Keleher Lark

Brad Shepherd

Creating this RC replica of Brad Poling's version named Prime Time took 15 years from the initial idea to reality. The wait was worth it. The lines, angles, color scheme, and flying ability combine to make this Lark as appealing as the original.

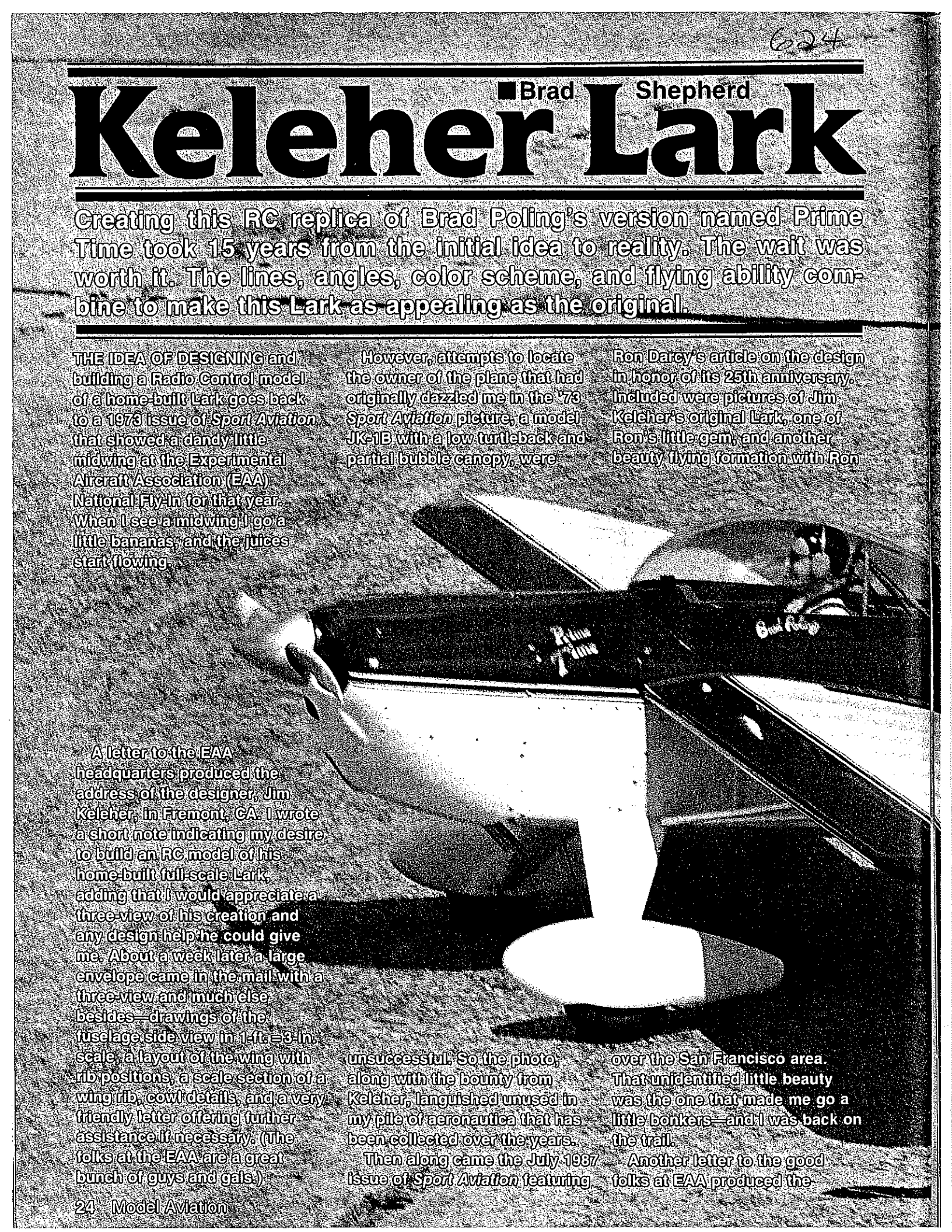
THE IDEA OF DESIGNING and building a Radio Control model of a home-built Lark goes back to a 1973 issue of *Sport Aviation* that showed a dandy little midwing at the Experimental Aircraft Association (EAA) National Fly-In for that year. When I see a midwing I go a little bananas, and the juices start flowing.

A letter to the EAA headquarters produced the address of the designer, Jim Keleher, in Fremont, CA. I wrote a short note indicating my desire to build an RC model of his home-built full-scale Lark, adding that I would appreciate a three-view of his creation and any design help he could give me. About a week later a large envelope came in the mail with a three-view and much else besides—drawings of the fuselage side view in 1-ft.=3-in. scale, a layout of the wing with rib positions, a scale section of a wing rib, cowl details, and a very friendly letter offering further assistance if necessary. (The folks at the EAA are a great bunch of guys and gals.)

However, attempts to locate the owner of the plane that had originally dazzled me in the '73 *Sport Aviation* picture, a model JK-1B with a low turtleback and partial bubble canopy, were unsuccessful. So the photo, along with the bounty from Keleher, languished unused in my pile of aeronautica that has been collected over the years.

Then along came the July 1987 issue of *Sport Aviation* featuring Ron Darcy's article on the design in honor of its 25th anniversary. Included were pictures of Jim Keleher's original Lark, one of Ron's little gem, and another beauty flying formation with Ron over the San Francisco area. That unidentified little beauty was the one that made me go a little bonkers—and I was back on the trail.

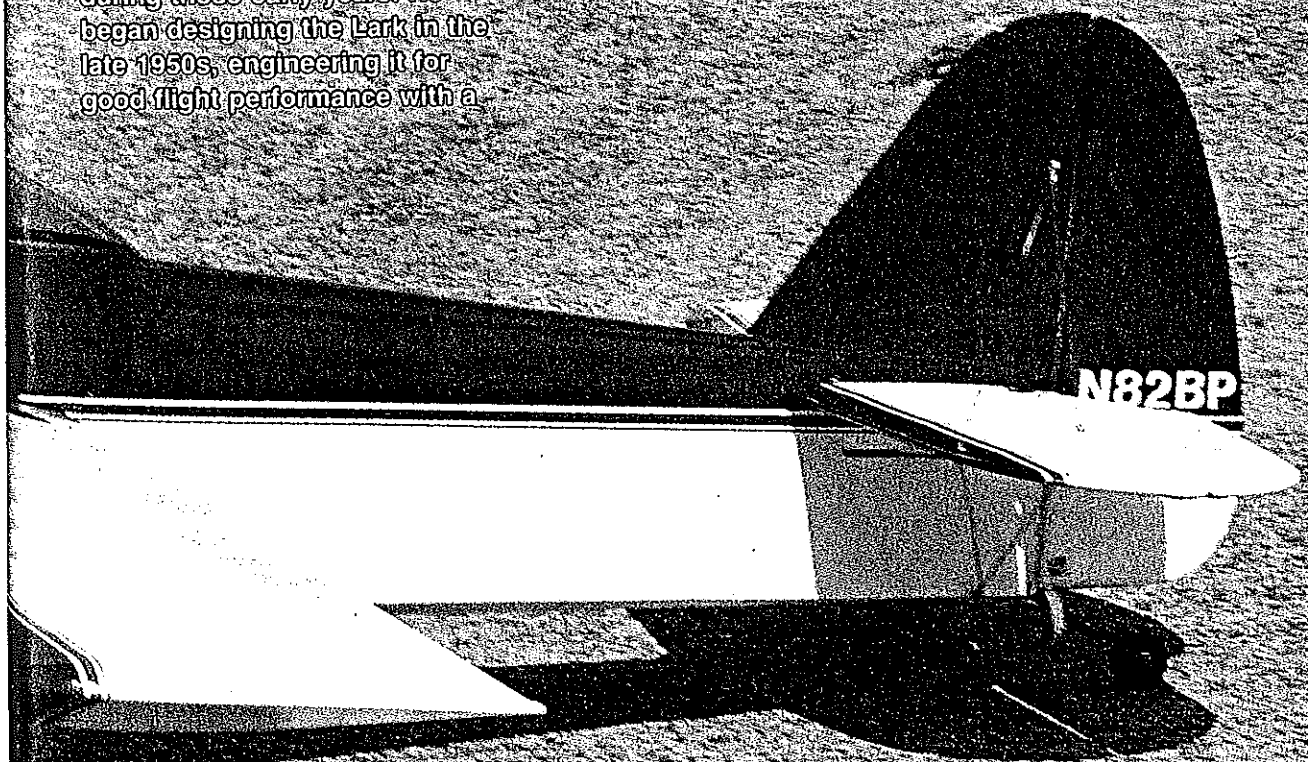
Another letter to the good folks at EAA produced the



address of the owner/builder/pilot, Brad Poling of Concord, CA. Brad and I have carried on a friendly correspondence, and he has been super cooperative in assisting me with this project. He is a former airplane modeler and competed in the old Plymouth meets.

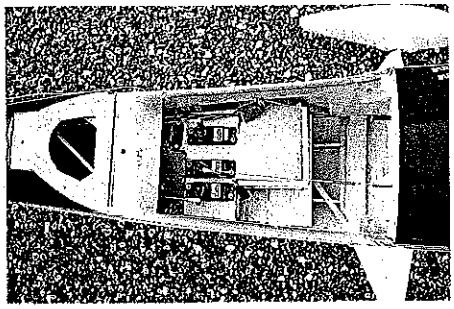
I gleaned a capsule biography of Jim Keleher from a number of sources including Ron Darcy, Brad Poling, and Jack Cox. Jim grew up in the San Francisco Bay area building model planes as a youngster. He studied naval architecture, was employed by the U.S. Postal Service, and restored a full-scale L-2 Taylorcraft for his own use during those early years. He began designing the Lark in the late 1950s, engineering it for good flight performance with a 75-to-85-hp engine. After five years of refining the design, Jim finally took off with his prototype from the Fremont, CA runway on April 26, 1962. It proved a dandy little home-built sport airplane from the first flight and is still being successfully built and flown today.

Big picture: This ½-scale Lark replica will do any maneuver that a pilot is capable of doing when it has the right power and weight. The neat little midwinger weighs 8.4 lb. and is powered by a Saito .65 engine. The pilot is a Williams 3-in. sport pilot. The color scheme and lettering exactly match Poling's full-scale Lark. Inset: Brad Poling of Concord, CA with his home-built Lark. This airplane was the inspiration for the model. Brad and Brad started corresponding, and a friendly relationship developed as Brad (Poling) assisted Brad (Shepherd) in designing the model Lark.



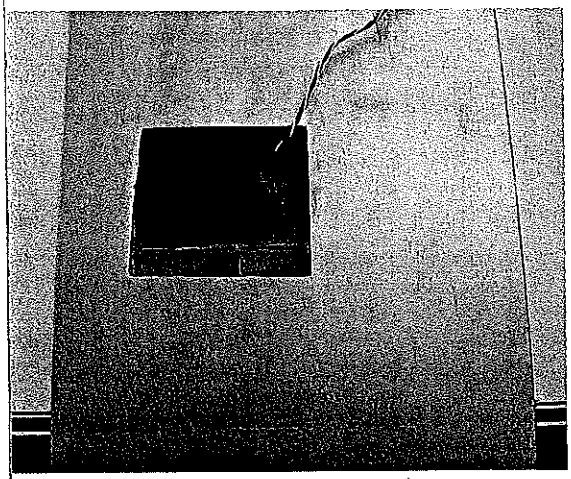
Brad Poling was one of almost 200 home-builders to purchase plans for the Lark, but he interpreted Keleher's design in a style all his own. To my way of thinking, Mr. Poling's inspired rendition is the sassiest little home-built in the air. The lines, angles, and color scheme all blend together to form an eye-appealing creation that the judges at EAA fly-ins find hard to fault, and he has been awarded a raft of trophies for his efforts.

Brad was born and raised in Fort Wayne, IN, locus of some great air racing during the 1950s. His youthful passion for model building, both Free Flight and Scale, led to his entering the great Plymouth meets—and dreaming of someday building his own full-scale airplane. After graduating from the University of Indiana, he went to work in the San Francisco office of the Moore Business Forms Company.

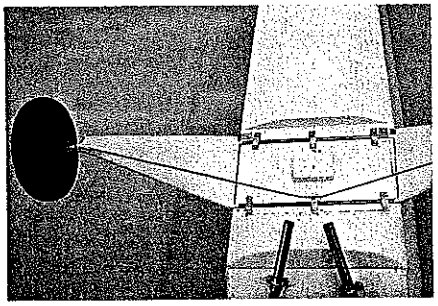


Radio equipment stored away in the aft end of the bay. Plans show the exact location.

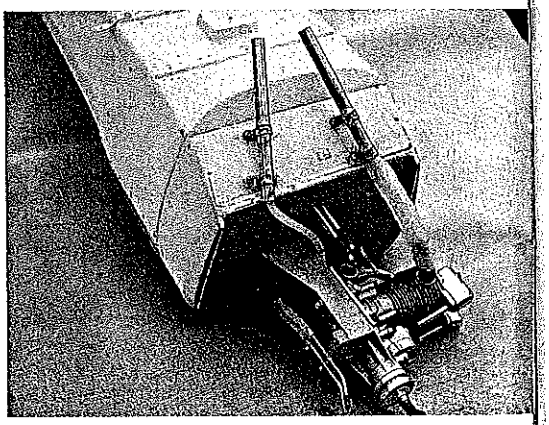
Author/designer Brad Shepherd of Victoria, TX with his Prime Time. Only four months after its initial flight tests this airplane took top honors at the October 1988 Scale Rally at Austin, TX. This was real testament to the author's design skills, craftsmanship, and piloting ability.



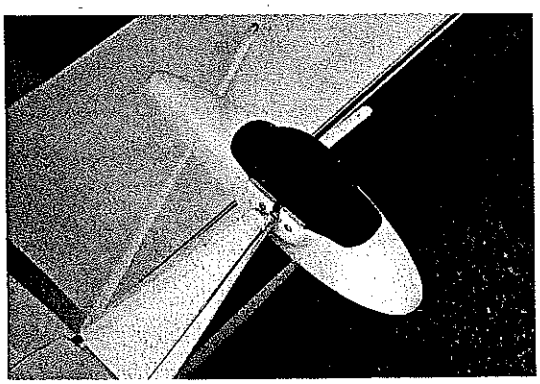
The aileron servo seen here has been deliberately installed off-center to help counteract the weight of the side-mounted engine.



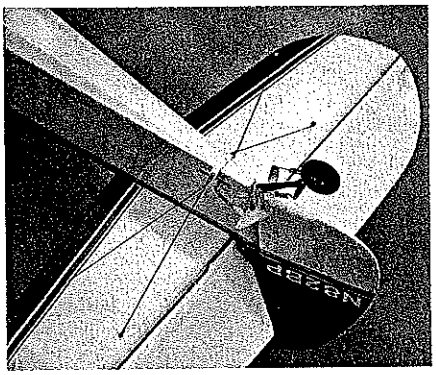
A good look at the landing gear mounting arrangement along with the spreader bar. Note the wing strut ¼-in. brass mounts behind the rear leg that are screwed to a ⅛ x ¼-in. spruce strip. The three-ply fairing hold-down block and exhaust pipes can be seen.



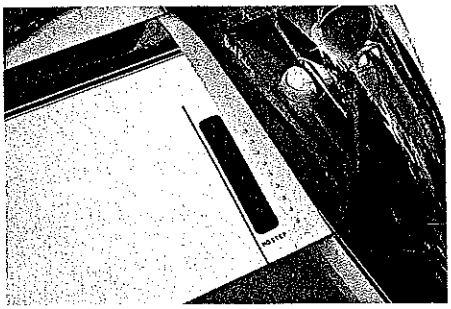
Exhaust stack fittings are made from ¼-in. brass strip and high-temp soldered to ⅜-in. brass tubing. One pipe is the engine exhaust, the other is the crankcase breather.



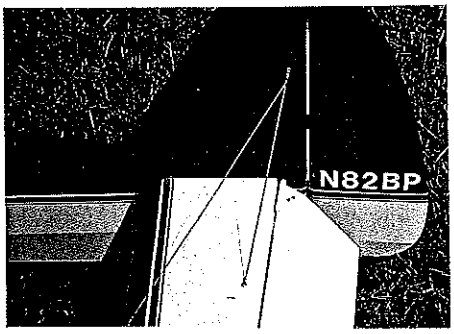
Wheel pant installation showing the radius of the pant inside face along with two screws going through the Sig wheel mount.



This close-up of the rudder/elevator assembly shows the ¼-in. brass mounts and terminals for the .030 music wire bottom brace, pushrod exit slot, rudder horn, and tail wheel assembly. This tail wheel is a home-brew assembly, but any commercial unit of an appropriate size would serve just as well.



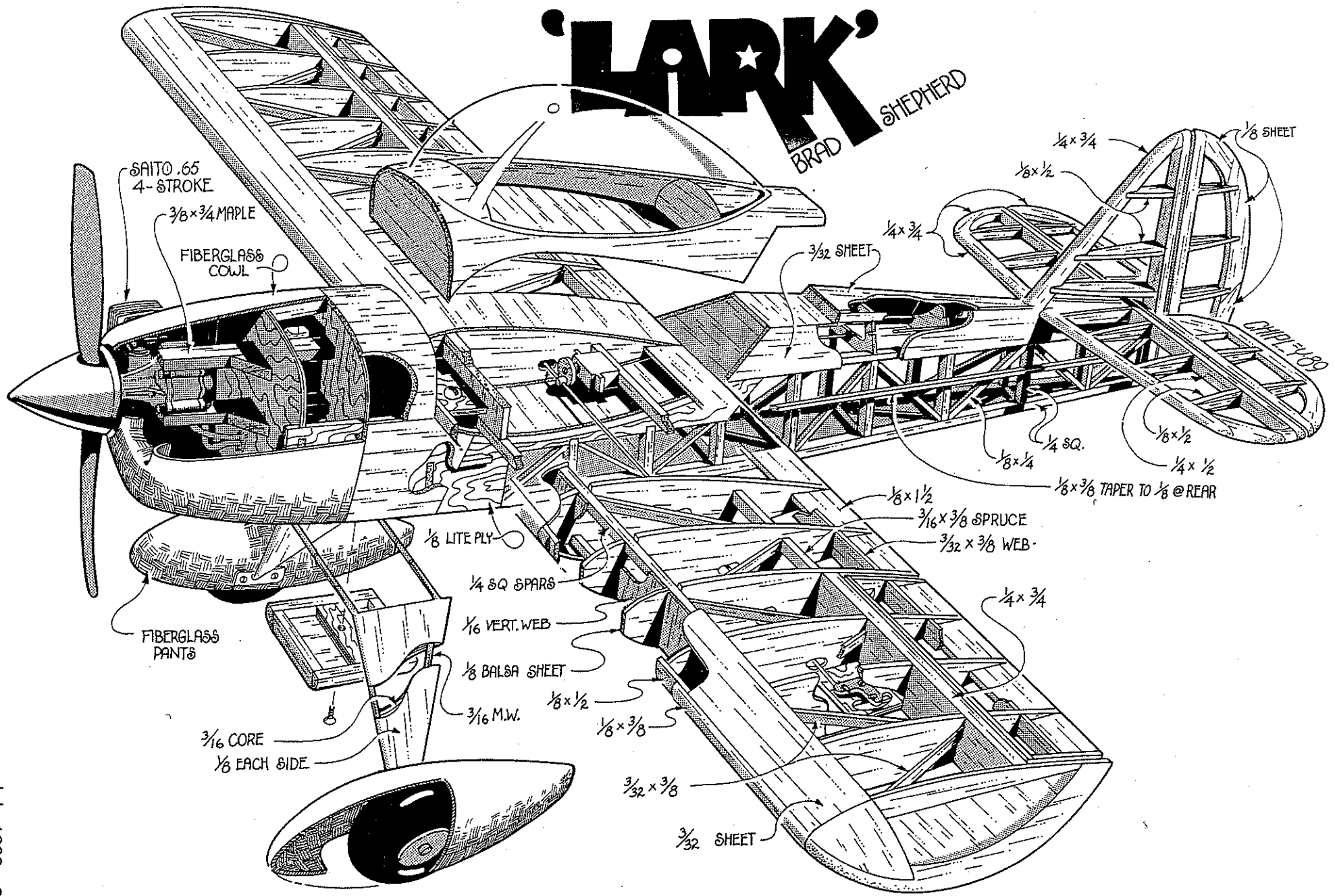
Aluminum-painted fairing with the #32 pin heads (screwheads) closely simulates that of Poling's full-scale Lark. The wing walk is black Coverite Graphic roughed with 180 grit, the no step is dry-transfer lettering, and the red striping is Coverite Graphic stripes.

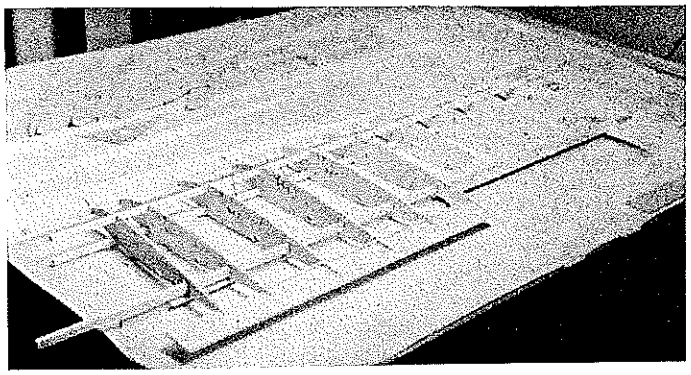


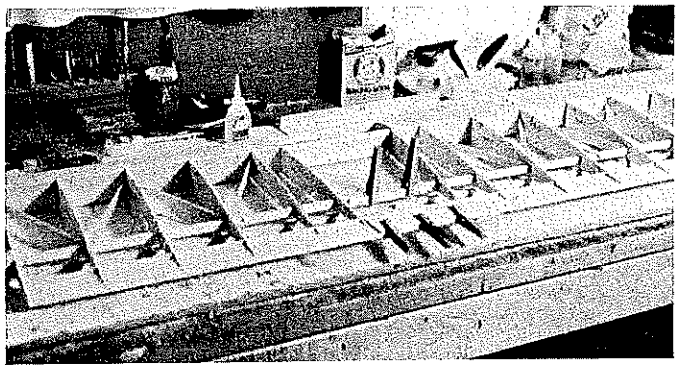
Top view of the stab/elevator showing the brace wires and terminals. The registration numbers are ¾-in. Presto vinyl stick-ons.

His desire to build his own airplane undiminished, in 1975 Brad began researching home-builder designs. As his research and contacts with home builders broadened, he found himself repeatedly turning to the Lark as an ideal project—a conservative design, strongly built with good performance on low power, and easy to fly. Brad purchased a set of plans and went to work.

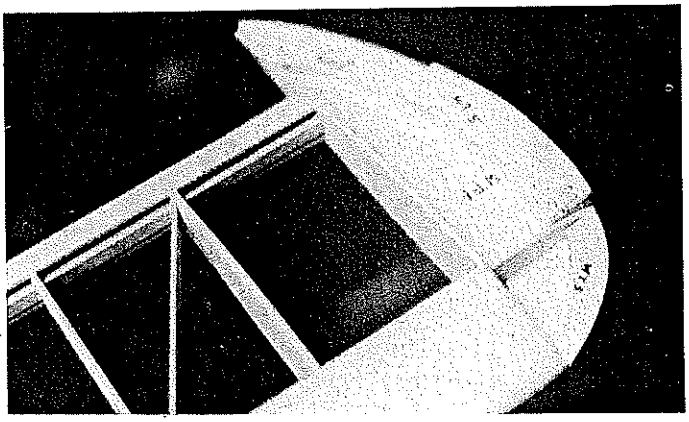
He contacted Ron Darcy, who was to help him through much of the construction process. Not knowing how to weld, he enrolled in a night course at the community college and started practicing on scraps of

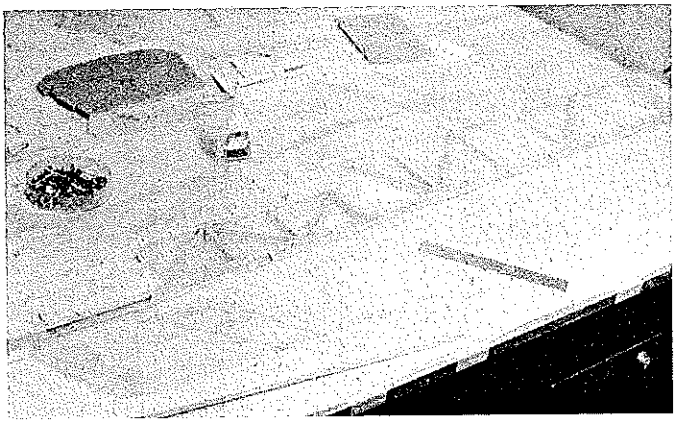

'LARK'
BRAD SHEPHERD
SAITO .65
4-STROKE
3/8 x 3/4 MAPLE
FIBERGLASS
COWL
FIBERGLASS
PANTS
1/8 LITE PLY
1/4 SQ SPARS
1/16 VERT. WEB
1/8 BALSA SHEET
3/16 M.W.
3/16 CORE
1/8 EACH SIDE
1/8 x 1/2
1/8 x 3/8
3/32 x 3/8
3/32 SHEET
1/4 x 3/4
1/8 x 1/2
1/4 x 3/4
3/32 SHEET
1/8 SHEET
1/8 x 1/4
1/4 SQ.
1/8 x 1/2
1/4 x 1/2
1/8 x 3/8 TAPER TO 1/8 @ REAR
1/8 x 1 1/2
3/16 x 3/8 SPRUCE
3/32 x 3/8 WEB
1/4 x 3/4
CHIEF-1989





Left: The right wing panel parts assembled and glued up. The center section excess hasn't been cut off yet. Right: The left and right panels being attached. Note the plywood plate over the 1/8-in. trailing edge, the rear spar spruce doubler, and the 3/4-in. sheet between the spars.





Left: The left wing tip showing the 1/8-in. WT-2 angle rib and the 1/4-in. edge pieces glued to the 3/16-in. WT-1. Follow the plans if there is any discrepancy between the drawing and what you see in the pictures. Right: The fuselage sides being built over the plans one on top of the other with wax paper between. This is the best way to assure the two sides will be identical, resulting in a true fuselage when they are assembled.

4130 tubing. By the time the course was completed he was ready to start welding the fuselage.

As he quickly realized, Brad had thrown himself squarely into the uncompromising world of "big airplane" construction. No room in Keleher's excellent plans for any gimmicky Mickey Mouse-type setups. The tubing sizes were large for a home-built and the wing spar plenty beefy. It was, as Brad put it, "just a hellishly stout airplane."

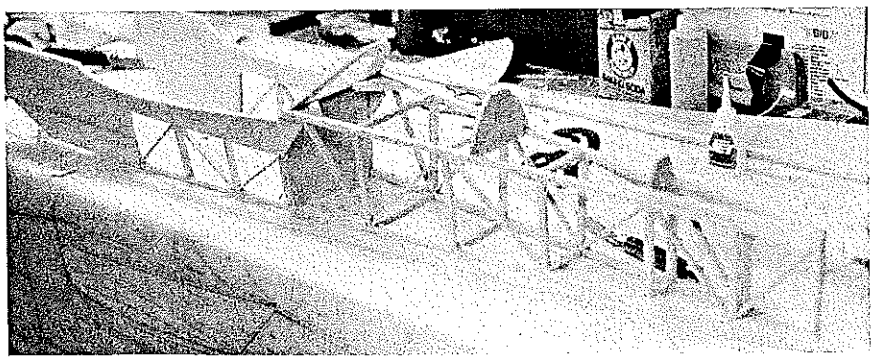
Two other people deserve credit for their efforts in assisting Brad as he progressed on his project. A&P mechanic Jim Waiter kept him on course with a lot of little things during Brad's three-year stint with his company's headquarters in Chicago. And his good friend Larry Pennock not only made the instruments work but helped with many details and did the finish painting.

A novel departure from standard construction practice was the elimination of rib stitching on the wing by gluing 1 1/4-in. cap strips to the ribs, then gluing the fabric to the caps. After doping and all preliminary work including the cowling and metal parts had been finished, Larry sprayed the aircraft with Du Pont Centauri acrylic enamel. It turned out so glossy that Brad has never felt the need to rub it out.

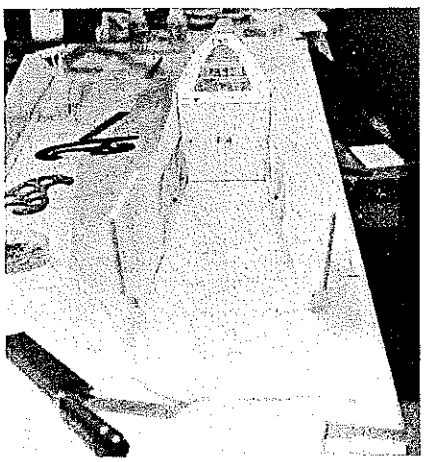
Since Larry Pinnock had more flying experience, he was elected to do the first flight honors. Neither Larry nor Brad had flown a tail-dragger before, so they both checked out first in a Super Cub. Larry had no problems on the Lark's first flight and pronounced the aircraft a real dandy. Here's Brad's panegyric after his first flight:

"Before I was off the end of the runway at Napa, I knew it was an easy airplane to fly. It's very stable, just outrageously easy to handle. Landing it you have such great visibility that it's hard to get really out of shape, and once you're on the ground it rolls out beautifully. It's not twitchy at all. Since you sit on the centerline of the fuselage you can instantly detect any drift in a crosswind and correct for it before you get into trouble. It's a very, very docile airplane."

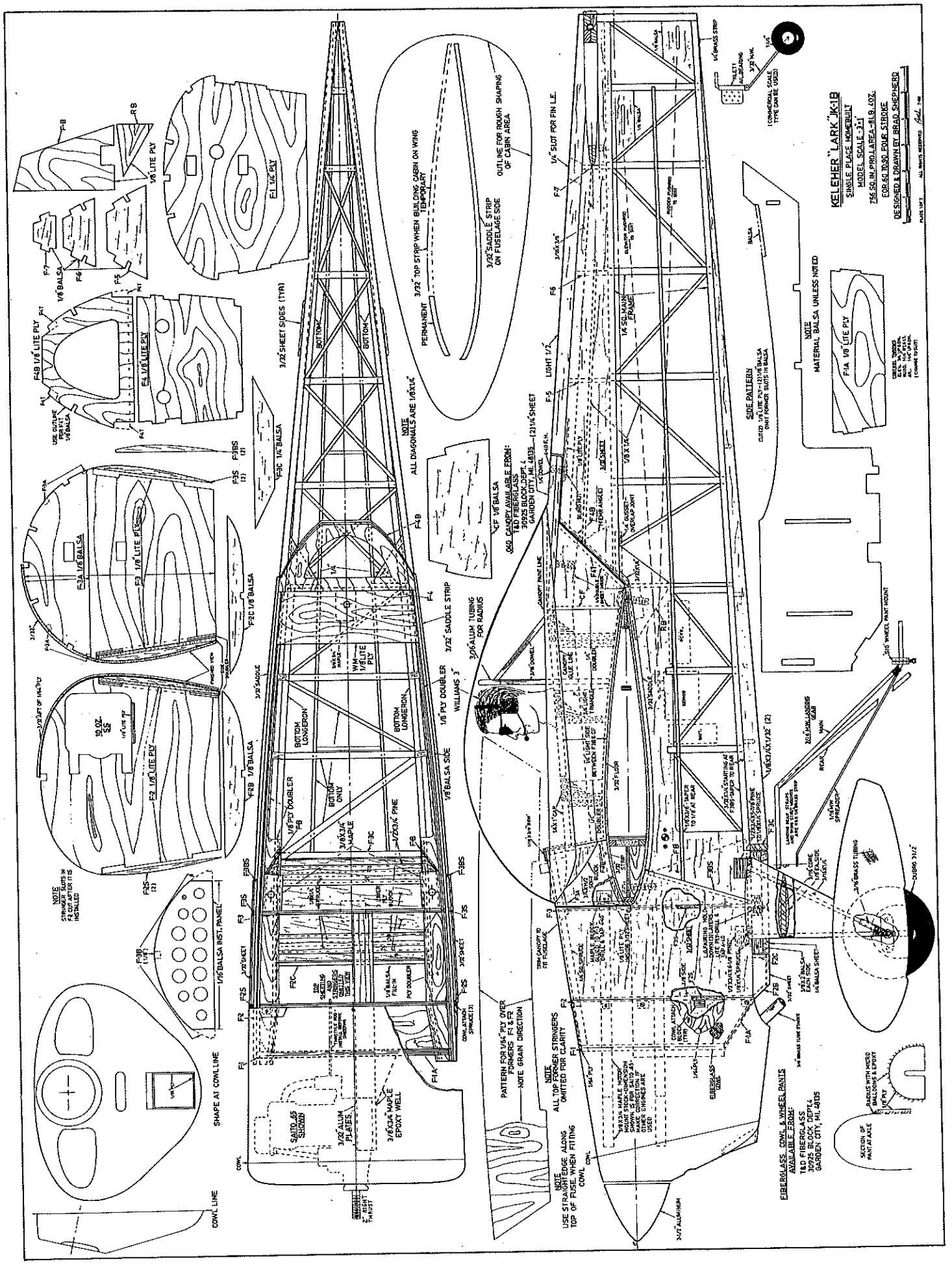
During the designing, drawing, and building phases, I kept hoping those upbeat words about the full-scale Lark's flight would carry through to the model's characteristics. After six months of drawing, cutting, gluing, fitting, refitting, redrawing, etc., I was finally to have my answer. In



The sides are pinned down over the plans top view, and formers F4 and F4B are glued in place along with the 1/4-in. balsa gussets. The turtledeck formers are temporarily pinned in place. They will eventually be moved as shown on the plans during a later phase of construction.



A good view showing the downward angle of the sides as the fuselage is being assembled.


KELEHER "LARK" JK-1B
SINGLE PLACE HOMEBUILT
MODEL SCALE - 3:1
756 SQ. IN. PROJ. AREA - 11.9 OZ.
FOR 60 TO 90 FOUR STROKE
DESIGNED & DRAWN BY BRAD SHEPHERD
SIDE PATTERN
NOTE
MATERIAL BALSA UNLESS NOTED
NOTE
ALL DIAGONALS ARE 1/8"X1/4"
3/32" SHEET SIDES (TYP.)
3/32" SADDLE STRIP
1/8" PLY DOUBLER
1/8" BALSA SIDE
BOTTOM LONGERON
OUTLINE FOR ROUGH SHAPING OF CABIN AREA
3/32" TOP STRIP WHEN BUILDING CABIN ON WING
PERMANENT
TEMPORARY
1/4" SLOT FOR FIN L.E.
1/4 SQ. MAIN FRAME
F1 1/4" LITE PLY
F2 1/8" LITE PLY
F3 1/8" LITE PLY
F4 1/8" LITE PLY
F4B 1/8" LITE PLY
F1A 1/8" LITE PLY
F2A 1/8" BALSA
F2B 1/8" BALSA
F2C 1/8" BALSA
F3C 1/4" BALSA
1/8" BALSA INST. PANEL
SHAPE AT COWL LINE
COWL LINE
PATTERN FOR 1/64" PLY OVER FORMERS F1 & F2
NOTE GRAIN DIRECTION
NOTE
ALL TOP LONGER STRINGERS OMITTED FOR CLARITY
USE STRAIGHT EDGE ALONG TOP OF FUSE WHEN FITTING COWL
3/16" BRASS TUBING
3/16" WHEEL PANT MOUNT
FIBERGLASS COWL & WHEEL PANTS AVAILABLE FROM:
T&D FIBERGLASS
30925 BLOCK, DEPT. A
GARDEN CITY, MI. 48135
CANOPY AVAILABLE FROM:
T&D FIBERGLASS
30925 BLOCK, DEPT. A
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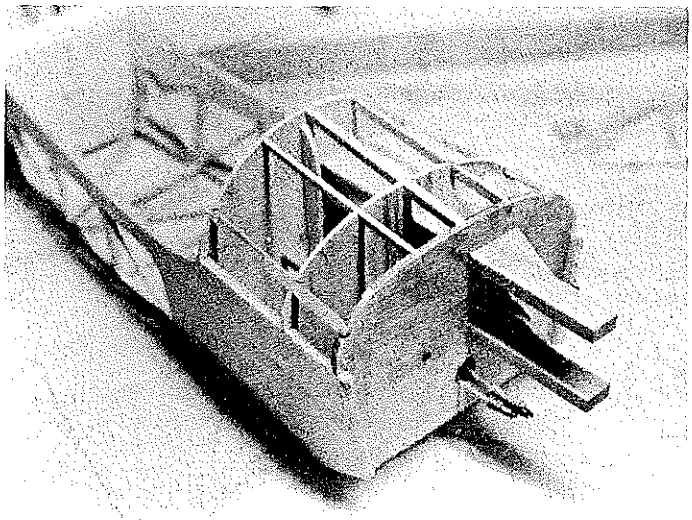
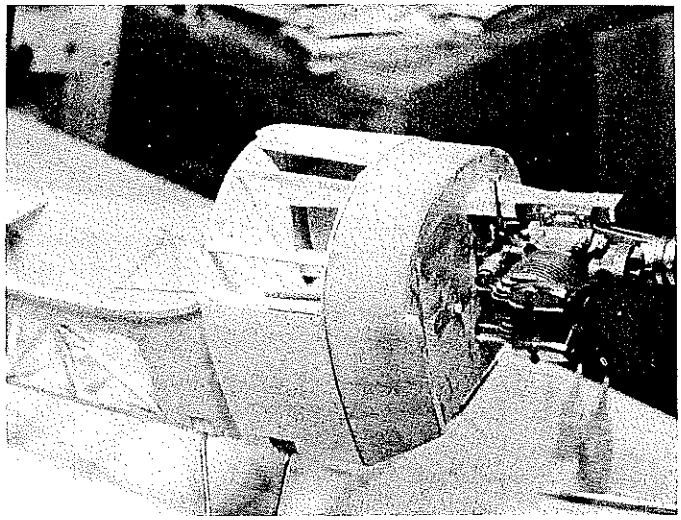
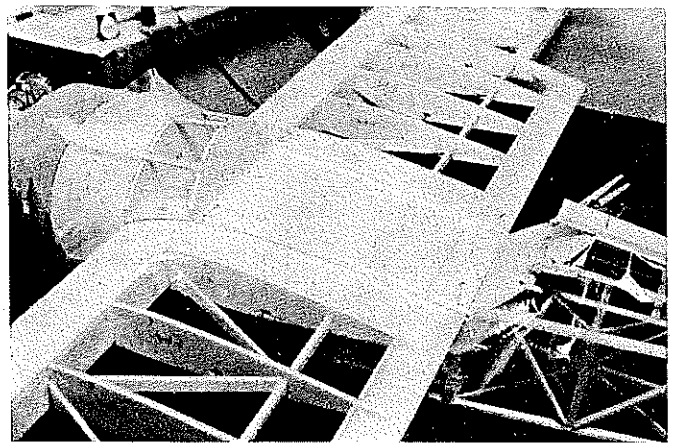
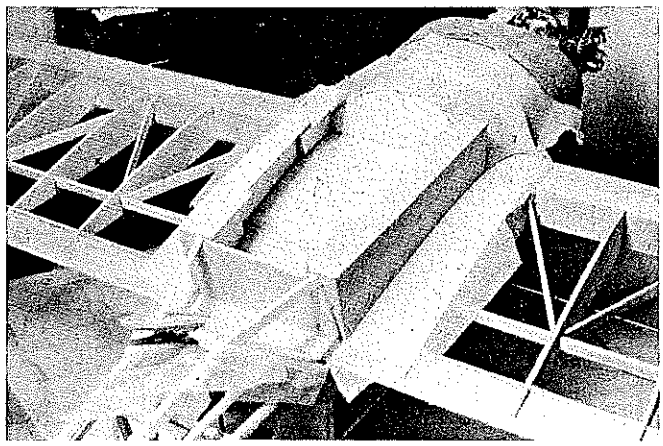


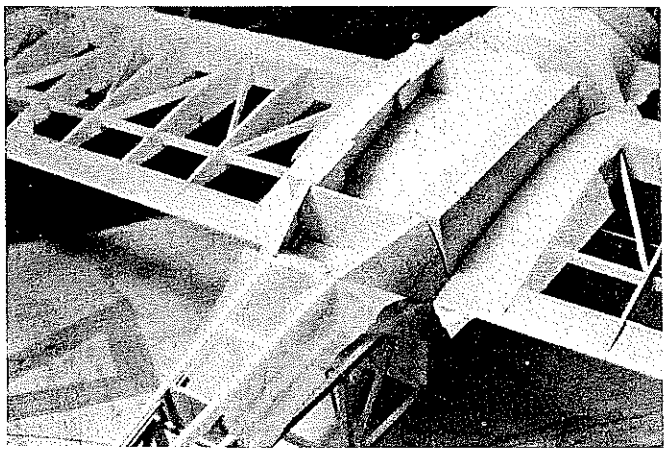


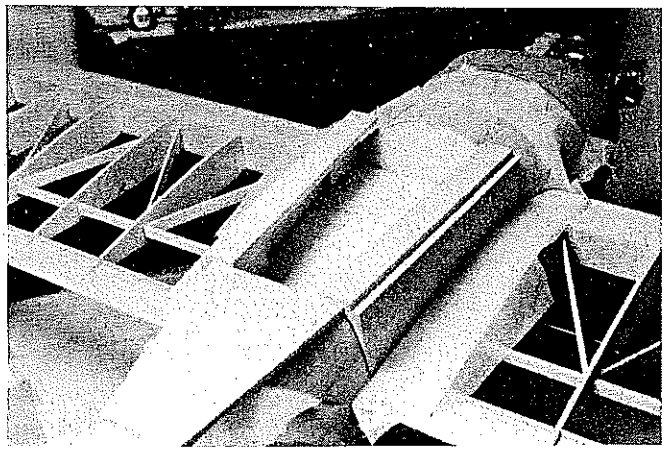
Left: Formers F1, 2, and 3 have been inserted into the side panels and glued in place along with the maple engine mount stock. The slots for the top stringers on former F-2 are cut after the formers are in place and adjusted with a straightedge across the top of all three. The tubing jutting out from under the engine mount stock is attached to a tank that will be used for a smoke system to be installed at a later date. Right: The side formers have been installed along with the 3/32-in. balsa sheeting. The 1/64-in. plywood has been wrapped around formers F-1 and F-2 and glued in place. The engine mount holes have been drilled, and the engine has been temporarily installed in order to fit the fiberglass cowl. The 3/32-in. saddle strip on the wing opening is glued in place. Note the pine landing gear mounts showing through notches cut in the sides.





Left: The wing has been positioned and bolted on. Polyethylene sheet has been taped over the wing, and the 3/32-in. top strip has been pinned in place. Formers F3A and F3B have been positioned and lined up with a straightedge before gluing the stringers in place and gluing them to the strip. Balsa former F4T has been clothespinned in place. Right: Balsa sheet has been glued in over F3A and F3B. Former CF has been glued in along with strips to F4T. The 1/4-in. sides, doublers, and triangles have been glued in place, and the 3/32-in. cockpit floor is installed.



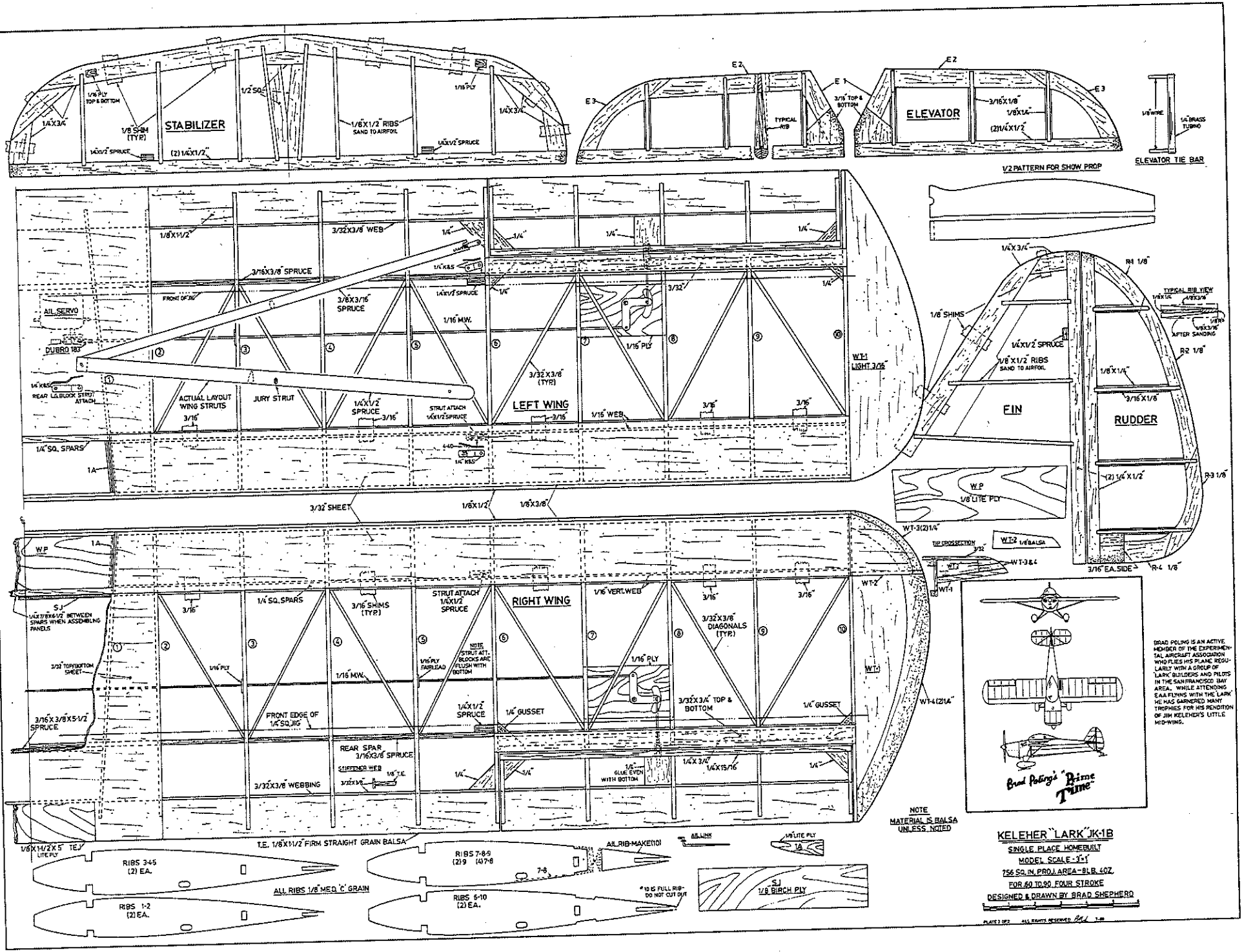


Left: The 1/8-in. balsa sheet has been attached to CF and F4T. Note the curve and transition from the turtledeck to the sides under the canopy. Right: One layer of 1/4-in. balsa sheet has been glued on top of CF and F4T. The 1/4 x 1-in. balsa cap has been glued over the side assembly.

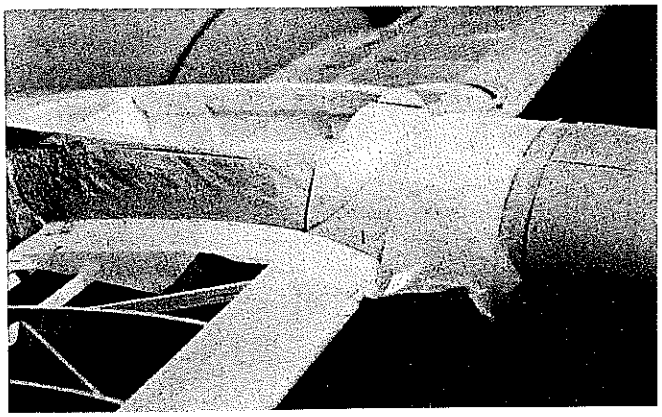
June 1988, 15 years after Keleher's design first captivated me, my prototype model Lark was ready for its maiden flight.

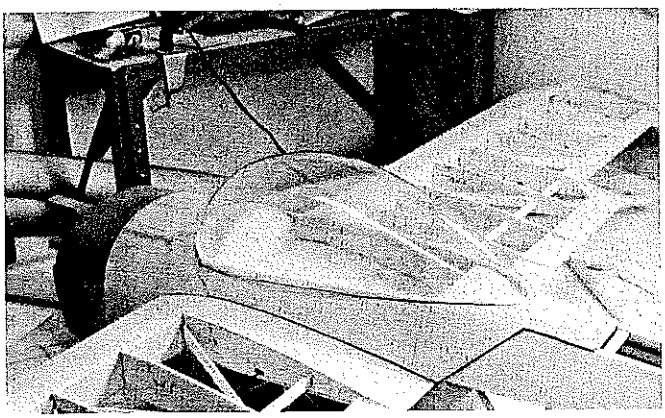
On June 23, 1988 at Steen Airstrip in south Texas, I unloaded the Lark from the pickup truck with all the necessary flight gear. The wing and struts were bolted on along with the "show prop" for some picture taking. After changing the prop, I fired up the .65 Saito, checked the rpm, and began taxiing. Going to the far end of the grass strip, I turned the plane into the wind and let it idle for a moment. I always have butterflies when a new creation first salutes the skies, but the excitement of wanting to see her fly pretty much kept them at bay this time.

At 4:30 p.m. I throttled the model up and

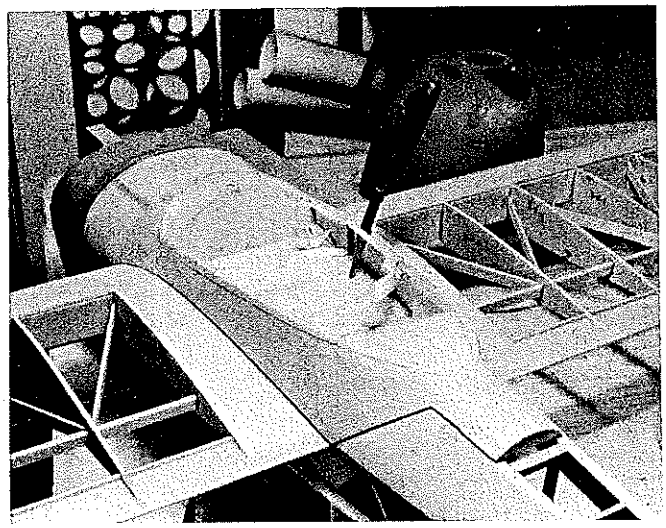


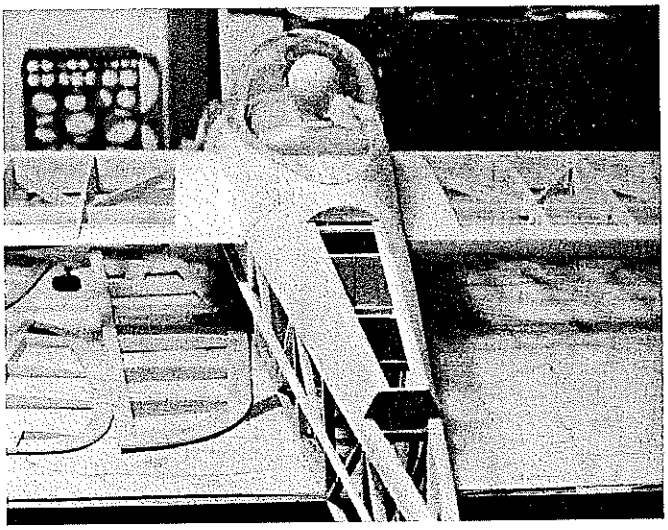
Full-Size Plans Available . . . See Page 186



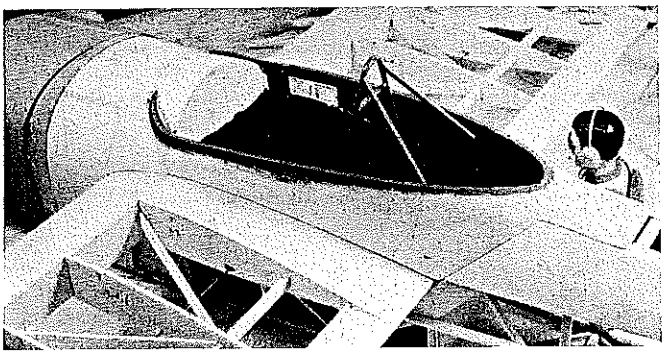


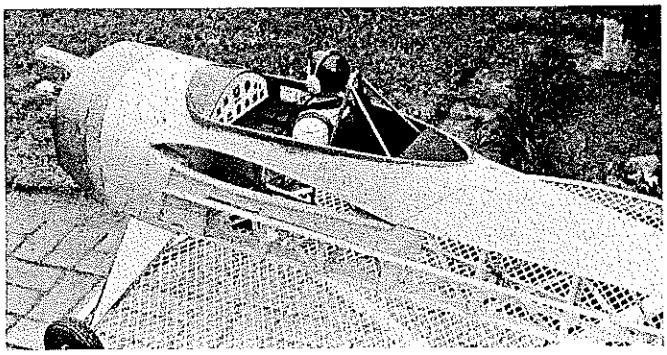
Left: Starting to rough shape the cabin section under the canopy. The front soft block has been fitted to the curved top sheet, and the top layer of the ¼-in. sheet over CF and F4T has been roughed out. Right: Fitting and marking the canopy for final shaping of the cabin section.





Left: Trimming the inside of the cabin section to final shape. Note how the outside has been sanded smooth for a clean joint between cabin and turtledeck. Also note the line for fitting the canopy. Right: This is a good view of the transition from the turtledeck to cabin that is accomplished by careful sanding in front of F4T. The photo also shows the horizontal stabilizer (under the left wing) construction quite clearly.



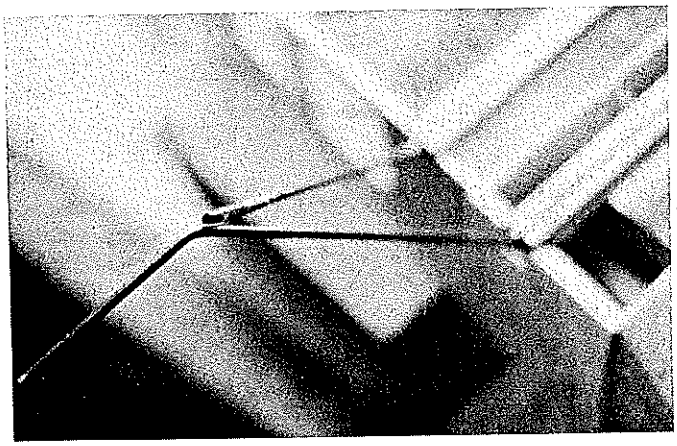


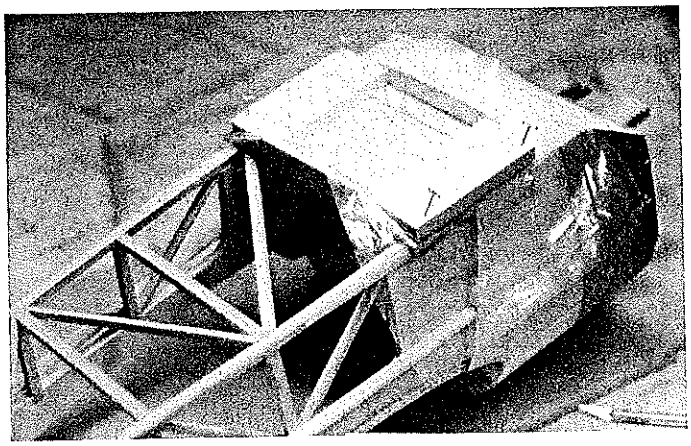
Left: Detailing the cockpit area. The 3/16-in. dowel and tube roll bar has been installed, the "start procedure" and "takeoff" placard has been glued in after coating the wood and roll bar with zinc chromate green and the floor with flat black. Brad Poling's "likeness" is waiting behind the right wing. Right: The instrument panel has been finished, the front decking has been painted blue, the 1/16 x 3/8-in. balsa band simulating the fiberglass bow over the top of the instrument panel has been installed and chromated, the turtledeck has been finished, side sheeting completed, stringers in place, and the 3/16-in. landing gear fairing core attached to the landing gear. The pilot has been detailed and installed.

headed her down the strip, playing the rudder slightly to keep her true. In about 100 ft., and even before touching any *up* elevator, the Lark was flying. I let it climb out farther while feeding in a little right aileron trim, made a 180° turn, and came back over the field moving the sticks to check response. A 180° turn at the other end brought it back.

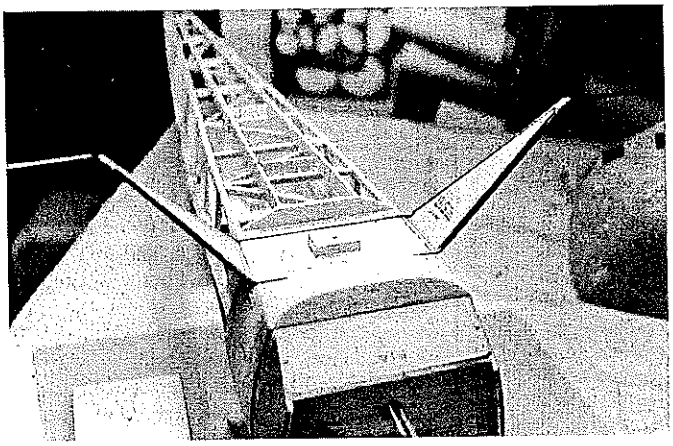
Response was so good that I entered a loop, and the steady-running Saito allowed a nice, round figure. Ol' Dad was getting elated, so I pulled up to a 45° climb and snapped it. Doing a perfect imitation of how the full-scale Lark would snap, it stopped with the wing horizontal, still going up at 45°. After a four-point roll and vertical climb, I pushed out and slowed into a stall, nosed down to about 60° and recovered, then throttled back and got into pattern. Things were going so well that I had to tell myself not to get carried away and have "brain drain" on the very first flight.

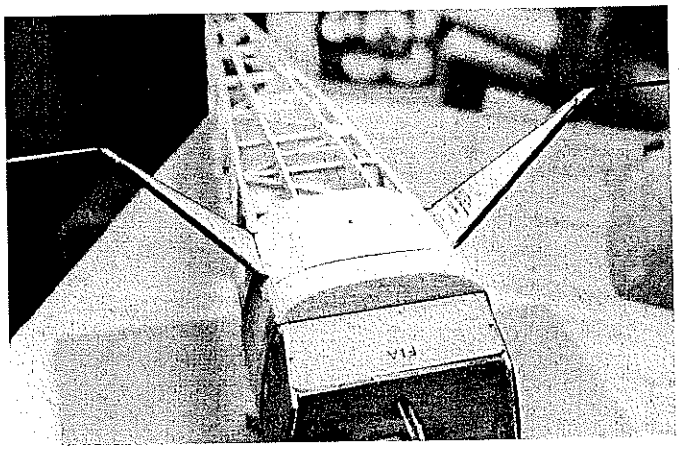
On that first landing, I was too eager with the sticks and slipped the model a little out of form, rocking back and forth and bouncing around. The model flipped on the last bounce due to overcontrolling the elevator, but fortunately there was no damage except for a little scuffing of the canopy. I worked out a better way on the second flight—setting the airplane up with a fairly long approach after base, keeping it low at reduced power until it crossed the edge of the strip, then cutting the throttle and letting it settle. Don't try a three-point landing like I did on my first flight. Bring the model down on its main gear and let the tail settle as it slows. On the second flight I executed a number of





Left: Close-up showing the 3/16-in. brass tubing on the rear landing gear strut with the radius filed into it, ready for wrapping and soldering. Right: Building the fairing to cover the landing gear. The bottom formers F2B and F2C have been installed and sheeted. Polyethylene sheet has been laid over the landing gear attach area, former F3C has been attached, and 3/8-in. sidepieces pinned on, ready for the 1/4-in. sheet.



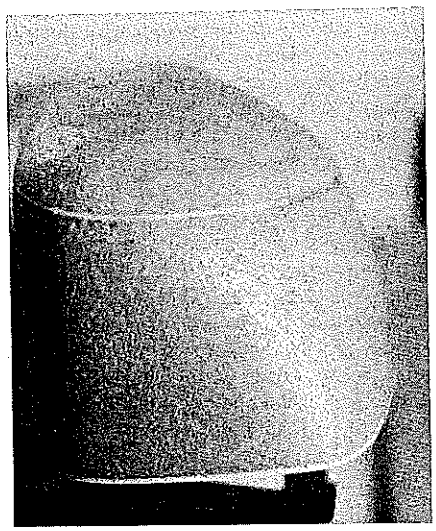


Left: The 1/8-in. sheet fill-in between the landing gear mounts has been installed, and the three-layer Lite Ply fairing mount has been attached along with the bottom stringers. Right: The bottom fairing has been sanded from round in front to angular in back as it transitions along the bottom. Careful sanding and shaping here will result in a smooth and scalelike appearance, as photos of the finished airplane clearly show.

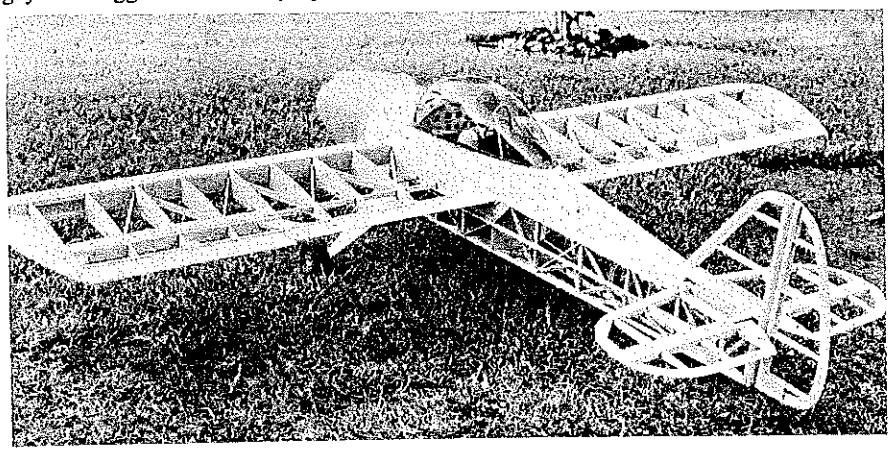
touch-and-goes that taught me how to set the model up for landing properly.

The second flight demonstrated that with the right power and weight, the Lark will do whatever maneuvers the pilot is capable of. I put it through the works: a three-turn spin with immediate recovery on release and the nose down about 60° coming out, outside snap rolls, loops with inside snaps at the top, rolls, knife-edge flight, outside loops, and slow flybys—with modeling buddy Leon Folse taking pictures the while. When I heard a voice behind me propose an inverted flyby, my immediate reaction was, "This guy is nuts! I've got six months of 'love labor' flying around out there, and he wants to take a picture of an inverted pass on the second flight." But this is the same guy who egged me into flying the Chips (*Model Aviation*, June 1981) inverted on the test flight—and as with the Chips, so with the Lark. Pleading temporary insanity, I again gave in to Leon's reckless request. He got his picture.

If you want a fine-looking quarter-scale model that has a lot of character, won't bust your budget, won't require a van for transport, and is a good flier, look over the plans and consider the Lark. It's not a difficult model to build, and the final results won't disappoint you. It'll be a major contender in any Sport Scale or Giant Scale contest you may want to enter, and you'll still have a



The plywood formers and a foam block carved to shape, with a coat of epoxy, before applying fiberglass over it for a one-off cowl. This was a lot of effort and expense and is not recommended because a quality cowl, along with a strong .040 butyrate canopy and wheel pants, is now available from Tom Keeling of T&D Fiberglass Specialties.



The completed model in its bare bones stage just prior to covering. As can be seen in the finished structure, it appears to be a very strong airplane capable of withstanding heavy use.

great-looking model for super weekend flying.

Construction

Wing. To assure accuracy when assembling the wing panels, I cut out a set of master ribs from 1/32 ply. Mark each rib as to its position on the panel after it's cut out to preclude any chance of error when building. Pin a piece of 1/4-in.-sq. balsa on the jig line as shown. Place 3/16-in. shims under the front bottom spar, then pin the 1/4-in.-sq. spar to the shims.

Cut a small 90° triangle from 1/32 ply, and use this to keep the ribs vertical when installing them on the spar. Install the top 1/4-in.-sq. spar, pinning it in place after all the ribs have been pinned to the 1/4-in.-sq. jig and bottom spar. Install the 1/8 x 1 1/2-in. trailing edge into the slots in the ribs. When satisfied that the assembly is square and straight, use cyanoacrylate (CyA) glue on all the joints. Gap-filling CyA such as Super Jet is the glue of choice, as it takes care of any irregularities introduced when cutting out the ribs.

Install and glue the 3/32 x 3/4-in. aileron spar cap in place. Pin the 1/8 x 3/8-in. leading edge, and glue in place. Slide the rear 3/16 x 3/8-in. spruce spar in place, and glue. Refer to the picture of the panel being assembled.

Cut out the 3/32 x 3/8-in. diagonals, and glue into place between the ribs. Glue the 1/16 vertical-sheet webbing to both sides of the spars. Install the 1/4-in. gussets in the corners. Sand a bevel into the 1/8-in. leading edge to conform to the ribs, and glue the 3/32-in. leading edge sheeting in place. Turn the panel over, remove the shims, pin down the jig where the ribs meet the board, and install the leading edge sheeting and aileron spar cap.

When both panels have been completed, lay them on a flat surface on which you have drawn a straight line over 70 in. long. I use a piece of Celotex for this job. Pin the panels down with the bottom spar along the drawn line. Use aliphatic resin or epoxy to glue the rear spar spruce joiner to the spar stubs. Clamp with clothespins until dry.

Glue the 1/8 x 1 1/2 x 5-in. Lite Ply trailing edge joiner to the top of the trailing edges. Glue the 1/4 x 7/8 x 6 1/2-in. spar joiner between the main spars. Epoxy the 1/8 x 1 3/8 x 6-in. ply joiner to the rear of the spars in the center section. Glue the 1/8 x 3/8-in. leading edge halves together. Glue on 3/32 sheeting to the top center section aft of the spars.

Remove the wing from the bench. Glue the aileron cranks in place with the crank mounted. Install the 1/16 music wire pushrods. Sheet the bottom center section. Note the offset position of the aileron servo, helpful in counteracting the weight of the side-mounted engine, but unnecessary with a twin cylinder. Sand the front of the leading edge sheeting flush with the 1/8 x 3/8-in. leading edge, and glue the 1/8 x 1/2-in. cap in place. Razor plane or course-sand the leading edge to a rounded shape.

Cut the tips from 3/16-in. lightweight sheet balsa using the WT-1 rib outline. Cut the

WT-2 rib from ⅛-in. sheet, and two each of WT-3 and WT-4 from lightweight ¼-in. sheet. Glue WT-2 in place as shown, then glue the tip, WT-1, in position with the bottom edge lining up with the bottom of the ⅛-in. leading edge and bottom trailing edge of rib No. 10.

Note the photo of the tip parts assembled to the wing. Disregard the WT-5 piece in the photo, using two pieces of WT-4 instead as per the plan. Sand the WT-3 pieces to conform to the No. 10 rib, and glue the 3/32-in. tip sheeting in place. Sand the tip to a rounded shape as per the cross section diagram and WT-2. Build the ailerons directly over the plans after installing the ribs onto the ⅛ x 1½-in. trailing edge and lining them up.

Tail surfaces. Cut the outlines to shape, gluing the ¼ x ½-in. spars together to make a ½-in. sandwich. This method of construction reduces the chance of warped spars caused by using a solid ½-in. piece. Notch the spars, and assemble the surfaces over the plans. The sandwich-type construction of the elevator and rudder results in a very strong but lightweight structure that appears realistic when covered. Install the hinges when finished.

The fuselage is built using the one-side-on-top-of-the-other routine. After the Lite Ply doubler and ⅛-in. balsa sides have been cut out and glued together, insert waxed paper between the sides and build them directly over the plan. Don't forget, when gluing up the ply and balsa forward side pieces, that you have both a right side and a left. Contact cement was used on these pieces on the prototype, then CyA was applied around the edges.

Separate the sides when finished, and pin them down over the top view at former F-4 and the tail post. Trial fit F-4, and trim if needed. Check the fit of F4-B, and sand in an angle at the bottom for a snug fit on F-4.

Cut temporary angles from scrap balsa, and pin them in place behind the F-4 location. Epoxy F-4 in place, then epoxy F4-B on top of F-4 and positioned against the angles. Use a 90° angle to get the tail post square, then glue the sides together.

Cut the aft fuselage crosspieces in place (not over the plan), noting the difference in width at the top and bottom as shown in the photos and plans. Again, if any discrepancies show up between the photos and plans, always follow the plans, which reflect changes made after the photos were taken.

Glue the ⅛ x ¼-in. diagonals in place as shown in the top view. Pin F-5 and F-6 in position, then trial fit the stringers for straightness. Pin F-7 in place, and trial fit the 3/16 x ⅜-in. top longerons. Trim the formers as necessary for a good fit. Glue the stringers, formers, and longerons in place.

Place F-1 in slots on the sides, and pull the sides together using a rubberband to lock them into F-1. Slide former F-3 in place, pinning the bottom sides securely so that they will pull in and meet F-3 firmly. When you're satisfied with the fit and

squareness, epoxy F-3 in position.

Glue the ⅛-in. Lite Ply fuel tank base to former F-2, keeping it 90° to the former. Check fit the maple engine mounts through F-1, F-2, and F-3. If you choose to use a firewall commercial mount, omit the cutouts in the formers but keep the same centerlines when installing the mount on F-1.

Remove F-1 and F-2 from the structure. Install the fuel tank on the base of former F-2. Position F-2 in the slots, pull the sides together with a rubberband, and install F-1 in the slots. Install the engine mount pieces through the holes, then epoxy the formers and maple stock. Use CyA to hold the tank in place; silicone can be used later for final tank installation. Stuff a piece of foam around the fuel tank tubing outlet hole on F-1, and epoxy it to seal off and fuel-proof the firewall.

A smoker tank was installed on the prototype for future use. Disregard the photos showing the tank tubing outlets unless you also want to include one in your model. Remove the fuselage structure from the plans.

Glue the ¼-in.-sq. spruce to the slots in the top of formers F-1, F-2, and F-3. Lay the ⅛ x ¼-in. stringers in place over F-1 and F-3, cut the slots in F-2 to receive them, and glue in place. Note the photo with the stringers installed. Glue F2-S, F3-S, and F3B-S to the sides. Glue the ½ x ¾-in. pine landing gear mounts in place using liberal amounts of epoxy.

Cut the 1/64 ply sheeting over F-1 and F-2 using the pattern on the plans. Note the grain to make it easier to wrap around the formers. One of the photos shows this sheeting in place and the 3/32 balsa sheeting being installed behind the ply. Glue the spruce cowl hold-down blocks in place flush with the ply and against F-2.

Glue the 3/32-in. wing saddle strips in place. Glue the FB Lite Ply pieces to the doublers and F-3. Glue the ⅜ x ¾-in. maple blocks for the wing hold-downs to FB and F-3 using epoxy. Epoxy the WM Lite Ply pieces to the fuselage and the ⅜ x ¾-in. maple block underneath.

Place the wing in the saddle, and pin it in place temporarily, lining up the trailing edge center to the centerline on former F4-B. Square the wing to the fuselage by measuring from the tail post to the No. 10 rib trailing edge. Pin firmly, and drill the rear hold-down bolt hole using a 3/16-in. bit. Remove the wing, and drill to enlarge the 3/16-in. hole in the wing trailing edge to ¼ in. Tap the maple block with ¼-20 threads.

Reinstall the wing, and bolt down the trailing edge. Square the wing again, and pin firmly. Drill the front hole, and fit it with a piece of 3/16-in. dowel. Drill the matching hole, remove the wing, then enlarge both wing holes to ¼ in. and tap the maple blocks to ¼-20.

Bolt the wing in place, and lay a sheet of polyethylene over the wing center section as shown in the photo. Again referring to the photos, pin the top 3/32-in. balsa strips in place on the wing between F-3 and F4-B. Pin F3-A in place, checking the fit against F-3. Pin F3-B in place, checking the fit with a straightedge from F3-B forward to F-2 to ensure continuity in the top sheeting. Sand and trim as necessary. Install the ¼-in.-sq. top balsa stringer and the two side ⅛ x ¼-in. stringers as shown in the photos.

Cut off the rear portion of the top cabin strip from F3-B to F-4. Cut the cabin (or cockpit) sides from lightweight ¼-in. sheet balsa using the outline on the side view of the plan from former F3-B to CF. Cut the front and rear ¼-in. sheet doublers from lightweight stock using the cabin side as a pattern. Glue these in place, making a right and left side. Glue lightweight ¾-in. triangle stock to the top edge of these sides, referring to the photos.

Draw lines on the polyethylene sheet from former F3-B to F4-B with a felt-tip pen. Pin the sides to these lines, then pin former CF to the back of the sides. Place F4-T against F4-B, holding with a clothespin temporarily as shown in the photo. Glue two pieces of ⅛ x ¾-in. stock between CF and F4-T. The two ⅛-in. pieces are substituted for a single ¼-in. piece so that the glue line can be used as a reference point when shaping the cabin area.

Glue the sides to CF and F3-B. Glue on the ⅛-in. side sheet between CF and F4-T, wetting the wood to fit the curve if necessary. Glue the ⅛-in. sheet doubler to the inside of this sheet. Glue the ¼ x 1-in. cap to the top of each side. Glue the two-piece ¼-in. sheet to the top of CF and aft of F4-T as per the photo. Glue the 3/32-in. sheet cabin floor in place, checking that it fits well on the sides. Glue the ¾ x 1½-in. soft block piece to the sides in front of F3-B, sanding the insides to fit the curve of the sheeting. Rough cut the exterior of the sides using the pattern shown on the plans. Refer to the photo showing the desired shape of the soft block on the front.

Rough sand the bumps out of the cabin area sides, taking care not to dig the wing sheeting. Sheet the sides from F4-B aft to the tail post.

Remove the cabin area and the polyethylene sheet from the plan. Make cutouts in F3-A where the hold-down blocks are located. Epoxy the maple blocks to F-3, then epoxy a piece of ⅛-in. Lite Ply inside the 3/32-in. side sheeting where the blocks meet. Drill through the sheet and blocks, and tap the latter for 4-40 bolts. Enlarge the hole in the side sheet for a 4-40 bolt as well.

Glue the ½-in. top sheet turtleback in place, then glue on the ply hold-down plate and the ¼-in. dowel in the top cabin sheet. Drill through the dowel and ply, enlarge the ply hole, and insert a blind nut. Screw the cabin structure onto the fuselage assembly.

Fair the cabin areas into the side sheeting using 180-grit paper. A little patience and careful sanding will make a nice, smooth transition from the turtle hump into the cabin area. Place the canopy over the cabin structure, trimming for a good fit along the glue line. Mark the canopy outline with a pen, then carve the inside of the area to about ⅛-in. thickness with a sharp knife, and finish with sandpaper.

With the hardest part of building the

model finished, we can now take a 'fun' break and doll up the cockpit.

The floor was painted flat black, the sides a green zinc chromate color. The headache rack was built using a piece of 3/16-in. aluminum tubing for the top radius and 3/16-in. doweling painted zinc chromate for the remainder. The instrument panel was painted an almond color as shown in the detail color photos. Mask off and paint the sheeting over the front of the cockpit the same blue that will be used on the final exterior finish. The prototype used Red Devil polyurethane in Empire Blue. Sig's Blue Sky Bright is also close to the color of Poling's full-scale Lark.

To simulate the fiberglass band on the full-size plane, a piece of 1/16-thick by 3/8-in.-wide balsa was laid across the top, curved, glued at the ends, and painted chromate. A Williams 3-in.-scale sport pilot was used and dressed up. A piece of balsa block was glued to the bottom and shaped to raise the pilot to proper height. The parachute was painted red to match the red shoelaces used for straps. The shoulder straps are black shoelaces. The "Starting" and "Before Takeoff" placard shown in the photo of the finished cockpit was glued to the wall before gluing on the canopy.

The canopy was tinted in hot water with black Rit dye. Be careful not to make it too dark. Swish the canopy around in a large roasting pan for a little while, then remove it and rinse with cold water. If it isn't dark enough, repeat the process until you're satisfied. The full-scale Lark has just a suggestion of tint. The canopy on the prototype was glued on with Testor's cement (the green tube variety). Any similar model cement should work just as well. Mask off the canopy above the paint line to protect it.

Finishing the fuselage. Install the stringers, glue F3-C, F2-B, and F2-C in place, and sheet this section. The 1/8 x 1/4-in. spruce strips may be glued to the pine landing gear blocks. Install 1/8-in. sheet between the blocks as fill-in.

File the 3/16-in. brass tubing to enclose the main landing gear wire, then wrap with soft wire as shown in the plan and photo. Place the gear in slots in the pine blocks, holding it in place by screwing three 1/4-in. brass strips on each leg, or by using commercial straps. Build the cover over the gear as per the photos and plans.

Glue the three-ply hold block to the 1/8-in. sheet balsa fill-in. Drill down through the fairing and the block, and tap the block for a 4-40 bolt. Screw the fairing in place, sanding it to fit the F2-C and F3-C formers.

One of the photos shows a foam form for shaping a cowling using the one-off method. Believe me, folks, "It ain't worth it," considering the cost of the foam, boat glass, epoxy, hours of sanding, filling, cutting holes, etc. T&D Fiberglass Specialties offers a ready-to-finish cowl. The sample Tom Keeling sent me fit my fuselage perfectly. I would highly recommend purchasing the cowl, wheel pants, and canopy from Tom. The T&D canopy is formed from .040 material and is a beaut, requiring only slight trimming for a perfect fit. I tried to mold a canopy 15 times before finally giving up.

It is easier to cover the tail surfaces *before* installing them on the fuselage. Sig Koverall and nitrate dope were used on my model with excellent results.

After bolting on the wing, slip the stabilizer in place, ensuring that it's square with the trailing edge of the wing and level with the wing. Make certain that the stabilizer is true before gluing it in place. Slip in the elevator. I used Klett pinpoint hinges, securing them with aliphatic resin. Install the fin in its slot, squaring it with the tail post, using 90° angles on each side to assure squareness with the stab. Make up the tail wheel assembly and glue it in place; or use one of the commercial assemblies, securing it with a ply plate epoxied to the fuselage bottom. Install the rudder, and glue on the hinges.

The prototype was given two coats of nitrate dope wherever the Koverall met the structure—that is, at the ribs, leading edge sheet, tips, trailing edge, fuselage stringers, front sheeting, and turtledeck sheeting. After a sanding with 220-grit paper, Koverall was installed by brushing nitrate through the material at the contact points. With the iron set at medium heat, the beauty of the taut covering is immediately apparent as if by magic. (That's one of the "uppers" from building stick-and-rag models.)

Five coats of thinned nitrate were brushed on the entire model. A coat of thinned nitrate mixed with talcum powder (the pure kind, without starch) was applied and sanded smooth with 220 Tri-M-ite. This was followed by three more coats of nitrate sanded with 360-grit paper. Finally I sprayed on the polyurethane, a mist coat followed by a fairly wet one.

I doubt I could have applied the red stripes without Coverite's Graphic Stripes. The 1/4- and 1/16-in. sizes are right on the mark for scale appearance, and the red exactly matches the color on the full-scale plane. These stripes are a joy to apply and eliminate all the masking and spraying that would otherwise be required. They're no thicker than a coat of paint and have a beautiful gloss.

The "Prime Time" lettering and Poling's name were hand painted with an 0-size long-haired sable brush, using Sig Skybright Yellow for the bottom half and mixing in red to create the orange for the top half. The registration numbers and letters are 3/4-in. Helvetica No. 411 Presto Stik Vinyl letters, found in office supply stores.

Use .030-in. music wire for the wire bracing on the tail feathers. A 3/8-in. length of 3/32-in. brass tubing is flattened on one end, drilled with a hole, and soldered to the wire. No. 2 screws are used to hold the bracing through holes drilled in the hardwood mounts and ply reinforcements on the stab and fin. No. 32 straight pins from Sig, secured with aliphatic resin, are used in the sheeted parts to simulate the Dzuz fasteners and PK screws driven into the metal on

Continued on page 141

Safety/Preston

Continued from page 20

types of animals, including birds. Nobody can predict at this time where the hot spots of the 1989 season will be, but since the known hot spots are close to us, it would be wise for outdoor modelers to know something about the disease, what to do to avoid it, and what symptoms to be aware of.

"First, avoidance. You can't avoid encountering ticks. They are small and are all over the place, as most pet owners know. However, by observing a few precautions you can keep from being bitten and/or infected. Actions that will keep ticks off the skin are the most effective preventative measures. Ticks dwell in low shrubbery and on grass blades. They get onto your shoes, ankles, or lower legs, and then crawl upward. Wear long pants, cinched at the ankle or tucked into socks or boots. The less access to the skin, the better.

"Check your clothing frequently, especially if you've been through the field and brush retrieving a downed airplane. Wearing light-colored clothing makes it easier to spot the little devils. Repellents containing Deet can be used effectively on the clothing (shoes, pants, socks), but direct application of high concentrations on the skin is not advised. A new product, Permanone, if available, may be more effective. Applied to the clothing, it both repels and kills ticks.

"After a day at the field, check your feet, ankles, and legs for attached ticks or tick nymphs (they are about the size of a pinhead) feeding on you. Any that you find should be removed immediately with a fine, curved-tip tweezer. Grasp the tick as close as possible to its mouth (the part sticking into the skin), and pull it outward firmly, without jerking. Alternate methods of tick removal (alcohol, heat, vaseline, etc.), popular in the past, have been shown to be less effective. A good removal is a fast removal, as there is less chance of infection. Immediately after removing a tick, disinfect the bite with rubbing alcohol or betadine.

"Unfortunately, most victims never see the tick that infects them. The symptoms of Lyme disease include various types of rash that may develop weeks after the infection, fatigue, stiff neck, flu-like symptoms (headache, chills, fever, muscle aches), and arthritislike symptoms. It is a difficult disease for the victims to recognize and for a doctor to diagnose, as the pattern of symptoms varies widely from case to case, and the symptoms mimic other illnesses. See your doctor if any symptoms lead you to suspect that you have this disease. Early treatment is most effective. Untreated, the disease is progressive and can become serious in its advanced stages."

Jesse also sent me a copy of an article on Lyme disease that appeared in *Consumer Reports* for June 1988 on pages 382-385. Another article on the disease can be found in the March 1, 1989 issue of *American Nurseryman*, in which it is the feature article. This article states that the New York Medical College is investigating a connection between Lyme disease and multiple sclerosis (MS), both of which have similar symptoms.

Be alert for ticks, and have a safe month.

Lark/Shepherd

Continued from page 37

Brad's plane. The scimitar "show prop" was carved from a piece of 2 x 12-in. white pine shelving material, covered with multiple coats of nitrate for a high-gloss finish, and painted with the same white used on the model.

Designing and building this beguiling airplane was very satisfying and enjoyable. Though problems cropped up and solving them could be frustrating at times, playing Daedelus was definitely worth it. You, too, can have a quarter-scale model of a beautiful home-built—and fly it off the workbench instead of the drawing board! What's more, you won't need a cargo van to carry it to the flying field—or the contest site. Enjoy building and flying your unique little Lark.

Radio Technique/Myers

Continued from page 41

5¼-in. disk in Microsoft 9 Sector format, which is usable in most IBM PCs and compatibles. Other formats may be available, if you need them. Ask.

WIMP will be in ASCII accompanied by a handbook and will have some hints for conversions to other computers in files on the disk.

RC Slope Soaring/Triebes

Continued from page 47

Not instant perfection, but a successful flight and landing, hinting at the promise of things to come. I knew what to do next. A couple of hand tosses

Continued on page 144