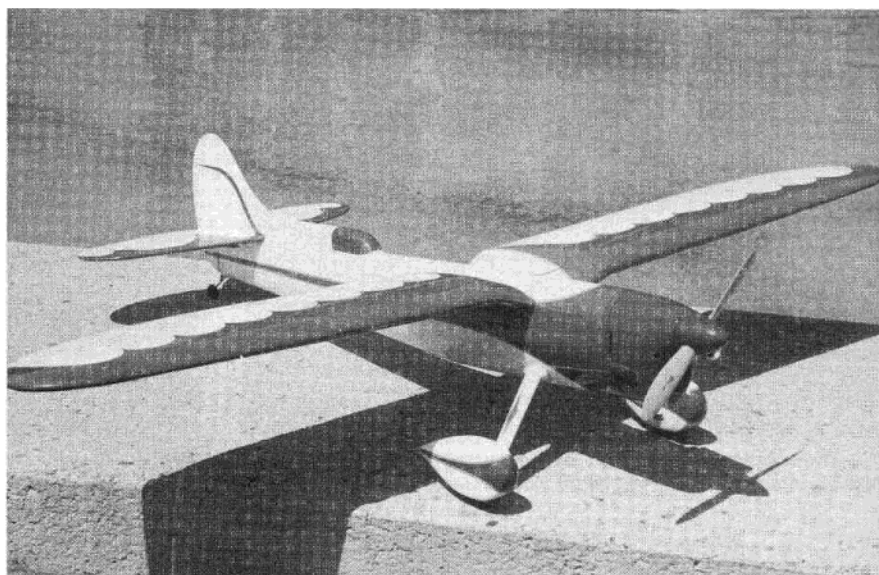


The older generation will relate the classic lines of the Gull Wing to the Golden Age of Aviation. That was the mid-1930's when sport and racing airplanes had distinctive personality in their lines.

By Martin A. Fallandy



Any way that you look at it, this Gull configuration is an eye pleaser.

GULL WING

Designed By : M.A. Fallandy

TYPE AIRCRAFT

Sport Pattern

WINGSPAN

58 Inches

WING CHORD

10 1/2 Inches

TOTAL WING AREA

530 Square Inches

WING LOCATION

Shoulder Wing

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Elliptical

DIHEDRAL, EACH TIP

2 1/2 Inches

OVERALL FUSELAGE LENGTH

46 Inches

RADIO COMPARTMENT AREA

(L)7" x (W)2 1/2" x (H)2 1/2"

STABILIZER SPAN

20 Inches

STABILIZER CHORD (incl. elev.)

6 1/2 Inches

STABILIZER AREA

100 Square Inches

STAB AIRFOIL SECTION

Top Lift

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

9 1/2 Inches

VERTICAL FIN WIDTH (incl. root.)

8" (Avg.)

REC. ENGINE SIZE

.60 Cu. In.

FUEL TANK SIZE

12 Oz.

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

5

CONTROL FUNCTIONS

Rud., Elev., Throt., All Flaps

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa and Ply

Wing Balsa and Ply

Empennage Balsa

Wt. Ready-To-Fly 96 Oz.

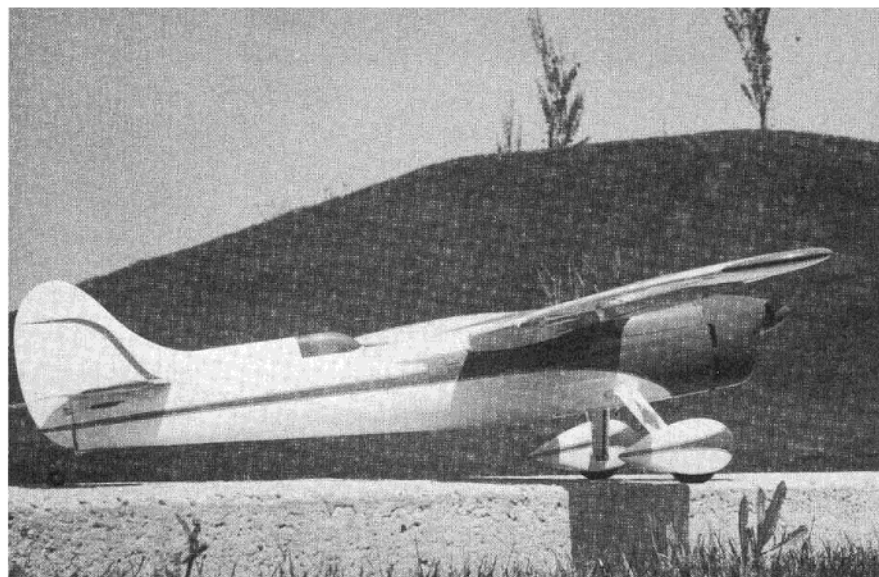
Wing Loading 26.6 Oz./Sq. Ft.

GULL WING

I have always admired the cross country Thompson Trophy and Bendix Pylon racers of the thirties. The project presented here is an airplane I feel would have been competitive in that era. Good flying stability is accomplished by the shoulder high gull wing, and the egg crate construction makes building fast and simple, plus self aligning, if some care is taken in cutting out the parts. The fuselage and gull wing section

were constructed first, followed by the outer wing panels and tail section. Everything went according to plan with only a few surprises. A Fox Eagle .60 seems to haul it around in grand style. Ace rack-type servos are used in the wings for ailerons and flaps, with Ace and D & R Bantam servos for the throttle, rudder and elevators. An Ace receiver completes the airborne portion of the electronics. And my knees knock with a Heath GD-19 transmitter in my

The Gull Wing displays the classic lines of aircraft of the 1930's.



hot shaking hands. When the antenna hits high C, I apply forward throttle and hang on; fortunately the airplane can fly better than I. As she hurtles down the runway and lifts into the air, I take a deep breath and the antenna drops to middle C — on a good flight I can play the Star Spangled Banner!

Construction is straightforward and should be interesting to scratch builders. All of the hardware is available from the local hobby shop.

Fuselage:

The fuselage is an egg crate design. This method of construction eliminates

parts of the fuselage,

The top forward part of the fuselage will later become the center gull section of the wing and is built together with the main fuselage. Bulkheads on the front and back end of the central section are temporarily held in place with a drop of contact cement. The central wing section and main fuselage are sheeted as a single unit. The wing spars that form the gull part of the wing are built into this central removable section. When the outer wing panels are complete, they are positioned and glued onto these spars.

the spinner as a guide, the exact diameter and position of the spinner was transferred to the front of the cowl. After removing the cowl from the fuselage, a 1/16" sheet plywood ring of the same diameter as the spinner O.D. was glued to the front of the cowl, using the spinner transfer marks for location. You now have the cowl with a sheet of 1/8" plywood on the back and a sheet of 1/16" plywood on the front. It is now an easy matter to carve and sand the cowl to shape.

The landing gear socket assembly is made of 3/16" plywood and glued into



the need for a complex building fixture, while producing a strong accurate assembly. If the bulkheads and main vertical and horizontal structural members are accurately cut, the fuselage assembles very quickly and accurately, with planking the only remaining task. All of the fuselage parts are cut from 1/8" sheet made by laminating 1/64" thick wing skins on both sides of 3/32" x 4" x 36" sheets of balsa, creating a strong, stiff bulkhead. The stationary portion of the rudder, cockpit canopy, landing gear sockets and wing saddle are all integral

Before the fuselage is sheeted, all internal work should be completed. This includes: throttle linkage, pushrods for the rudder and elevators, servo rails, and the three T-nuts that secure the central gull wing section to the fuselage. The nose piece, or cowl, is made up of balsa blocks glued to a 1/8" plywood backing ring. The backing ring has the identical shape as the firewall. Using a Dremel tool, the inside of the cowl was hollowed out for engine clearance. With both the engine and cowl bolted in place, the spinner was bolted to the engine shaft. Using

the fuselage. This completes the structural part of the fuselage and it may now be completely sheeted with 3/32" balsa.

Wing:

The elliptical gull wing is of standard construction, with three main sections, the center gull section and the two outer panels. The two outer panels contain the ailerons and flaps. Movable surfaces are controlled with bellcranks, and Sullivan flexible pushrods activated by servos mounted into the thick section of the wing.

Intercommunication between ailerons and between flaps is accomplished by running the pushrods straight through the gull section of the wing. This method eliminates secondary bellcranks or lever arms from a fuselage mounted servo. As an advocate of strength from wing skins, I have circumvented the need for heavy wing spars. The top and bottom of the center wing section are glassed with 2 oz. glass cloth. Two degrees of negative wash are built into the last quarter of each wing panel to eliminate snap stalls during landing approaches.

The basic airfoil section was scaled from Don Mathes' "Digester," one of my first scratch built aircraft. Drawing of the graduated wing ribs for the elliptical wing was taken from an RCM article by Chuck Cunningham. The instructions were easy to follow and produced the desired results. After drawing all of the ribs, one on top of another, two 1/4" diameter holes were added for a wing construction jig. The wing jig is a simple one consisting of two 1/4" diameter aluminum bars separated the same distance as the holes in the wing rib pattern and supported above the work area by split wooden clamps. Four clamps were used and positioned on the print to fall between wing ribs. The trailing edge of the clamp nearest the wing tip was raised 2° to achieve the desired 2° of negative incidence. Rather than draw each individual rib, the wing rib pattern was copied the required number of times on a Xerox machine. Then, the line for an individual rib may be cut out to produce the required rib. This process is repeated until a complete set of ribs is produced. Before cutting out a rib, the Xerox copy is pasted to manila folder-type cardboard to achieve a more permanent pattern in case parts are required for future repairs. The rib patterns are traced on 3/32" sheet balsa, cut and sanded to shape. Sounds like a lot of trouble, but it goes faster than I can write about it, and when you sight down the wing jig and see the wing line up and take shape it all seems worthwhile. With all ribs positioned in the jig, the top stringer and leading edge are glued in place. The 3/32" sheeting is added from the leading edge backwards, and from the trailing edge forward, with capstrips over the center exposed section of the ribs. After

drying, the jig is turned over, and the process is repeated with the exception of adding shear webs between ribs. The wing tips are lightweight, solid balsa. When both left and right wing panels are sanded and complete, the ailerons and flaps are drawn directly on the wing and cut out with a razor saw. Each hinge line is cut 3/16" wide. The open faces produced by the cuts are covered with 3/32" sheet balsa. Each hinge position is backed with a 1/4" square block running between ribs.

Each main wing panel is then fitted on the forming spars that extend from the fuselage center section. Care must be taken to accurately align the wing and support the proper dihedral angle before gluing. After the glue has completely dried, the main wing structure is complete. Pushrods, servo mounts, bell cranks, control horns are added, and the removable servo hatch covers are fabricated and finished in their proper positions. The final thing to remember to do before sheeting the center section is to provide holes to run the servo extension leads through the wing root to the receiver. The servo extension leads are short, about 6", and proved to have no adverse effect on the radio.

Landing Gear:

Each leg of the landing gear is bent up from a single piece of 3/16" diameter piano wire, and is of a torsion spring design. The wheel struts are grooved to fit over the landing gear wire and glued to the wheel pants. Two small clips are soldered to the landing gear wire and are screwed into the pants to hold the assembly together. This method allows for quick, easy removal for first flights, rough fields, or tall grass operation.

The wheel pants are carved from medium-hard, laminated balsa blocks, with the center section relieved to accept the wheels. The 1/8" plywood washers built into the side walls of the pants provide support and a backing for the screws holding the assembly to the landing gear wire.

Each landing gear wire fits into a plywood socket, built into the bottom and walls of the fuselage. The space between the landing gear wire is filled with a removable insert that serves to hold the wires in place and provides easy removal in the event straightening is required.

Elevator and Rudder:

The stationary part of the rudder is included in the main or keel part of the fuselage egg crate, and completed by sheeting both sides with 1/16" balsa. This may be done on a flat surface before the fuselage is assembled to avoid warping. A 1/4" sheet of balsa, sanded to a tapered trailing edge, forms the movable part of the rudder. Ground handling is accomplished by coupling the tail wheel to the rudder. A 3/16" diameter dowel, drilled through, and epoxied into the rudder, gives the added strength required to handle the tail wheel wire. Four Klett hinges attach the rudder to the stationary fuselage portion and are held in place with Wilhold glue. All hinges are doweled with a cocktail type toothpick. The rudder horn is from Carl Goldberg and is bolted (using the nut plate supplied), to a small piece of 1/16" plywood and inlaid in the rudder. This method of attaching horns eliminates the nut plate showing on the side opposite the control horn. All control surfaces, including flaps, use this method of attaching control horns.

Construction of the elevators are identical to the rudder. The two halves are coupled together by a 3/32" diameter piano wire bent in a U shape. A 1/4" square strip of plywood, drilled 3/32" through and inlaid in the elevator provides the additional strength required. Frame construction is done directly over the plans with 1/8" x 1/4" strips laid over axial members and extending over both leading and trailing edges. After all glue has dried the capstrips are sanded to a slight airfoil, with the thickest portion of the airfoil about one third back from the leading edge. Snap stalls on landing approaches are avoided by the small lift generated in this type of tail section. This lifting tail idea was taken from an article by Chuck Cunningham and has worked well on several of my models, avoiding disaster on low, slow approaches.

Engine:

A Fox Eagle .60 is used for power and is mounted inverted, on a standard Fox Aluminum motor mount. Four 6-32 socket head cap screws hold the motor assembly to the 1/4" plywood firewall. To avoid flooding, the model is inverted and placed in a padded cradle for starting.

Finishing:

All fillets are put in with Hobbyepoxy Stuff, using a little finger dipped in acetone as a radius tool.

Final covering and trim is done with MonoKote. Some areas, engine cowl, wheel pants, etc., are painted and trimmed with polyurethane paint.

Flying:

Flying is simple and straightforward. Everyone seems to have a different theory on a take-off procedure for a tail dragger, so I will add mine. Line up with the runway, slowly add throttle, hold back elevator for ground handling and put in right rudder as required to keep the plane headed straight down the runway. As speed increases, relax the back elevator and the plane will lift off when ready. Climb to the desired altitude and do your thing. If you like flaps on take-off, be careful to milk them up slowly while still close to the deck, since the plane will settle a few feet when the flaps are retracted. I think you will find no surprises, and that flying will be fun and relaxed. □

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