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Big airplanes always get a lot of attention, but a big airplane with the elegance and lines of this classic Navy bird will always be a show stopper. If there are any doubters on the ground, they'll be swept away once its great flying habits make you look like one of the smoothest pilots at the field. ■Paul Byrum

BILL WINTER is known to most of us as a designer of all kinds of RC models, though lately most have been of the electric-powered variety. In the old days, however, he was a prolific designer of rubber-powered Free Flight Scale models.

My interest in the Curtiss SOC-1 Seagull was spurred into action when I saw a picture of it done as a beautiful little Rubber model in this magazine. The caption indicated that Bill had designed it and that it had become the favorite of all his designs.

My experience in modeling has been that if a given design makes a good rubber-powered Free Flight model, it will scale up very nicely to a Giant Scale RC model.

Photos by Lynne Byrum

The sturdy Seagull was one of the Navy's most numerous biplanes during the period from 1935 to 1939. It could quickly be converted from wheels to pontoons for use on either land or sea.

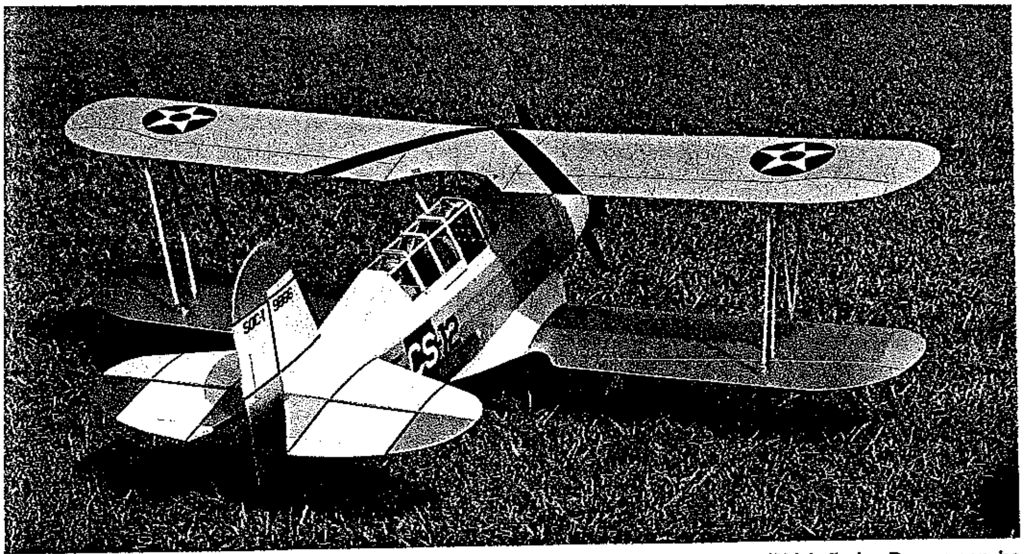
Curtiss SOC

So it was with high hopes that I set to work on my ⅕-scale version of this Navy workhorse. I wasn't disappointed, to say the least.

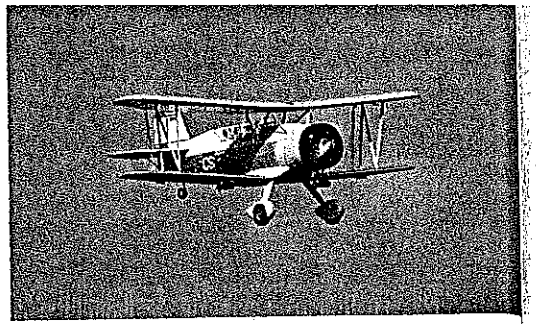
The full-size Seagull has been largely forgotten today. In fact, none are known to exist, either in museums or anywhere else. What a pity! We can, however, get an appreciation of how the original Seagull flew by flying this Giant Scale reproduction. In the late 1930s the Seagull was the most numerous of the Navy shipboard biplanes. It was classed as a convertible—that is, it could be quickly converted from floatplane to landplane, and vice versa. This allowed the plane to be used whether the ship was in port or out at sea.

The Seagull was a STOL aircraft even before the term was invented. The strange, small ailerons on the top wing were designed that way to allow room for large flaps. Leading edge slats were also employed. It routinely made unarrested landings on the carrier deck and could take off in

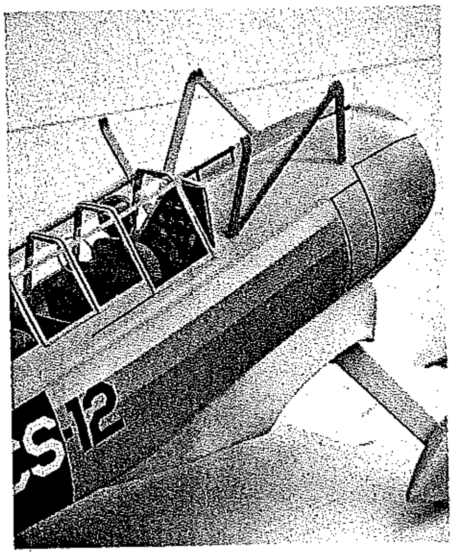
C-1 Seagull



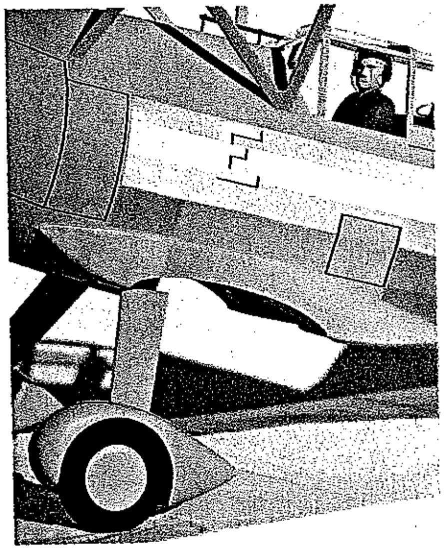
Graceful curves set this model apart form the usual crowd at an IMAA fly-in. Power can be from many of the available gasoline engines, with the Quadra 40 or the Zenoah 38 best suited.



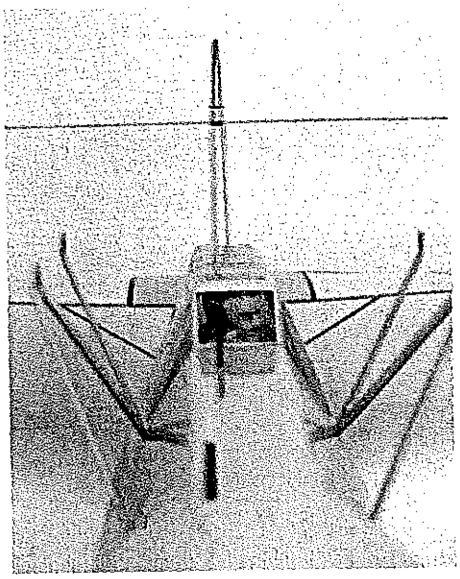
Smooth and steady. The Seagull makes an ideal subject for a large-scale model. Take-offs and landings are easy due to correct landing gear position and overall stability.



The cabane struts are cut from ⅛-in. sheet aluminum using either a band or jigsaw. With this method there's no welding or soldering.



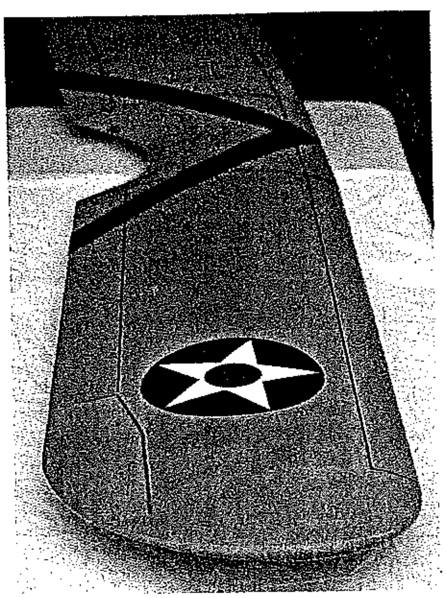
Open wheel pants are typical of Navy airplanes of the 1930s. The large wheels smooth out grass-field landings and takeoffs.



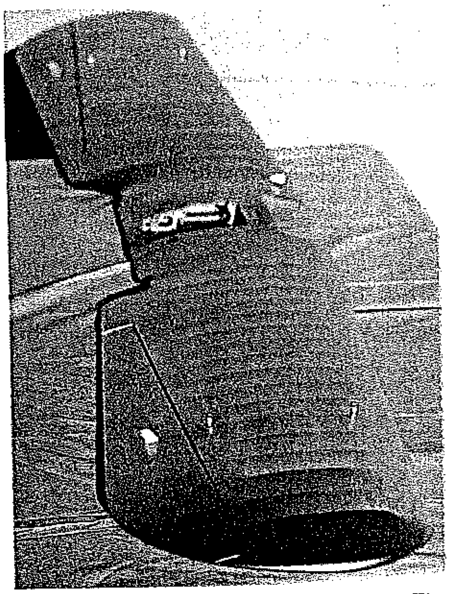
The pilot looked through the tubular gun sight to aim the .30 caliber Browning machine gun. Most planes were lightly armed prior to WW II.

160 ft. in a 10-knot headwind. I have read the original test pilot reports, which reveal that the Seagull's flight characteristics were found to be very good in general, with excellent water handling.

In those pre-radar days, scout planes like

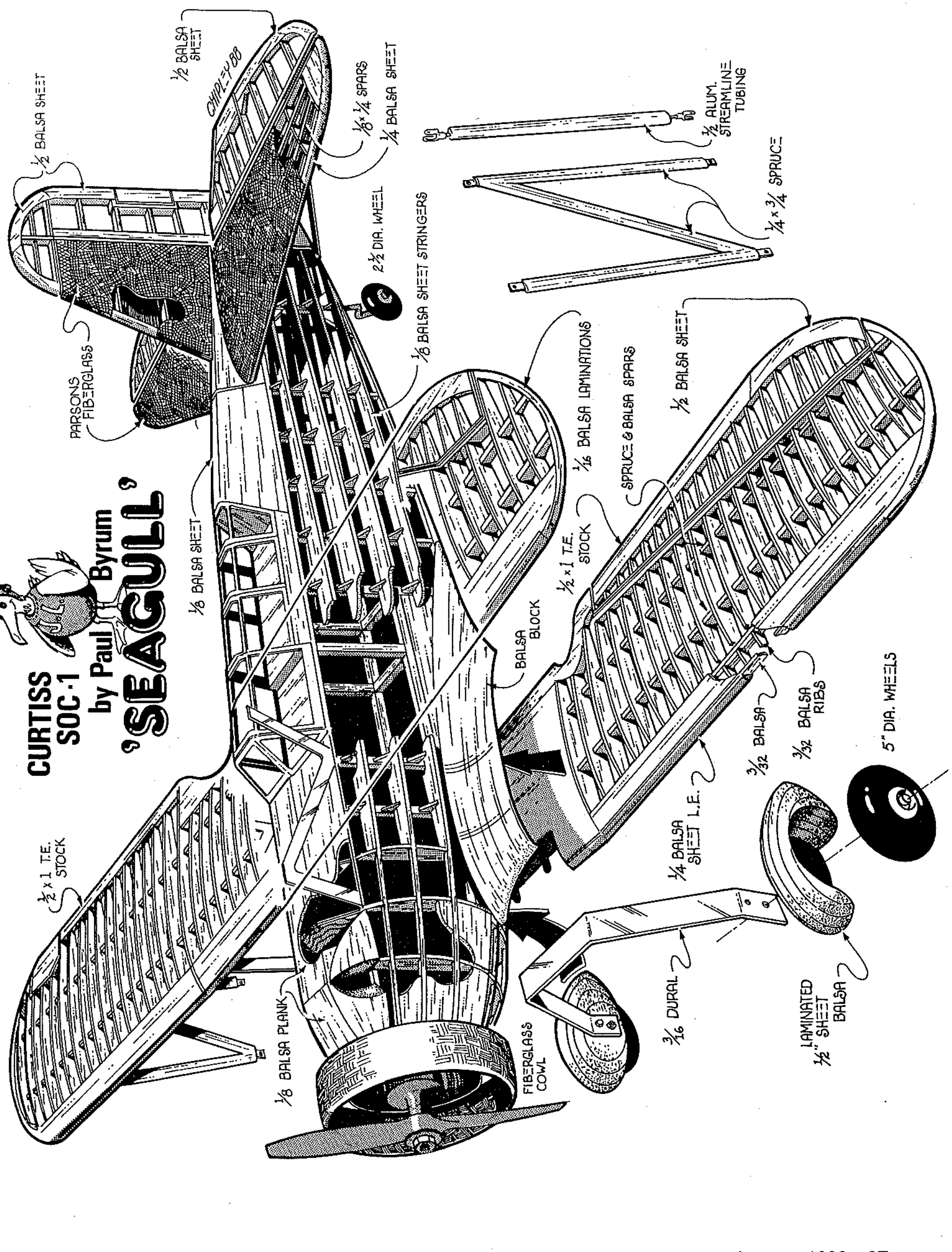


The small ailerons on the top wing allowed more room for the large flaps. Leading and trailing edge flaps are outlined in black tape.



The lower wing has generous ailerons. The mounting studs for interplane struts make assembly quick and allow precise adjustment.

Unusually large tail surfaces help to make the Seagull a stable, solid model. Navy pilots praised the flying characteristics of this plane.


CURTISS SOC-1
'SEAGULL'
by Paul Byrum
½ BALSA SHEET
½ BALSA SHEET
CHIPLEY 88
⅛ × ¼ SPARS
¼ BALSA SHEET
½ ALUM. STREAMLINE TUBING
¼ × ¾ SPRUCE
2½ DIA. WHEEL
⅛ BALSA SHEET STRINGERS
PARSONS FIBERGLASS
½ BALSA SHEET
⅛ BALSA LAMINATIONS
SPRUCE & BALSA SPARS
1/16 BALSA LAMINATIONS
½ × 1 T.E. STOCK
⅛ BALSA SHEET
BALSA BLOCK
3/32 BALSA RIBS
3/32 BALSA
5" DIA. WHEELS
¼ BALSA SHEET L.E.
½ × 1 T.E. STOCK
3/16 DURAL
LAMINATED ½" SHEET BALSA
⅛ BALSA PLANK
FIBERGLASS COWL

the Seagull served as the eyes of the fleet. The big cannons the Navy was using had a range farther than the eye could see. It became one of the Seagull's primary tasks to fly over the target area and radio back information which was then used to adjust the naval gunfire. It could also attack small targets with its two .30-caliber machine guns and two 100-lb. bombs, though by later standards its armament would be considered insignificant.

The Seagull's Pratt and Whitney Wasp engine, R-1340, must be one of the best ever built. It was used in fighters before the Seagull and later in trainers. You can see them today in SNJ/AT-6 Texans. Now-a-days they've been improved to produce 600 hp; the one in the Seagull was rated at 550 hp.

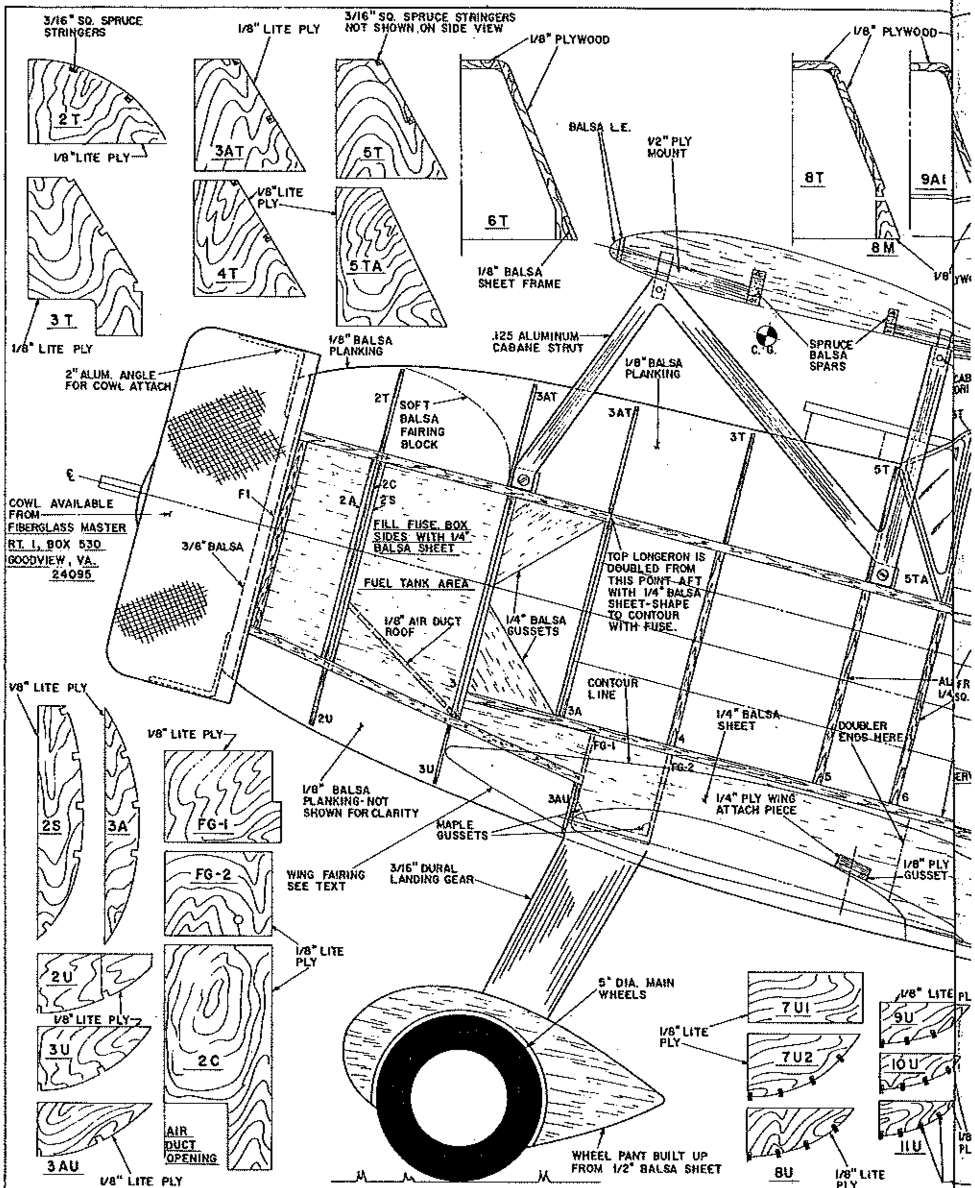
The most remarkable thing about the Seagull was its long service life in an era when airplanes were changing fast. With its outstanding flight characteristics, its toughness and dependability, this biplane managed to remain active for the whole of WW II. In fact, its replacement, the midwing monoplane Seagull II—another Curtiss design—proved to be a real turkey and was rejected.

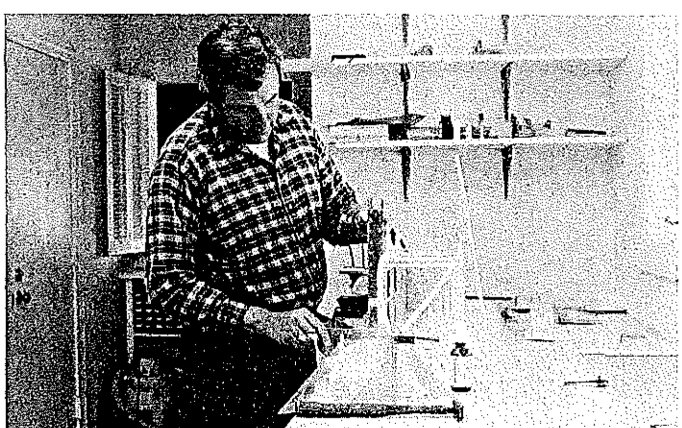
There are many features that make the Seagull a fine Giant Scale project, among them large tail surfaces, simple landing gear, fabric covering, and simple but graceful lines. The plans follow the full-scale outline with no deviations from scale. Scale rib and stringer spacing is maintained, and those areas on the full-size aircraft that were fabric and metal are reproduced by fabric and by fiberglassed wood, respectively. The extent of fine detailing is left to the discretion of the the individual builder.

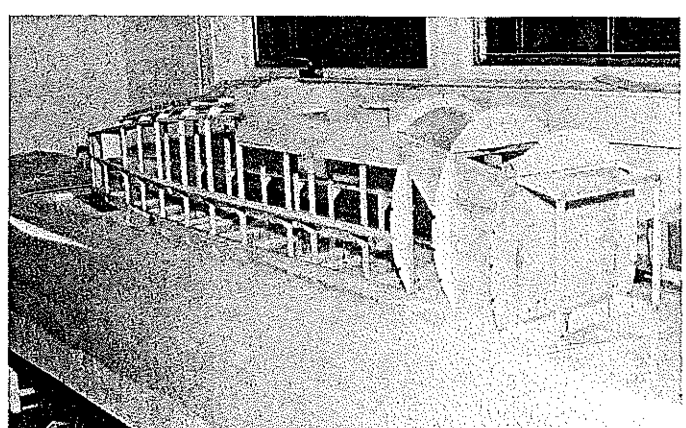
Another nice thing about this model is that you're almost guaranteed to be able to take it to any contest knowing everybody else and his brother won't have one!

This model is very docile in flight, and it lands slowly. With two degrees of right thrust and the big fin and rudder, takeoffs are very, very easy. No tip stall tendencies or snap rolls have been noted. Construction is somewhat complex and lengthy, but flying will pose no problems. The airplane is an ideal initiation into Giant Scale.

The plans are designed for the experienced builder. It's recommended that patterns be traced from the plans onto See Temp plastic sheeting, which is available from P.O. Box 105, Sussex, WI 53089. Use the See Temp templates as a guide to cut out the parts, then check them against the plans for accuracy. Using a Dremel saw and sander, I found that after tracing all the parts onto the wood, I could cut them out in an evening. Wing plans should be lightly coated with Johnson's baby oil and turned over for the left panels. None of us has ever built two right-hand panels per wing, have we?

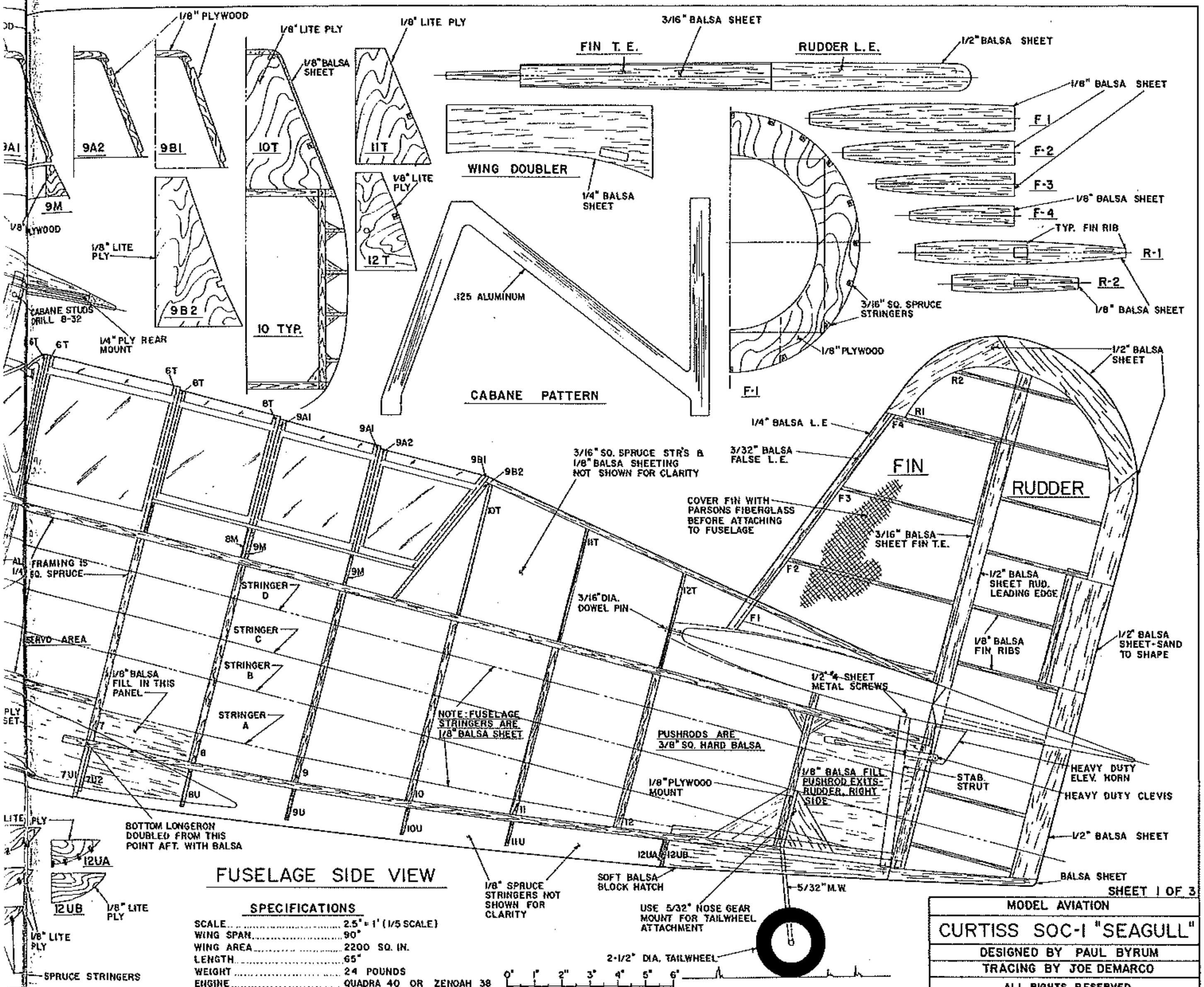






Left: The author checks the basic fuselage box for squareness. The Seagull can be build directly on the work table without resorting to time-consuming jigs. Right: Bulkheads and stringers are added while the basic box is still pinned to the work table, ensuring no warps later on.

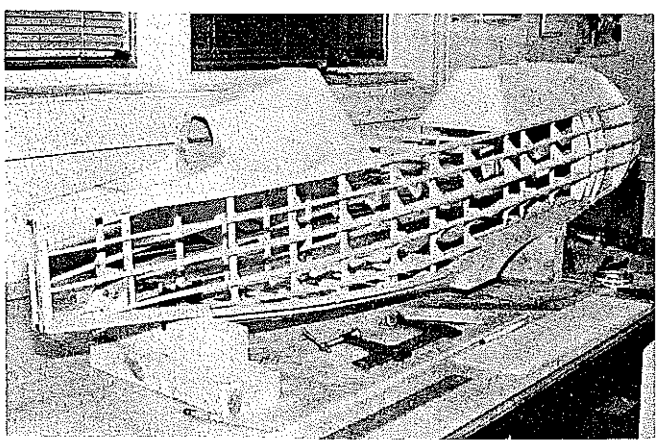
Full-Size Plans Available . . . See Page 196

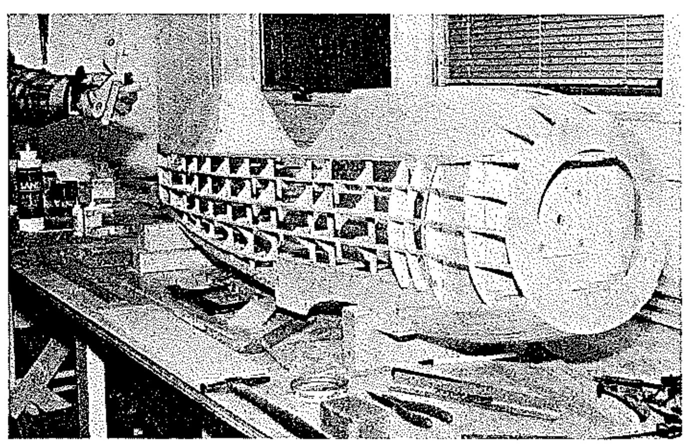


A word about materials: I used balsa from Hobby Woods (2931 Larkin, Clovis, CA 93612), because it is available in density grades and is attractively priced. Use medium-density wood on most applications, lower density on all trailing edges and tips, and the lowest density on the lower wing fairings and wheel pants. Plywood and spruce came from Balsa USA.

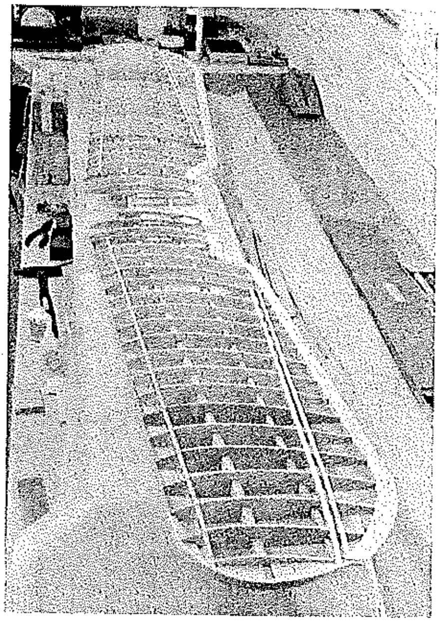
Super Coverite is recommended, as is Dan Parsons' fiberglass method, and his glass cloth itself, for wood surfaces. Parsons is at 11809 Fulmer Drive, N.E., Albuquerque, NM 87111. The cowl is a stock item from Fiberglass Master, Rt. 1, Box 530, Goodview, VA 24095. The landing gear was by D&D Engineering, 201 S.E. 12th St. Pompano Beach, FL 33080.

The reference three-view from *Aviation News* by Ian Stair is available from Repla Tech International, 48500 McKenzie High-

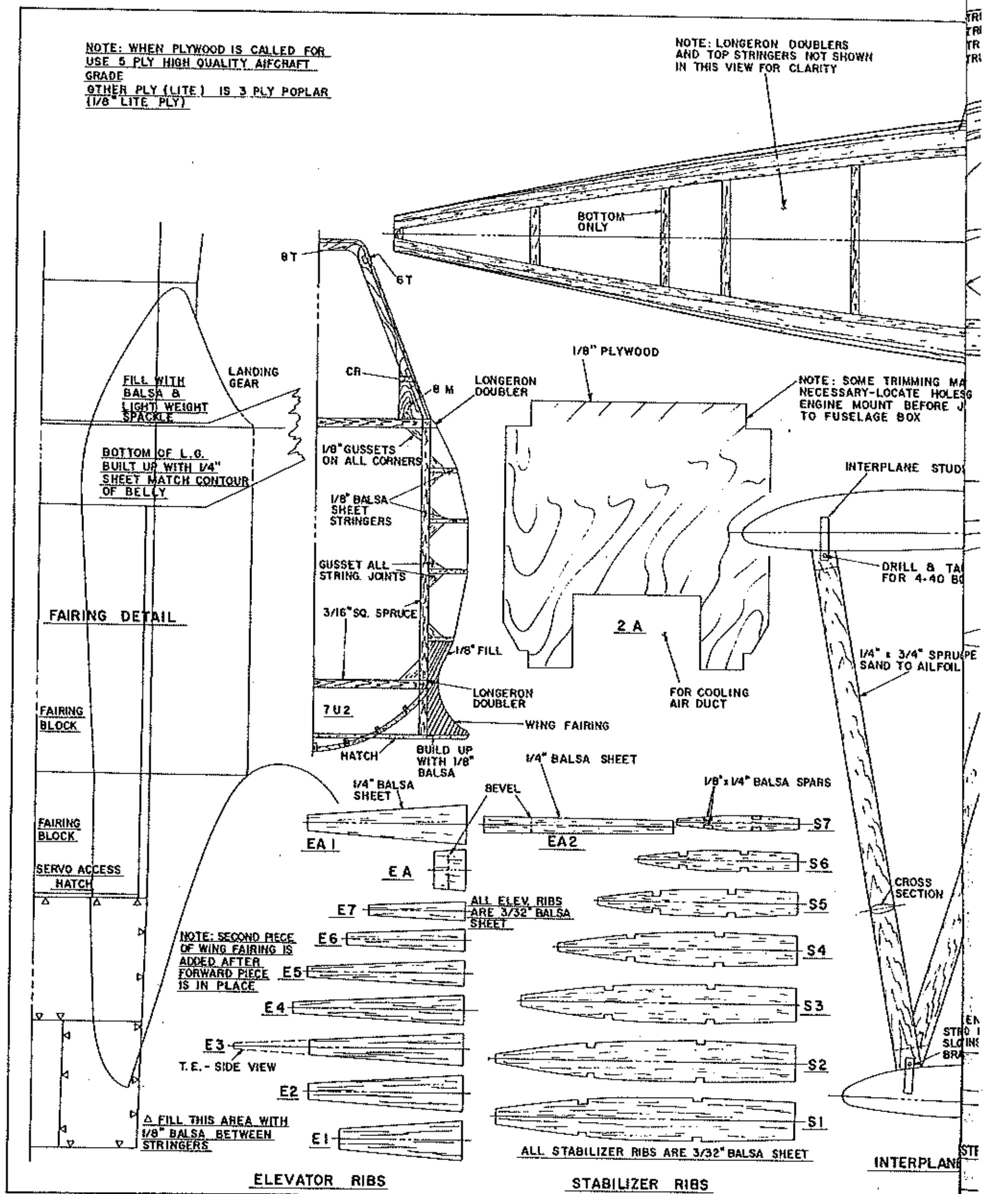




Left: Remove the fuselage and rotate it to the upright position for addition of front and rear turtledecks. The decks' simple, squarish structures are scale, and building them goes very quickly. Right: The mount for the Quadra engine is recessed within the nose. Air ducting (lots of room for the heat to escape) is important for good engine performance. The use of tapered stringers and gussets eliminates the side bulkheads.



The almost-completed lower wing. Combination of sweepback planform and rounded tips makes an elegant and different model.



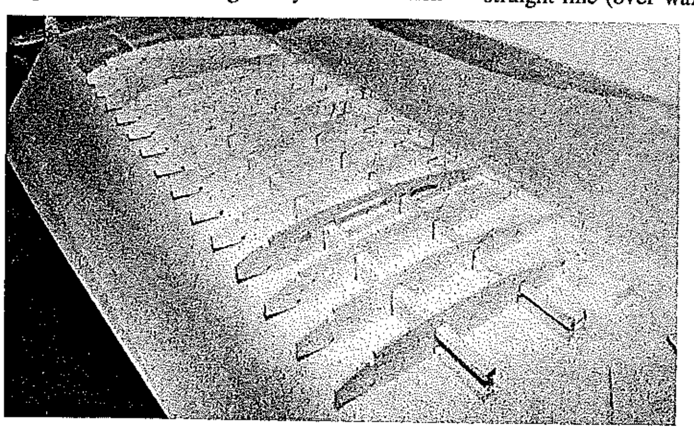
way, Vida, OR 97488. Another big help is the Hasegawa plastic SOC-3 Seagull in 1/72-scale.

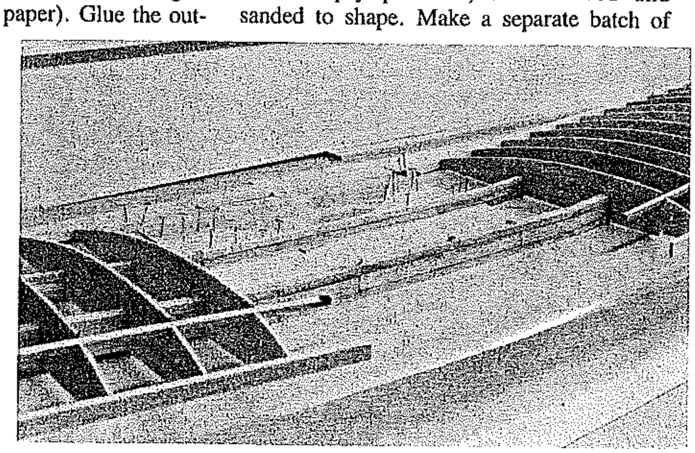
We used Foremost bomb releases, which work fine when used with a large, powerful servo. Dive bombing is a lot of fun, and my scores are slowly getting better. There was a very good *Profile Publication* volume on the Seagull which is now out of print but can still be found in some libraries. The Squadron/Signal Publications book, *Navy Air Colors*, Vol. 1, by Doll, Jackson, and Riley, has a wealth of information and photos of the Seagull. It's available in many hobby shops. Decals used were the water-soluble type from Major.

Where possible, 1/8-in. balsa gussets were used at glue joints throughout the model. The grain should always run parallel to the long side. To mass produce gussets, rip 3/4-in. strips off 1/8-in. balsa sheet. Use a triangle to mark off the gussets on each strip. Saw to rough-shape, then do the final shaping on the sander with the miter gauge set at the appropriate angle. Glue the gussets in place slightly recessed so they will not show up under the covering. They add a tremendous amount of strength and take only a few minutes to make and install.

Wing. Upper and lower wing construction is similar and begins with the spars. I have given up trying to find straight wood in the sizes required and now laminate the spars. Pin the balsa center piece down along a straight line (over wax paper). Glue the outside spruce pieces using Superjet cyanoacrylate (CyA), and hold or pin them until the glue hardens. Don't forget to make the slot for the dihedral brace. Saw and sand the spar tips as per the plans. Cut and sand the remaining parts.

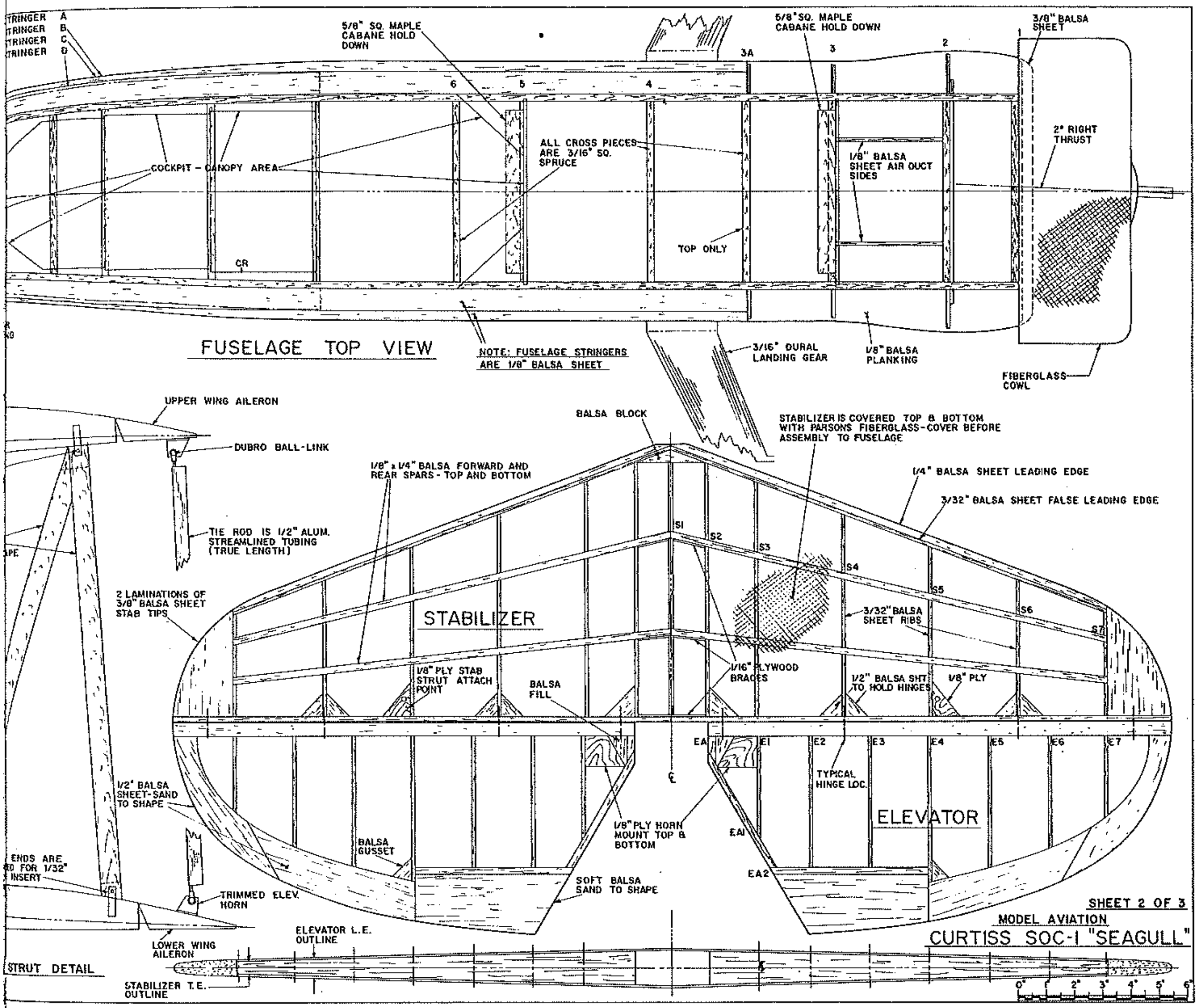
All the R-1 ribs are stacked between 3/32-in. five-ply patterns, then carved and sanded to shape. Make a separate batch of





Left: Outer wing panels are built flat on the work table. Fourth and twelfth ribs of the lower wing are plywood to accept the bomb release hardware and interplane struts. Right: Both outer wing panels are pinned to the table at the correct dihedral, and the center section is built up to join them. Work carefully in this high-stress area to ensure a sound structure. Sloppy construction here could mean an in-flight failure.

Full-Size Plans Available . . . See Page 196



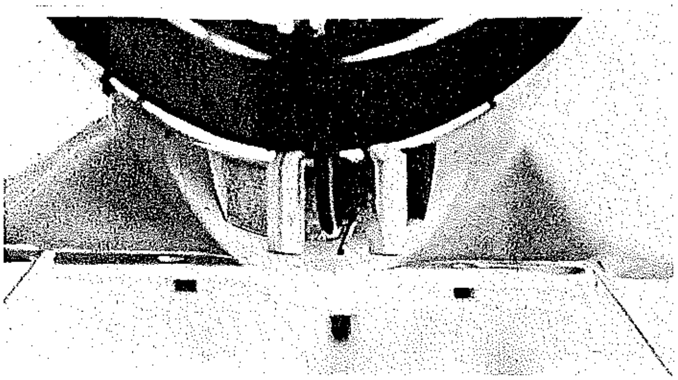
ribs for the right and left panels of the top and bottom wings. Save the patterns to be used as ribs where indicated on the plans.

Pin the right spars to the plans. Mark on the ribs the location of the ⅛ x ¼-in. strips that form the wing/aileron separation. Notch the ribs accordingly, and pin the bottom ⅛ x ¼-in. strips to the plans along with other applicable parts. Glue the R-1 ribs to the spar strips and other parts, being careful to keep them straight. Fit and shim up the tip ribs carefully.

Add trailing and false leading edges. Add the tip parts that form the base for the tip bow lamination. Tip bows are laminated from five pieces of $1/16$ balsa well soaked in water, and glued with Tower's Quick-Sand aliphatic resin. It's not necessary to leave the wing panel on the board for all laminations. Add the top $3/16$-sq. spar and the top ⅛ x ¼-in. strips at the wing/aileron separation. The ailerons are sawed apart from the wings later and faced with $3/32$ balsa.

Pin the completed right and left wing panels in position on the board, and build the center section to join them. The center section spars are built up from the bottom piece. Add the hardwood dihedral braces, the middle balsa spar segment, and finally the top spruce spar segment. Strong! Pin the $3/32$-in. bottom sheeting to the board aft of the front spar.

When everything is dry, remove and com-



Left: A look at the underside shows how the fillet blocks are contoured into the lower wing and landing gear. Right: Properly sized crew figures help maintain realism. These figures were carved in ⅙-scale, same as the airplane. Loop antenna is for the airplane's radio direction finder.

plete the wing. Sand the leading edge planking flush with the false leading edge, then glue on the leading edge caps. It took me a week to build each warp-free wing once the parts were sawed and sanded. When the wing is finished and sanded, hold it in your hands and fly it around the house, making Pratt and Whitney sounds. Brings good luck to the project.

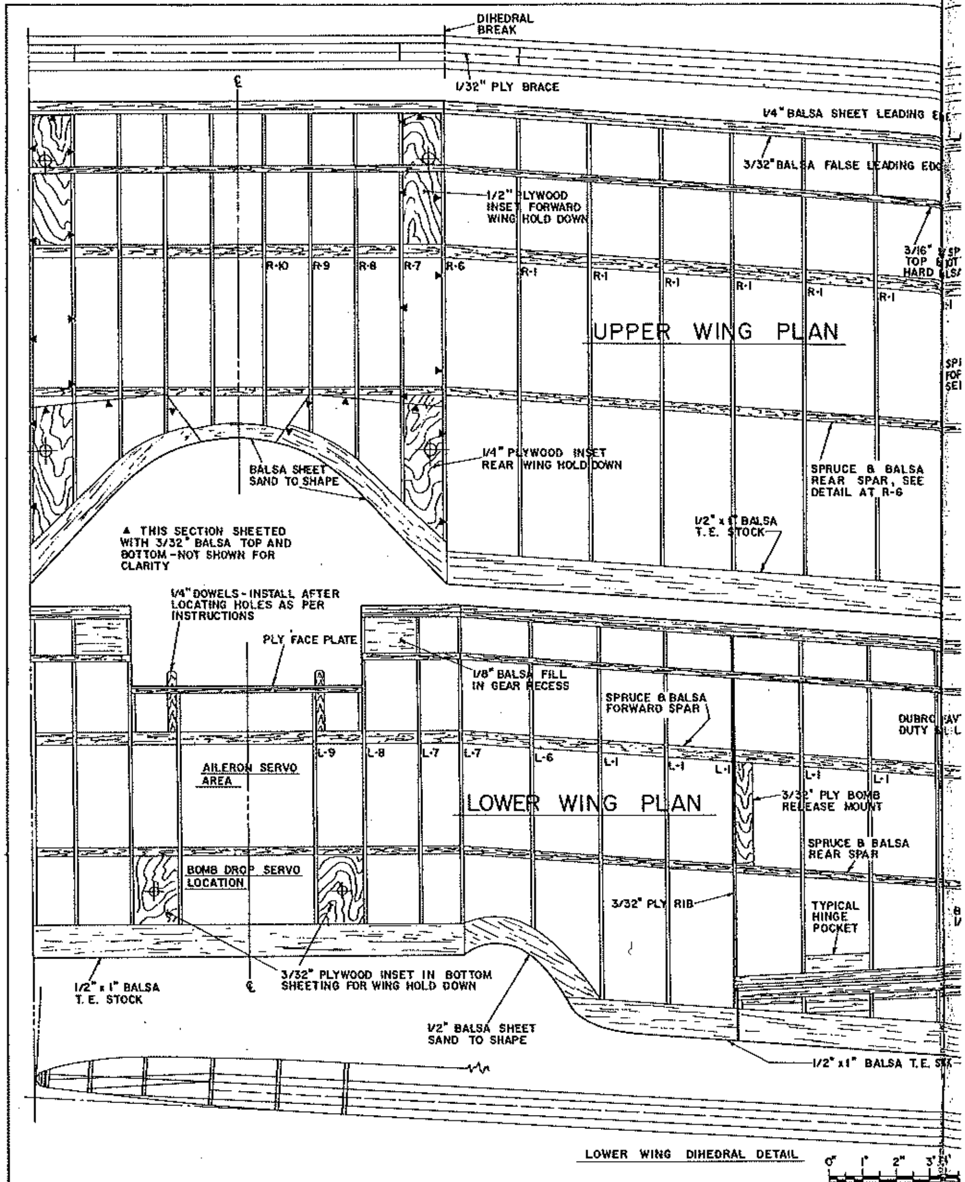
Fuselage construction begins with the sides. Follow the outside line on the plans *exactly* so that both sides will be identical. The basic fuselage box framework is assembled upside down over the top view. Make two sets of crosspieces, and pin one set down to the top view. Do the same with the firewall former 2C. Add the sides using pins and triangles cut from scrap plywood. Glue in the second set of crosspieces, former FG-2, and the wing attachment piece.

If your shop permits, the lower wing can be fitted to the fuselage box while it's still pinned to the board. If not, you can do as I did—use the dining room table. Use the same care in aligning the wing as you would in a Pattern ship; everything depends on this setting.

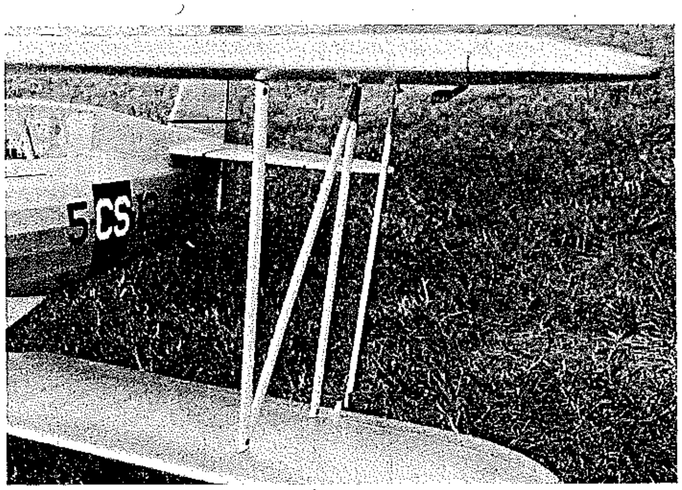
Drill the holes in FG-2 for the wing dowels. Drill through the wing into the wing attachment piece with a tap-sized drill, then tap the piece for the ¼-20 wing hold-down bolts. Add the remaining bottom formers, stringers, planking, and hatches.

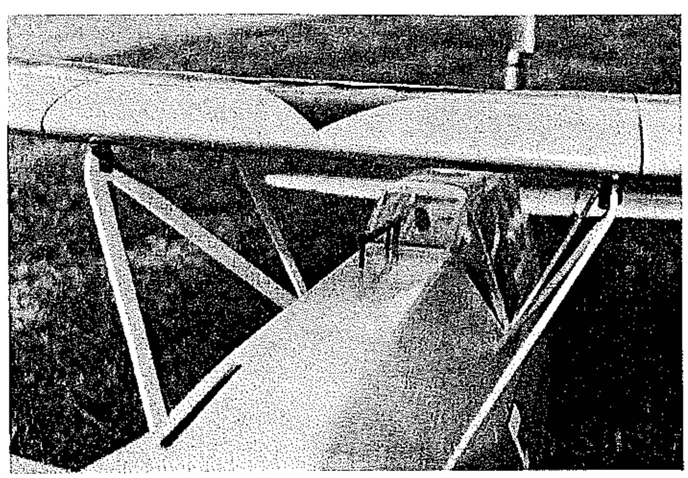
Install the top formers, side formers, stringers, and planking except for the canopy bows. The side stringers are shaped from the top view plan, sanded carefully, and attached using lots of gussets.

The nose planking is tricky. Notice that above the top longeron, the strip planking goes from former 2 forward to former 1. Aft of 2, a soft balsa fairing block is used to make a smooth contour into the sheet planking that runs from 2 to 6. The longerons are doubled with balsa aft of the nose planking and wing fairing. Shape the longeron doublers so as to provide a smooth transition between the side contours and the top and bottom.



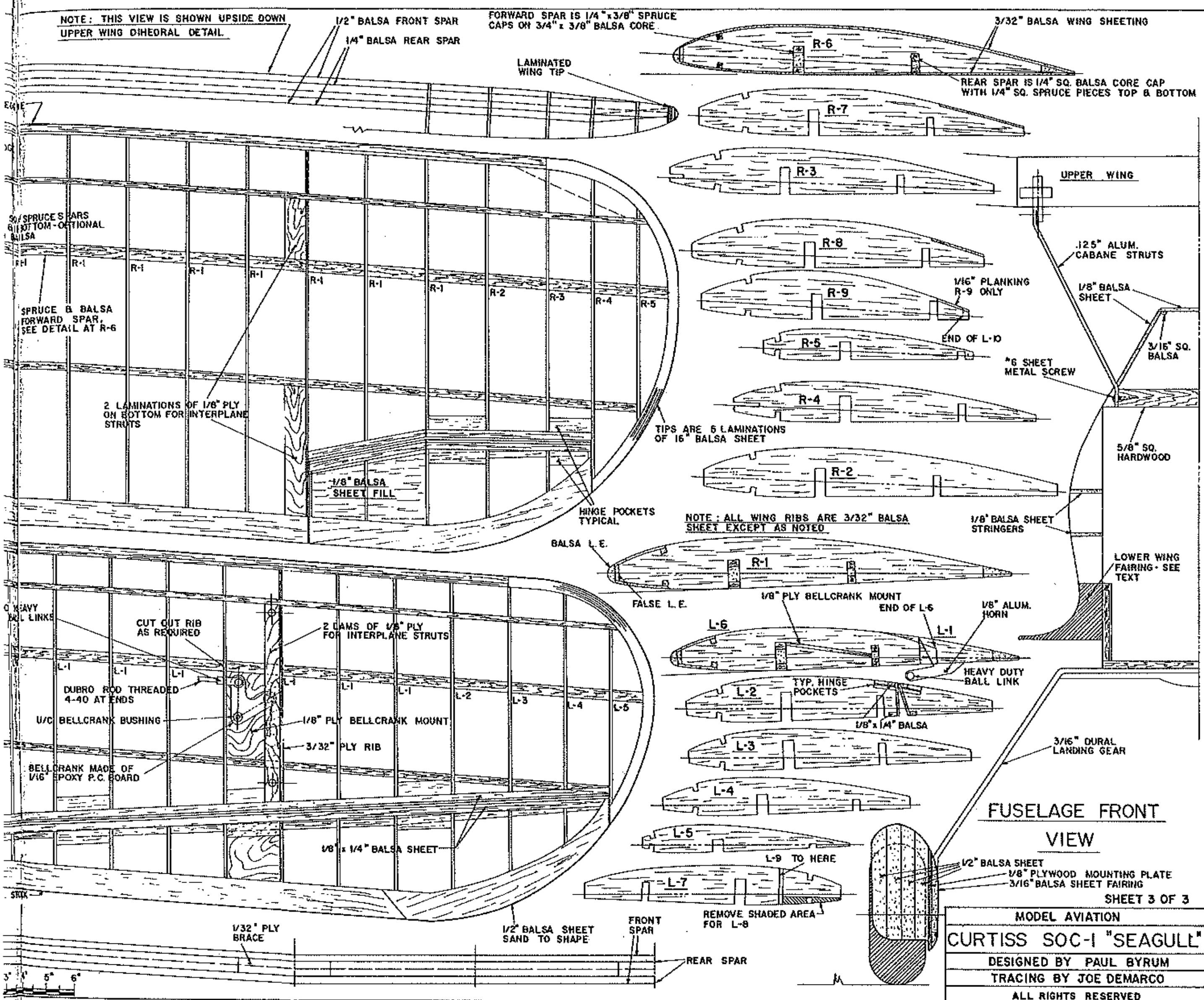
Although the lower wing fairing is time-consuming to carve and shape, it's crucial to a realistic Seagull. Start with a couple of true and square 3 x 3 x 18-in. soft balsa blocks. Use a band saw to make the cutout to receive the lower wing. For a precise fit, the block will have to be built up to about 18¼ in. using sheet balsa. The second, cone-shaped, rear piece of the fairing can be made from that stock cut from the block to receive the wing. The Hasegawa plastic model is useful here in visualizing the con-





Left: Interplane struts fasten to the wing studs with 4-40 Allen-head bolts. Mass balance on the upper aileron was found necessary for flutter-free performance. Right: The top wing is attached to the cabane struts using 2-32 Allen-head bolts screwed into the top wing studs.

Full-Size Plans Available . . . See Page 196



tours.

The landing gear mount should be the strongest part of the airplane. Use epoxy to glue the mount in place, and attach the gear with wood screws. Build up the landing gear itself with fiberglass around the area where it attaches to the fuselage so that it matches the fuselage contours.

The hot air duct is important in dissipating heat. Poor engine performance in Giant Scale models is often traced to a poor cowling design. Remember it's not what comes in, it's the air that goes out that counts. This Seagull gets good performance from a hopped-up Quadra 35. A stock Quadra 40 or Zenoah 38 would also work well. I normally use a 20 x 6 prop because it is scale size, but better performance is obtained from a Zinger 18 x 6-10.

Interplane and cabane struts are unique in this model. The interplane struts are made from ¼ x ¾-in. spruce sanded to an airfoil shape. Each cabane strut, though, is cut from a single piece of ⅛-in. hard aluminum on a band saw. After cutting out the cabanes, clamp them in a vise and true up

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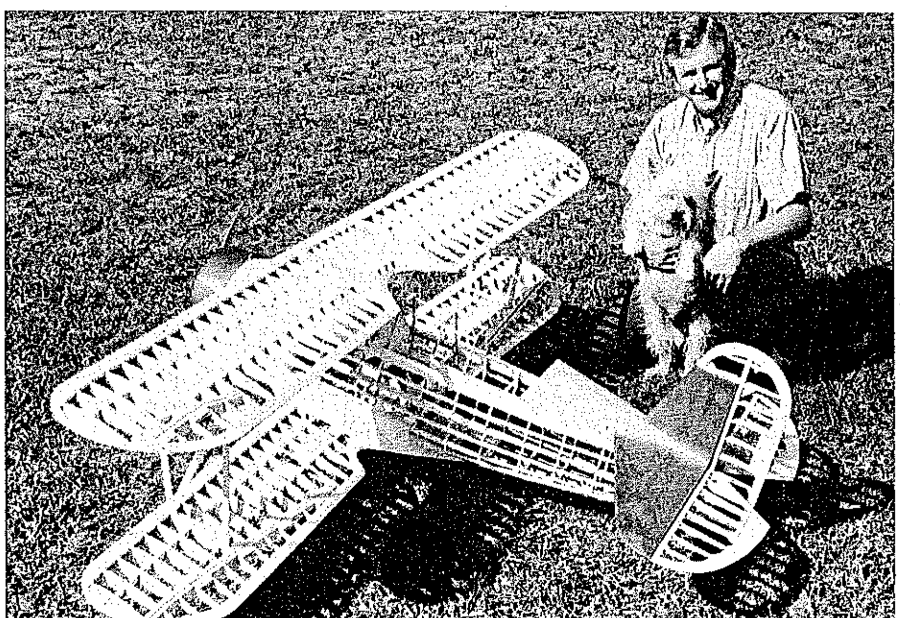

Paul says his Cairn Terrier, Mac, hopes he'll get some attention now that the Seagull is framed up. Just looking at the "bones" makes this a very satisfying project; flying is icing on the cake.

In short, Frank has done something that I have long thought of doing myself but never quite got around to. He has taken my nine years of writings, and by cutting and pasting has organized them into chapters, each of which contains articles of a similar nature. Quite a monumental task in my opinion.

I forwarded Frank's book to Bob Underwood, AMA's Technical Director, and asked Bob if he would consider Frank's suggestion to make the book available to AMA clubs by some means or other.

Just last week I received a copy of a letter from Bob to Frank which states that AMA is considering making it available to clubs or members who might wish to have it. It's not just pride of authorship that makes me believe that this would be a worthwhile undertaking. If any readers are of a similar opinion, I suggest you drop me a line or contact Bob Underwood directly. If enough letters (or phone calls) express interest in this project it might help convince the AMA HQ staff to go ahead with the publication. Please let us know your thoughts.

Have another safe month.

Seagull/Byrum

Continued from page 33

their edges using a file and straightedge.

Studs are made from threaded steel rod and screwed into tapped plywood that is securely glued inside the wings. Multiple laminations of $\frac{1}{8}$-in. five-ply work better than a single piece of thicker plywood. Use a sharp tap to avoid splintering the wood. Saturate the finished plywood with thin CyA to harden it. Incidence can be adjusted by screwing the studs in or out.

The studs themselves are drilled and tapped for screws that hold on the cabane and interplane struts. Always use Loctite to keep the screws from vibrating loose. When you are satisfied with the way the Seagull flies, epoxy the studs in place. Once everything is permanently in place, the Seagull can be assembled at the field in 15 minutes.

The tail wheel takes a lot of abuse in this model. To make the a tail wheel assembly capable of taking the punishment, I used a piece of $\frac{5}{32}$ music wire and anchored it with a $\frac{5}{32}$ nose gear mount.

Having tried all varieties of hinges, I like the large Du-Bro type best. Notice the hinge pockets on the plans. Hinges should also be pegged with toothpicks. Many Giant Scale models are still being lost through the use of unsuitable hinges. Be careful!

The stabilizer, fin, elevator, and rudder are all built in the same manner. Cut the leading edges (LE) and the trailing edges (TE) to the dimensions shown on the plans. Mark a centerline on each LE and TE with a ball-point pen. Pin the LE and TE over the plans, using shims at the tips to keep the centerlines parallel to the building board.

Ribs are cut from the patterns shown on the plan and are also marked with a centerline. When gluing the ribs to the LE and TE, the centerlines should, of course, meet.

Sheet the top side of the fin with $\frac{3}{32}$ balsa. Turn the fin over, reshim as before, and then sheet the other side.

The stab spars are added after the ribs are glued to the LE/TE, and the stab is then sheeted with $\frac{1}{16}$ balsa. As with the fin, the stab is turned over, reshimmed, the other set of spars added, and then the $\frac{1}{16}$ sheeting glued on.

The rudder and elevator ribs are simple pieces of $\frac{1}{8}$ x 1-in. balsa tapered to meet the TE. Both the rudder and elevator are built directly over the plans. After construction they are covered with fabric as per the full-size Seagull. I recommend using one servo per elevator to handle the loads, and in that case there is no need to join the two elevator halves.

To avoid adverse yaw, the ailerons need about a 20/80 differential in down-to-up throw. That is, if the right aileron goes up 20°, the left aileron should go down only 5°. I didn't build enough differential into my model initially, but was able to obtain it electronically by adjusting the settings on my Futaba 8FGA radio.

The plans show an arrangement that should give increased mechanical differential over the original scheme I used. Of course, two servos are used on the ailerons, and the top and bottom ailerons are linked together with a tie rod as was done on the full-scale plane. I found it necessary to include external static balances on the ailerons in the prototype.

The large canopy is, as usual, the focal point of the model, but in this case it

Seagull/Byrum

Continued from page 149

presents no special problems. All parts should be carefully sanded and primed before assembly. For the stringers in the canopy I used basswood, which is available in the railroad section of our hobby shop. After covering and priming the fuselage and finishing the cockpit interior, the canopy is glazed with .015 clear plastic from Sig. Wilhold's RC-56 is a very good adhesive for attaching the canopy.

The stabilizer and fin are covered with Parsons brand fiberglass before being joined to the fuselage. Glass cloth is also used on the wing fairing, interplane struts, wheel pants, and any wooden surface not covered with fabric. Dan Parsons has a very good set of instructions which he will send with the cloth. This method is much easier and infinitely lighter than the old polyester method.

Open framework should be covered with Super Coverite and primed with nitrate dope, sprayed on to avoid brush stroke marks. I used Sig Supercote clear nitrate dope, and then followed that with their colored butyrate dope. Apply several coats, then rub down with steel wool. A magnet will remove the small steel particles that remain. Supercote silver is a particularly attractive color and is heavily pigmented.

Before flying the model, check the radio with the power off and the engine running at full throttle. It is good practice to also make a power check using a smaller prop than the one you'll be flying with. This approximates the in-flight (higher) rpm.

At 25 lb., my Seagull takes off in about 100 ft. with no wind. Rudder response during takeoff is very good, and launches are smooth and graceful. My landing technique is to try to hold it a foot off the runway, applying more and more *up* elevator as the airplane slows down, until if finally settles in by itself. I don't always succeed, but when I do I get a nice landing.

The interest and encouragement of Bill Winter is acknowledged and appreciated. Also, the advice of the library staff at the National Aviation and Space Museum in Washington, DC was very helpful. These lads are very, very knowledgeable, which helped make the day I spent there doing research on the Seagull one of the best of my life. When this was written my Seagull had 25 flights on it, and each flight was an emotional experience. Hope you enjoy yours as well.

Radio Technique/Myers

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AMA (Academy of Model Aeronautics)—National organization of aeromodelers, member of the NAA, representative of the United States of America in negotiations with the world, publisher of *Model Aviation* magazine.

EAA (Experimental Aircraft Association)—National organization of builders of homemade, man-carrying aircraft. Frequent users of RC models to investigate and verify performance of aircraft designs.

EC (Executive Council)—Governing body of the AMA, consisting of the President, Executive Vice-President, Executive Director, and 11 District Vice-Presidents.

FAA (Federal Aviation Administration)—part of the U.S. Federal Government charged with regulating transportation use of the air above the nation.

FAI (Federation Aeronautique Internationale)—Organization which oversees and coordinates aerospace competitions and records. It is based in Paris, France.

FC (Frequency Committee)—Advisory body to the AMA Executive Council on matters pertaining to obtaining and using radio frequencies for hobby purposes.

FCC (Federal Communications Commission)—part of the U.S. Federal Government charged with regulating radio frequency transmissions.

FM (frequency modulation)—a system for impressing information on a radio frequency transmission by adding information which moves the assigned radio frequency in an intelligible manner.

FSK (frequency-shift keying)—a system for impressing information on a radio frequency transmission by shifting between two radio frequencies in an intelligible manner. This is the system actually used in RC systems described as "FM systems."

HQ (headquarters)—in the case of AMA, located at 1810 Samuel Morse Drive, Reston, VA 22090.

NAA (National Aeronautic Association)—members include the EAA, AMA, and other U.S. aviation associations. The U.S. national aero club recognized by the FAI.

PC (printed circuit)—a method for connecting electronic components by etched copper foil pathways.

PCM (pulse-code modulation)—a system for encoding the modulation of a radio frequency by use of computer words that can be decoded into control commands by a computer in the receiver.

PWM (pulse-width modulation)—a system for encoding the modulation of a radio frequency which uses the time between pulses as an analog of the desired control position. This system was the most common system in the years 1969-1988.

RC (sometimes R/C; radio-controlled)—Describes systems in which human commands are delivered to machines by way of a radio link.

RF (radio frequency)—pertains to systems which generate electromagnetic radiations at radio frequencies.

RFI (radio frequency interference)—any electromagnetic radiation that degrades the radio link of an RC system.

RX—radio receiver.

XMTR—radio transmitter.

XTAL (sometimes XTL; crystal)—common frequency-determining element in XMTR and RX.

Battery/Smith

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Making use of the dual battery system is relatively simple, but it does entail adding a negative and positive lead to the receiver, with a connector, to supply it with current. Generally, the existing power connector built into the receiver can be used for the servo power supply. On most receivers the