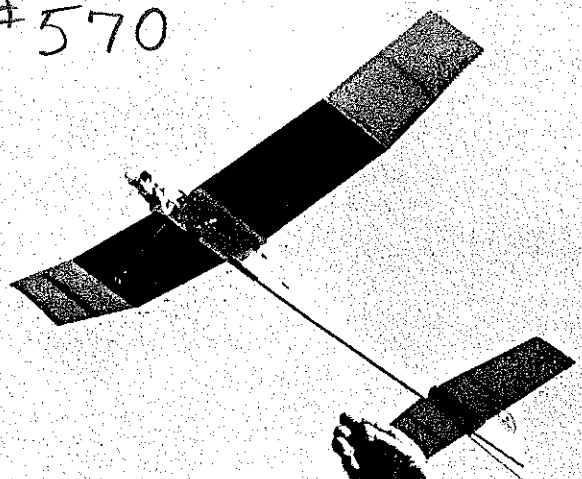
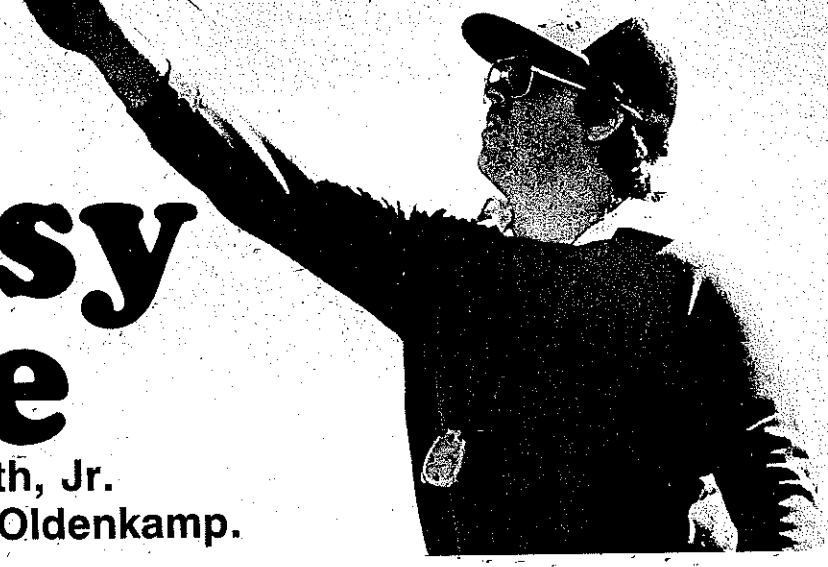
#570



Inexpensive, quick and easy to build, and a great vehicle for club contests, this Pee Wee-30 model has the appeal it takes to become a winner. We should also mention that it's a perfect model for that youngster just starting in model aviation.



Busy Bee

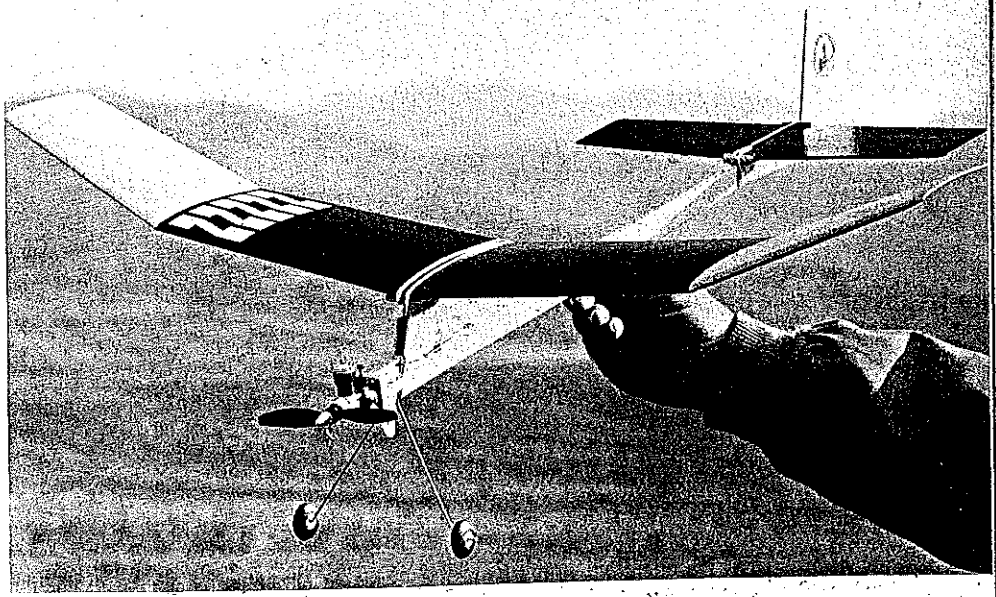
■Design by Bill Booth, Jr.
Text/Pics by John Oldenkamp.

FREE FLIGHT IS ALIVE and well! It may need a little sprucing up here and there, but nothing in aeromodeling can match the thrill of witnessing your latest project wheeling overhead, whether in light lift or in a genuine monster thermal. Watching the model speck out on that solid max flight amply justifies those frenzied hours of designing, building, and testing.

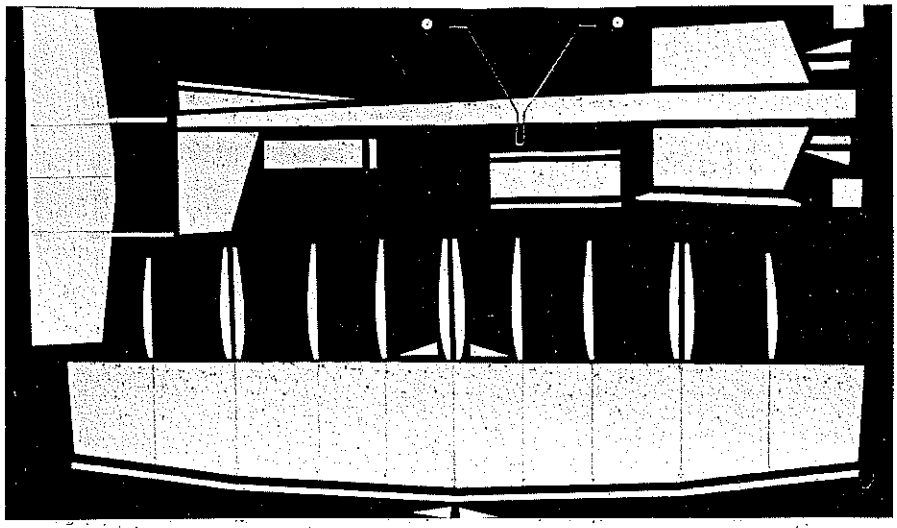
Today's smaller flying sites have spawned several new events, among them the very successful P-30 Rubber class, Walt Mooney's West Coast Bostonian for 14-gram models, and any number of Scale and semiscale events promoted by the Flying Aces Club. Many newcomers to the Free Flight community have entered through these classes.

The category of Pee Wee-30 can now be added to the list of new events, but that's getting ahead of the story. Like so many of the good things in aeromodeling, Pee Wee-30 had its beginnings during a late-night hangar flying session.

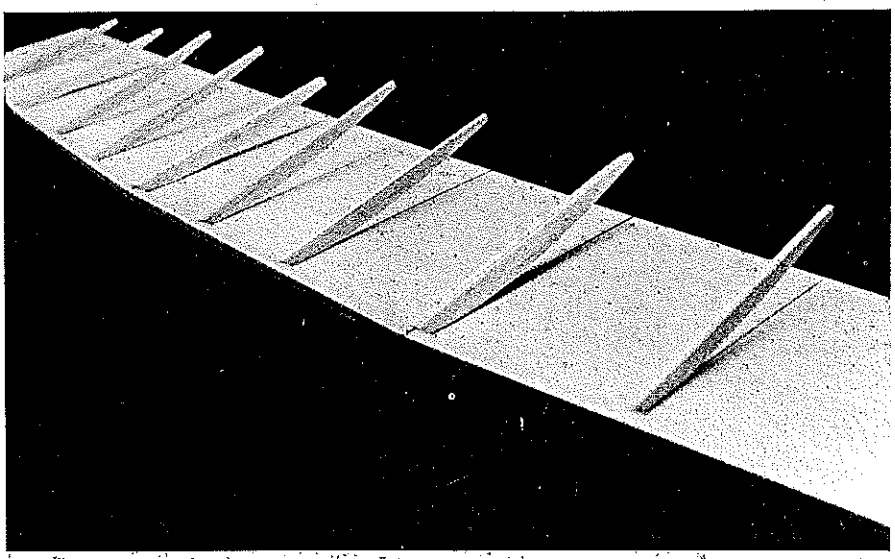
At the 1984 Nats in Reno several San Diego Orbiteers got together at their motel to relax and enjoy a blessedly cool evening. They were temporarily saturated with fly-



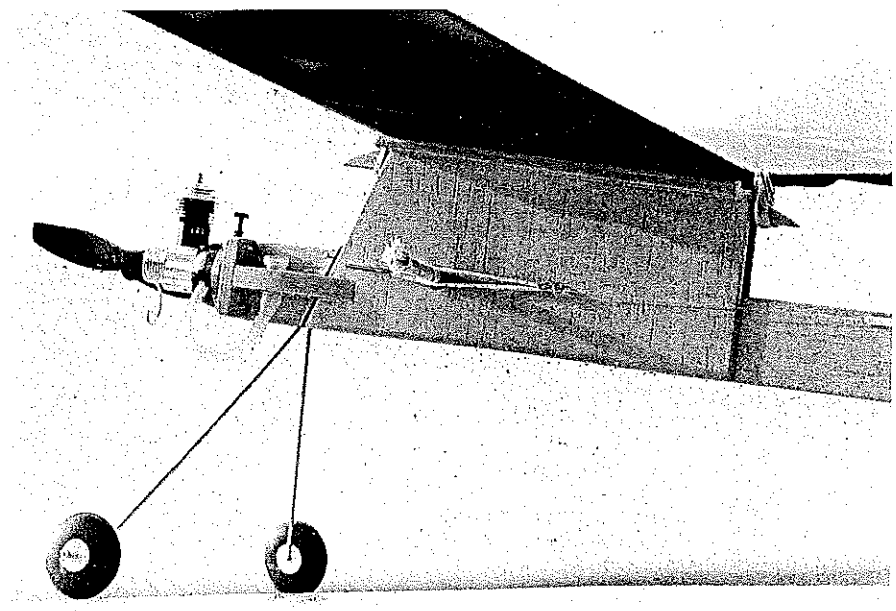
Above: Designer Bill Booth, Jr. has a try at launching our author's Pee Wee-30 model. Right: The completed model (done here in black and yellow) at the Orbiteer's spacious flying field.



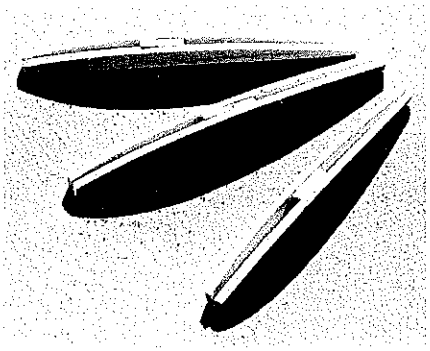
Fully "kitted" and ready for assembly, it's easy to see the relative positions of the parts for the finished model. Note the guidelines drawn on the wing and the stabilizer for rib placement.



First install the leading edge, then double-glue the rib tip and leading edge joints. To avoid warping, glue the sheeting onto every other rib, then go back and glue the remaining ribs.



Things of note on the business end of the Pee Wee-30: Engine mounting screws should extend through the firewall where a drop of CyA will lock them in place. The fuel reservoir is mounted in the firewall brace, and the wheels are held on with a piece of aluminum tube. Also note the dethermalizer fuse and related hardware and the simple pylon and landing gear.



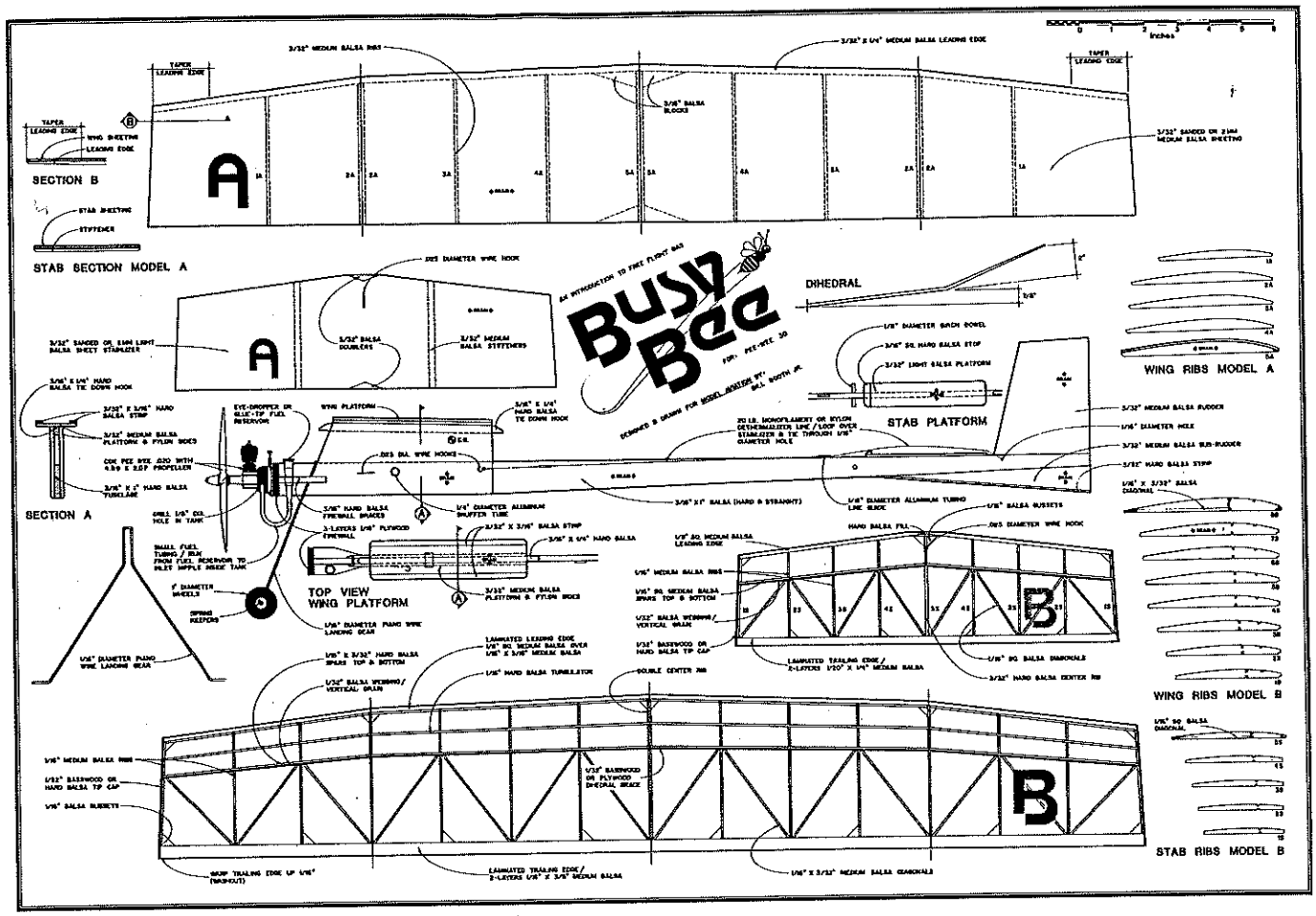
Above: These rib assemblies for the polyhedral joints simplify and ensure proper panel angles later during the wing's construction.

The wing camber is established "in the air" using gentle finger pressure, proper alignment, and very small amounts of CyA glue.

ing and playing the casinos, and out of the ideas they bounced around that night came a new proposal. Charlie Yost (longtime Free Flight proponent and McDonnell-Douglas aero engineer) suggested that we develop a low-key Gas event using the popular Cox Pee Wee .020 engine. The goals were that it be something fun, simple to build, relatively inexpensive, yet exciting to fly in competition. Charlie threw in one last requirement: It had to have *wheels!* On the spot it was christened Pee Wee-30—and the fun began.

Within a month, six or so of the little beasts were being flown informally at our local contests. Preliminary rules were drawn up, data was taken on engine performance, and the flight envelope was developed. What emerged was an entry-level Gas class that nearly everyone enjoyed building and which seemed worth pursuing beyond the club level. In no time at all the national modeling press picked up on the idea, giving it an additional boost. Very quickly we realized a winner was in the making, but to our surprise the appeal was attracting both experienced and novice fliers, and more than a few of the new contestants were RCers.

After two years of testing, tweaking, and refining the rules—and with the help of our friends, national columnists Ed Whitten, Dave Linstrum, Bob Stalick, et al—the Orbiteers chose 1987 as the year to introduce Pee Wee-30 to the world. We included the



category in our club schedule as a special event and ponied up $100 for the year's Pee Wee-30 club champion. The process of formalizing the rules grew out of our shared experience in the event, and we trust reflects its true spirit. A brief summary version of the rules (although the actual language is a little tedious) can be found at the end of this article.

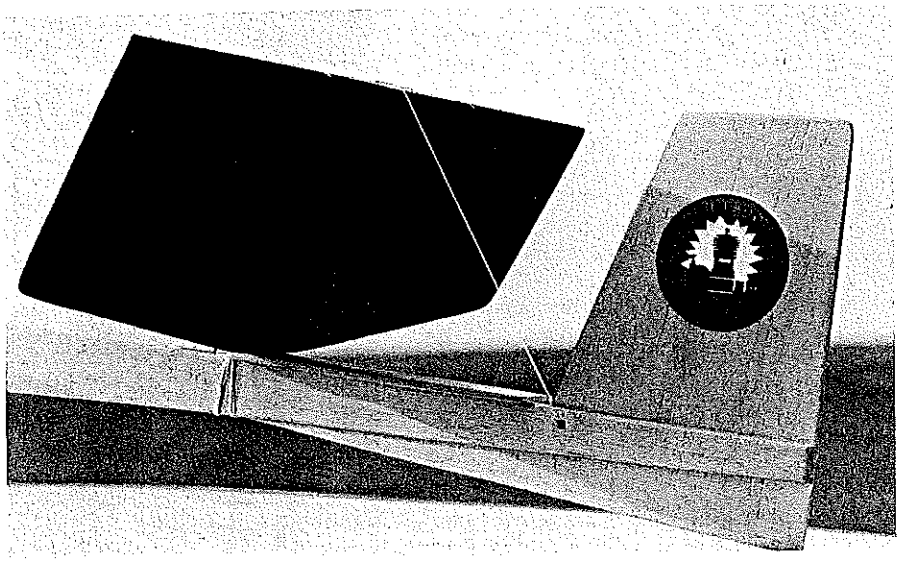
There are probably a thousand model designs that could be adapted to the Pee Wee-30 formula. Among then are many Old-Timers, Nostalgia subjects, and even modern designs with the addition of wheels. Complicated curves and fuselages can simply be executed in all-sheet construction, although a built-up stick-and-tissue wing will yield a better glide. If you want to roll your own, try to keep things simple and straightforward. You will be rewarded with an extremely durable and fun-to-fly ship that won't cost you a bundle to produce.

The Busy Bee is a knock off of Bill Booth's very successful Malibu ½A and A model. The plans show two versions of construction. Depending on your time schedule and skill level, you can build either an all-sheet or a stick-and-tissue version. The prototype was all-sheet and took about 10 hours to finish. Despite being heavily painted it weighed only 102 grams. It flew very well during initial tests, but was slightly tail-heavy. Substituting a stabilizer made from lighter wood brought the center of gravity (CG) to the proper location—and now it goes like all the others we've built, with a mild right climb and a fast but hanging glide.

Flight times are around a minute or so in dead air, and well over two minutes in buoyant air. Rise-off-ground (ROG) takeoffs are brisk and safe, and this is one tough little airplane. On one test flight the model was inadvertently sent off with about three seconds of engine run time remaining, resulting in a violent stall and a resounding smack into a truck. A larger, faster ship would have smashed to pieces, but with the Busy Bee the only damage was a small nick in the wing leading edge—and a smidgen of embarrassment on my part.

Building. The following construction guidelines are for the all-sheet Busy Bee as shown on the plans. If this is your first or second model, it might be useful to enlist someone with more experience to help you smooth things out a bit, particularly with the use of the instant Cyanoacrylate (CyA) glues. They are remarkably easy and fast to use but require a little caution and practice.

The basic supplies needed for construc-



Use plenty of DT angle on the stab to assure a safe return of this good-flying model. Monofilament fishing line holds the stab down in place until the fuse burns through the rubberband.

tion are sheet balsa, additional bits of wire, plywood, dowel, etc. Three sheets of 3 x 36-in. balsa either 3/32-in. or 2mm thick, will make all the parts except for the fuselage, which is made from rock-hard, dead-straight 36 x 3/16 x 1-in. balsa. (A common yardstick will also work well for the fuselage.) Lightweight quarter-grain (speckled looking) wood is best. Pete Vacco and the fine folks at Hobby Woods (P.O. Box 48, Linden, CA 95236) can supply some super 2mm wood in the 6- to 8-lb. range that is ideal for these all-sheet projects.

Only the simplest of tools are needed: sharp single-edge razor blades, 100- and 320-grit sandpaper, a sanding block, pliers, a ruler or straightedge, and small drill bits or round files. In keeping with the spirit of this category, nothing complicated is called for.

It is a lot of fun to pre-cut or "kit" these all-sheet models before beginning the assembly process. Once all the pieces are cut to size and laid out, the finished product will take shape very rapidly. Do the time-consuming parts first. Begin by butt-joining two of the 3 x 36-in. sheets together, using instant CyA glue. As soon as the glue sets, place all three sheets together and block-sand them to a uniform thickness. Patterns for the various shapes can be traced, measured, or cut from the plans.

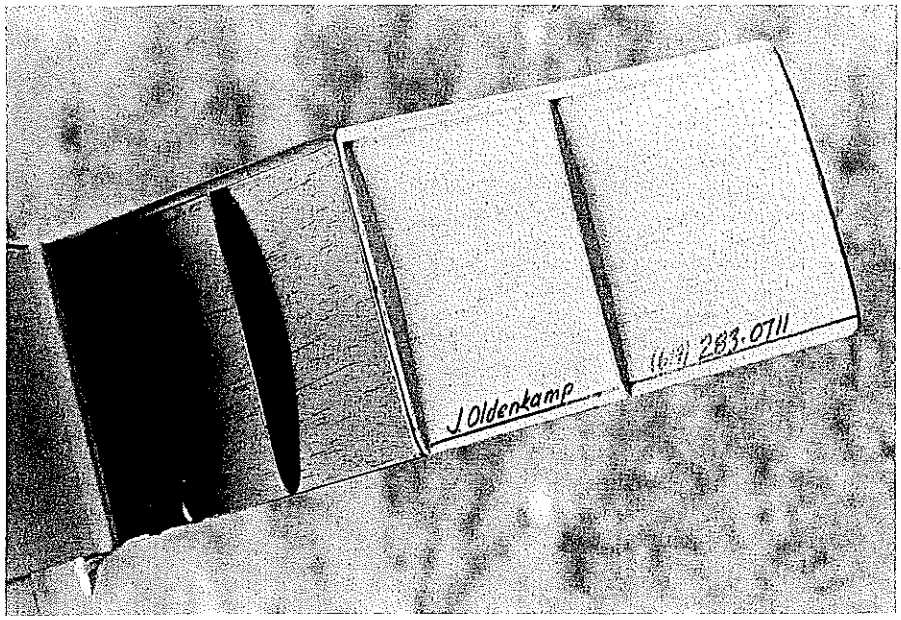
Using any method you choose, mark the outlines, rib and brace locations, and cut everything out as cleanly as possible. Gussets, smaller bits, and the wing leading edge are cut from the remaining scrap. If you wish, all the ribs can be cut from the center rib pattern and shortened to match the plan taper as you go along.

The fuselage stick requires only two cuts—length and taper; after these are made, sand it lightly and set it aside. The wing hold-down, firewall braces, and wing center fillets all come from the fuselage remains. Now is a good time to make up the wing and stabilizer platforms. Lay out all the parts in the proper position as you go along to avoid losing track of which is which.

The firewall is a sandwich of 1/16-in. plywood glued up in layers and then sanded true on all four edges. Mark the engine mounting holes and drill them out or punch them halfway through with a small brad to guide the screws later in assembly.

Make the landing gear from 1/16-in. music wire, beginning with the small top bends. Bend in the spread next, and finally the bends for the axles. File the axles off smooth. If you wish, the remaining hooks, dethermalizer (DT) tubes, guides, etc., can be made up at this point. Paper clips will work just fine for the hooks. The aluminum tubes are easily cut with a razor blade by rolling the tubing back and forth on a cutting surface.

Now that all the bits are at hand, take a few minutes to figure out where everything fits before beginning to glue it together. I suggest completing the smaller assemblies such as the fin, sub-fin, stabilizer, pylon, and wing mount before tackling the wing and fuselage.



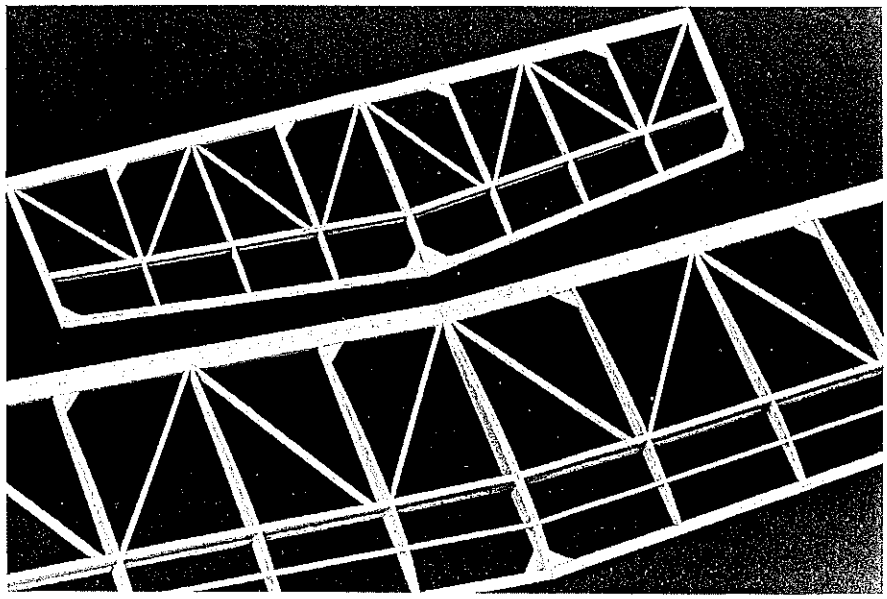
The wing surfaces are gently rounded using #360-grit sandpaper. Always be aware of the power of booming thermals and place your ID somewhere on the model as our author did.

Fuselage. Glue the firewall squarely in place with a thick CyA glue. Alignment is very important here! If it is crooked, pull the joint apart quickly and start over. Round the edges of the fin and sub-fin, align them carefully and tack-glue into position with thin CyA. Do the same with the stabilizer platform, then spot-glue the pylon assembly where it belongs. Add glue fillets sparingly at these major joints and allow them to set.

Sand the entire fuselage assembly, rounding all edges slightly with 320-grit sandpaper as you go along. Glue the landing gear flush to the fuselage at the pylon front, let it set, then finish by adding the firewall braces. (Check the photos for more details.) Finally, add thick CyA glue fillets over these last joints, and set the fuselage aside.

Wing. Our sheet wing was built "in-the-air," which is quite easy to accomplish. Start by attaching the leading edge to the wing sheeting, making sure it is flat and true. The ribs that make up the polyhedral breaks are prepared, as shown in the photograph, by *lightly* tack-gluing them with a wedge of 3/32 scrap at the top to create the offsets shown. This pretty much automatically establishes the correct polyhedral joint angles ahead of time.

Next, spot-glue the nose of each rib in place at the sheeting/leading edge juncture. Double-glue with thicker CyA on each side as well. Once those joints are thoroughly set, begin forming the wing camber by CyA-ing every other rib in place, working out from the center to the tips. The ribs *must* be pulled and set in place accurately along the position-locating lines, or warps will result. Be careful, and be patient! It really is an



The alternative wing (as shown on the plans) should be built up of straight, lightweight balsa. Models using this wing tend to glide longer, but building it may be too much for the beginner.

easy transition from flat sheet to a nice-looking curved surface, so not to worry.

Trim the rib ends, sand the entire assembly smooth, and round the edges— particularly at the leading edge. Add the triangular pieces on each side of the center ribs. Carefully mark and square-cut the wing at the three polyhedral joints. A flexible straightedge is a great help here. Again, work slowly, and do not force things. Several light cuts work better than one ripping cruncher.

To install the proper polyhedral, first block-sand each joint end straight and true by positioning it over the workbench edge or off the end of a glass sanding surface, such as those "do-it-yourself" shelf units that many paint stores have for sale. Test-fit the joints and re-sand if necessary.

When you are satisfied with your work, pin down the main panels, leading edge to leading edge, and add the tips in proper alignment, propped up 2 in. above the board. Check the measurements, then spot-glue the tips to the main panels. Set with thick CyA, then reglue top and bottom. Repeat at the center joint, blocking each side up with a hunk of standard 1 x 2-in. lumber for the correct angles. To finish off your new wing, dress down the rib bottoms with a sanding block and 320 paper to eliminate any fuss.

Preassemble the model to make sure everything looks right, and correct any misalignments. Drill or hog-out the holes for the DT hardware, hold-down hooks, fuel tank, etc. Test-fit the engine with four #2 wood screws. Once properly fit, remove the engine and set it aside.

Finishing. All that remains is painting, trimming, and fuel-proofing your new model. The quickest and easiest way to do this is with Sig Spray clear butyrate, or, if color is important, Pactra Aero Gloss spray butyrate dope. Alternatives are tissue color trim, K&B Superpoxy, Hobby Poxy, Black Baron Spray Epoxy, etc. Whichever you choose, don't overdo it. Keeping the weight down is important, and finishing adds weight in a hurry. Also, it is best to paint outside on a decent dry day. Many of our materials are quite toxic, despite what the labels might say.

To complete assembly, remount the engine, CyA the fuel reservoir/tank (an eyedropper or large glue tip) in place, and add the remaining hardware, including the DT line as shown on the plans. Install the wheels on the axles, and use Perfect ½A retainers to hold them in place. Finally, strap it all together with rubberbands, and your Pee Wee-30 model is complete.

Flight trimming begins with a good hangar inspection. Check the balance point (CG). If it is rearward of the point indicated on the plans, add clay or lead to the nose area; conversely, if it balances forward of the point on the plans, add weight to the tail area. If there are any bad warps, steam them out. Make sure the DT works by installing a piece of test fuse, letting it burn through to ascertain that the stab pops up. If anything else looks weird, correct it now before you hit the turf, first-flight nerves ablaze!

Pick a sunny and calm day for the maiden flight, and preferably early in the morning. A field covered with tall grass would be best—if one can be found. A few hand-launched test glides from shoulder height are a good idea before you turn on the power. If no bad dorks occur, move on to running a couple of tanks of fuel through the system at near-peak rpm.

Tweak the trailing edge at the third rib bay of the right main wing panel down about 1/16 in. for washin, adding a teeny bit (1/64 in.) of left rudder. Test glide once more. Rerun the engine and watch the fuel level until you find the point where it runs out in about four or five seconds; remember this mark,

Restart the engine, wait for the fuel to drop to the mark, then launch level and smooth. The model should make a smooth power climb to the right, make a very slight dip at cutoff, and then transition into a smooth descent with a wide left glide.

If things didn't proceed exactly as planned, trim them out one at a time. If the model made a slight loop, that can be cured by adding downthrust—a washer or two under the two top engine-mounting screws. Severe looping may require a shim under the trailing edge of the wing. A hard right turn under power can be corrected by adding left thrust to the engine, using one or two washers. If the turn is missing in the glide, shim up the stabilizer on the left side. If the model stalls at the end of the power climb, first recheck the balance point, then try adding a little nose weight until the condition disappears. If the model spirals in during the glide, check the balance point and incidence angles; increase the incidence (raise the front of the wing or back of stab) as needed.

One of the beautiful aspects of these all-sheet Pee Wee-30 models is that adjustments can be *bent* or *cut* in. Repairs are quite easy with a dab of CyA, and damage in the event of a crash is usually pretty minor. Newcomers are well-advised to take a friend along on these first episodes. You should also observe safety practices from the start. Stay away—*well away*—from cars at all times, keep your eye on where spectators are, and don't do stupid things in jest or otherwise.

When your Busy Bee is performing to your satisfaction, try a couple of rise-off-ground flights, pointed dead-straight or ever so slightly to the left of the prevailing breeze. At this point, the fun quotient is somewhere above the horizon. Have fun and cheers! *John Oldenkamp, 3331 Adams Ave., San Diego, CA, 92116.*

Condensed Orbiteer's Pee Wee-30 Rules: Power: Cox Pee Wee 20 reed valve engine. 30-in. maximum airframe dimensions (length and wingspan). Minimum weight: 100 grams (2.52 oz.). No gadgets allowed. Two-wheel main gear, 1-in. minimum diameter. Engine run controlled by metered device, eyedropper, etc. No mechanical timers for engine run (DT timers OK). Any type of construction.

Official flights: 40 sec. minimum. Six attempts to make three official flights, one of which must be ROG. Engine run: 0-15 sec. = 15 sec. Over 15 sec. counted to next highest whole second. Flight time fractions are rounded to the previous whole second. Scoring: Flight time (120 sec. max) divided by the engine run (15 sec. min.) times 100 equals the flight score. Flyoff flights: Max increased by 30 sec. per flight as necessary. All flyoffs must be ROG.

Safety/Preston

Continued from page 22

wind, you have the wind pressure on the tail helping you swing the plane over."

Some of you may be questioning why I'm mentioning the effect of wind on the performance of aerobatics. Well, I believe that a lack of understanding of what wind will and will not do to your model has a direct bearing on your ability to fly it in a safe manner.

Do you agree with the above statement concerning the Stall Turn in a crosswind? If I get any responses I'll discuss them in a future column. Meanwhile, fly safely, and watch out for the other guy.

John Preston, 2812 Northampton St., N.W., Washington, DC 20015.

Electrostreak/Stryker

Continued from page 32

steps forward, and tossing it forward in a level attitude. If it is the first test flight, try a few clicks of up-elevator trim to ensure that it will not dive immediately after the launch. Allow a few seconds of level flight to build up speed before beginning a climb.

The Electrostreak was first flown with a Leisure 05 competition-wind motor, Cox gray 6-4 prop, and a G.E. six-cell 1,200 mAh battery. Straight-and-level flight was quite fast, or at least it appeared that way with its sleek lines. Rate of climb, however, was a little low. All basic maneuvers, such as rolls inside and outside loops, hammerhead turns, snap rolls, and spins could be performed. It simply needed a few seconds of straight-and-level flight between each maneuver to gain speed. This is a good combination for the budget-minded flier that still offers good performance.

Later the Leisure motor was removed and an Astro Cobalt 05 installed in its place. This was easily accomplished, the only modification needed being to wrap masking tape around the rear of the smaller Astro Cobalt's case so it would fit snugly through the hole in F2. The two mounting holes in F1 aligned perfectly. The six-cell battery was replaced with a seven-cell Sanyo 1,200 mAh pack.

Performance with the Astro Cobalt is no-

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