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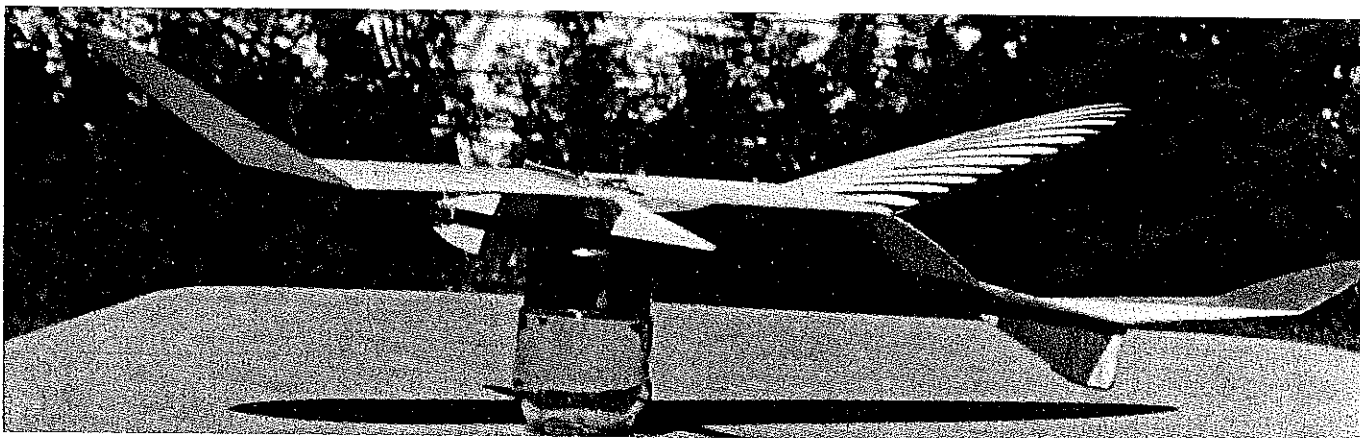
# One Good Tern Deserves Another

## Fine-flying Tern II lands only in the winner's circle.

### ■ Larry Conover

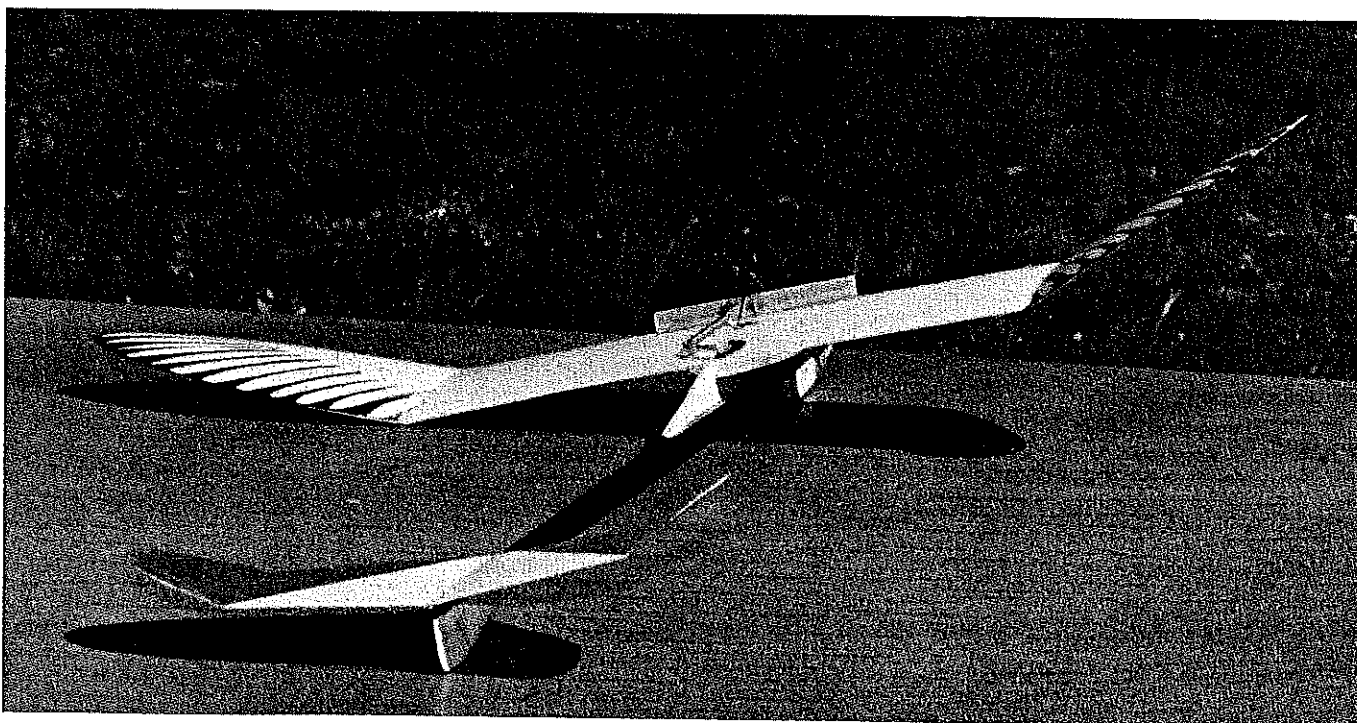


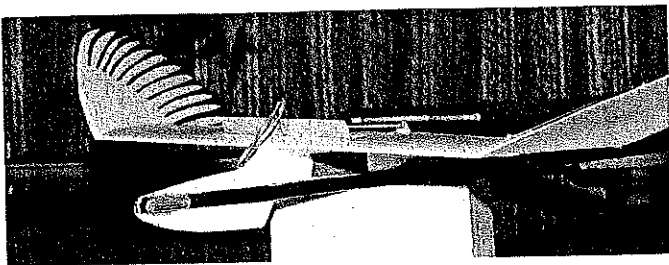
Larry Conover and Tern II at a Colorado flying site. A reliable DT is a must to keep well-trimmed contest models.



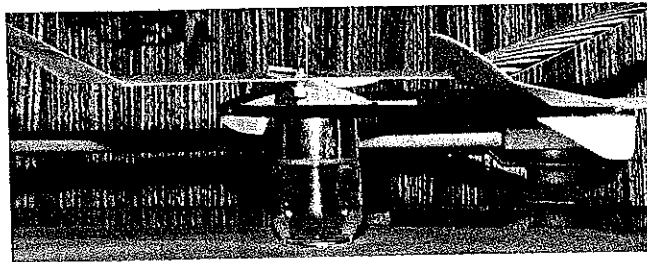
Above: Tern II is a thermal soaring HL glider. It has an 18-inch wingspan, is 18 inches long, and weighs 1.2 ounces.

Below: Center-section flap, shown in the open position, disturbs airflow and stalls the wing, causing a shallow dive.

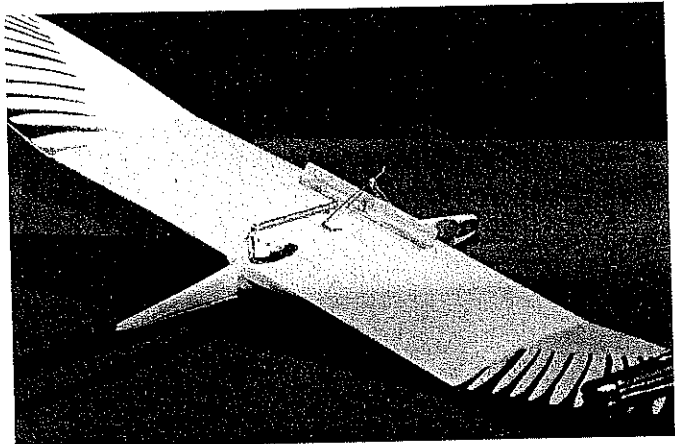




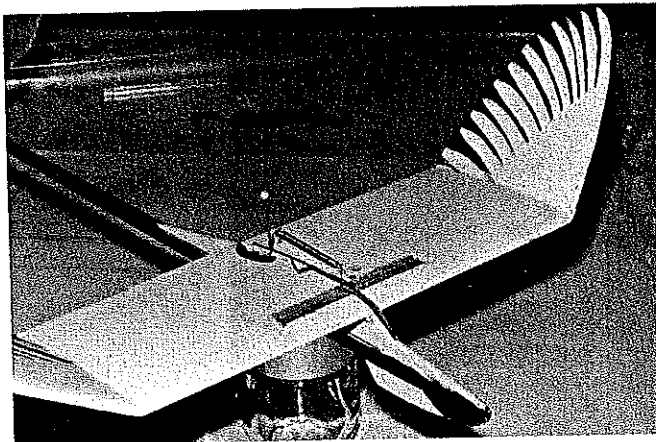
Front view of Tern II highlights pylon-mounted wing, Silly Putty spoiler DT, and stabilizing front-end guppy.



Tern II has clean lines, despite wing-top DT. Designed as a thermal-catching contest model, it rides even the lightest lift.



Author used full-scale gliders as basis for flap DT on Tern II. Positive, lightweight system weighs only two grams.



Top view shows DT hookup ready for flight. System adds little drag or weight, and is better than fuse DTs.

**I**N THEIR QUEST for theory and knowledge of flight, the Wright brothers studied birds. Many before them had also watched the soaring flight of eagles and gulls, but lacked the careful attention to detail and the creative capacity the Wrights possessed.

Others "talked" a good flight long before they attempted to brave the unknown elements of the ether. The French were being hailed as the world's greatest aviators before they ever completed a circular flight.

Wilbur Wright cut through to the truth when he answered some critics. He observed: "The parrot talks more than any bird, but is a rather poor flier."

With his words in mind, I searched bird

books for a gull-like creature that could soar in nearly all contest conditions. The tern family filled the bill—graceful, more streamlined than gulls, good ground skimmers, agile, and great at picking up lift.

**B**ut before we get into the hand-launched glider (HLG) designs, let's take a look at those exciting days of yesteryear when such Chicago glider pitchers as Milt Huguelet and Wally Simmers (later to become Hall of Famers) were setting the pace for both the East Coast hotshots and the West Coast thermal thumbers.

In those early days most hand-launched gliders looked pretty much alike. Many V-dihedral gliders with swept wings and

long noses can be seen in the older *Zaic Yearbooks*. Polyhedral wings became popular in the 1940s a la Goldberg's Zipper. Later, tail moment arms stretched out, and noses were shortened.

The first real departure in hand-launched technology that I remember was Ray Acord's Monster. The model, with its huge 30-inch wingspan and six-inch chord, held the Junior, Senior, and Open records back in the early 1950s—a true California thermal catcher. It was the first glider I saw that sported both a guppy and a dethermalizer (DT). I borrowed both features for my Flanger designs.

In the Midwest, Jim Lang and I discovered

*Text continued on page 53*

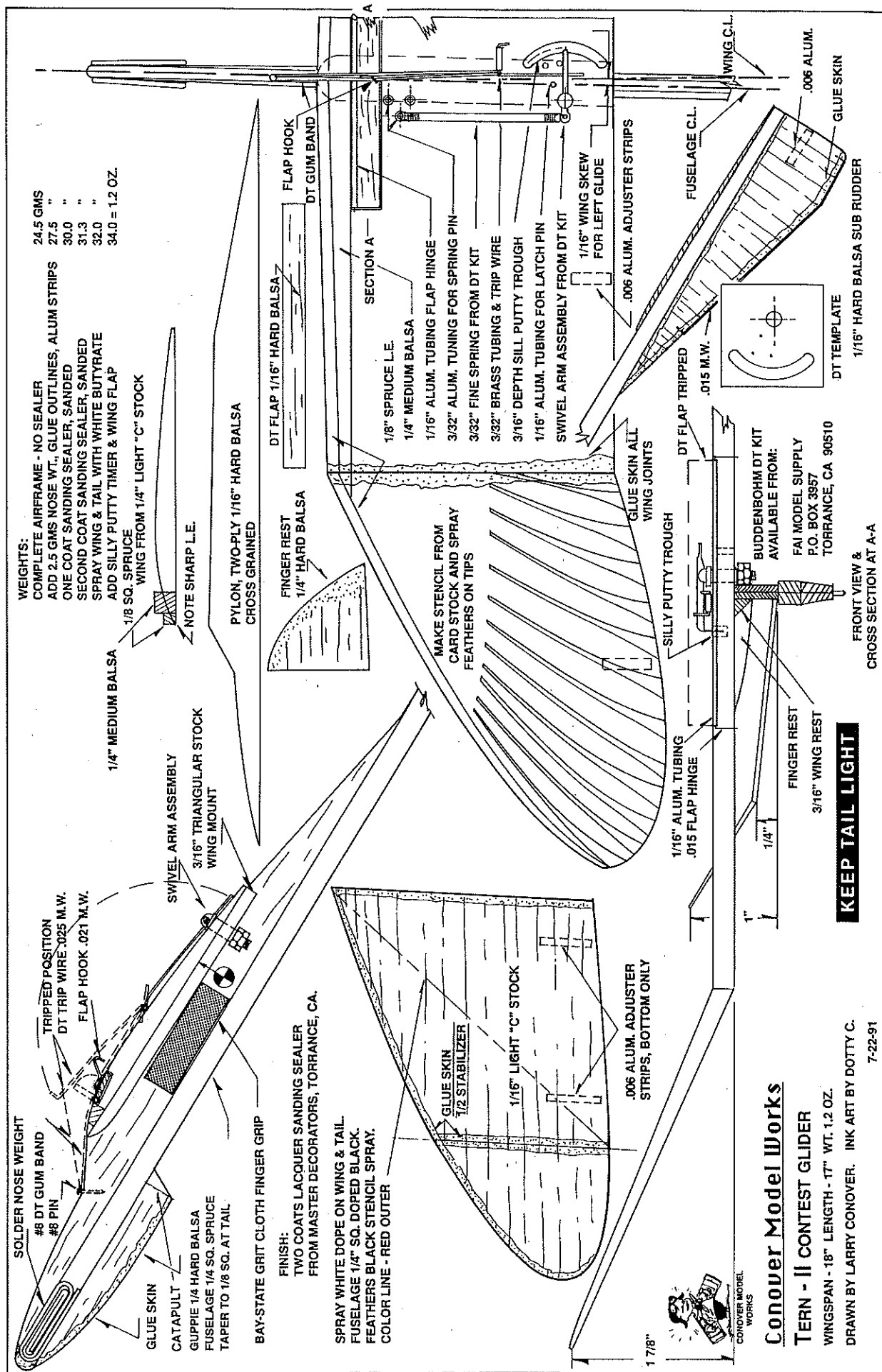
*See plan on page 51*



Left: Testing the air with a flat-footed launch. Best flight pattern is achieved with a hard, nearly vertical launch.

Below: A test glide for Tern II. Note long tail moment arm. Left wing has washin for spin prevention during thermal flights.





- WEIGHTS:**  
 COMPLETE AIRFRAME - NO SEALER 24.5 GMS  
 ADD 2.5 GMS NOSE WT., GLUE OUTLINES, ALUM STRIPS 27.5 "  
 ONE COAT SANDING SEALER, SANDED 30.0 "  
 SECOND COAT SANDING SEALER, SANDED 31.3 "  
 SPRAY WING & TAIL WITH WHITE BUTYRATE 32.0 "  
 ADD SILLY PUTTY TIMER & WING FLAP 34.0 = 1.2 OZ.

1/8" SQ. SPRUCE WING FROM 1/4" LIGHT "C" STOCK  
 NOTE SHARP L.E.  
 1/4" MEDIUM BALSA  
 SWIVEL ARM ASSEMBLY  
 3/16" TRIANGULAR STOCK WING MOUNT  
 PYLON, TWO-PLY 1/16" HARD BALSA CROSS GRAINED  
 1/4" MEDIUM BALSA  
 DT FLAP 1/16" HARD BALSA  
 1/8" SPRUCE L.E.  
 1/4" MEDIUM BALSA  
 1/16" ALUM. TUBING FLAP HINGE  
 3/32" ALUM. TUNING FOR SPRING PIN  
 3/32" FINE SPRING FROM DT KIT  
 3/32" BRASS TUBING & TRIP WIRE  
 3/16" DEPTH SILL PUTTY TROUGH  
 1/16" ALUM. TUBING FOR LATCH PIN  
 SWIVEL ARM ASSEMBLY FROM DT KIT  
 1/16" WING SKEW FOR LEFT GLIDE  
 .006 ALUM. ADJUSTER STRIPS  
 FUSELAGE C.L.  
 WING C.L.  
 .006 ALUM.  
 GLUE SKIN

1/16" ALUM. TUBING .015 FLAP HINGE  
 SILLY PUTTY TROUGH  
 DT FLAP TRIPPED .015 M.W.  
 DT TEMPLATE  
 1/16" HARD BALSA SUB RUDDER  
 BUDDENBOHM DT KIT AVAILABLE FROM:  
 FAI MODEL SUPPLY  
 P.O. BOX 3957  
 TORRANCE, CA 90510

GLUE SKIN ALL WING JOINTS  
 MAKE STENCIL FROM CARD STOCK AND SPRAY FEATHERS ON TIPS  
 .006 ALUM. ADJUSTER STRIPS, BOTTOM ONLY  
 1/16" ALUM. TUBING .015 FLAP HINGE  
 1/4" WING REST  
 3/16" WING REST  
 FINGER REST  
 1" WING REST

1 7/8"  
 SOLDER NOSE WEIGHT  
 #8 DT GUM BAND  
 #8 PIN  
 TRIPPED POSITION DT TRIP WIRE .025 M.W.  
 FLAP HOOK .021 M.W.  
 GLUE SKIN  
 CATAPULT  
 GUPPIE 1/4 HARD BALSA  
 FUSELAGE 1/4 SQ. SPRUCE TAPER TO 1/8 SQ. AT TAIL  
 BAY-STATE GRIT CLOTH FINGER GRIP  
 FINISH:  
 TWO COATS LACQUER SANDING SEALER FROM MASTER DECORATORS, TORRANCE, CA.  
 SPRAY WHITE DOPE ON WING & TAIL.  
 FUSELAGE 1/4" SQ. DOPED BLACK.  
 FEATHERS BLACK STENCIL SPRAY.  
 COLOR LINE - RED OUTER

KEEP TAIL LIGHT  
 FRONT VIEW & CROSS SECTION AT A-A  
 CONOVER MODEL WORKS  
 CONOVER MODEL WORKS  
 7-22-91

**Conover Model Works**  
**Tern - II Contest Glider**  
 WINGSPAN - 18" LENGTH - 17" WT. 1.2 OZ.  
 DRAWN BY LARRY CONOVER. INK ART BY DOTTY C.

The Confederate Air Force, IMAA Chapter 94 Presents;

THE ELEVENTH ANNUAL

# Joe Nall

GIANT SCALE FLY-IN

MAY 13,14,15,16, 1993

HARTNESS FIELD

GREENVILLE, S.C.



## Tern II/Conover

Continued from page 49

that a sharp-leading-edge airfoil was most stable for models flying at low Reynolds numbers. It starts a turbulation process early into a stall and keeps the flow attached to the wing surface.

In the '50s and '60s, we knifed through the air with sharp leading edges and generous polyhedral, but the general layout copied those who had tested and experimented before us.

Another real departure in the '70s and '80s was the wonderful creative designs of Mark Drela and his brother. They did very well with their high-tech models, which featured folding wings, tissue covering, carbon fiber—the list goes on. The Buddenbohm boys, with their Silly Putty DT, put a capper on recent HLG technology.

Today, 25 years after the days of my strong-arm launches, it's becoming apparent that innovation is the best approach. (So whose arm lasts forever?)

**W**hen I studied bird configurations, I noted the swept-back tips, the short nose, and the forked tail that twisted and tilted for roll and rudder at the same time. Terns have an ability to roll into any up-current and ride the lift. They often ride mechanical lift off waves, knolls, and trees.

And so our Tern II has swept wing tips, a

short nose, polyhedral tail, very little subrudder and a pelican-style guppy. The long spruce tail boom is not tern-style, so you might want to substitute hard, stringy balsa to keep the tail light and weight down.

This glider is not designed to be a dead-air floater. Its greatest talent is nosing up into approaching lift and wheeling around in a short turn to pick up the little risers. In a

### Tern II

**Type:** Outdoor HLG

**Wingspan:** 18 inches

**Expected flying weight:** 1.2 ounces

**Type of construction:** Solid balsa and spruce

**Type of covering/finish recommended:** Lacquer sanding sealer

full-blown thermal, it just rides up like a hawk until the DT cuts in.

**Wing:** Select light 1/4-in. C stock, and white-glue a hard 1/4-in. square to the leading edge. Put a 1/8-in.-square spruce in front of that. Note that the long center span is one piece. Use a template of the airfoil section to get both sides equal. Taper the tips before

airfoiling. Don't worry about the DT installation until the model is finished and has been flown a few times.

**Fuselage:** The fuselage is constructed using 1/4-in. square spruce or hard, stringy balsa, and is tapered as the plans show. The pylon is hard 1/16-in. sheet cross-grained in two layers, and the guppy is hard 1/4-in. sheet. The triangular wing saddle is hard 3/16-in. square balsa, split in half. Keep the tail end light.

**Tail:** The stabilizer should be medium-light 1/16-in. C stock, tapered and airfoiled like the wing. The subrudder is hard 1/16-in. sheet with an .015 wire skid—it takes a beating on cartwheels.

**Finish:** Use your favorite sealer, but if you can find it, try the lacquer sanding sealer from Master Decorators. I believe it even beats the old Testors sealer.

**Spoiler flap:** I was only about six years late when I discovered the Silly Putty timer. The West Coast fliers have used it with great success, according to Gary Buddenbohm, who manufactures it and whose workmanship is excellent. Ed Dolby markets the timers through FAI Model Supply. The address is on the plans. It really is worth the five or six bucks.

A good DT is about as important as the American Express card: Don't leave home without it! If you have fussed with fuses as I

have over the years, you'll love this DT. It resets in less than 10 seconds, and the action is reliable.

A full-scale soaring glider I saw years ago is responsible for my decision to use a wing spoiler flap. It's a natural for the Silly Putty timer, because the mechanism is concentrated in the wing and adds only two grams to the weight—a pittance.

My drawing of the spoiler should be clear, but here are a couple of hints. The flap hinge is secured with an .015 wire that runs through the entire length of the tubing. It is a good idea to glue silk over the tubing.

The little flap hook will surprise you, as it did me. When the trip lever flips up, the rubber band slips along the length of it (not a normal use of the trip lever), and engages the flap hook (if you have the proper dogleg bend in it). This lifts the flap up and helps the trip lever keep the flap steady in the wind. Drawing it took a lot longer than installing the real thing.

To install, just follow the step-by-step instructions that come with the DT kit.

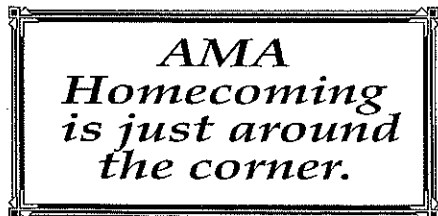
**The aerodynamics of it:** The lift on the center of the wing is killed when the spoiler flips up, which drops the nose. When the turbulent flow reaches the tail, it upsets lift back there, so the model comes down in a controlled shallow dive (about 20°). No spiral dives. No flipping around in a boomer. It flies out of it and down.

All that plumbing sitting on top of the wing may cause some worry. Not to fret. The climb or glide doesn't seem to be affected, but it does make it a real joy to test-fly the bird.

**Flight pattern:** This glider has an uncanny ability to roll out of the worst pullouts. Rather than stalling off the top, it rolls over into a glide circle instead of screaming back down. It is a good thermal hunter. It noses up into the edge of lift turbulence and whips around into the thermal. Let it ride on the edge of a stall—just keep the circle small. Some washin on the left wing will keep it up in a tight circle. Be wary of using rudder for turn. The 1/16-inch wing skew (see plan) will give you a natural left turn.

The best launching technique is to throw it hard, nearly straight up, into a thermal. You laugh—everybody tries to fly thermal air. *Tries.*

If you want to be a winner, get Dave Thornburg's *Old Buzzard's Soaring Book*. That old buzzard knows his air currents. Just make sure to pull the release pin on the DT, and have that Honda handy. . . ➔



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Extremely smooth running, extra defoamer, drk color, special heavy oil for heli'p'trs								
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_____	10 Pattern	13.23	9.93	9.66	8.87	7.94	293.42	_____
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