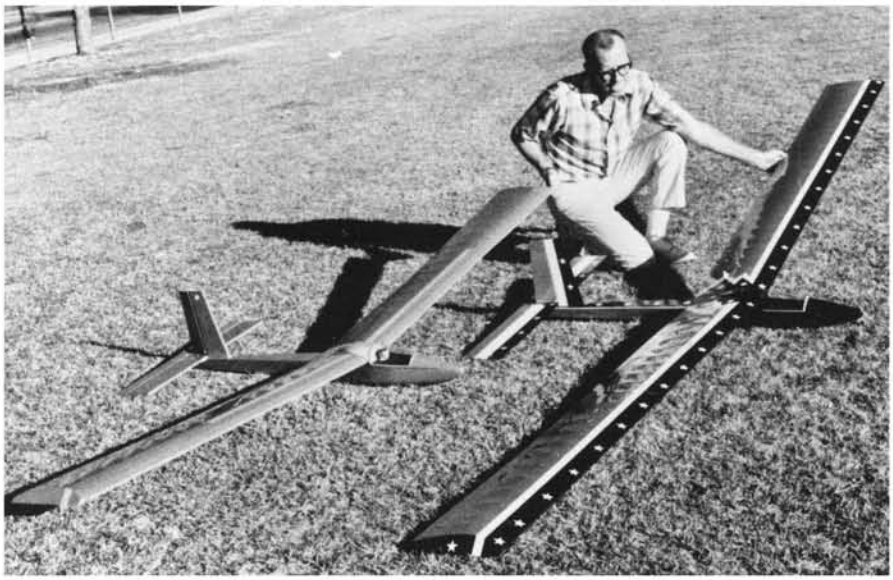
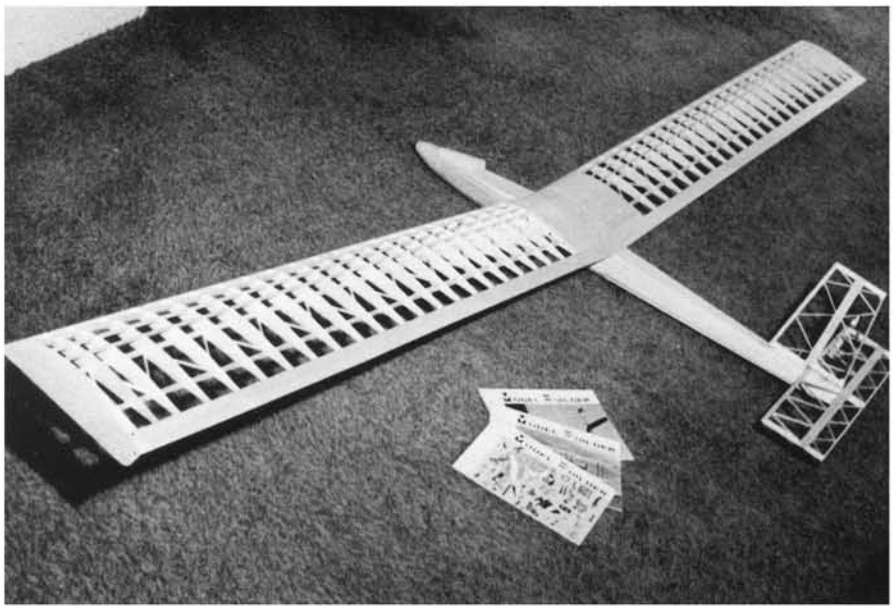


The long and the short of it. Author/designer of the YANKEE GULL, Le Gray, poses with the 100" version, built by Bill Whitney, and the 12' "Big Turkey" or "Axelrod's Joy," which he built himself. The 12 footer's nose starred in last month's article on fiberglass reinforcing.



The "bones," cleverly posed by the author with some "objects d'art" for scale effect. The guy obviously has class! Before covering, the wings make excellent escape ladder in case of fire.

PHOTOS BY BILL WHITNEY

"How ya going to get it home, Mister?" Believe it or not, the whole shebang fits in Le's VW convertible. Of course the wings unplug, dummy!!

"Yankee Gull"

The ultimate machine? No. But a different approach to the common problem . . . soaring performance . . . Finesse be hanged . . . here's a direct assault on the world's thermal population . . . an affront by brute force, wrapped in a three-for-one variety package. By Le Gray

● Ralph Dodsworth, LSF/032, in Saskatoon, Saskatchewan calls his 12-foot version the "Canadian Hawk", but like the man said, "A rose by any other name smells." So call it what you will . . . "Tennessee Turkey", "Connecticut Canary" or "Arizona Albatross" . . . the Yankee Gull does one thing very well. It flies. Of course, Ralph doesn't know that . . . yet. Winter came suddenly one night while he still had a few hours of detailing work left. But come the Spring thaw, his "Hawk" will provide many hours of pleasant thermal soaring . . . before the world turns white and it's "building season" again in Saskatoon.

Bill Whitney, LSF/120, in Woodland Hills, California built the first-to-fly Yankee Gull. It was his first-ever model airplane. He elected to go the 100-inch route . . . same plane as Ralph's, but with a shorter span. Bill's wing seemed stubby with only a 10 to 1 aspect ratio . . . it looked different than "normal"

sailplanes. But Old Flying Buddy (OFB) Whitney's Gull could hardly have worked out better. For its apparent size, the all up weight of 4 pounds was discouraging. It promised to be a lead sled . . . definitely not a beginner's airplane . . . and when it was time for first test flights, we didn't admit our concern to OFB . . . or his wife . . . or his daughter . . . or his son. But that just-over-8-foot-span packed 7 square feet of area, and that big wide wing carried its 9 ounce wing loading like a "conventional" skinny wing does 6 ounces . . . or so it seemed.

After the first flight, OFB's smile . . . and his wife's . . . and his daughter's . . . and his son's . . . made them look as if they were standing behind a white picket fence. We commented about the deep gratification and the sense of satisfaction realized when a designer's creation performs as anticipated. They were kind enough to play-like they believed it . . . even the kids.

The concepts incorporated in the Yankee Gull grew over a period of a year or so from several influences, jealous observation of large free flight gas model glide performance; a hunch that the narrow wing chords used on most R/C sailplanes . . . imitating full-scale appearance . . . might not be too smart due to Reynold's Number effect; and a very interesting NASA publication . . . Technical Note D-2052, "The Design of Sailplanes for Optimum Thermal Soaring Performance", by Clarence D. Cone, Jr. of Langley Research Center. This report makes some pretty interesting claims . . . albeit regarding man carrying machines . . . for very low aspect ratios. Like 6 or 8 to 1. The 100-inch span, 10 to 1 aspect ratio original that OFB built seems to verify that at least one . . . or possibly some combination . . . of these several influences has merit. Wonder which one?

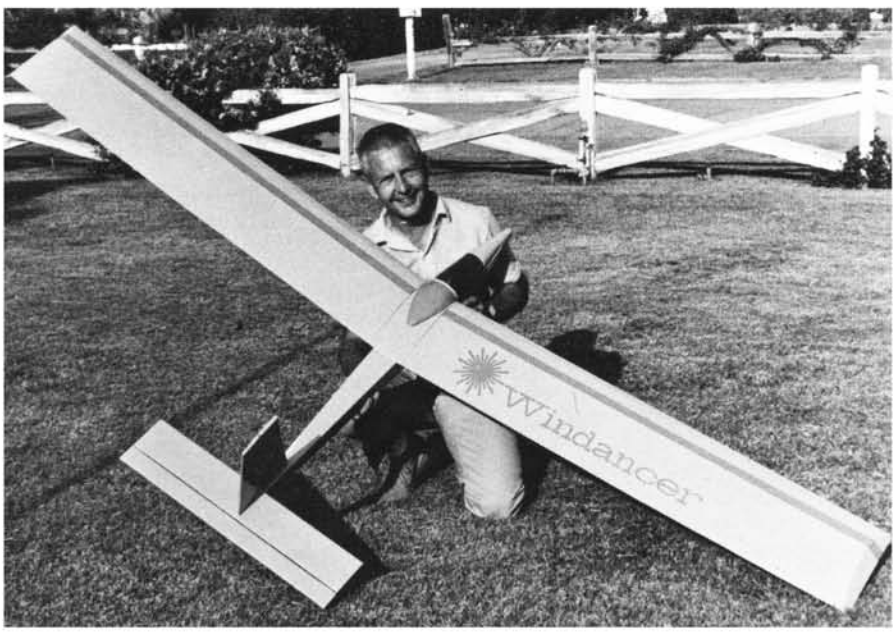
On a winch launch, OFB's Gull climbs like a turpentined cat . . . hands off . . . when lighter machines are struggling for altitude. It floats like a free flight, but has reasonable penetration. Turns are flat and tight when wanted. To sorta sum it up, the Yankee Gull/1000 . . . 1000 for inches of wing area . . . soars like a light-weight yet handles with the solid no-nonsense feel of a heavy machine. The Yankee Gull is an easy sailplane to fly. Well, let's face

The 100 incher, with Bill Whitney on the stick, gets winched up at the 1971 Western Soaring Champs. Site is dry lake bed east of Riverside, Cal. Le on the winch, Dan Dickenson timing.

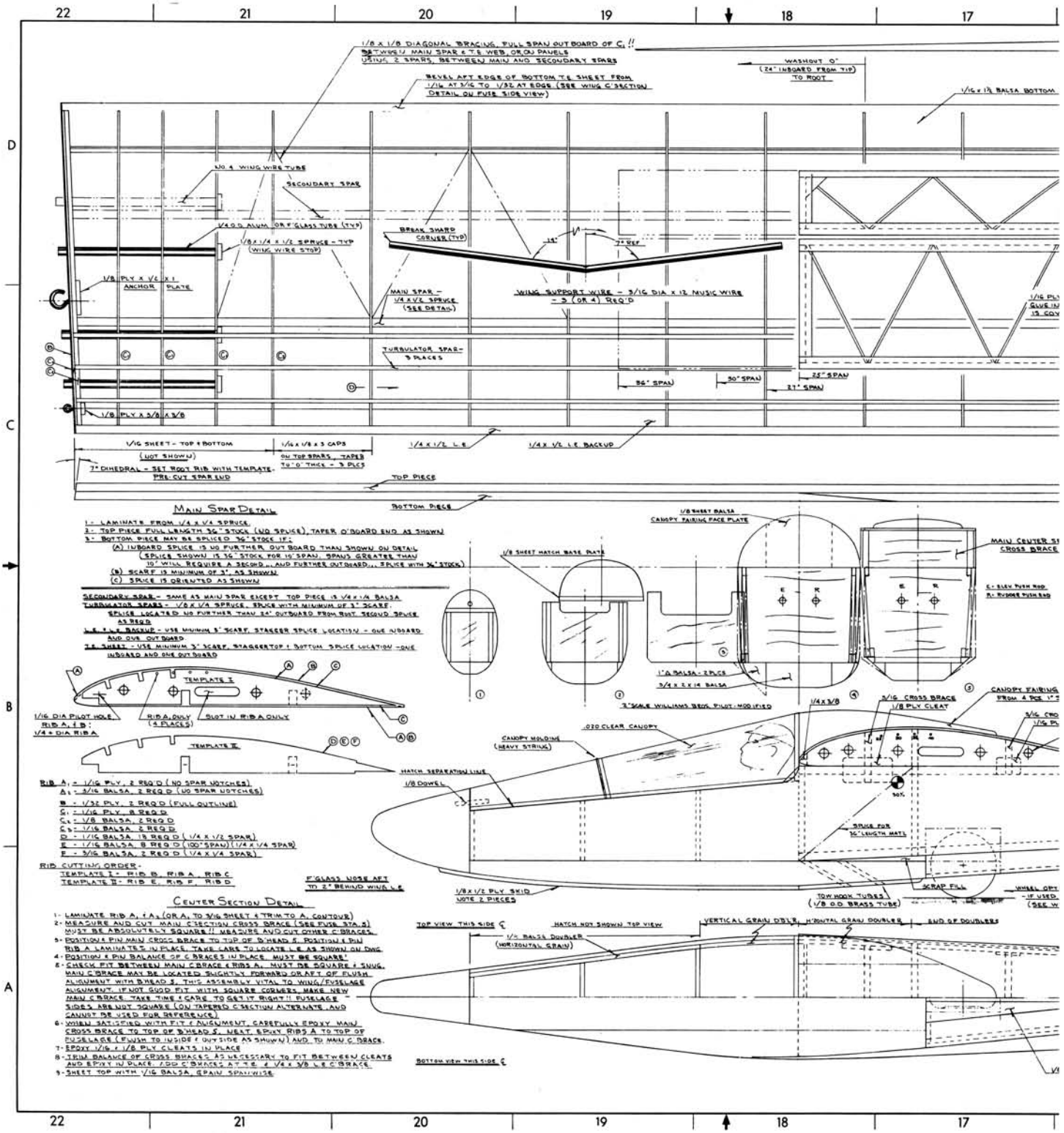
it. It was OFB's first model and he learned to fly with it . . . including all his LSF Level I work. No disrespect, but . . . like all of us . . . OFB kinda had sixteen thumbs and no depth perception at all. And, on occasion, he too could forget which sailplane in the covey he was supposed to be flying. But OFB and his Yankee Gull stuck together . . . with a total of about three gallons of fast-drying epoxy . . . and are now a coming tiger-team, just having a blast in West Coast sport flying and competition circuits.

The Yankee Gull represents a brute force approach to soaring through utilization of wing area. The Yankee Gull/1000 gives 7 square feet of area in 100 inches of span. For comparison, the popular Graupner Cirrus carries 806 square inches . . . 5.6 square feet . . . in 118 inches span. The Gull/1200 spans 120 inches with 8.4 square feet of area. And el monstro, the "1440", serves up 10 square feet within its 12 foot span.

Since Dodsworth's progress in Canada had suffered a white-out, the Yankee Gull/1440 had not been tested, and this had to happen before plans could be published. So to prove . . . hopefully . . . that the big end of the variation stick was valid, we started cutting and glueing. There hadn't been a twelve-footer in our barn for over a year . . . since we wrapped one around a light post on landing approach . . . and we welcomed an excuse to build one. It's simple. Big ones are more fun. In



How's that for a first time model building job? Bill Whitney is rightfully proud. "Windancer" is the name Le has given all of his series of glider designs. All employ his pet turbulator wing spars.

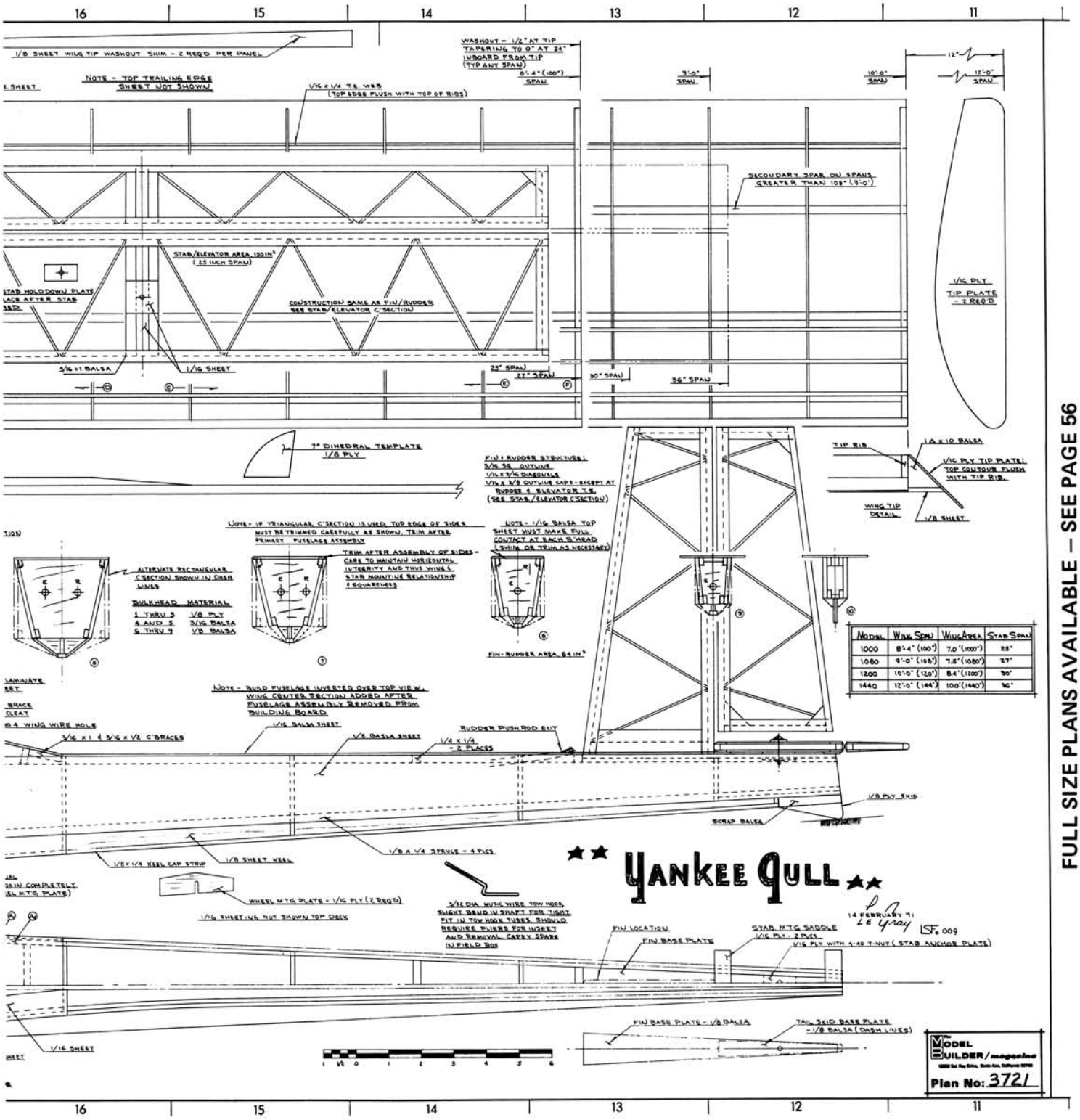


about three weeks, we were ready for test flights. The Yankee Gull goes together quickly . . . in any size.

During frame-up, many experts commented about the short coupled tail and, with the good humor and comraderie that is so much a part of our sport, let one and all know in very loud voices that ". . . you're an idiot". At first, it was easy to ignore, but after so much repetition, ya start to wondering. It hurts. You don't want to believe 'em. But they seemed so sure.

OFB's "1000" had had excellent pitch stability and control. The new "1440" should be the same . . . or nearly so. But "turn" performance became a worry . . . especially after components were complete enough for a preliminary "block up" assembly. Those 6-foot long, 10-inch wide wing panels go to looking more like surf boards all the time. Thoughts such as "maybe a little taper wouldn't have hurt" kept nagging. The more we looked, the more concerned we became. There was just no way that a rudder set up as close as the Gull's could have enough power to swing all that wing into any reasonable turn in any reasonable time. Just no way.

And so the day came that all the theory . . . guesses . . . were to be put to test. The fate of "Axlerod's Joy" . . . well it took nearly four rolls of Super MonoKote . . . was on the line. OFB was at hand to help and seemed to have all the confidence in the world that all was well. After all, he was the world's most



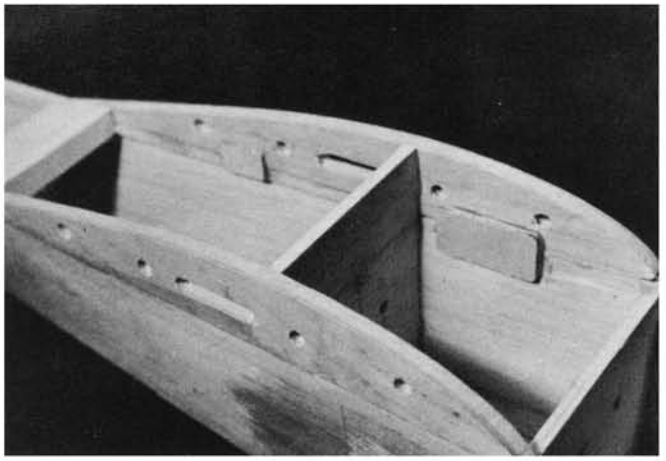
experienced Yankee Gull pilot, and he anticipated . . . or so he said . . . absolutely no problems. Obviously, we gotta find a smarter friend.

A coupla test glides provided no excuse to go home . . . and did little more than use up a lot of perfectly good breath. And so to the winch. First flight. It looked good. Second flight. Looked better. More flights. More better. A little ballast out of the nose . . . and a shim or two under the stabilizer . . . to slow it up. That was it. No sweat. When one has confidence, all works out.

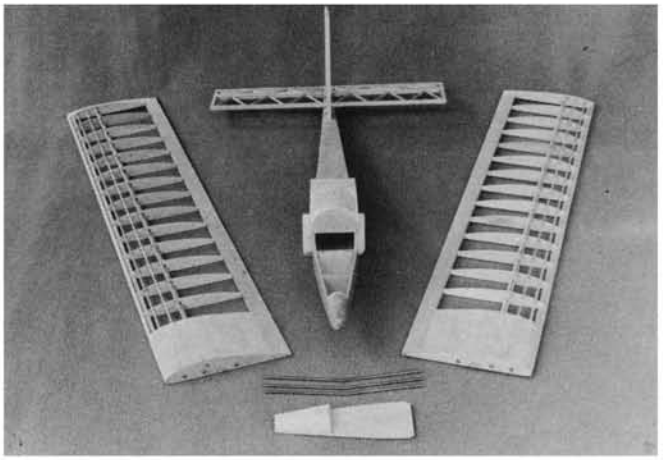
That big, long-winged turkey showed excellent pitch control and stall recovery . . . and turns were a delight. Now any 12-foot span model will present a slower roll rate than a 6-foot toy . . . but the Yankee/Gull 1440 gave better turn response than we had even hoped. A result of true design genius. Obviously.

Some points that might be of interest. All the wing ribs are basically the same, so stack cutting is the order of the day. The canopy is all straight lines and requires no special fabrication techniques. The tail surfaces are all sticks . . . no ribs to cut. All bulkheads are straight lines.

Wing construction utilizes turbulator spars. It requires no leading edge sheeting. Wing tips are triangular balsa stock and plywood plates. Simple, functional and always a conversation grabber: "Are those 'vortex' tips? Any difference in performance from regular?" Well, if you



Close-up of uncovered center section, showing rugged construction. Wire wing rods actually suspend fuselage between plug-in panels.



The 100 incher ready for Monokote skin. Construction is very similar to "E-Z Juan", another Gray design kitted by Midwest Products.

build a Yankee Gull you'll have to make up a story . . . theory. The tips give the wing such an esoteric appearance, it's a real shame to come right out and admit that their main purpose in life is to protect against "abrasive" landings. Maybe the local library has some books that will help pad your part a bit.

One other point. Any of the Y-G's will fit in a VW bug for transport. At least in the older models . . . before the advent of the throne-style front seats. The "1440" takes a bit of care in loading, but it goes. Just don't plan on taking a friend.

Plans show 100 inch, 9, 10 and 12 foot spans. So pick a size that suits ya. Hardly a glamorous description, but the Gulls flown to date have been as docile as a family cow.

A few comments on construction are in order. Don't let the drawings scare you. There are lots of marks on the paper but that doesn't mean the Yankee Gull is difficult to build. Instructions and notes are on the plans where you can see 'em when you need 'em. Also, four wing sizes and four comparable stabilizers are indicated. That helps fill the space. Look the plans over carefully. Actual construction is quite simple . . . for a high-performance sailplane. Oh yes, remember all the photos are not of the latest configuration . . . so follow the drawings. They have the latest changes.

TAIL SURFACES: These are just a bunch of sticks glued together . . . basically a 3/16 "core" with 1/16 stock on either side around the edges. The 1/16 edges lock it all together, providing a gusset over every joint and holding the covering material up away from the core. Makes for a smooth surface. The covering only touches the structure around the perimeter.

Start building by laying 1/16 x 3/8 strips and other 1/16 sheet pieces directly over plans, gluing joints as indicated. Next, fit and glue all 3/16 thick "core" pieces over the 1/16 base. Note that trailing edge of elevator and rudder do not have the 1/16 sheet overlay, and thus must be shimmed 1/16 above building surface for proper alignment. Add the top layer of 1/16 sheet, similar to that which went down first. That's it.

When dry, sand leading and trailing edges round. Final cross section should be like that shown for the horizontal tail surfaces on fuselage side view drawing. Hinge the elevator four places and the rudder two places. Prepare mounting holes for control horns. Note that elevator horn is on center line as the elevator push rod comes straight out the tail end of fuselage.

WING: Cut, splice and laminate all

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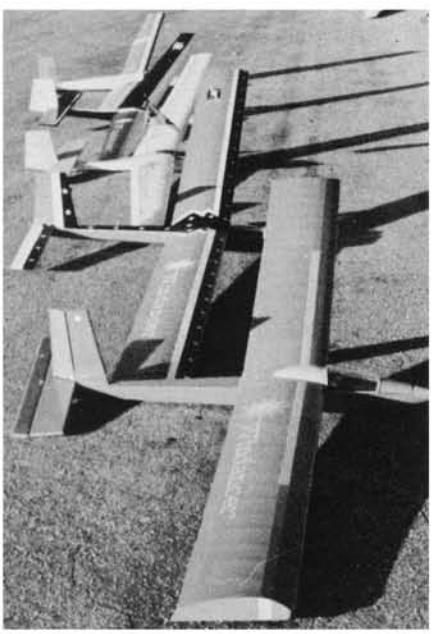
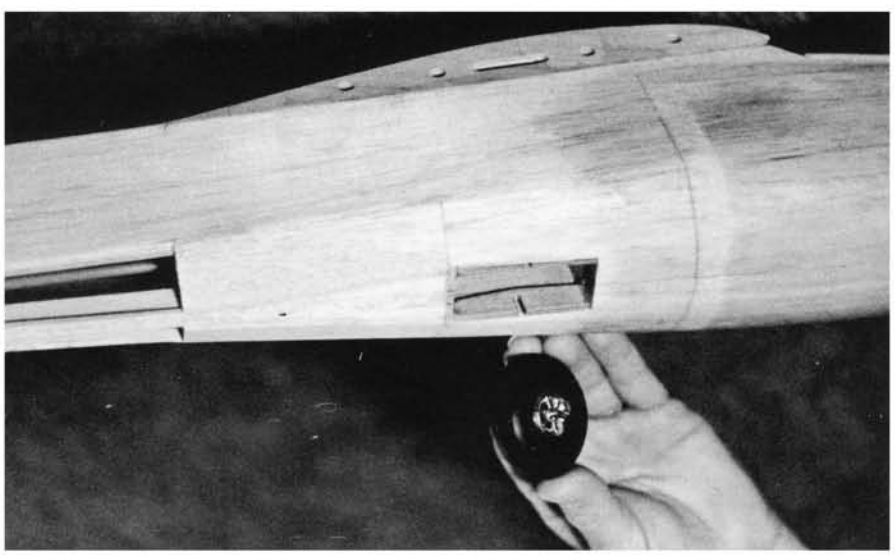


Windancers at North-South meet in Bakersfield. Swept forward design is the latest "Scorcerer."



Very simple but effective landing wheel mounting. Axle fits into slotted plywood sides of wheel compartment. When ready to leave it in place, just seal up the slots with epoxy and that's it!

Yankee Gull... *Continued from page 12*

spars as noted. Take care to make good scarf . . . angled . . . joints, and orient splices as shown. Use straight edge for alignment and pin down to building board while glue dries completely.

Cut ribs as necessary for the version you're building. Where ribs are laminated . . . such as A-1 to A-2 and C-1 to C-2 . . . the easiest way is to cut the plywood rib, laminate balsa stock to it, and then trim to the ply outline. Rib B goes on after panels are otherwise complete and final sanded. Plan your work so as to stack cut and stack drill whenever possible. This can be accomplished by progressively modifying Template I to match rib cutting order specified on drawings. Same with Template II.

Make appropriate splices . . . taking care for good fit . . . and pin to building board the 1/4 x 1/2 leading edge backup strip, the 1/16 x 1-1/2 bottom trailing edge sheet, the main spar and, if used, the secondary spar. Be sure to make bevel at aft edge of trailing edge sheet, per drawing, before pinning down. Position and glue Ribs D thru F in place.

Cut 1/4 OD wing wire tubes to length. These MUST extend 1/4 inch beyond root Rib B after wing is completed, so don't cut too short. Check fit of tubes in holes of Ribs C-1. Should be an easy, slip fit. If too tight, use a round file, twisting carefully to enlarge holes for proper clearance. Do it now . . . not after ribs are glued in place.

Position per drawing and glue Ribs C-1 and C-3 in place. Note that 1/16 shim is required under Ribs C at this stage in lieu of bottom root sheeting that will be added later. Use dihedral template and carefully position the root rib, Rib C-1/C-2 laminate, and glue. Check and re-check angle until glue sets firm. This step fixes the wing dihedral and is quite important.

When construction to this point is dry, remove all pins in structure from wing tip Rib F inward towards root for 24 inches. Prepare 1/8 sheet wing tip washout shims. Locate one shim at the extreme aft edge of the bottom trailing edge sheet so that the trailing edge at tip Rib F is elevated 1/2 inch above the building surface. Pin shim to building board and bottom trailing edge sheet to shim. Re-pin leading edge backup strip flat to board. Use the second shim under the forward edge of the bottom trailing edge sheet to help support the structure during subsequent work. Do not force too lightly . . . just barely touch the bottom of the bottom trailing edge sheet . . . and remember it should not go in quite as far as the shim at the aft edge. Pin this second shim to the board but NOT to the structure. The balance of wing construction will be accomplished with the structure "jigged" this way so that washout "warp" will be built-in.

Splice and glue 1/4 x 1/2 leading edge in place. Fit wing wire tubes in place . . . flush with outboard surface of outboard Rib C-1 . . . and epoxy. Add wing wire stop plates.

Position 1/8 x 1/4 spruce turbulator spars and glue in place. Orient splices as noted on drawing. These spars should be flush with top of ribs. Recut any rib notches if necessary . . . or "suspend" spar in slot. But get 'em and keep 'em flush.

Cut and glue 1/16 x 1/4 trailing edge webbing. Top must be flush with top of ribs before top trailing edge sheet can be added. So trim now or later as necessary.

Add 1/8 square diagonal bracing, over full panel span, as noted. These braces are important for torsional rigidity. Don't omit.

Glue 1/8 x 1/2 and 1/8 x 3/8 x 3/8 plywood backup plates to Rib C-1/C-2 laminate. These are required to anchor wing hooks securely in root rib.

Add top trailing edge sheet. Next, add 1/16 sheet at root over top of Ribs C-1 to C-3. Glue 1/16 x 1/8 x 3 balsa cap strips to top of each turbulator spar, running from top root sheeting at Rib C-3 to Rib D. Trim and sand cap strips to straight taper down flush with top of spars at Rib D. Since root sheeting goes over the top of turbulator spars, these cap strips are needed to make a smooth transition for covering material from sheeting to the Rib D contour.

Remove wing panel from building board. Re-glue all joints. Cut and glue 1/16 lower root sheeting to bottom of Ribs C-1 to C-3. Note that bottom sheeting is flush with and butts to either side of main spar and, if used, secondary spar.

Prepare wing tip block by laminating 1/8 sheet to 1 inch triangular stock per drawing. Glue this sub-assembly to Rib F. Trim to match Rib F contours.

Carve and sand panel to final finish. Add Rib B and Tip Plate.

Screw main wing hook in place. The forward auxiliary wing hook is usually only required on the longer span versions to hold wings snug to fuselage during launch acceleration. It may be added later, if experience proves it necessary. Pilot hole was drilled during rib fabrication.

FUSELAGE: Cut side panels from good medium stock. If 4-foot lengths are not available, splice as shown on drawing. Be sure sides are identical or you're liable to have a funny flying sailplane. Mark position of bulkheads. Glue 1/8 x 1/4 spruce stringers in place. Glue the two horizontal grain doublers in place on side panels . . . use contact cement or epoxy. One doubler goes from Bulkhead 1 to Bulkhead 3, and the other from Bulkhead 4 to 5.

Cut out fin base plate and 1/16 plywood stabilizer anchor plate and glue together. Add 4-40 T-Nut to anchor plate . . . or epoxy a 4-40 Hex-Nut in place. Cut out skid base plate. Cut out all balsa and plywood bulkheads.

The fuselage is assembled upside down directly over drawings.

Secure fin base plate assembly in position over drawing . . . inverted, with nut side up. Position one side panel assembly inverted over drawing so that alignment point for wing leading edge . . . forward face of Bulkhead 4 . . . is exactly positioned per drawing. Pin solid to keep this index point, and glue aft end of panel to fin base plate. Repeat with opposite panel, again taking care to get wing leading edge index point right on . . . so to speak. Any error or misalignment in this step can cause major offset in the wings and poor flying qualities. Glue second panel to fin base plate. Now, if the tail end of the panels don't come out quite even, fix it later with a saw . . . but don't mess around with the index points for the wing.

Starting at tail, glue Bulkhead 9 working forward thru 6. Masking tape is handy to hold sides snug into bulkheads, and fast drying epoxy works great here. Let set to hard cure. Add tail skid base plate.

Pin Bulkhead 4 in place, temporarily, and glue in Bulkhead 5. Let cure.

Very carefully, glue in Bulkhead 4. Before it sets up hard, pull forward end of fuselage together to Bulkhead 1. Tape, pin or whatever to hold together and to hold alignment over drawings while Bulkhead 4 sets up. Add balance choice. Super MonoKote recommended.

ASSEMBLY: How to put the thing together is pretty obvious, but there might be a question or two about the wings. The first thing you may wonder about is, yes, the wing wires DO NOT attach to the fuselage. They "float" free in the wing tubes, and the fuselage just sorta hangs on 'em. That's the reason the wing tubes must extend beyond the root ribs . . . because they plug into Rib A in the fuselage center section. The holes in Ribs A may need to be slightly enlarged for a slip fit. If so, do so . . . but take it easy. Material is quick to take away, but very slow to put back.

To mount the wing, locate wing wires through fuselage, and slip on one panel. Make three loops in a No. 62 rubber band, fit it over main wing hook, and pull through fuselage. You'll need a special wire tool for this . . . and a small screwdriver is handy when transfering the rubber band from the wire tool to the second wing hook. Slip the other panel on wires, bring up to near fuselage, and fit rubber band over its hook. Tension should be quite tight between the two panels. On the long-winged versions, a 1/4 diameter x 1-1/4 long tension spring is similarly stretched between the forward auxiliary wing hooks. No, this operation doesn't really require 13 hands and 4 knees, but they might help until you get the knack. Have patience.

Incidentally, you'll notice that in rough air you can hear the wing wires rattling on occasion as the wings "load" and "unload". But that's okay . . . it causes no problems . . . and those wires ain't gonna break. That's for sure.

The stabilizer goes on with a single machine screw. Be sure it's not so long as to cause interference with the elevator push rod. A coat of dried rubber cement on the aft stabilizer saddle will resist movement and still let the horizontal tail rotate if it hits something.

FLIGHT TRIM: The first step here should occur before covering . . . so hope you're reading the complete article before starting to build. Assemble all components. Ballast nose to get a reasonable balance. Push a heavy pin into fuselage, on top center line, at trailing edge of center section. Push another one in at leading edge. Tie heavy twine around pins, so as to make a "sling" or "bridle". Now, lifting the whole works by the twine "bridle", check for balance about the fore and aft center line. Chances are that one wing will be heavier than the other. On a 12-foot span, a full ounce of weight may be needed to get the wings to balance properly. Maybe more. Whatever is needed, do it. Those big thick tip blocks will hide lots of ballast. Bury it in the block. You don't want it flying off loose in a "hard landing".

Now, cover and finish . . . like a coupla paragraphs back. If you use other than plastic film covering, recheck balance after final finish. Correct as necessary. Shouldn't be much now.

With all gear, push rods, canopy, wheel and everything else installed and assembled, check CG position. Again, make a "bridle" of heavy twine, but this time tie ends to 2 small brads . . . little nails about 1/2 inch or so long. Pull the wings away from the fuselage far enough to push brads into the 1/16 hole on either side of center section that represent the 30 per cent point of wing chord. It's noted on plans . . . should be the second in a series of four holes . . . 3 inches back from leading edge.

Add ballast in nose . . . undoubtedly . . . until balance is achieved and craft hangs level when suspended by twine bridle. Use various sized fishing weights so that you can adjust by 1/2 ounce increments. When you're satisfied by balance, remove ballast, weigh and record the amount required for a 30 percent CG.

Repeat this balancing act, but this time set pins in the 35 percent holes. Again, record ballast required. Put these notes in your field kit for future reference. Re-balance at 30 percent in first flights.

Check total assembly for alignment. Get it right. Check for warps. Correct as necessary. Check washout at wing tips by measuring from a flat surface . . . such as a dining room table. Washout in both wings MUST be the same . . . about 1/2 inch, or maybe a little less. If washout is not correct . . . and similar . . . warp wings as necessary to get it right.

Check control surface movement . . . and centers. Go for maximum rudder throw . . . at least 1-1/2 inches either side of center. About 1/2 inch up and down on elevator should be okay. Is up, up? Right, right?

Note that to this point, all pre-flight checks are made before loading the car for the field. Don't hurry. Look at it this way; you've spent numerous hours and several bucks on your Yankee Gull, so why take a chance on blowing it now? . . . by hurrying . . . or even skipping the last, and perhaps most important steps. There'll be thermals next week, too. And, it's always better to be as relaxed as possible . . . certainly not all in a dither . . . when you're out for first test flight. Besides you'll enjoy it more. Take your time in pre-flight, and the first flights will probably be a breeze.

And so . . . to the field.