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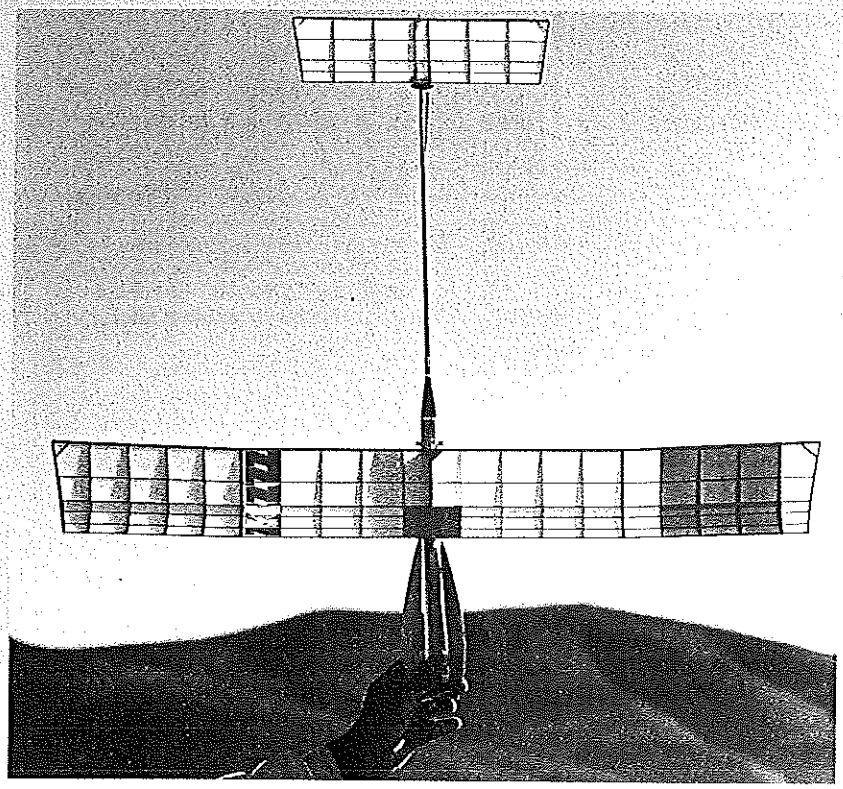
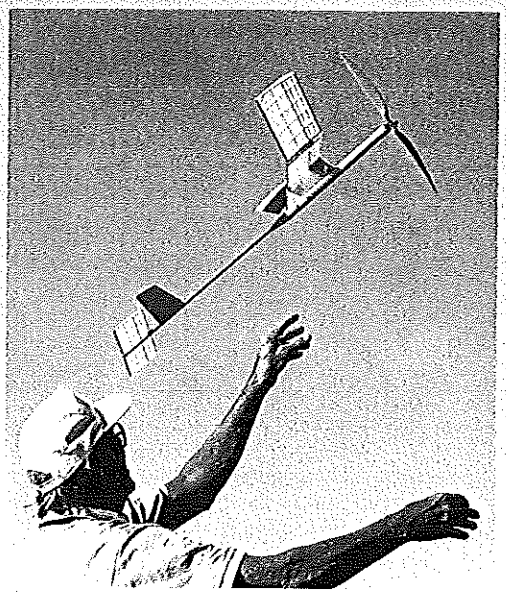
IceBox 25

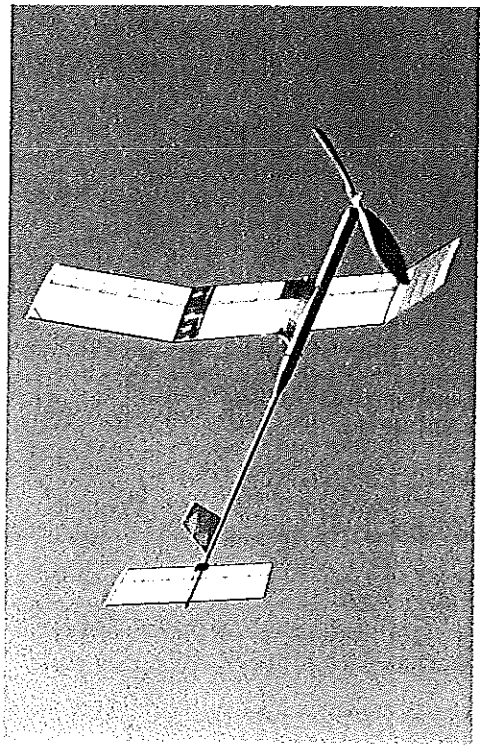
■ John Oldenkamp



Simple lines, modern proportions, close-folding prop blades. AMA number is silver MonoKote. Painted accents are light coats of Krylon fluorescent spray.



Lefthander Bob Langdon launches second prototype for a camera pass. Release angle will be steeper at full winds.



IceBox 25 in flight, just milliseconds after launch. Wing and stab are covered with Polyspan on top, Mylar™ on bottom.

IceBox 25

Type:
FF F1G (Coupe d'Hiver) rubber

Wingspan:
37.2 inches (projected)

Rubber motor:
FAI Tan (10g max)

Flying weight:
80 grams (minimum, with motor)

Construction:
Built-up

Covering/finish:
Polyspan/Mylar™ combination

ICEBOX 25, the latest in a series of F1G (Coupe d'Hiver) models dating to 1970, borrows quite a bit from its predecessors, but also features some very current neo-tech tweaks.

The airplane is smaller than most normal Coupes, so it punches up very strongly, thermals well, and is more than competitive.

IceBox 25 was a winner in its first contest outing, racking up 550 of a possible 600 seconds in the San Diego Orbiteers' Coupe Festival under less-than-ideal conditions.

Retained from previous iterations are the beloved "fishmouth" airfoils, quite likely unsurpassed for low drag, strength, and building ease; constant-chord wing with straight center panel (again, for strength and easy building); a moderately tall pylon provides safe, rapid trimming; and "locked in" surface adjustments provide reliable, confidence-enhancing performance.

New to #25 are modest applications of carbon fiber that reduce both the size and number of components; a "stinger" type fuselage which further reduces drag, along with the airfoils. (British studies suggest about a 12% increase of efficiency over standard rolled booms, boxes, and the like—something the Wakefield gang has practiced for many years.)

Last but not least is the all-plastic covering "system" that has proven outstanding on a dozen or so airplanes in my squadron. Details follow, but as a tease, this may be the kicker for those on the fence about ordering the plan!

CONSTRUCTION

First-time builders should arrange a bit of mentoring from someone already familiar with the Coupe class and the construction disciplines shown on the drawing. IceBox is a relatively puzzle-free build and can emerge from the average workshop in three days or less. Success in this project, however, demands—at the very least—careful selection of wood, access to an accurate gram scale, and economical use of thin cyanoacrylate (CyA) glue. Plasti-Stic is unrivaled for all-around applications, particularly where carbon-to-balsa bonds are required. See supplier list at the end of this article for sourcing.

If you have a modicum of patience and a willingness to accept the joy of putting things together, then the "process" that beckons will be all the more enjoyable. If blunders occur along the way, why not incorporate them?

Select sheet and stripwood for low weight *and* strength. Rib stock should weigh 9-12 grams per sheet, quarter-grain preferred. Motor tube material is A-grain by about 10 grams for the starter sheet. Sticks are whippy medium-hard to hard for leading edges and main spars. Pylon frame is medium to soft. Platforms and other ancillaries are also medium, since they are capped with plywood.

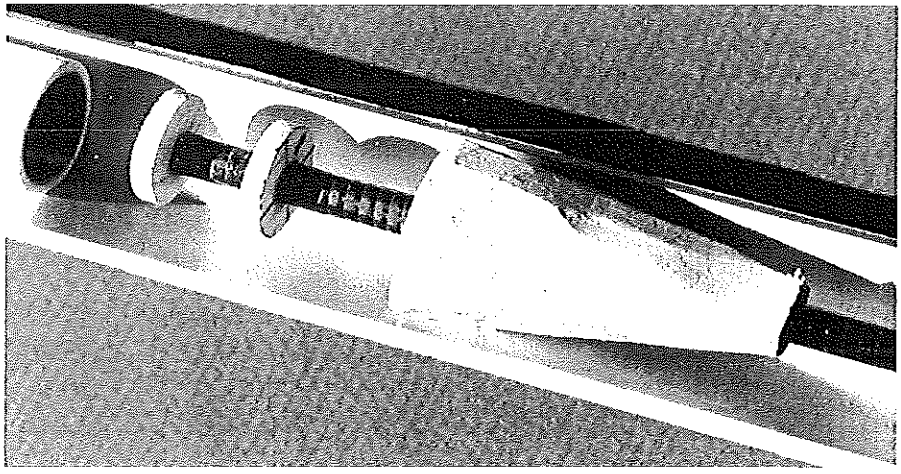
Carbon strip should be cut from sheets, sanded lightly, then wiped clean with MEK (methyl ethyl ketone) or dope thinner prior to laying up frames. Rib templates, complete with spar notches, are traced and cut from thin plywood. Cutoff pins will help register them during production. Plan should be covered, top and bottom surfaces, with waxed paper and positioned on a level pin-accepting surface such as Celotex.

Rudder, stabilizer, and wing should be built as flat as possible with all parts fit closely with no stress that might come along later as a warp. The structures should be laid down as completely as possible with pins trapping major elements against each other, followed by right-to-left application of Plasti-Stic glue.

When locating/pinning the trailing edges of the stab and wing, the carbon strip vertical facing should be "pulled" along to help create a good bond. As the rib ends are glued in place, the carbon will also adhere. The between-rib areas are final-glued in the air once the structure has cured and been removed from the building surface. Ditto the bottom spars where shown, the stick gussets, and various sheet elements and full-span wing spar webbing. Please note that this webbing has the grain running *spanwise, not vertically!*

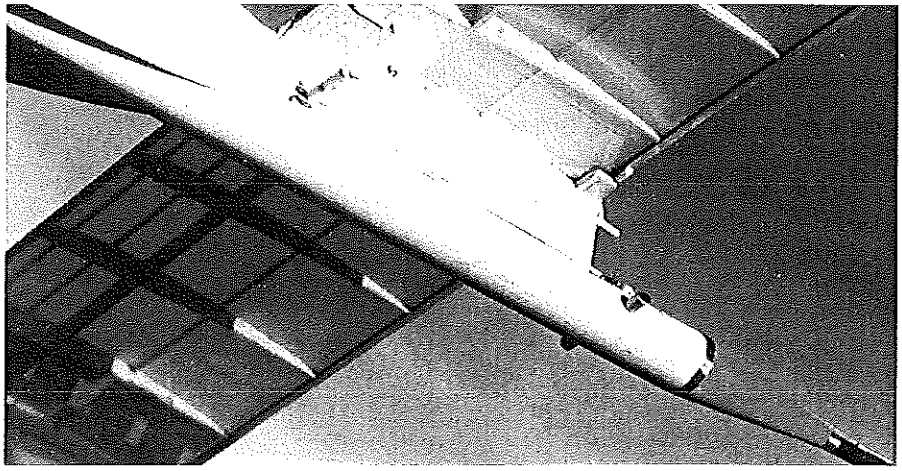
Motor tube: Make the initial blank about 14 inches by 3 from the aforementioned A-grain sheet. Dope one side twice with full-strength nitrate dope. Sand a bit. Now cut it to 2.6 inches wide by 13, soak the undoped side for a few minutes under very hot tap water, pat with paper towel, then coax it around a straight, candle-waxed ¾-inch dowel, wrapping smoothly with an Ace bandage. The open seam should be unskewed. Allow to dry 24-48 hours before "peeking."

A few minutes after the bandage is removed, the semi-tube should "pop" off the form. If it does not, slide a standard business card along the seam to free it. Tack glue the seam every half-inch or so as you pull the sheet off the dowel. Finish with a full line afterwards. Sand lightly, then proceed to the "stinger" unit.

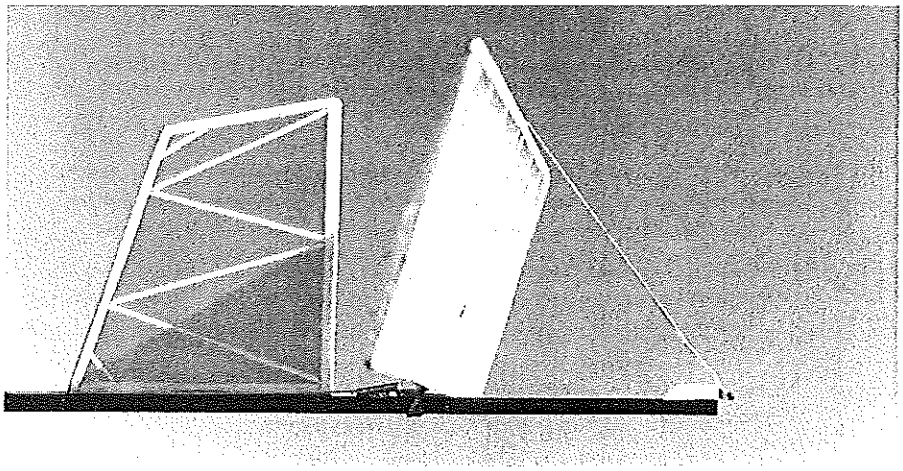


Graphic Design by J Cavanaugh

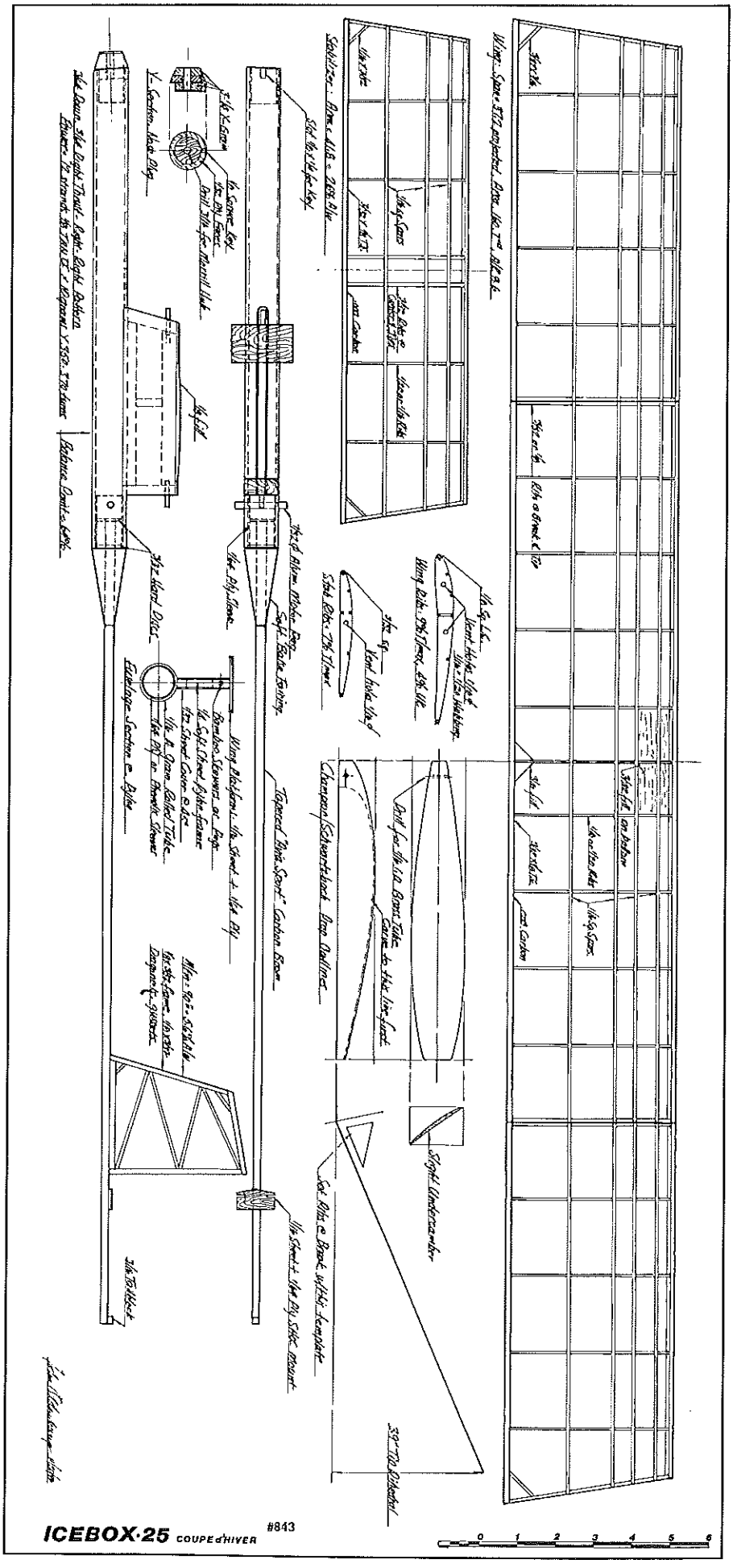
The boom locating disks are ready to insert into the motor tube, and the balsa transition cone has been roughed out. Aluminum channel aids proper alignment.



Note the carbon-fiber TE strip, "breather" holes in the wing ribs, webbing, and sheet fill for alignment keys. Motor tube is covered with grain vertical.



DT system uses fly line backing (20# test) lanyard that passes over stab top through a pair of aluminum tubing guides. Note the steep DT angle.



Thin balsa, plywood, or phenolic collar reinforcements are first installed at both ends of the motor tube. Two hard-balsa disks, center-drilled to fit the 21-inch Avia boom, are made up. The outer circle should fit the inside of the collars quite closely. After fiddling/test-fitting, glue the disks to the boom, having first roughed up the carbon a bit with an emery board.

The key move now is to attach the boom/disk unit to the motor tube. Use white glue or Titebond for this operation, with the whole works cradled in a section of 90° aluminum channel as an aid to accurate alignment. Very slight variations from perfect can be tolerated, but it is best to get it right while the glue is still workable.

The pylon, platforms for wing and tail, nose block, and any remaining components can now be roughed out. If you choose to go with the Champion-type propeller blades (they are excellent for providing rocketlike initial climb), they now can also be done.

Piece-of-cake scenario for this is to shape the blank from one-inch sheet with knife/sandpaper or bandsaw. Drill at 90 degrees for the prophangers X 3⁄32. Carve the bottom first to the stated outlines, progressively sanding to finish. Sandpaper wrapped around a one-inch dowel and pulled diagonally along the cut will yield a slight undercamber if desired. If not, finish flat, then carve the top surface to an even "average" airfoil shape. Let your fingers do the sensing of thickness, one blade to the other.

All bits now nearing required shape, it is time for a "sanding party" in the backyard or driveway. I like to work in bright daylight on a glass surface with #100 grit wrapped around a 1 x 2 block for openers, flat-sanding the wing, stab, and rudder, then contouring the rest of the stuff where indicated. A final dressing-down with 220 helps. The fishmouth leading edges need only minimal shaping. Ditto trailing edges. Do not sand away too much—anywhere!

Once all pieces are smoothed, cut the wing panels free at the breaks, sand the angled dihedral ribs cleanly and test-fit the tip panels to required dimension. These may be spot-glued "in the air," rechecked for accuracy, then finally bonded; or take the assemblies back to the workbench, jig, pin, eyeball, and glue whilst immobile.

Covering and finishing: Wing and Stabilizer *upper* outlines are given two coats of undiluted nitrate dope, lightly sanded, then covered, using thinner, with Polyspan™, a Starline International product. Polyspan applies much easier than ordinary paper tissue, adheres more aggressively, and is both stable and waterproof once finished. Try it—you won't go back to that messy, brittle, fading product of yore!

Try to get the Polyspan reasonably smooth. Trim excess with a new razor blade or two. Do not dope, sand, or shrink right now, because Step Two is to turn things upside down and cover the *bottom* of the wing and tab, and both sides of the rudder with Model Research Labs' adhesive-backed iron-on 0015 Mylar. Attach with low heat set on a MonoKote or equivalent covering iron or "shoe." Gentle tugs will smooth the way after tacking at mid-rib ends, then corners, lastly midpoints lengthwise.

Each undercamber line should also be ironed fully. It's sort of a slippery three-handed process, but is manageable once confidence builds.

The point of the method is the attempt to preserve the optimum airfoil performance wherein the bottom surface is as smooth as possible and the upper is sort of nappy, self-turbulating, in classic Lippisch style. Furthermore, the end result is a stable, relatively puncture-proof finish that no tissue job can approach.

Is it too heavy? *Not!* IceBox 25, all strapped together, fused, and ready for action, weighed in at 80.1 grams and is nothing if not robust.

The motor tube should have a couple coats of nitrate (thinned 50%) before covering with Polyspan, with the grain *vertical* to the center/thrustline. Seal the seam overlap with more dope, let dry, then spray two light coats of Deft semi-gloss Clear Wood Finish, which contains lightweight fillers. Also treat the pylon, platforms, noseblock, prop blades and the rest in the same medium. Sand to smooth.

While the above is drying, pile two water-thin coats of nitrate on the wing and stab upper areas. When set, begin shrinking the surfaces, top and bottom, with the heat at medium-high (2 to 3) on the covering iron, shuffled back and forth directly on the Polyspan and Mylar coverings.

Work slowly. No warps should occur, but if they do, apply opposite twist between the knees as

holder, add heat for one second, hold one more, and release. Works great! I have even used the technique on Bostonians with good results.

Should warps/surface offsets be desired, they are easily induced in the same manner: reverse twist, heat, release. Infinitely small adjustments can be set. They will *stay*. If they cause a problem, they can be removed just as easily.

Other stuff: Heat-shrink the motor tube covering if wrinkles appear. Sand out all the other bits and pieces. Mask off the wing and other areas for color accents and spray with Krylon paint (two very light coats, thank you) followed by two more of Krylon Crystal Clear; if you don't mind waiting an extra day or two, shoot the remaining hunks with spray can Behr Hard Gloss Polyurethane, for extra permanence and a finish that appears super-professional. Add AMA numbers (vinyl press-on stock is best), owner labels, club decals, and the like.

Attach the stab mount, wing platforms, and rudder to proper locations. Allow for ½-inch tilt in the stab for *right* glide turn (right side of stab is higher than the left, when viewed from the rear). Prepare the motor peg, dethermalizer (DT) hardware (I like the lanyard-over-stabilizer-from-front fuse system the best), a ten-gram motor, prop and noseblock assemblies, etc.

Because of the short nose moment, a Montreal-stop front end is a necessity. The most dependable (and cheapest) readymades are the John Morrill design listed under sources. Prop blades, should you want store-boughts, are available in a wide variety of styles. The Champion (nee Schwartzbach/Bob White) unit illustrated provides the most spectacular climb, particularly under turbulent conditions when fast ascent is paramount to success in competition.

Final Assembly: After all this work on the cocoon, it is time for the flyer to emerge! For final assembly, install a twelve-strand ten-gram motor with Crockett hook up front. Fix prop blades to hub/noseblock. Band wing

and stab to their platforms.

Tape the pylon/wing to rough location as shown on the plan, suspend the airplane (with blades in folded position) for trial balance point location. Untape the wing/pylon unit and move until proper level suspension happens and balance point is at 64% of the wing chord. Mark the pylon position fore and aft, roughen through the covering with emery board, then retape the pylon (minus wing), aligning both with rudder and thrustline. Tack-glue both pylon ends, remove the tape, then finish off with a full-length bead of Plasti-Stic CyA.

Preflight: Check for proper right and down thrust as shown. The airplane cannot be flown successfully without them. See that there is ⅛ inch incidence present between wing and stabilizer. Ensure that prop blades fold flat and that noseblock key seats firmly. Test that the pop-up DT function is friction-free, with correct angle (60°) and quick deployment.

Does the airplane look the way you envisioned it? Wait a day or so for the first airing out. Free Flight is not a hundred-yard dash!

Flying: Start early on a calm day for trimming/maiden flight. Take only a few test glides, adding or subtracting incidence through the use of index-card shims. The first flight should be on 33% turns or 125 on the counter. Launch level into the drift, but resist the urge to shove it aloft.

Observe for smooth right turn under power, precise prop stop and fold, and right glide. Initial stalls may indicate addition of downthrust shim, or slightly less incidence, *but not both*. Disaster awaits the overly anxious pilot! Ditto the person who fails to install and light the DT fuse—even on low winds.

Both of my prototypes flew quite well from the beginning, although pylon misalignment on the first caused power stalling for a time until a piece of trailing edge stock on the rudder induced a minor amount of right turn to eliminate the behavior. Even though Coupe-class airplanes lack wads of power, they nevertheless can sometimes benefit from the most subtle changes in thrust and incidence from the indicated specs. It is helpful to enlist an experienced "observer" during the testing phase, lest pesky or misunderstood fight gremlins set in for good and discourage the unwary.

At full tilt, IceBox 25 will power up almost vertically before settling it into a very strong "cruise," especially in a thermal (we all look good in those!) as the right glide trim goes to work.

IceBox 25 is at its best when the sun is out, the breeze is moderate, and thermals are moving through. Its smallish proportions make for generally top competitive performance, but it is definitely *not* a true

light-air machine. One might make a longer-winged version for early morning work.

And if you are machine-shop fluent, a removable tailboom, two-piece wing, and associated hardware would be an improvement. As IceBox 25 stands so far, however, I could not be more pleased. The chore now is to study air-picking as an art, change motors before each flight, and generally push the envelope out and over my opponents.

Questions and assistance will be cheerfully fielded at my hangar or by telephone. ✈

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Sources

Starline International, 6146 Cactus Wren Road, Scottsdale AZ 85253; Tel.: (602) 948-5798. Carbon Graphite sheet and strips, Polyspan™ covering, winders.

FAI Model Supply, Box 360, Sayre PA 18840; Tel.: (717) 882-9873. Tan II rubber strip, John Morrill Teeny-Torque Montreal front end units ($19.95), Morrill winders, winding stooges, Crockett winding hooks.

Aerodyne, 1924 East Edinger, Santa Ana CA 93705; Tel.: (714) 258-0805. Excellent nitrate dope. Thinner. Broad inventory of AMA and Old-Timer Free Flight kits, plans, materials, and accessories. Fast service.

Model Research Labs (MRL), 25108 Marguerite #160, Mission Viejo CA 92692. Carbon fiber sheet, Plasti-Stic CyA glue, Iron-on Mylar covering stock, random-weave polyester tissue.

Kite Country, 566 Horton Plaza, San Diego CA 92101; Tel.: (619) 233-9495. Avia Sport spiral-wrapped carbon tapered booms, type "G Force Skinny" @32.5 inches length ($10.50 prox.), weight 8 grams—and *very* stiff. Also "Skyshark Response Zero" tapered carbon boom (5mm to 3mm)—stiff, but somewhat lighter than the Avia Sport. Many other useful tubes and booms in various combinations of aluminum/carbon, glass, and epoxies as well.

Superior Props, 2412 Tucson Avenue, Pensacola FL 32526; Tel.: (904) 944-1972. Custom and ready made balsa propellers, front end hardware. Prop used on IceBox 25 was nominal 17 diameter x 19 pitch. Call to check inventory. Some finishing work required.

X-Acto, Speedball Road, Statesville NC 28677. Razor blades that actually cut! Stock #X670 in 100-count boxes. Special-order from most hobby and art-supply stores.