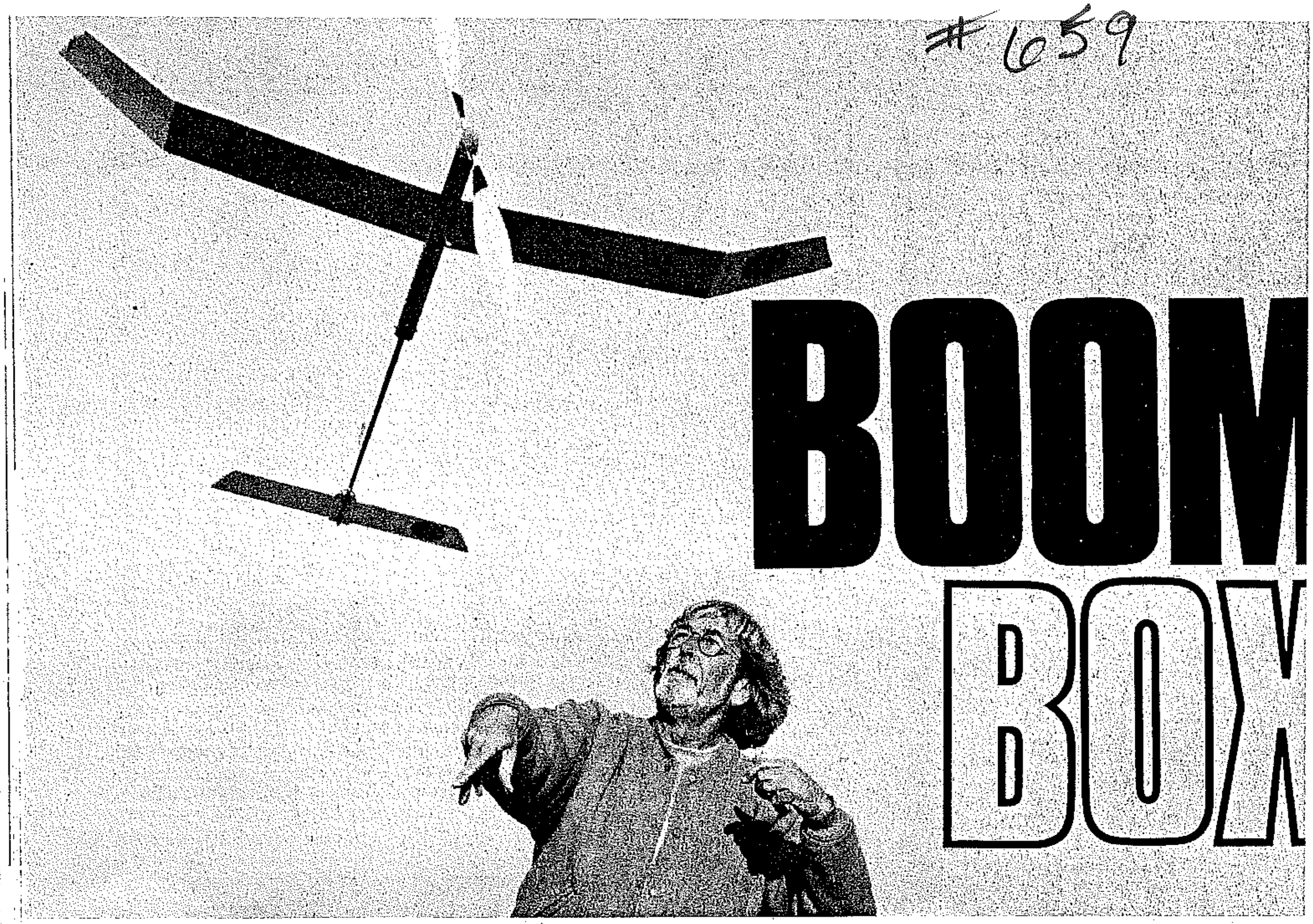
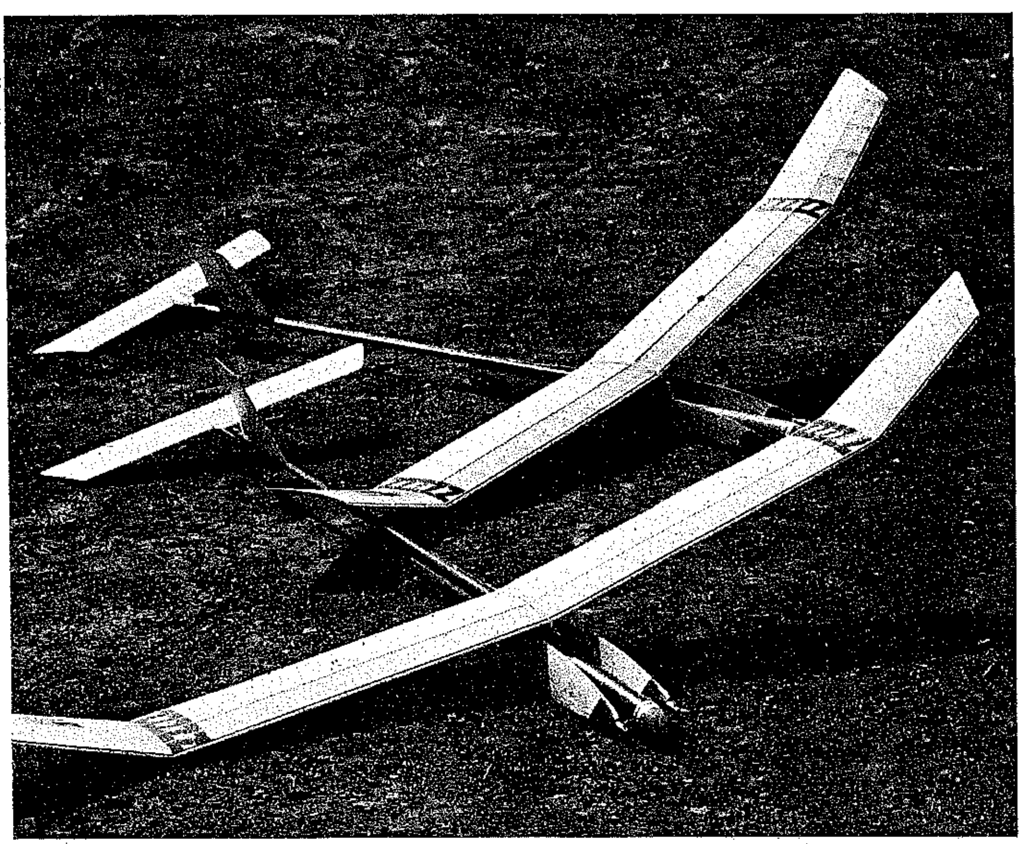


BOOM BOX



Top picture: The author launching his Number One prototype during an early test session. The clay visible on the right wing tip was later removed and the stabilizer tilt reduced to achieve 50-sec. circles. Above: Two prototype BoomBoxes. The black stripes on the leading edge of the wing and over the webbing are made of Formatt border tape and act as turbulators.

Have you ever thought about giving Wakefield Rubber a try? Give this one a look for a starter. With available components, it's simple, fast-building, and competitive.

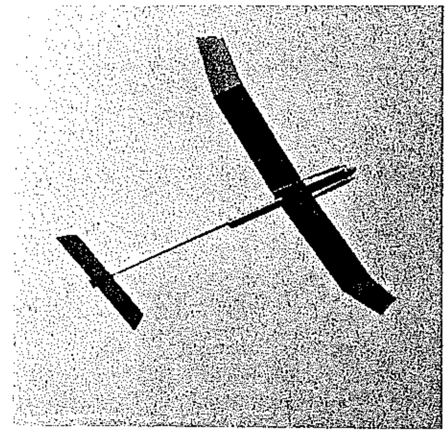
■John Oldenkamp

FIRST CONTESTED in 1928, the Wakefield Cup for Rubber-Driven Aeroplanes has a long and storied past. Eventually this competition became the modern FAI event that biennially yields a World Champion in the F1B category. Asked to list standouts among U.S. team participants, anyone who's attuned to the mystique will mention names like Gordon Light, Dick Korda, Chet Lanzo, Herb Kothe, Joe Bilgri, Joe Foster, George Reich, and Robert P. White. With airplanes of astonishing performance, aesthetic appeal, and competitive challenge, these gentlemen were prime developers o the event as we know it today.

Despite the attraction of the above-mentioned luminaries, Wakefield may not be for everyone. Detractors point out that the event is too complex, uncompromising, and difficult, not to mention labor-intensive and costly. My contrary view, as a relative newcomer, is that nothing so far in my aeromodeling career has matched the excitement and pleasure the BoomBox project has generated for me.

There's probably no such thing as a beginner's Wakefield, but recent developments in technology and the elimination of the builder-of-the-model rule have created the near-possibility of ARF (almost-ready-to-fly) airplanes in Free Flight. New products are coming on line in great numbers from cottage industries both here and abroad. Expect a flood of overseas products as East-West trade restrictions are loosened. Imports I anticipate we'll be seeing soon include wing sets, fully finished front ends, bulletproof fuselages, and other major components—if, indeed, not complete airplanes.

BoomBox isn't a beginner's model, but neither does it pretend to be a World Champion candidate. This model is an intermediate step along the way. It's also a very serviceable, robust, and competitive machine. With good air and dedicated practice, BoomBox can be a winner.



Number One BoomBox soars overhead in glide mode with the prop blades folded well beyond the wing leading edge. This photo clearly shows the model's general layout.

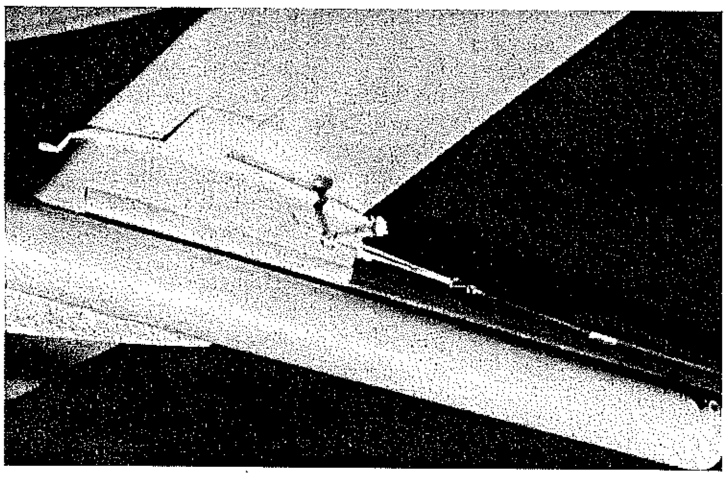
Two prototypes were built with only minor variations in detail. Number one, as shown on the plan, has a "safe" but modern airfoil and modest moments and areas. It was built from scratch in less than 30 hours. Number two is slightly larger in area, bringing it close to the maximum allowed by the rules (293.4 sq. in. of combined lifting and stabilizing surfaces). It also has Bob White's latest wing section and a thinner stabilizer. Other parameters are as shown on the plans.

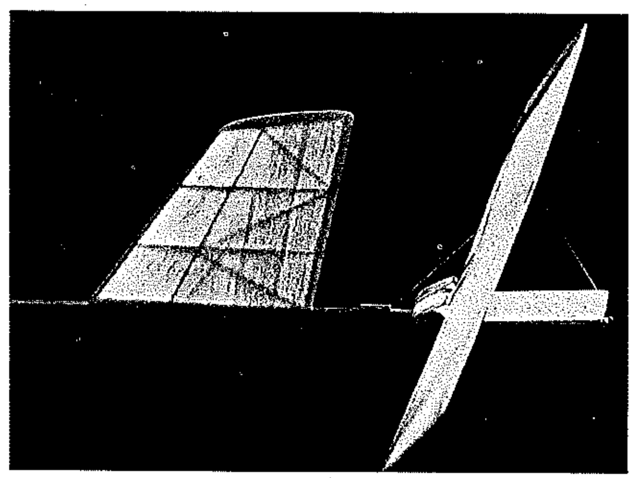
Though the number one model appears to climb faster and pull more strongly under power, it lacks the hanging glide of the subsequent version. But because it's easier to trim, the original variant has my recommendation as a learning lab for Wakefield.

The large amount of sheet balsa employed in my designs sometimes causes my colleagues to snicker a trifle, but the logic of my system has proven sound over time. My method involves using the wing and tail bottom sheeting as the "plan," which allows much of the assembly to be done off the board. This reduces construction time considerably, presents a smooth airflow across the bottom of the wing, and helps the model to withstand the shock of DT (dethermalized) landings. I've used this construction method very satisfactorily through a series of P-30s, Coupes, Pee Wee 30s, and finally the BoomBox.

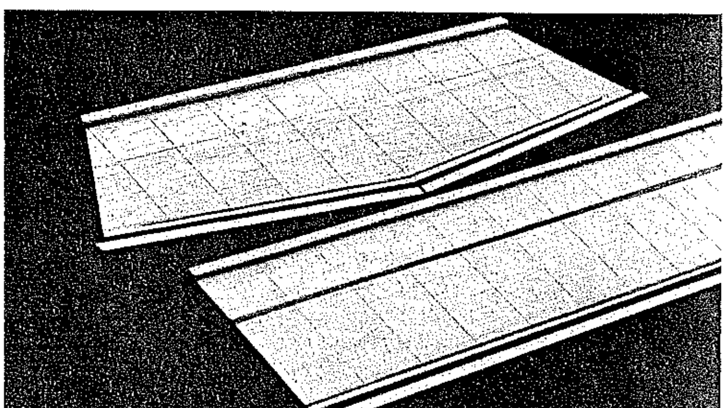
Extensive use of carbon fiber sheet gives the model strength without making it overly rigid. And the pod-and-boom semifuselage lends quite a distinctive, out-of-the-rut appearance to this simple-to-build Wakefield.

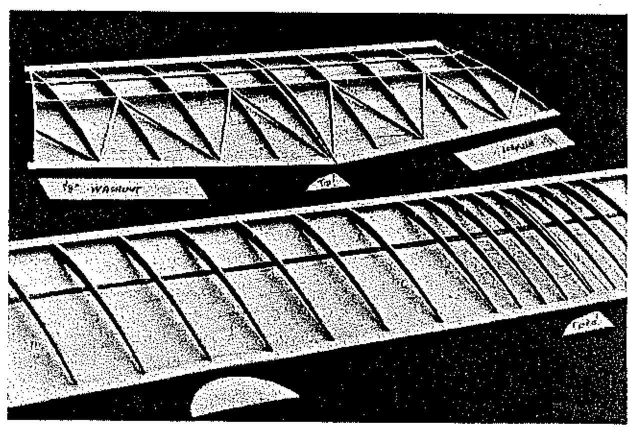
Continued on page 78





Left: Close-up shot showing details of the motor tube, the pylon and wing saddle, boom arrangement, and dethermalizer with the line hooked up. The rear motor peg can also be seen. Note the fully sheeted, undercambered wing bottom. Right: The stabilizer in its dethermalized position. The line rides on a small piece of carbon fiber at the stab trailing edge to keep the line from cutting into the structure. Note the lightly constructed, cambered rudder. The sheet rudder shown on the plans also will work quite well with perhaps only a very small weight penalty.



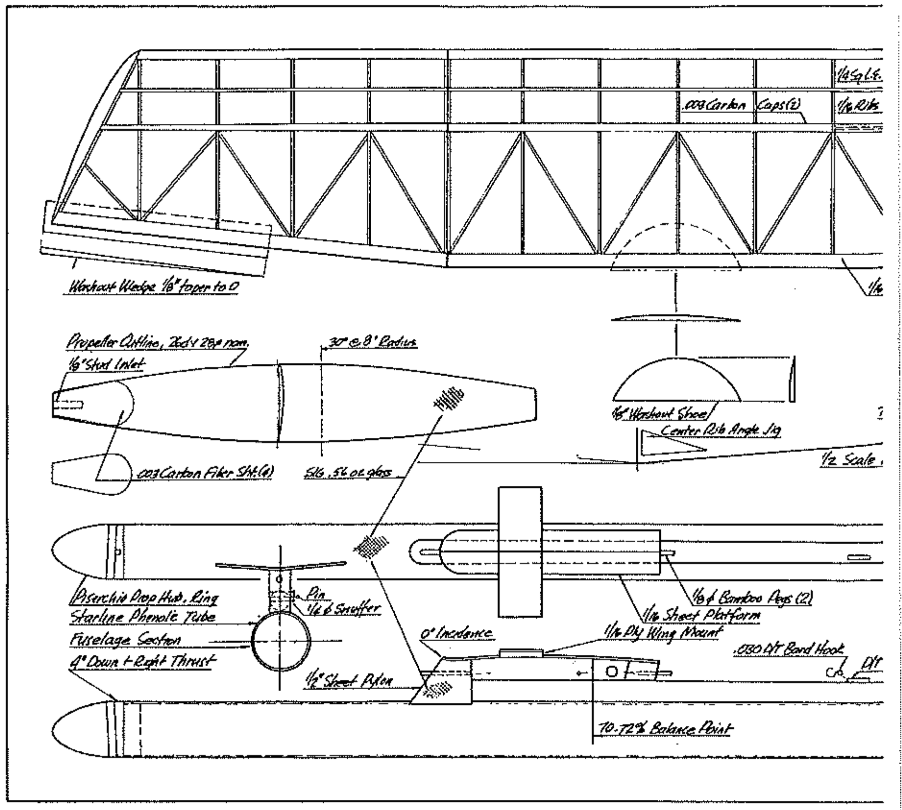


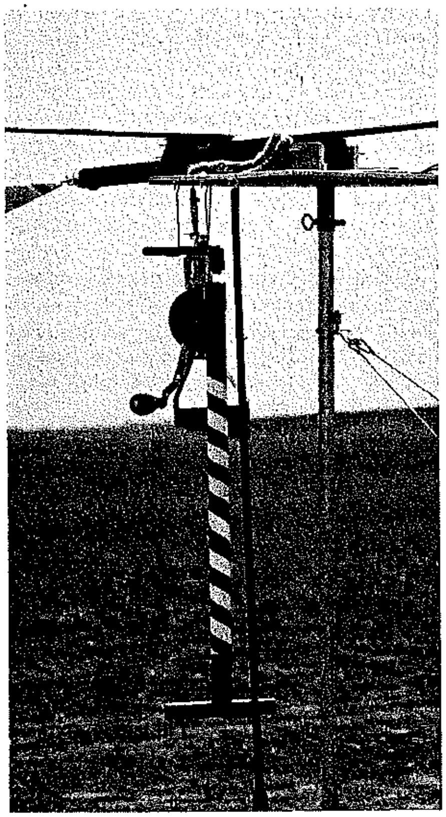
Left: The initial stages of wing construction. The bottom sheets are cut out and marked for web and rib positions. The carbon fiber web flange on the center panel is in position. Strips of carbon fiber are glued on the trailing edges (not necessary if using firm balsa stock). The leading edge stock is in place, the trailing edge stock is displayed. Right: Construction moves along. Ribs are glued to the center panel leading edges. Webbing and diagonals are in place on the tip panel. Washout wedges and rib angle guides are displayed. The majority of construction is done off the board and moves along amazingly fast. The center and tip panels are constructed as single units and separated at a later stage.

Construction

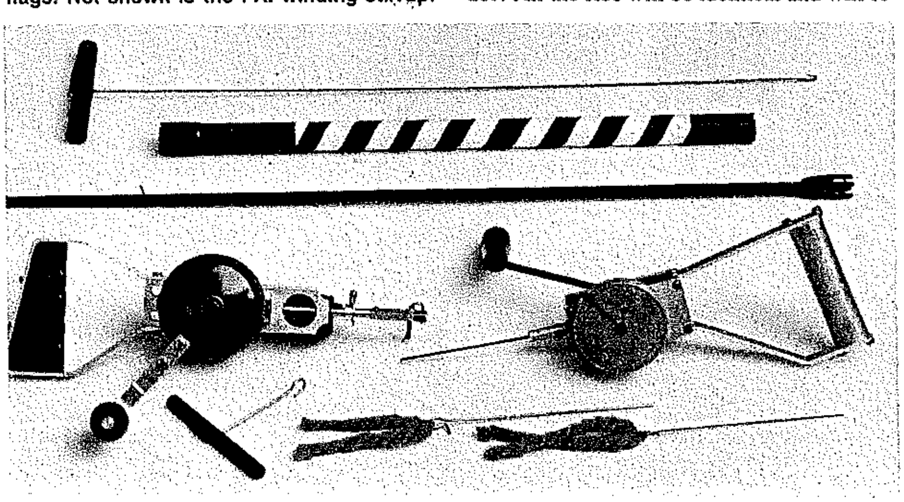
What follows is not a step-by-step guide. Instead it's a rundown on methods that are intended to get you on the flying field faster than ever before.

For starters, select an adequate amount of quality quarter-grained stock for the bottom surface skins; the wood should be both light and straight. Look for the same qualities in the stick wood too, making sure it's also medium-weight and springy. Relatively hard, speckly wood is best for the wing ribs (14-15 grams per 3 x 36-in. sheet) and trail-





Above: Number One prototype on the winding stooge with blast tube, extractor, winder, and other accessories shown on a special shelf built by the author. Below: Tools of the trade: Winding aids from top are 3/32 music wire extractor, blast tube from scrap PVC irrigation pipe, stuffer stick for inserting motors, Simplex winder (L), Wilder winder (R), 3/32 wire latching tool for the Pierchio front hub, and two hold pins with flags. Not shown is the FAI winding stirrup.



ing edge slices. Use regular (thin) and medium (gap-filling) CyA (cyanoacrylate glue) on all joints. Be sure the CyA is the freshest available.

Stabilizer. I prefer to build this component first. Measure and cut out the bottom sheet. Sand both sides to almost see-through density. A piece of plate glass makes an excellent sanding surface. Use circular strokes to begin with, then finish off along the grain.

Align the leading edge, and attach it with thin CyA. Mark the rib locations using a drafting triangle and soft pencil. Use the leading edge as the T-square. Also mark the placement for the spanwise carbon fiber bottom strip. Cut and glue in the trailing edge.

The ribs are cut from a plywood template equipped with with straight pins protruding 1/32 in. as registers. Zip around the outlines with a common razor blade, then nip off the ends and spar indentation using the same razor. All the ribs will be identical and will require no preliminary sanding.

Lay the partially completed stabilizei (which now functions as your plan) flat oı the bench. Lay down the carbon fibe: "spar" flange, then add the ribs precisel} along your pencil lines. Apply the horizontal-grain webbing between each rib. Finally, install the diagonals as shown on the pho tos. Now, was that fast enough to take you: breath away? It did mine!

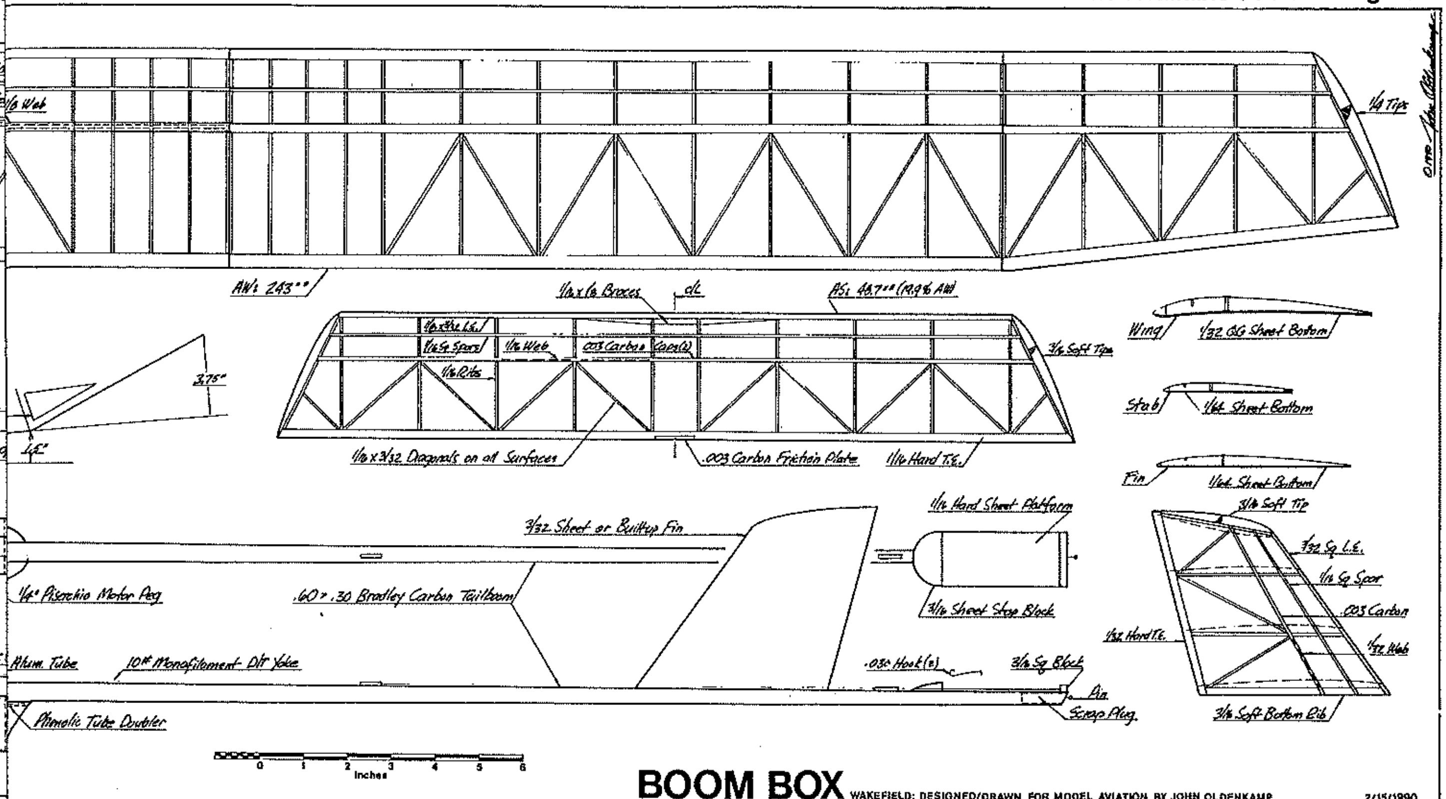
Prepare the stabilizer for covering b} sanding the top rib contours and leadin; edge shape to proper section (on a plat(glass support as a work surface), then sanding the bevel in the trailing edge. Blocl sand the webbing so that it's straight an(level with the rib tops.

Install the turbulator spar and the upper external carbon fiber spar cap directly ove: the webbing. Sand the tips flat before adding the punk-soft balsa stabilizer ends rounding them nicely from bottom to top.

Carbon fiber sheet as used on BoomBo: is a marvelous—and lightweight—way t(build stiff and dependable structures. I must, however, be prepared and laid u] carefully in order to avoid debonding unde: the high stress associated with turbulent air violent dethermalizing, accidental bumps etc. A very good glue for working with carbon fiber is PIC Products' Plasti-Stic (se(the April 1990 "RC Soaring" column iı *Model Aviation*). I give it a 100% recommendation.

To prepare carbon fiber, sand both side: of the material with #220 paper. Cut it t(the planned shape, width, and length usin; a straightedge and razor blade. If desired the .003- and .006-in.-thick stock may be tapered lengthwise by applying drafting tap(to both sides to avoid blade skidding. It's advisable to wipe the material down with ace

Full-Size Plans Available . . . See Page 194



tone just before gluing it in place to ensure a secure bond. Other than those few caveats, carbon fiber sheet is very nearly in the miracle category.

Rudder. Two versions are shown on the plans. I prefer the cambered type, since it assists in keeping a good nose-up, level power pattern and initiating left glide. The sheet balsa version will do just fine. If you use the latter, remember to thin out the aft area to allow for tweaking, if need be.

The cambered rudder section is a 4% Simplex airfoil. The ribs are cut to length from a plain template, and the webbing and spar inlets are eyeballed into place. A very narrow .003 carbon fiber cap is installed over the webs once the structure is sanded to perfection. If this is a first Wakefield project, then by all means go to the simpler sheet rudder.

The wing is the heart and maybe even the soul of BoomBox, so take a little care with it. Prepare an accurate rib template complete with pin registers as previously described. Cut out all the ribs, then sort them so that those of the best-quality wood will be placed in the middle where most of the stress is generated.

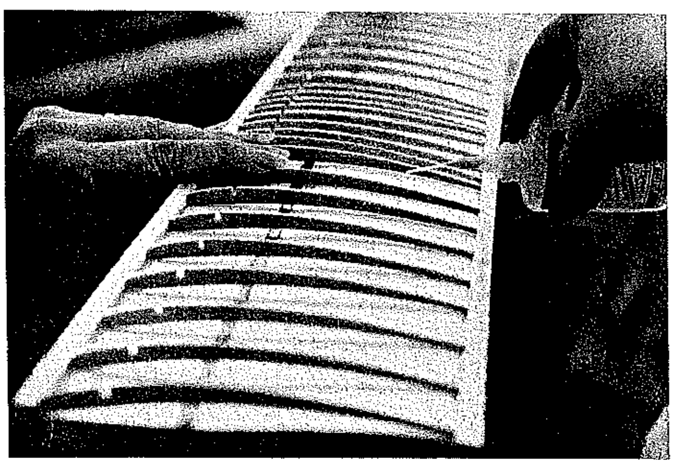
Make up the bottom sheets as with the stabilizer. Add the leading edges, then mark the locations for the ribs and carbon fiber bottom flange. Glue down the flanges spanwise. Add the trailing edge stock, using relatively dense wood. Position and glue the ribs to the leading edge *only*. There's no need to pin down the sheets, but make sure to use waxed paper underneath during this operation.

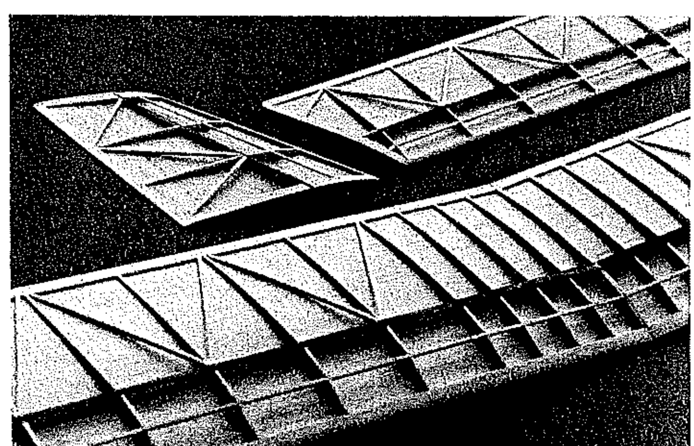
The polyhedral ribs are set at proper angles using templates as shown on the plan. The center section and tips are built as joined units at this point. Set them both up vertically in such a way that they won't move, and reglue each rib/leading edge joint with medium-thick CyA. Accelerator can be used to speed things up.

With the wing off the board, glue the alternate ribs to the bottom sheeting, one hand feeling and fitting while the other dispenses glue. Make sure to position the ribs exactly on the predrawn chordwise lines.

Install the webs using 1/8-in. balsa stock at the four center bays and 1/16 stock out to the tips. Keep the grain lengthwise. Contour sand the ribs and the leading and trailing edges. Install the single spar.

To establish the correct polyhedral, razor saw the sections apart, block sand the ends to a good test fit, then block to correct dimensions and rejoin the sections with CyA. A narrow (approximately 3/16) piece of .003 carbon fiber is installed at the center joint as





Left: Adhering the bottom sheeting to the undercambered ribs with the structure off the board. The left hand presses the sheeting to the ribs while the right hand applies glue. Note the already-installed carbon fiber web flange. Right: The wing, rudder, and stab structurally complete and ready for covering. Carbon fiber caps are in place. Note the carbon fiber dihedral brace set against the webs at the center break.

buzzing of a multifunction timer.

New products and such: As mentioned earlier, electric power is gaining more and more acceptance as an FF power source, particularly as motors get smaller and batteries get lighter and more powerful.

One of the newer Electric enterprises, Hi Line, Ltd., P.O. Box 1283, Bethesda, MD 20827, is run jointly by that dynamic duo, Tom Schmitt and Don Srull. Their latest offering is the well-named Mini-6 motor, a six-watt, ready-to-go geared unit capable of flying models weighing from three to five ounces with wing areas up to 150 sq. in. Ask for Catalog 902 for details and new additions to their line, including plans of eight aircraft designed just for Electric—one of which is Don's fabulous Dornier DO-X for six motors (and 12 props)!

Pharis Models, Box 804, Folsom, CA 95630, has several new kits out for the Nineties, including the old Ace Whitman-designed Albatross, a 36-in.-span Old-Timer, and the Pharis 30, a new P-30 design with winglets.

More good news from Robin Pharis says that Dave Platt's terrific Dragon Fly P-30 kit will be ready in the not too distant future. *(Readers may remember that this plane appeared as a construction article in the April '88 issue of this magazine. It is available as Full-Size Plan No. 585 for $4.—RMcM)* All Pharis kits that I've seen are quality products with excellent wood and top-notch accessories.

Champion Models' George Schroedter has his new, nicely illustrated catalog out, too, for 1990, and will be concentrating on filling kit orders for his popular Champion Coupe, Up Shot Mulvihill, and Wake-Up Wakefield. Due to the increase in demand for the in-house designs, George has elected not to carry Phil Hartman's Blue Ridge Coupe de Ville or Square Eagle this year. Both are still available from Phil, but through other retail outlets. Send George a buck for his catalog, which also lists stock balsa, Champion rubber, and many other FF accessories.

The Bostonian boggle: The new rules proposal cycle for 1990 has just been announced by AMA, which means the time is right to do a little fixing up of the newly adopted Indoor Bostonian Cabin rules. There seems to be a certain amount of inconsistency between the intent of the new rules and what actually showed up in the rule book. You don't think so? Then tell me whether or not a biplane is legal in Bostonian Cabin. If so, how many square inches are allowed in each wing? How about lifting bodies? Are they legal or not? What about windshield area vs. projected area?

These aren't my questions. They've come from every part of the country. Let's see if we can't figure out what we're doing before the next rule book is printed. Bostonian's been a great event for experimentation. I doubt that we need a shrunken version of the Manhattan Cabin locked into the AMA rules.

BoomBox/Oldenkamp

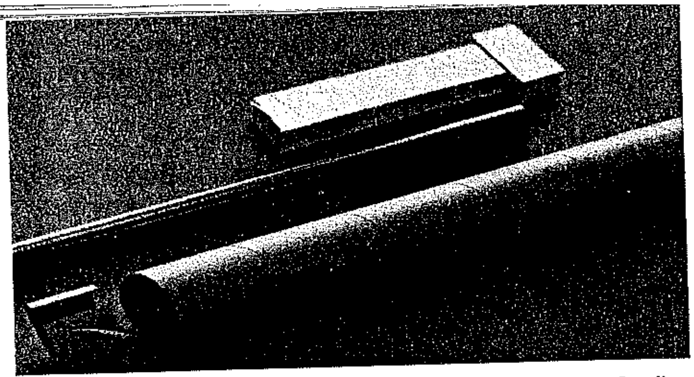
Continued from page 80

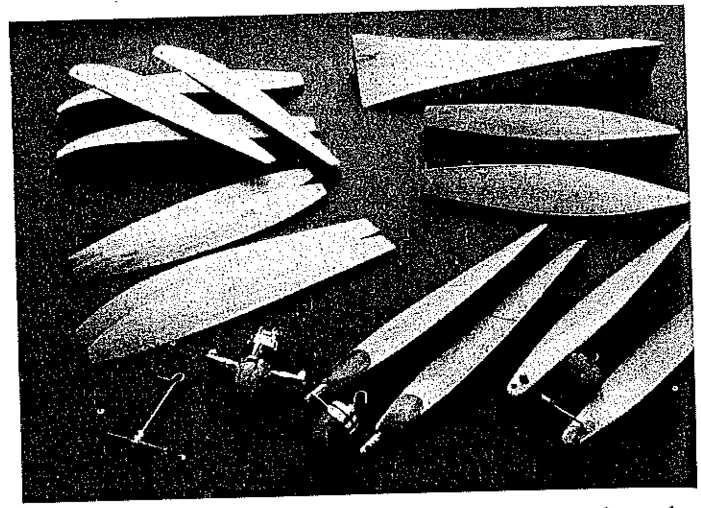
CyA plus accelerator. Cap the hangers with small pieces of carbon fiber sheet. Final gloss is three thin coats of Krylon Crystal Clear #1301 spray. An almost instant front end!

The BoomBox propeller is 26 inches in diameter, set at 30° eight inches from the center. It pulls like a Belgian draft horse! In the event you don't want to carve your own pitch block and lay up your propeller, sources for several suppliers of ready-made prop blades and hubs are listed at the end.

Final assembly. Scuff the boom rudder attach area, then carefully install the rudder on the boom centerline and aligned with the pylon vertical sight line. Drill the motor tube for the rear peg. Install a 40-gram, 28-strand FAI Model Supply tan motor. Hook up the prop unit to the motor tube, with the blades folded. Strap on the wing and stabilizer, the DT system, and all flight bands.

With drafting tape, assemble the motor tube to the boom following the plan dimensions. Suspend the model from a string set at 75% of the root chord (3.75 in.) to ensure that balance is dead-level fore and aft. If not, adjust the tape to slide the motor unit until it's balanced. Mark the forward point





Above: Basic fuselage parts: Bradley carbon fiber boom, Starline phenolic motor tube and rear doubler, and the roughed-out pylon, grooved to fit the tubes. Right: Wakefield prop blades and hardware. From top left: Champion blanks and author's carved set, Superior Schwartzbach pitch block, author's Maxwell block, and Maxwell's state-of-the-art block. Maxwell blades and a conventional Z-bar front end, BoomBox No. Two blades with a Piserchio hub, a Polish SPZ-1 front hub, a solderless Z-bar hub, and two Louis Joyner blade sets.

a brace to the webbing on each side.

Install the diagonals end-to-end. The tips will need to be shored up with wedges to provide 3/16 maximum washout. Washout can also be added after covering, should you choose not to use diagonals. The optional washout in the left main panel should have been added when the trailing edge was glued on. More on this later.

The soft balsa wing tips can now be added and sanded to a nice, curved upsweep. They can just as easily be omitted with no great performance penalty.

Prepare and glue in place the top carbon fiber flanges over the webbing. Double-check the integrity of this very important joint. If any ripples appear, reglue with Plasti-Stic. Finally, check for any irregularities in the surface, and sand them smooth.

The wing, stabilizer, and rudder should now be covered and doped while the rest of the project moves along. Cover both sides of each structure using the traditional nitrate-dope-precoat-and-stick-down-with-thinner method. Spray lightly with rubbing alcohol, and allow to dry. Finish with four coats of thin nitrate dope, sanded lightly between coats. Set aside to cure.

The semifuselage is a piece of cake. Prepare the motor tube by sanding lightly. Cut the tube to length, then attach the scrap-piece doubler at the rear using white glue. Pour in nitrate dope, and slosh it around in the tube for lube protection.

Sand both ends cleanly, then cover the tube with either light (.56 oz./yd.) glass-fiber cloth or silkspan. Seal with three coats of thinned nitrate dope. When this is dry, sand the tube smooth and set it aside.

Plug the small end of the Bradley tail boom with soft balsa, and square up the larger end with a sanding block. Make the pylon/wing mount from three pieces of ½-to 0.6-in.-thick balsa. The angled end pieces are vertical grained. Round the front before cutting the top to fit the undercamber curve. Whittle a V shape into the top to accept the center polyhedral angle.

Cut out the plywood wing rest. Partially slice through the bottom, and glue in the proper bend before attaching it to the roughed-out pylon. The fore and aft plates are similarly fabricated from hard balsa. A ½-in.-dia. wood dowel wrapped with sandpaper will neatly contour the fuselage mating surface on the bottom of the pylon. Wrap sandpaper around the motor tube, and run the short front shoe over it to establish its mating contour.

Dope and cover the structures with either glass cloth or silkspan. Punch holes fore and aft to accept the ⅛-in. wing hold pins, which can be made from bamboo kitchen skewers cut to length.

Carefully test fit and glue the pylon unit to the boom. Add the stabilizer platform, then mask off as necessary and paint the pylon and stab platform. Using two or three coats of Krylon spray colors works nicely.

The dethermalizer and associated hardware should be made up and installed at this point. When fitting the various tubes to the boom, scuff the mating surfaces with an emery board to ensure a solid glue bond.

The DT system used on BoomBox was an innovation of fellow flier Charles Yost. It consists of an external closed loop on *top* of the fuselage and stabilizer, obviating the use of a restraining line at the rear and making stabilizer on/off movements easy to accomplish. The DT action is very positive. Be sure to carry along some spare 10-lb.-test monofilament should the line break.

These BoomBox front ends and blade units (one shown disassembled) were laminated on a carved form covered with glassfiber and resin, then slotted to accept the Piserchio hanger aluminum studs. Carbon fiber shapes the cover and reinforces the slots. The little 30° triangle at right is used to eyeball the correct pitch at an eight-inch radius from the hub centerline.

Propeller and front hub. Owing to the very short nose moment design, it's advisable to use a Montreal stop mechanism to keep the prop from folding over the wing and causing a vertical dive.

BoomBox features a unit handcrafted by Bob Piserchio that includes the spinner, front fuselage ring with thrust adjustments ground in, blade hangers, pitch adjustment stop nuts, and hardened rear motor peg. It's beautiful—and tough to beat for durability and reliability. The blades are laminated from very hard 1/16 B-grain sheet balsa on a form carved to the J.H. Maxwell state-of-the-art pitch distribution, as described on page 76 of the *1988 NFFS Symposium Report* (issued by the National Free Flight Society; see source list at the end of the article).

The blades are airfoiled to shape, then covered on both sides with Sig .56-oz./yd. glass cloth and two coats of K&B finishing resin. Cut slits to accept the prop hangers, then set them fast with both thin and thick

Continued on page 181

of the pylon, and disassemble the units. Scuff the bottom of the boom and motor tube where they mate, block and jig the components to correct alignment, and very carefully spot glue them together with CyA.

This is the only really dicey operation in constructing the model, and it must be done with extreme care to achieve absolutely perfect alignment. If you happen to miss the mark, apply CyA debonder and start all over again. Fortunately, I haven't had to do so to date.

Final assembly and preflight checkout. Add thick glue filleting where boom meets motor tube, then mask off the boom and paint the motor tube, letting the overspray add opacity to the pylon unit. Again, Krylon colors are highly recommended. If you prefer a gloss finish, add a topcoat of Krylon Crystal Clear.

After the paint is dry, firmly glue in the front nose collar with thick CyA or epoxy. Make sure the mating surfaces are thoroughly scuffed—it *will* come loose on prop fold shock otherwise. At this point, take a break. Make sure everything is in inventory, and rejoice over your about-to-be-launched marvelous flying machine.

Check for warps, misalignments, and DT binds. Verify that the dethermalizer snuffer tube has a nice, fat flare on it, lest you burn up the whole works. The stabilizer should be flat end-to-end. The wing should have equal washout in each tip, plus either the optional left panel washout or an overall $\frac{1}{16}$ washin in the right main panel. Make sure this is correct before proceeding.

Check the downthrust and right thrust. You'll need every bit shown on the plan, and possibly even more. Incidence should be to specification as well. Weigh the airplane. You'll probably be about six to 10 grams shy of the magic 230-gram minimum, including motor, all bands, hardware, etc. Make up a sheet-lead weight, smoothly contoured, and tape it on the motor tube at the 75% balance mark. Are your national numbers, flag, name, and address affixed?

At this point, a tip or two about warp inducement or removal might be worth mentioning. This technique was first suggested by Lee Hines of Nordic fame. I've simply brought it up to date.

Locate the offending area, or the area where you want to add either washin or washout. Wrap it with at least three layers of paper towels, the microwave variety being the best. Tape the seam. Boil some water in a teakettle. When it's whistling, hold the component over the sink, and pour the boiling water directly onto the paper towels. Allow it to seep through the toweling.

Remove the toweling as soon as it's cool enough to handle. Apply the required amount of twist in the structure, and walk around with it in a cool breeze for several minutes. The warp is removed—or set in—forever! The method looks and sounds awful, but it works.

Flying. When the big day arrives, take heed of the following: I was utterly astounded at how fast these modern Wakes move and how much room they eat up, even under glide testing. Make sure your flying space is adequate.

Test glide the model at least two dozen times to make certain you have no unwanted stalling, diving, or overly tight turns lurking before the power testing phase begins. Make any corrections with judicious shimming and regliding until it's right. Ideally, the plane should run out smoothly and turn somewhat to the left, with no ups and downs.

When satisfied, wind in 100 turns on the motor. Holding the model in the launch position (don't launch it), let the prop unwind to observe the fold. If it folds properly, wind in 125 turns. Launch the airplane smoothly and evenly; don't throw it! Good flight? Wind in 175 turns for the next one. It stalled? Add a downthrust shim. No glide turn? Tilt the stabilizer slightly.

By the time you've reached 250 turns, things will be getting pretty lively. It would be helpful if a veteran gumbander were along for the show at this point. Fly the airplane 10 or 20 times before going for more power, especially if any anomalies appear. Work out any problems, even going back to low-power testing if necessary until the answer is apparent. I flew my prototype in its first full-power maneuvers (369 turns) under contest conditions. Not a good idea! But the plane did manage to max on six out of eight flights in cool, breezy weather at the October 1989 FAI team selection semifinals at Lost Hills, CA—again on 369 turns.

Postscript. BoomBox number three is nearing completion. It incorporates changes aimed at optimizing the design. All outlines are retained, but the motor tube has been lengthened one inch to accommodate a new, thinner batch of rubber. This will create a tighter motor, assuring a fail-safe condition for the prop stop mechanism.

The wing undercamber has been increased from a nominal six percent to eight percent. The top camber (USA 5) remains the same. A Shoc-type stabilizer mount is being incorporated to prevent random prop fold shock from pulling the stab off its perch. A new, higher aspect ratio prop outline will be tried with Andrujikov pitch distribution. Write to me at 3331 Adams Ave., San Diego, CA 92116 for further data, information, and problem solving.

Sincere thanks go to Robert P. White, many-time U.S. Wakefield team member, World Champion, and acknowledged maestro, for advice and encouragement which I found most helpful in developing my series of BoomBoxes.

Sources

Aerodyne, 603-B San Michel North, Costa Mesa, CA 92627: Quality nitrate dope, thinner, covering adhesive.

Bradley Model Products, 1337 Pine Sap Court, Orlando, FL 32825: Carbon fiber tail booms, carbon fiber sheet.

Champion Model Products, 880 Carmen Court, LaVerne, CA 91750: Prop blanks, Z-bars, good tissue, balsa, kits.

Composite Structures Technology, 3701 Inglewood Ave., #268, Redondo Beach, CA 90278-1110: Glassfiber cloth, carbon fiber sheet.

FAI Model Supply, P.O. Box 3957, Torrance, CA 90510: Morrill winders, winding hooks, stirrups, FAI tan rubber strip, Slick lube, Simple Stooge winding aid.

Free Flight Consultants, 5257 Stone Court, San Diego, CA 92115: Piserchio propeller hubs, motor tube fittings.

Louis Joyner, 3657 Brookwood Rd., Birmingham, AL 35223: Precision laminated prop blades in several pitches and shapes.

J. H. Maxwell, Aids for Advanced Aeromedelling, 14 Upper Craigs, Stirling, FK8 2DG, Scotland: Preformed prop blades, pitch blocks, sheet wings, rib sets to order, jigs, state-of-the-art propeller pitch blocks.

Model Research Labs, 25108 Marguerite #160, Mission Viejo, CA 92692: Carbon fiber sheet and other composites, PIC Plasti-Stic glue for carbon fiber sheet.

National Free Flight Society, c/o Fred Terzian, 4858 Moorpark Ave., San Jose, CA

95129: *1988 NFFS Symposium Report.* In addition to J.H. Maxwell's article, "State-of-the-Art Propeller," the report has a piece by Bob White called "What to do After the Glue Dries," a classic on Wakefield trimming and competitive strategies. A must-see!

Starline International, 6146 East Cactus Wren Rd., Scottsdale, AZ 85253: Phenolic motor tubes, SPZ-1 front end and hardware, thermistors for thermal detection.

Superior Props, 2412 Tucson Ave., Pensacola, FL 32526: Prop blades, pitch blocks, front end hardware.

Wilder's Model Machine Works, 2010 Boston, Irving, TX 75061: Precision winders, torque meters, custom accessories.

School/Hendry

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Not only are the kids learning academically, but they're able to see the finished product—a beautiful and fully functional model airplane.

"This program is getting quite a reputation as inquiries continue to come from all parts of the country and Canada. Most are inquiries about how other areas might replicate this program. Denise Elliot and Annette Bohs, employees of the Private Industry Council of Lee County, Florida, visited the program for a firsthand look. 'Extremely impressive,' stated Denise. 'The program is well run and the kids thoroughly enjoy what they are doing. It is obvious they are learning.' "

With responses this positive, it's no wonder that we're looking forward to an even bigger and better summer session in 1990. Why not try a summer school course in model aeronautics in *your* school district? Happy flying!

Editor's Note: Dr. Hendry is an adjunct faculty member of Pasco Hernando Community College, an instructor at Gulf Comprehensive High School, and an active member of the West Pasco Model Pilots Association.

For information about the Pasco County program, write: Dr. William W. Hendry, Gulf Comprehensive High School, 5355 School Road, New Port Richey, FL 34652.

Yaks/Berliner

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The Reno Air Races opened on September 12, 1988, with the first three days for qualifying time trials. For the 28 Unlimited class airplanes on hand, this meant a single maximum-speed timed lap around the 9.171-mile, nine-pylon course. The course is laid out across a 5,000-ft. plateau and bordered by 7,000-ft. peaks of the Sierra Nevada, so the hell-for-leather roar of engines echos back to the watching crowd.

Skip Holm flew Joe Kasparoff's No. 97 and completed his lap in 1:19.12, an average speed of 417.274 mph. A decade ago, this would have come close to the record, but advances in engines and airframes have produced amazing speeds for piston-engined airplanes flying in a circle.

Lyle Shelton led the way in 1988 in his No. 77 Grumman Bearcat, Rare Bear, ad-

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