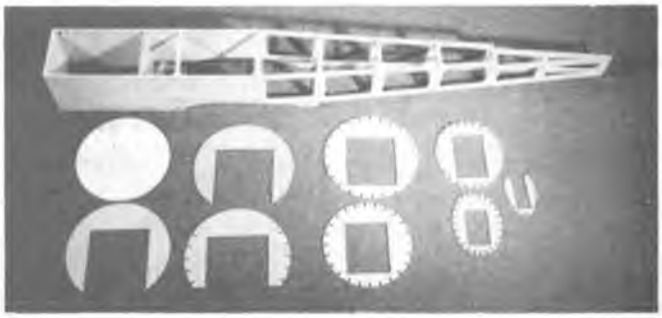


Bottom view of fuselage with bulkheads, L/G block and wing saddle in place.

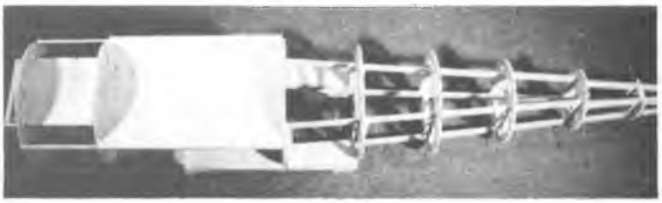
Side view of fuselage.

Drill holes for upper wing hold-down dowels.

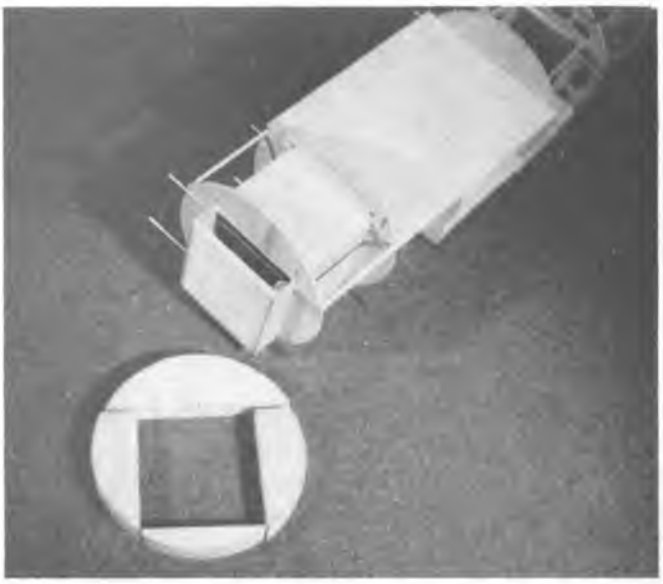
Bottom of fuselage with hatch removed. Gives access to L/G retainers and fuel tank.



Basic sides assembled and removed from jig. Note wire alignment rods through fuselage sides (see text).



Top view of fuselage.



One inch balsa nose blocks ready to install.

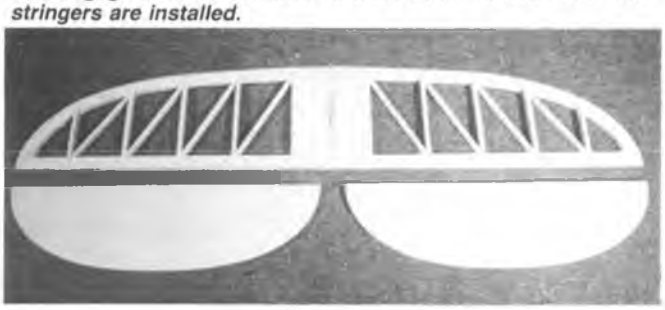
Front portion of fuselage is now completed.

are still together.

After the two sides are exactly like you want them cut out the lightening holes that have the glue and your pieces will separate and be indentical. Set up the two sides over the top view, shown on the plans, normal to your work surface and parallel to each other. I use an RCM building fixture, but whatever method you use make sure the sides are at a right angle to your work surface and held there while gluing. Next thread short lengths of 1/16" diameter music wire through the holes drilled while the two halves were together. This will help align and position the two pieces. Cut 1/4" square balsa spreader bars the proper length and glue them in place at each bulkhead position.

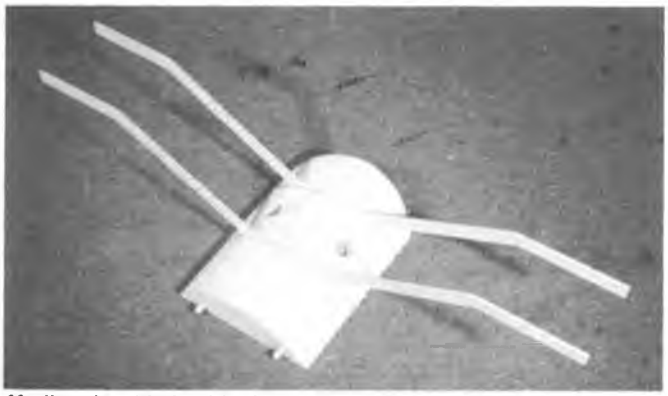
While this set-up is drying you can

Landing gear installed with hatch bolted down. Note rear stringers are installed.

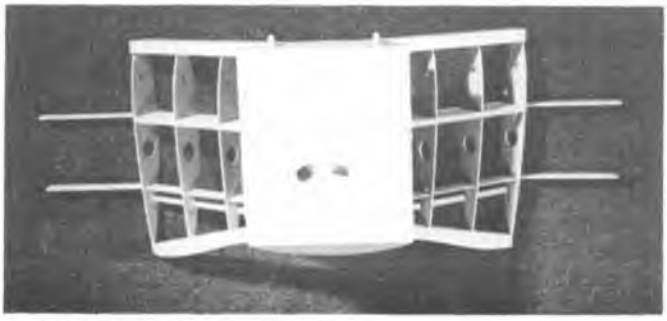


Completed stab and elevator.

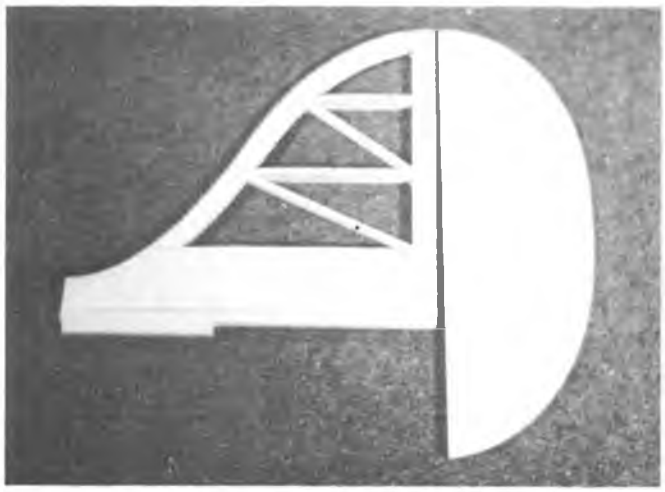
Lower wing panel set up on wing fixture. With this type of fixture, you get a true wing.



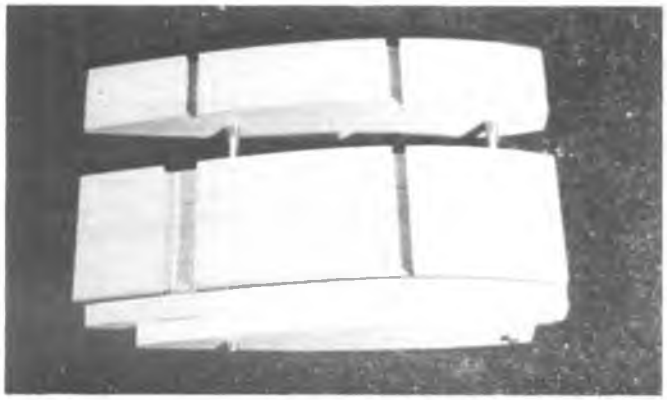
Medium hard balsa blocks contoured to fuselage. Holes are for servo leads.



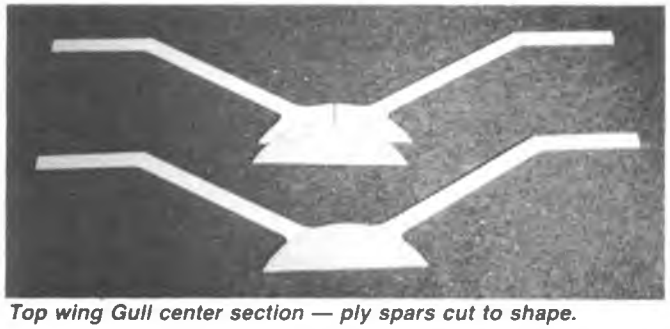
Bottom view of Gull center section.



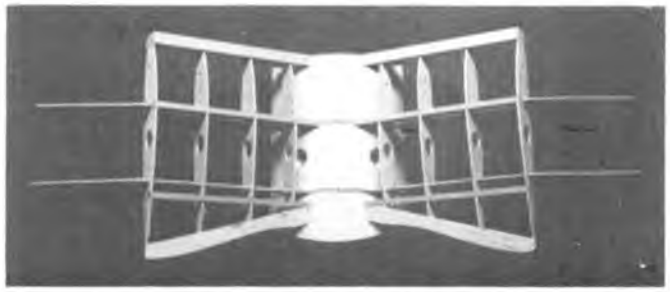
Completed fin and rudder.



Wing ribs are all stacked and saw cut. Drilled holes are for wing rods on author's wing fixture.

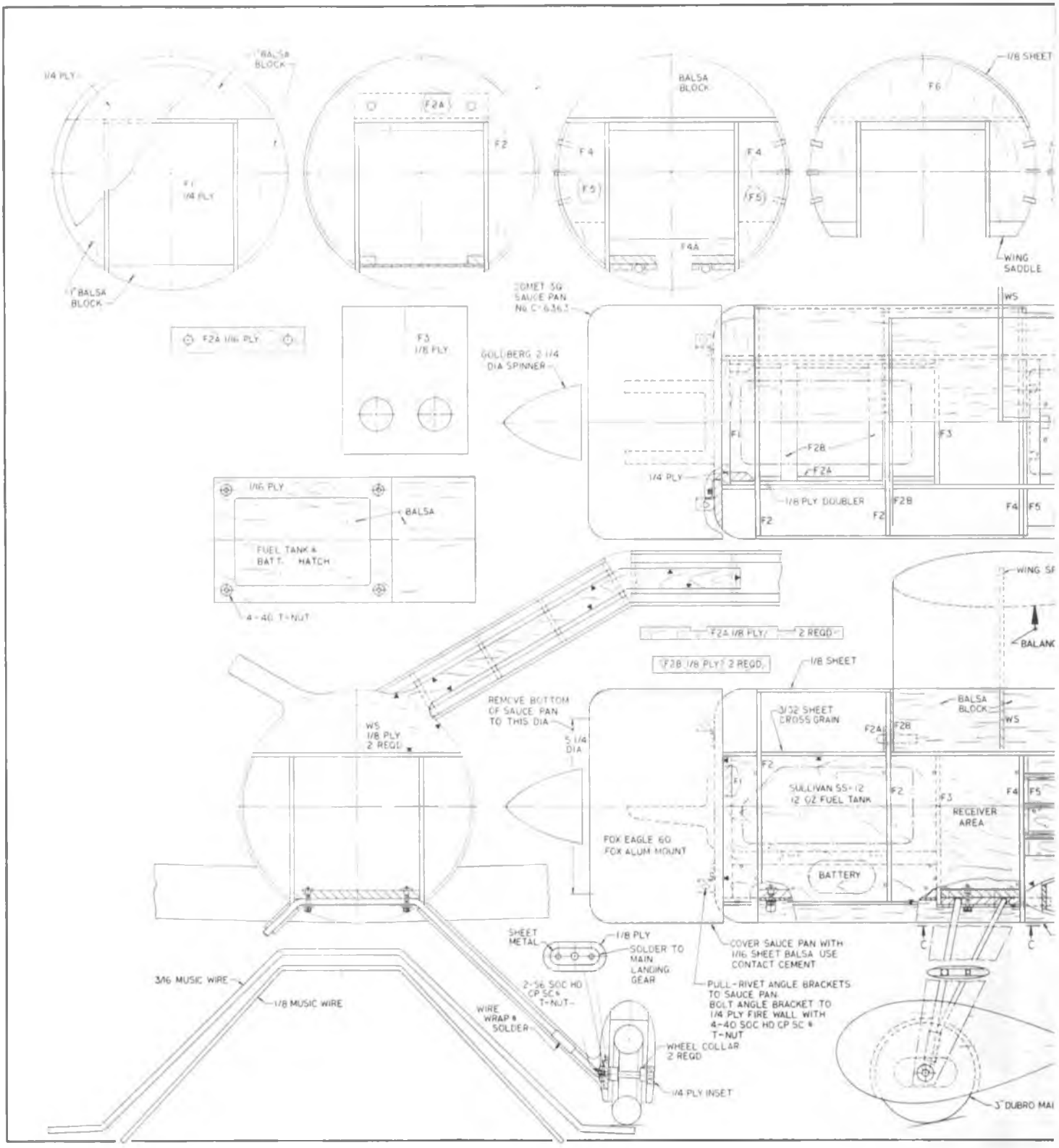


Top wing Gull center section — ply spars cut to shape.



Ribs, spars, leading and trailing edge, installed on Gull center section.

Rear view of completed top wing.

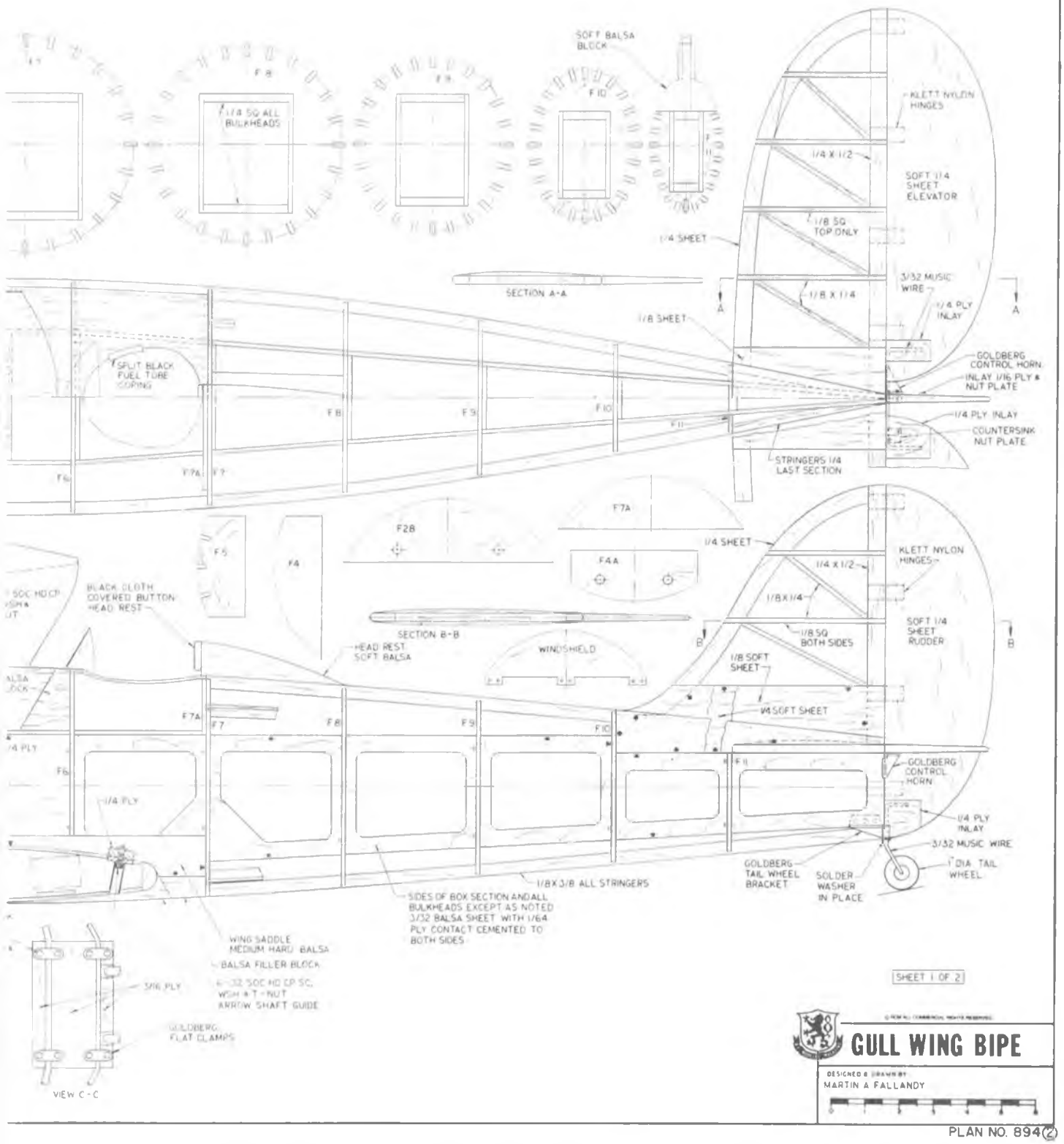


cut out the bulkheads, wing saddle, tank support, landing gear support, and whatever else goes into the fuselage. Most of the bulkheads are made of one piece, as I have always had trouble gluing sections of a bulkhead to the side of a tapered fuselage. The part always wants to set up at right angles to the tapered side rather than the centerline of the fuselage. Large sheets, from which to cut the bulkheads, may be made by laminating 3/32" sheet balsa between two sheets of 1/64" plywood of the required area.

With the fuselage box section dry, remove it from the fixture, and remove all the 1/16" piano wires except the ones that position the bulkhead closest to the nose. Now stand the box section on its nose and slide the first bulkhead over the tail to where it rests on the two wires that position that particular bulkhead.

After the first bulkhead is in place, thread the next two wires that will support the next bulkhead back and work that bulkhead into position against its two supporting wires; continue until all bulkheads are in place.

Take a final look to make sure everything is squared away, then



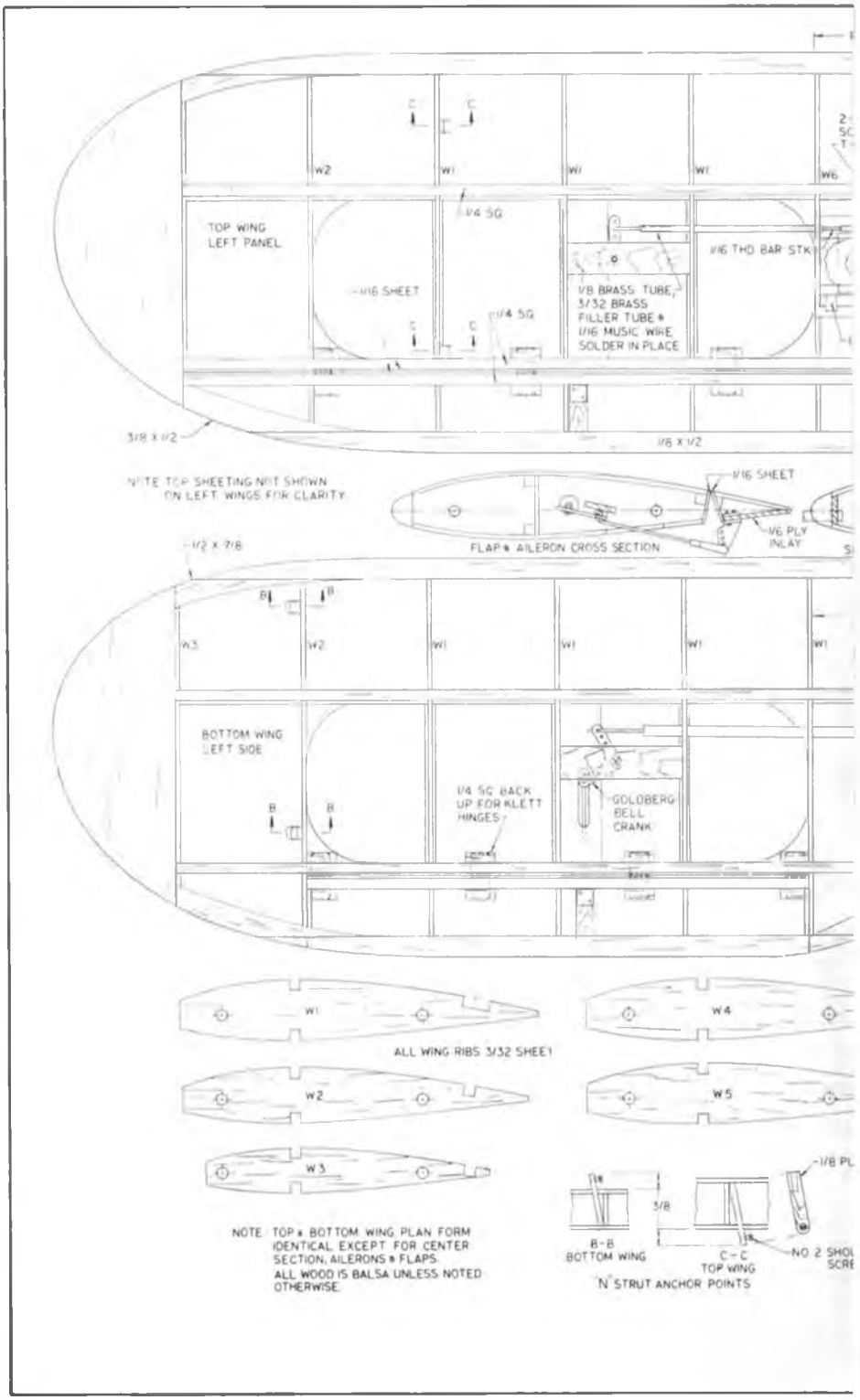
PLAN NO. 894(2)

apply whatever bonding agent you prefer. Mine was made using Wilhold Glue. This method will assure you an accurate assembly.

When all this has dried, remove the wires by giving them a small twist before pulling them from the fuselage. Various other components, servo rails, fuel tank supports, etc., that glue to the inside of the fuselage box are now installed by first running 1/16" diameter music wire through the appropriate holes and positioning the part against the wires. This will assure that all corresponding parts are at identical locations on each side of the fuselage. Avoid the temptation of sheeting over the covered areas of the fuselage or gluing in the stringers at this time. It is much easier to install the wing locking dowels, screws, T-nuts and controls without the covering on. Biplanes are notorious for being tail heavy, so you will notice a heavy concentration of lumber in the front end. My reasoning is, use the weight to build in strength rather than add a slab of lead. Balance the model about where shown on the print and you should be all right.

The cowl is large enough to accept almost any .60 size engine in any attitude. Mine ended up vertical, with

GULL WING BIPE
Designed By:
Martin A. Fallandy
TYPE AIRCRAFT
Sport Biplane
WINGSPAN
Top 60 Inches
Bottom 50 Inches
WING CHORD
9½ Inches
TOTAL WING AREA
888 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Constant Chord
Elliptical Tips
DIHEDRAL EACH TIP
Upper — None
Lower 3/4 Inch
O.A. FUSELAGE LENGTH
42½ Inches
RADIO COMPARTMENT SIZE
(L) 9¼" x (W) 4" x (H) 3½"
STABILIZER SPAN
23 Inches
STABILIZER CHORD (inc. ele.)
7½ Inches
STABILIZER AREA
138 Sq. In.
STAB AIRFOIL SECTION
Flat Bottom
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
10½ Inches
VERTICAL FIN WIDTH (inc. rud.)
8½ Inches
REC. ENGINE SIZE
.60-.61
FUEL TANK SIZE
12 Ounce
LANDING GEAR
Conventional
REC. NO. CHANNELS
5
CONTROL FUNCTIONS
Rud., Elev., Ail., Flaps, Throt.
BASIC MATERIALS USED
Fuselage ..... Balsa, Ply
Wing ..... Balsa, Ply, Fiberglass
Empennage ..... Balsa
Wt. Ready To Fly ..... 152 Oz.
Wing Loading ..... 24.67 Oz./Sq. Ft.



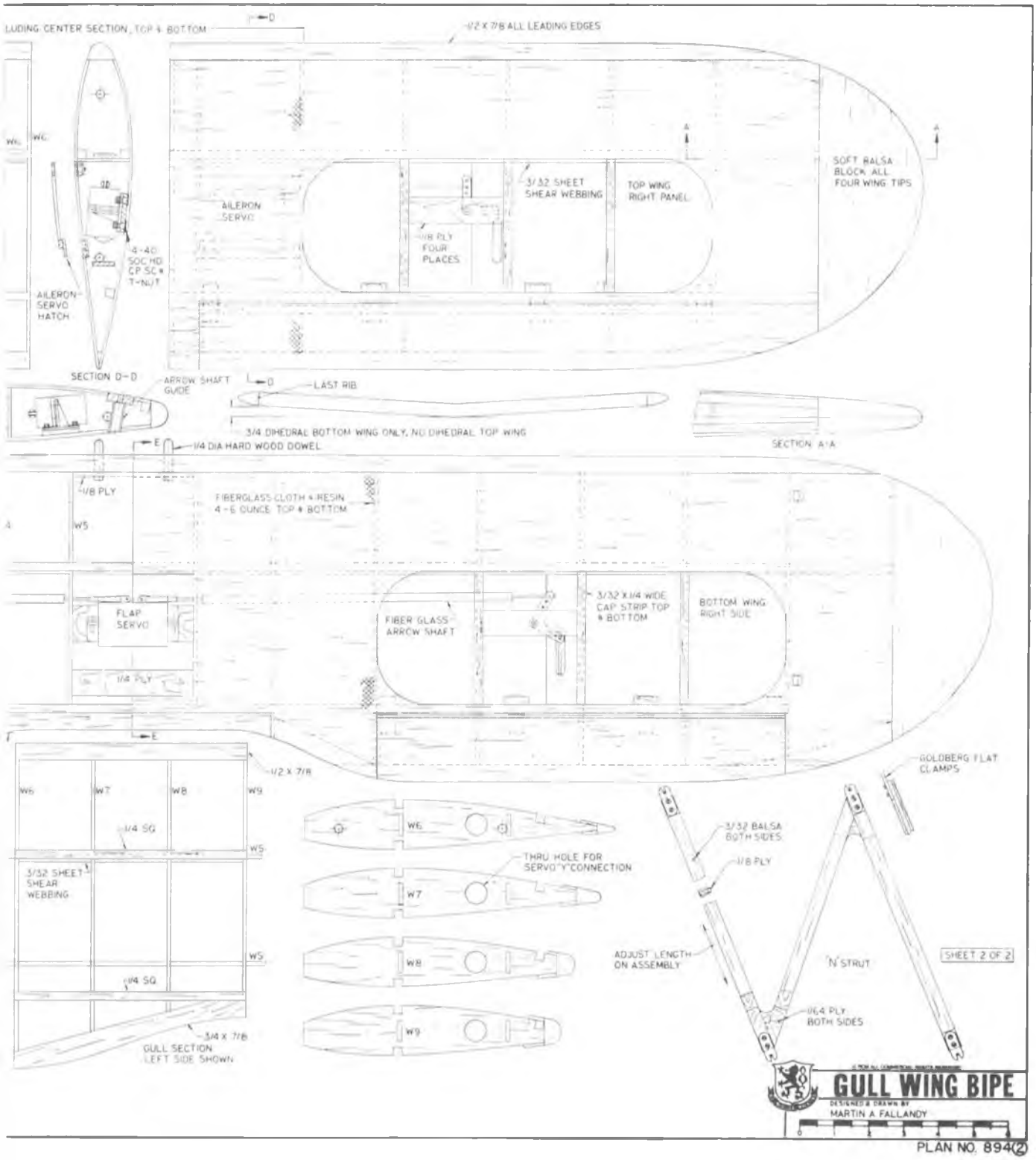
a 1/2" O.D. aluminum tube directing the exhaust out through the bottom of the cowl. My fuel filler tube is in the same area. However, the engine may be rotated in whatever gives you the best exhaust position for a particular set up. I do recommend that you use a muffler and exhaust through the bottom of the cowl; clean-up is much easier.

Wings:

The top wing is made up of three main sections, the center "gull section" and the two outboard panels. The center section is an integral part of the fuselage and is formed from medium hard balsa in the fuselage area, and two main spars with four ribs on either side. When you cut out the two main spars, they are identical; mark the position of the wing ribs. Since the center cannot be assembled flat, these marks are the only reference for positioning the ribs. The spars also act as formers to properly contour the balsa in the center section.

With the spars accurately shaped, glue the balsa as indicated in front of, between the two spars, and behind the after spar. The forward and middle blocks can be finished cut to length prior to gluing them in place, but leave a little length on the rear one to allow for the saw blade kerf if you make the slanted cut with a power saw. Even if you have balsa blocks wide and thick

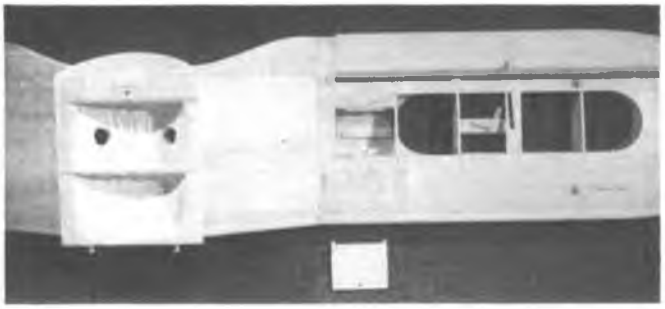
FULL SIZE PLANS AVAILABLE — SEE PAGE 194



enough to do the job, it is a good idea to cut them in half, glue the two halves back together, and position this cut line on the centerline of the wing spars. Then as you form the balsa you will always have a center reference line.

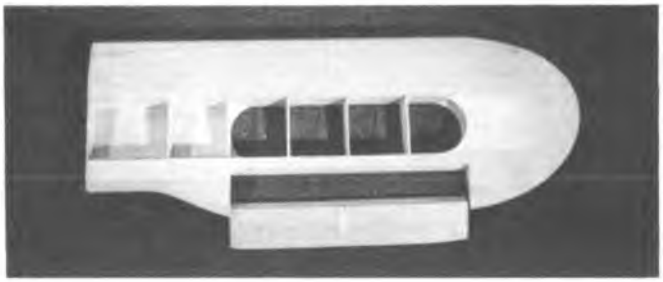
Just a word about power tools. A good access to power tools are the local high schools and junior high schools. Many offer adult courses, which amounts to signing up and using their equipment for whatever purpose you choose. I have found that by being frank and explaining to the instructor exactly what I am trying to accomplish he is usually very helpful. In fact, most of the time they are so happy to meet someone who does something besides pop a can of vitamins and vegetate in front of the tube, they bend over backwards to help.

The top wing outer panels may be assembled in any number of ways. I prefer threading the ribs over two 1/4" diameter drill rods and supporting the rods slightly above my building board at three stations. The supports can be of any type of wood, but the hole spacing must be identical with the holes in the wing ribs. One support is threaded on the drill rods with an equal number of ribs on either side. The remaining two supports are threaded on outboard of each end of

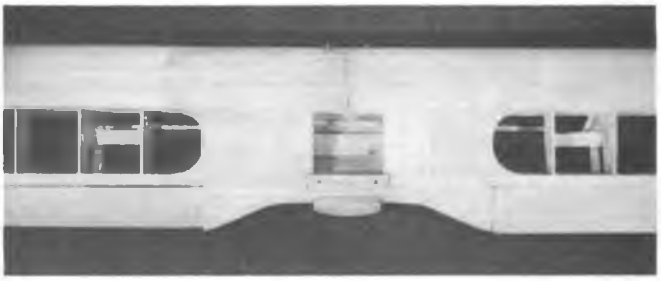


Bottom view of top wing. It requires a servo in each panel.

Top view of Gull Wing completed.

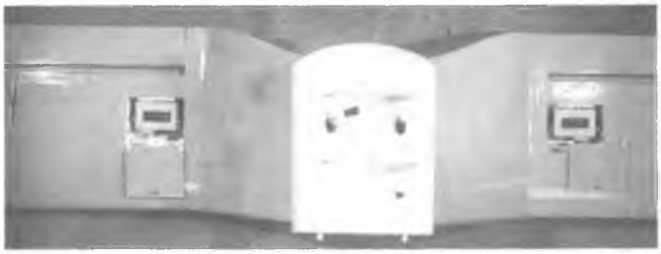


Bottom view of lower wing panel.



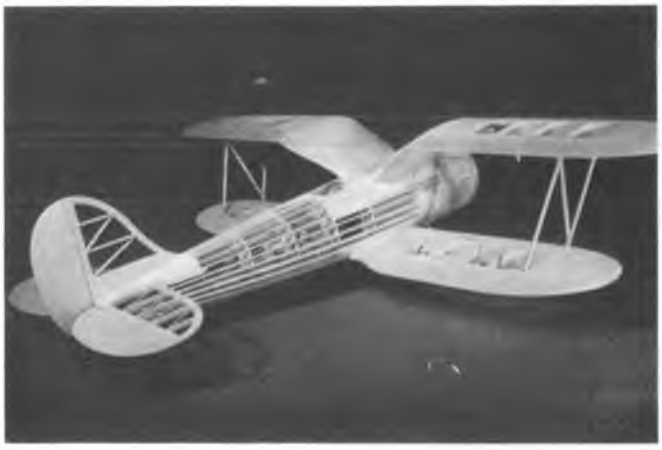
Top view of lower wing with bellcranks and pushrods installed.

Bottom view of lower wing with center faired into fuselage.



Servos installed in top wing. Servo cables have a "Y" connector to receiver.

Ample room for radio installation.



Gull Wing Bipe framed up and ready to cover.

the ribs.

With everything properly spaced, secure the center support and the support on the fuselage end of the wing to the work surface with wood screws. Then place a 1/8" shim under the back edge of the support nearest the wing tip. This will give you a little negative incidence in the last third of the wing and again avoid a stall on those long slow approaches.

While the ribs are in place add the leading edge, trailing edge and the 1/4" stringers. Note that there are two 1/4" stringers near the trailing edge. When you install these two stringers, separate them with a few pieces of 1/8" sheet scrap, between the ribs where they will not become permanently glued in place. When dry, remove the 1/8" shims and sheet over the required areas. When all this is dry, carefully thread out the two 1/4" diameter drill rods.

The outer wing panels may now be assembled on the center gull section. This is done with the wing in an inverted position on a flat surface; there is no dihedral in the top wing. Before applying glue liberally to wing spars and wing panels, make certain the flat portion of the center section is parallel to the work surface. Before sheeting over the bottom of the wing, make sure you have clearance holes for the two servo "Y" connection wires, through the outer wing panels, through the center gull section, and into the fuselage.

Place the completed wing section on the fuselage and accurately align it by measuring from an identical point on each wing tip to the end of the fuselage. With the wing properly positioned, use the guide holes in the

first two bulkheads and drill through into the gull wing saddle, about 1" for the wing locking dowels. Also at this time install the 6-32 socket head cap screw and T-nut to secure the wing to the fuselage. The top wing may now be accurately repositioned after each removal.

With the three main sections assembled, sheet over the bottom of each outer panel. Cut out the ailerons by locating on the 1/8" slot between the two 1/4" stringers near the trailing edge of each wing. Sheet over the forward side of the ailerons and after section of the wing with 1/16" sheet balsa. The aileron bellcrank, horn, and servo hatch may now be installed.

Bottom Wing:

Making the bottom wing is identical to making the two top wing outer panels, with the exception of the flaps. They are not quite as long as the ailerons. Butt the two sections together with 3/4" dihedral at each outer wing tip. When the wing is properly fitted to the fuselage, use scrap balsa to fair both leading and trailing edges of the wing center section to the fuselage. Both wings are fiberglassed top and bottom from the first open bay on one side to the first open bay on the opposite side. This is very important as the resistance of both wings to folding is from the tension in the fiberglass. The gull shaped spars in the top wing serve only to give it shape and there are no hardwood spars in the bottom wing.

At this time, turn back to the fuselage and add the fuel tank and battery hatch, planking, and stringers. However, before doing all of this I found it very helpful to construct a small dolly, padded with foam, to hold the fuselage. Because the fuselage is round, it has a tendency to roll around during a crucial moment. Nothing exotic, just two upright pieces of 1/2" plywood with an 8" semi-circle cut out of them, secured to an 8" to 10" long base.

When adding the rudder fairing to the fuselage, use soft balsa and leave a 1/4" wide slot to accept the rudder and elevator.

Rudder and Elevator:

The movable portion of the rudder and elevators are cut directly from medium to soft 1/4" sheet balsa. Inlay the plywood as shown, to accept the "U" shaped tie bar in the elevators, and tail wheel rod in the rudder. The rudder horn and nut plate are bolted to a strip of 1/16" ply, inlayed and epoxied to the lower portion of the rudder. Depending on where your pushrods exit the rear of the fuselage, bridge the gap with 1/8" sheet and slot for free movement. This will give you an area to stick whatever covering material you choose. The stationary

portions of the tail are built directly on the plans. Add 1/8" square stringers to both sides of the horizontal rudder braces and sand to shape. The completed rudder slides directly into the 1/4" slot on top of the fuselage tail fairing. Add 1/8" square stringers to the top of the elevator only and sand to give a slight airfoil. A little lift in the caboose is also handy on slow approaches.

Covering:

Before covering, seal the front end of the fuselage, inside and out, with resin, back to the leading edge of the lower wing, including both wing saddles. I covered mine completely with MonoKote except for the cowl, which is painted. A word about attaching the cowl. As mentioned earlier, there are four "L" shaped brackets pull-riveted to the inside of the cowl, these brackets fit right up against the firewall. Several excellent articles have been written about centering a cowl. However, because this is a round cowl on a round fuselage of the same diameter there is not much of a problem. Wrap a piece of file folder grade cardboard around the fuselage, hold it there with a couple of rubber bands, slide the cowl into the

cardboard cylinder up against the firewall. Mark the holes in the brackets on the firewall. These are the positions for wood screws or socket head cap screws and T-nuts.

When covering is complete, wrap the front hatch, top wing gull section, and lower wing center section with Saran Wrap. Now place a film of clear silicone over the mating surfaces and reassemble all components. Carefully wipe off any excess immediately, as silicone is very difficult to remove from plastic films when dry. When dry, disassemble all parts and peal off the Saran Wrap. This will give you a fuel tight model.

Installation of engine and radio gear should complete the model. When all is ready take your model to a remote area where the noise won't bother anyone and run a few tanks of fuel through the engine and make sure everything stays together and performs like it should.

Well the moment of truth is at hand, Gull Wing Bipe is ready. I called the coolest set of thumbs I know, Neil Sweeny, of "What's Her Name" fame (June 1981 RCM), and we arranged to meet at the field later in the day. After arriving at the field, Neil read and signed all the necessary papers turning all his worldly possessions over to me in the event anything should happen to "Gull Wing Bipe." We then checked everything together and, when satisfied, fueled up, fired up, and taxied out to the take-off area. From there on, Neil did his thing as only he can. When he was satisfied it was air worthy and had done all the good maneuvers, Neil brought it in for one of the prettiest three point landings I have seen a biplane make. One point about flaps — when you pop the flaps the first time, you will need back trim as the nose will drop. Have plenty of altitude so you know that the back trim you have available is sufficient for the amount of flaps you have available.

Well things have gone full circle. Once again, as I unloaded my gear, my ever-loving wife handed me a bottle of my favorite vitamins. As I turned to thank her, I remarked, "Say are you putting on a little weight?" "Yes," she smiled that beautiful smile of hers, "and we're going to have another midget around the house pretty soon." That's one of life's mysteries I've **got** to solve, right after I finish my next model.

Happy landings! □