Throw it off a cliff (let go first) . . . or loft it via towline, hi-start, or modify for power pod. Anyway you fly it, it delivers satisfaction plus.

6

Ira Achey's "SKYLARK 4" SOARER

RADIO CONTROL

73" Wingspan

FULL SIZE PLAN AVAILABLE THRU "MODEL PLAN SERVICE"

1

2

7

3

#1 Turn the radio on, pick that Skylark up, and let's go flying!

#2 Walk toward the bluff, very determinedly, with transmitter in hand.

#3 Hesitate just long enough to check the strength of the wind.

#4 Point the nose into the wind, sample the lift and launch!

#5 Fly that beauty past with a swoosh of wings.

#6 Keep the nose high on the downwind pattern when coming in.

#7 Level those wings and watch the tree on the left, its a tough tree.

5

4

♦ After spending many exhilarating hours flying my Lil'T soarer designed by Bob Hahn (FM June-July 65) and seeing a number of other beautiful scale jobs down at "instant lift," the famed cliff soaring site for the Harbor Slope Soaring Society, I couldn't put down the urge to build a scaler. I decided to see the man with the largest library of reference material on model gliders and data in general in our area, Dale Wil-

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"SKYLARK 4"

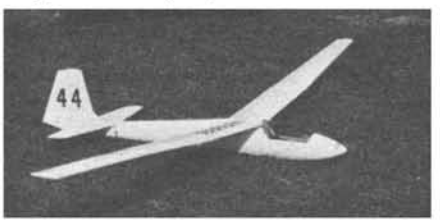
(Continued from Page 21)

loughby. I could have had a nice scaler in the air long before I did, but on the wall, in his office, I kept looking at his Soaring calendar with a picture of a "Skylark 4." Dale told me that he had a complete set of factory prints of the design, and that was all it took. I borrowed the roll of prints and floated home. With a complete set of prints, I'd have it flying in no time.

The "Skylark 4" was winner of the 1963 Nationals flown by Dick Johnson and another won the Canadian Nationals in 1963. Specifications for the real thing: span 59.6 feet, aspect ratio 20.5:1, glide ratio 36:1. Built by Slingsby Sailplanes Ltd., Kirbymoorside, York. Only England would couch an address like that! It is the most graceful looking thing I've ever seen. If I never flew it, the sight of it would turn me on.

Here's my driveway, the car can set out. I gotta see these prints. Clear the living room I'm coming in! I hurriedly unrolled what had now been blown up in my mind on my trip home as the treasure of the year. Hmm.

My faith in this model is unshakeable, more work than first envisioned but certainly worthwhile. 23 scratch pads were consumed before I arrived at one composite ⅛ scale outline. Now to build a model of it. What kind of airfoil? The full size has a NACA 63 (3) or NACA 633-620 with a tip airfoil NACA 6415. Better stick with a high lift RAF 32 and this wing has got to be strong. In fact make it real strong, make it out of foam. Fuselage: that rear section is conical why not a skin stressed balsa cone? A couple of strong formers to tie that monstrous wing in. Front end could be shaped out of soft balsa and covered with fiberglass to make it strong. Need weight in the nose anyway, so we might just as well make it

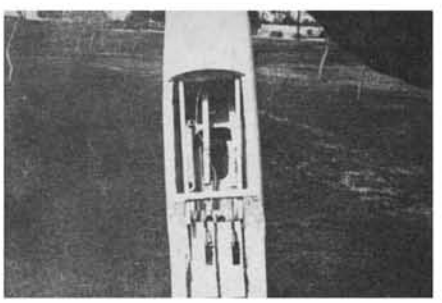


do some good. Tail surfaces should be light. That rudder has a lot of area! Does it really need all that flapping in the breeze? You better believe it! Let's get busy man, you haven't shaped much balsa with that pencil.

CONSTRUCTION

Fuselage: Start by selecting a pair of 3/16"x½" medium hard balsa crutch sides 32¾" long. Angle off the forward ends using the side view as a template. Shave off the other end where they come together so you end up with a final thickness of ¼". Mark the locations of the formers. Refer to the top view and cut the crutch spacers to length from ⅛"x½" stock. Put the crutch together at the rear and install the spacers. At this point there should be no bows in the crutch. It's a straight line from where the crutch is joined to former #3 position. Set aside to dry and cut out your formers. Material types are shown on the plans. The use of ½" styrofoam for formers #3 thru 7 is not absolutely necessary, however, it does provide a better skin loading. This material works easily with a sharp X-Acto knife, saw or hot wire and sands easily. Now formers #1 and 2 may be installed, be sure they are perpendicular to the crutch. Servo mounting board #8 may now be installed. All of these formers should be adhered together with white glue for best strength. Always use a water base adhesive on the foam. Install formers #3 thru 7 and set aside to dry thoroughly.

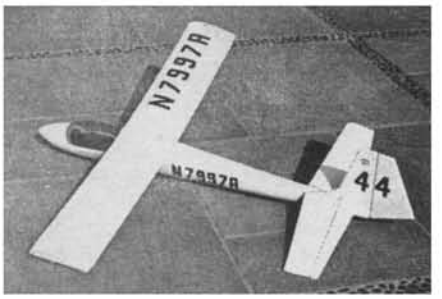
Meanwhile make up the "T" members. These are formed up by gluing a piece of soft ¼" square in the center of 3/16"x⅜" stock. Make up two of these, one for the top and one for the bottom. These may be a little stronger than necessary but I've yet to damage the fuselage on the prototype. These "T" members provide a nice large surface to mount the skins on. Glue into place as shown on the plans, the top one from former #2 back to ply former #7 and and the bottom from former #1 all the way back. These should be straight when finally glued into place. When this structure is dry, shape the conical section with a Delta 42" sander or if that isn't available, use a strong piece of sandpaper on a straight 1"x2" at least



Insides of the "Skylark" shows wing dowels, servo board, servos and wire sprung wheel.

30" long. Using former #2 and the ply former #7 as a guide, shape down the other formers so that you have a tapered cone from former #2 to former #7 and all the formers are beveled correctly to give the maximum surface area for maximum support to the skins.

Now let's shape that nose up. Cement formers #9 and 9A together. Be sure to cut out slots for the crutch and former #10 on an angle. Go ahead and glue formers #10 and 11 in place. Make sure this assembly is glued straight and according to the plans. The nose of these gliders really take a beating, so don't space the sauce.



Demountable panels, joined with tubing.

Cement in the ½"x½" servo mounting board supports into place. When dry use your sanding block to shape the outside of these blocks to the skin contour using formers #1 and 2 for a guide. Now the fun begins. This is really not bad if you soak the skins thoroughly. Cut the patterns as shown on the plans. It would be a good idea to cut these a little larger than shown, in case yours is not exactly the same as the prototype. Select a fairly soft straight-grained 6" wide sheet and cut both the bottoms from the same sheet. Soak one of them thoroughly and get some clothespins or rubber bands ready. Also some pressure relief strips. These should be large enough so you can apply equal pressure on the skins along crutch and on the "T" members. Line up the straight edge of the sheeting down the middle of the crutch. The front edge should be flush with former #9, or stick out slightly beyond. Use the pressure relief strip and clamp into place. Now work the skin on around and clamp onto the "T" member. Don't worry if it overlaps the "T" member this will be trimmed later. The curve around former #2 is the worst place but with a little effort it will work right in. After it is in place, clamp and let dry thoroughly. When dry remove and do the other side. The top quarters are not as hard but trim off at the front of former #2 where the wing fits in. This is not shown on the pattern. Follow the same procedure as outlined above. Now the skins should be trimmed for final fit before gluing.

The vertical fin must now be installed. Build as shown on plans using a good hard ¼"x½" rear upright. The front ¼"x½" can be soft. Add the ⅛"x¼" braces and the ¼" sheet as shown, after it's dry, cement into the crutch. Use plenty of glue as this takes a good beating at times. Skins may now be glued into place. Hold in place as before, or use large rubber bands at the

formers for clamping. Former #12 should be installed and the planking cemented in place. The cheeks should now be made up. These should be soft balsa and by this time you should have the general shape of the fuselage and be able to shape these cheek blocks to the proper contour. After getting the outside shape, hollow out to an average thickness of ¼". The nose block should be carved out of hard balsa or pine. Do your final shaping and you are ready to apply the fiberglass. Fiberglass back to the area shown on plans.

Tail Surfaces: The rudder can be made directly over plans using the material shown. Keep it light and true.

Stabilizer: Build directly over plans and do the final shaping of the ribs after it is thoroughly dry, using the side view as a pattern.

Wing Construction: A point of decision. On the prototype I made foam wings, although they are heavy, they are also very strong and very resistant to warps. With a high aspect ratio such as this they have got to be strong particularly the center-section. No details are shown for the foam construction, but I will briefly describe how to go about it. Wing cores can be made using #W5 for the center-sections and as the wide chord end of the tip section. Use W24 for the tip. You will have the correct amount of wash-out if you line up the tip rib on the same center line as the root rib (W5). On gliders it's important that you don't have a critical stall speed because most of your flying is done just a bit past the stall point. By building in wash-out into the wings, the wing tips are still flying even though the rest of the wing are stalled. The result is a far more stable wing. The undercamber is non-existent at the tip. Save the blocks the wing cores are cut from as they make a good platform when you bond the skins to the wing.

The center-section should be cut for the dihedral braces and for a 3/16"x¾" trailing edge stock. Glue the T.E. to the sheet stock to be used for the bottom sheeting. Cut out for box spar as shown on plan. Bond the core and the sheeting with your favorite adhesive. I used Weldwood Super contact cement, with two coats on each surface. Let dry according to instructions and apply bottom skin into place. Install the box spars and tubing in place, add the dihedral braces, bond the two cores together and proceed with the top sheeting. Bond rib W5 to the ends and apply the leading edges. After sanding to shape, apply two coats of fiberglass to the bottom of the wing at the center. The first layer should extend out 4" either side of center on bottom only and the second layer out 6" from center on the top and bottom. Add a 2" strip around each end. The outboard sections are built in a similar manner only use ⅛"x½" trailing edge stock.

Built-Up Wings: The wings are well defined on the plan, so I won't go into much detail. The center-section is built strong to take the loading which this glider can generate. You have basically a ¼"x½" spar reinforcing a "D" section. Start by putting the trailing edge together. Lay a piece of 3/16"x¾" T.E. stock on the rear sheeting and glue in place. Sand or plane the sheeting down so you will have a smooth, thin trailing edge. Mark rib locations on this, the spar and leading edge. Slip ribs into place over the spar and glue ribs into the T.E. assembly. Glue spar and leading edge in place, pre-shape dihedral braces and cement into place, then install box spar and bind with thread. Be sure to keep the inside of this assembly free of glue. Add tubing, webbing and sheeting. Outboard panels are constructed in a similar manner.

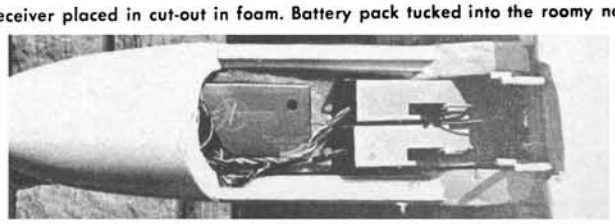
Finish: The prototype was finished with Hobby Poxy over two layers of Silkspan cross-grained. Finish was per their recommended procedure. As can be seen from the photos, the prototype was finished in white with black trim.

Canopy: I made my canopy from a sheet of 1/16" plexiglas. After making up a mold from soft balsa with a layer of fiberglass, the plexiglas was heated and stretched over the mold. It looks good but I wouldn't go to that much work again and fortunately you don't have to go through the same rain-dance. As an alternate, make up a soft block to shape and give it a coat of fiberglass, smooth it down and hollow out the inside. Give the outside a coat of black paint, or better yet order one from Willoughby Enterprises.

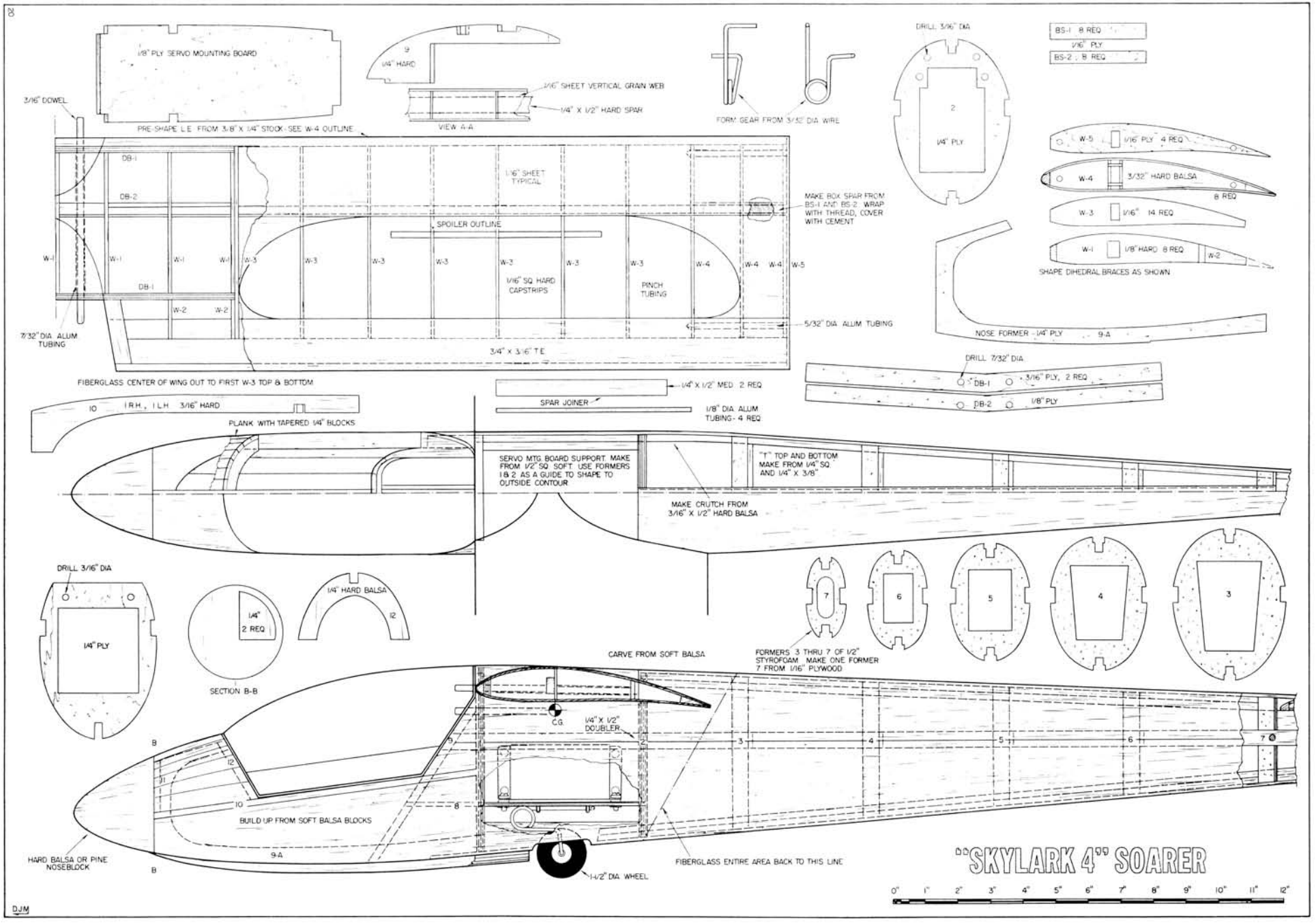
Radio Gear Installation: This is pretty much up to the modeler so not much detail is shown. The servos are shown in the optimum location, however, on the prototype they had to be moved further forward because the tail surfaces were heavier than the construction shown on the plans. Because there is no vibration in a glider, installation is not as critical and servos may be installed with wood screws after determining your C.G.

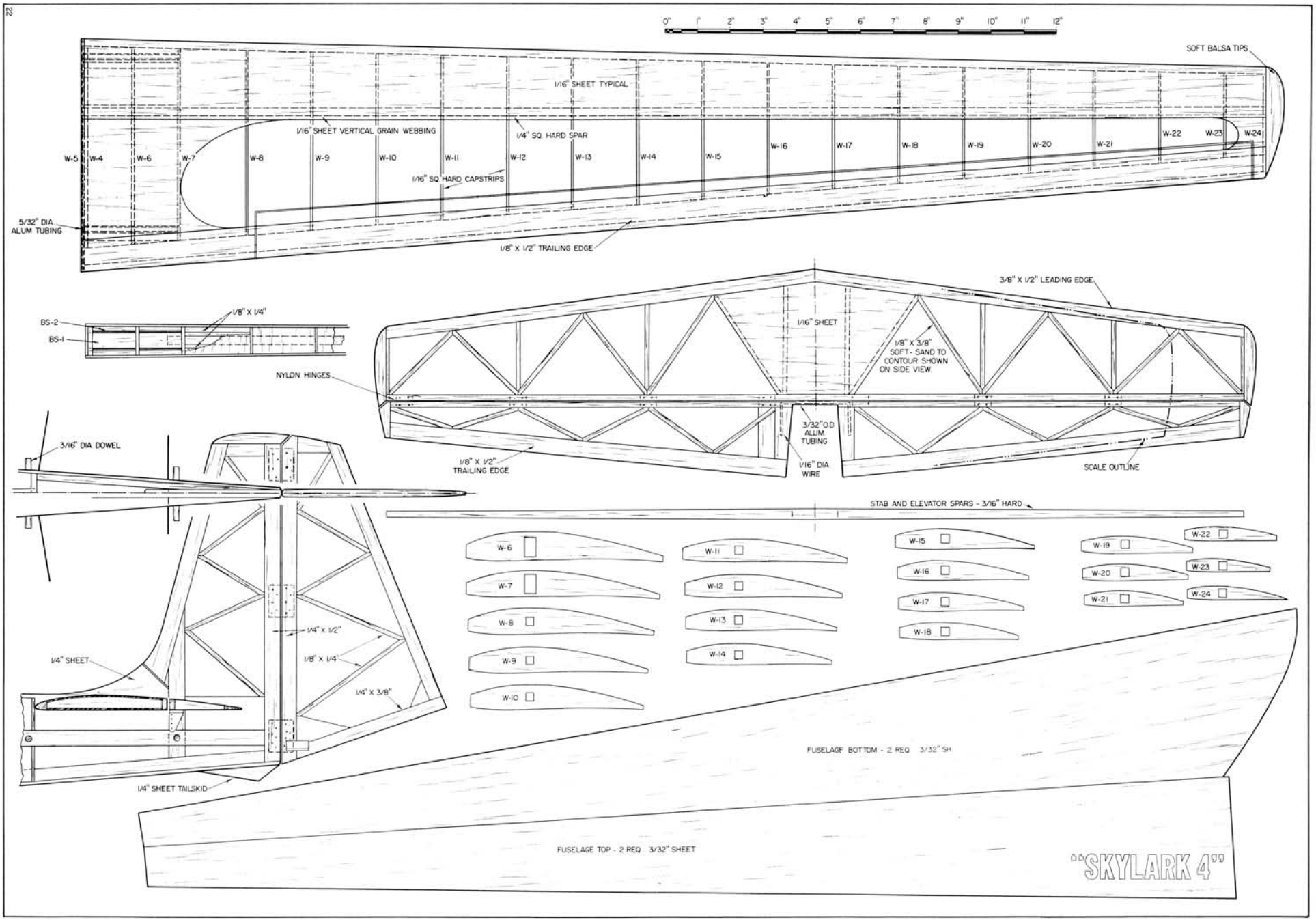
Flying: Although I didn't know what to expect, this ship turned out to be quite docile even on the first times out. I'll go through my own experiences which will perhaps be of some value to you. The prototype is a little on the heavy side, particularly for thermal soaring but it works well in average to good thermal areas along the bluffs. The first time out, the C.G. was too far back, so weight was added to the nose to bring it up to that shown on the plans. Too much weight was added at first and it had a very definite diving tendency and up elevator got a good work out. By taking some weight out of the nose and adding two turns of up elevator, I remedied the problem. Rudder was originally linked to the outermost hole of the horn and found to be sluggish. So sluggish I wasn't able to keep the plane in the area of lift in front of the bluff and found myself on the leeward side of the bluff. It was a long walk but the glider had no significant damage. Next time up I had the rudder at the innermost hole and found it overly responsive, resulting in somewhat jerky and erratic flight path. The next hole outboard is a happy medium. I put in 4° of dihedral to make the ship more stable (twice scale) and this worked out quite satisfactory. With the proper amount of dihedral, high aspect ratio wings are no more troublesome than lower ratios. It turned out to be as gratifying in the air as I had envisioned it, there are no words to define the elegance of seeing a scale soarer sensing a thermal and riding it skyward, particularly with those long toothpick wings, or zooming past you hanging in the lift area along the ridge not more than 25 feet away from you. This ship is a good penetrator and really moves downwind. When you hit that up elevator button the wings flex and flap and you wonder if you have enough strength built in. You keep doing that time after time and soon you hit the button just to watch them flap. I found this "Skylark 4" to be very satisfying and gratifying. Why not try one for yourself? Enter the graceful silent world of soaring. ●

Receiver placed in cut-out in foam. Battery pack tucked into the roomy nose.



View from the top shows scale tail surfaces, just right for R/C glider.


1/8" PLY SERVO MOUNTING BOARD
3/16" DOWEL
PRE-SHAPE L.E. FROM 3/8" X 1/4" STOCK - SEE W-4 OUTLINE
9
1/4" HARD
1/16" SHEET VERTICAL GRAIN WEB
1/4" X 1/2" HARD SPAR
VIEW A-A
FORM GEAR FROM 3/32" DIA WIRE
DRILL 3/16" DIA
2
1/4" PLY
BS-1 8 REQ
1/16" PLY
BS-2 8 REQ
W-5 1/16 PLY 4 REQ
W-4 3/32" HARD BALSA 8 REQ
W-3 1/16" 14 REQ
W-1 1/8" HARD 8 REQ W-2
SHAPE DIHEDRAL BRACES AS SHOWN
DB-1
DB-2
1/16" SHEET TYPICAL
SPOILER OUTLINE
MAKE BOX SPAR FROM BS-1 AND BS-2 WRAP WITH THREAD, COVER WITH CEMENT
W-1 W-1 W-1 W-1 W-3 W-3 W-3 W-3 W-3 W-3 W-4 W-4 W-4 W-5
1/16" SQ HARD CAPSTRIPS
PINCH TUBING
W-2 W-2
7/32" DIA ALUM TUBING
5/32" DIA ALUM TUBING
3/4" X 3/16" T.E.
NOSE FORMER - 1/4" PLY 9-A
FIBERGLASS CENTER OF WING OUT TO FIRST W-3 TOP & BOTTOM
DRILL 7/32" DIA
DB-1 3/16" PLY, 2 REQ
DB-2 1/8" PLY
1/4" X 1/2" MED. 2 REQ
SPAR JOINER
1/8" DIA ALUM TUBING - 4 REQ
10 I.R.H., I.L.H. 3/16" HARD
PLANK WITH TAPERED 1/4" BLOCKS
SERVO MTG. BOARD SUPPORT MAKE FROM 1/2" SQ. SOFT. USE FORMERS 1 & 2 AS A GUIDE TO SHAPE TO OUTSIDE CONTOUR
"T" TOP AND BOTTOM MAKE FROM 1/4" SQ. AND 1/4" X 3/8"
MAKE CRUTCH FROM 3/16" X 1/2" HARD BALSA
DRILL 3/16" DIA
1/4" PLY
1/4" 2 REQ
SECTION B-B
1/4" HARD BALSA
12
7
6
5
4
3
FORMERS 3 THRU 7 OF 1/2" STYROFOAM. MAKE ONE FORMER 7 FROM 1/16" PLYWOOD
CARVE FROM SOFT BALSA
C.G.
1/4" X 1/2" DOUBLER
B
B
11
12
10
8
BUILD UP FROM SOFT BALSA BLOCKS
9-A
HARD BALSA OR PINE NOSEBLOCK
1-1/2" DIA WHEEL
FIBERGLASS ENTIRE AREA BACK TO THIS LINE
DJM
"SKYLARK 4" SOARER
0" 1" 2" 3" 4" 5" 6" 7" 8" 9" 10" 11" 12"


0" 1" 2" 3" 4" 5" 6" 7" 8" 9" 10" 11" 12"
SOFT BALSA TIPS
1/16" SHEET TYPICAL
1/16" SHEET VERTICAL GRAIN WEBBING
1/4" SQ HARD SPAR
1/16" SQ HARD CAPSTRIPS
W-5 W-4 W-6 W-7 W-8 W-9 W-10 W-11 W-12 W-13 W-14 W-15 W-16 W-17 W-18 W-19 W-20 W-21 W-22 W-23 W-24
5/32" DIA ALUM TUBING
1/8" X 1/2" TRAILING EDGE
3/8" X 1/2" LEADING EDGE
BS-2
BS-1
1/8" X 1/4"
1/16" SHEET
1/8" X 3/8" SOFT- SAND TO CONTOUR SHOWN ON SIDE VIEW
NYLON HINGES
3/32" O.D ALUM TUBING
1/16" DIA WIRE
1/8" X 1/2" TRAILING EDGE
SCALE OUTLINE
3/16" DIA DOWEL
STAB AND ELEVATOR SPARS - 3/16" HARD
W-6 W-7 W-8 W-9 W-10
W-11 W-12 W-13 W-14
W-15 W-16 W-17 W-18
W-19 W-20 W-21
W-22 W-23 W-24
1/4" X 1/2"
1/8" X 1/4"
1/4" X 3/8"
1/4" SHEET
1/4" SHEET TAILSKID
FUSELAGE BOTTOM - 2 REQ 3/32" SH
FUSELAGE TOP - 2 REQ 3/32" SHEET
"SKYLARK 4"