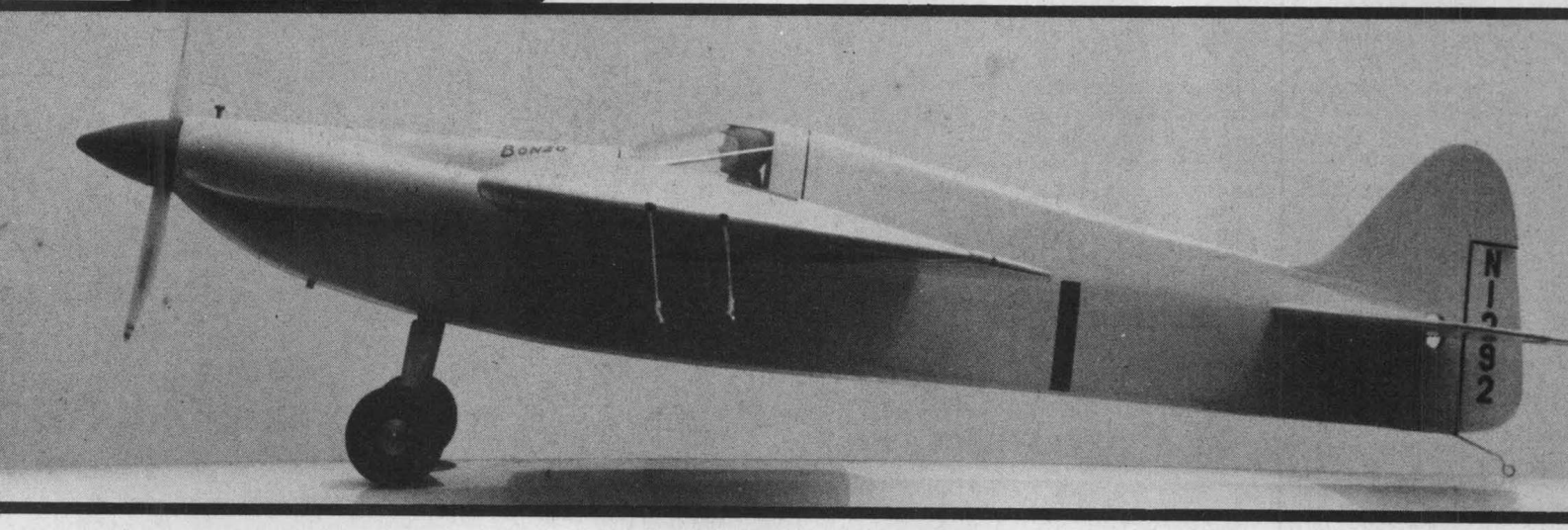
BY PAUL PLECAN



Bruce Plecan shows off his Pappy's handiwork. This yellow beauty was featured in full color on earlier A.M. cover painting.

Scale-Like "BONZO" Stunter

Looks like big-plane designer, racer Steve Wittman hit the nail right on the head for model aerobatics, too!

If U-control stunt is heading in a new direction, it is definitely toward scale, particularly since Dave Hemstrought's PT-19 appeared in the Sept. 1960 issue of *American Modeler*. (This Fairchild ukie stunt plane, incidentally, is being re-presented in the 1965 *A.M. Annual* so newer aerobatic recruits will know of it.) Subsequent designs have veered toward scale even when not patterned after any particular airplane, with cockpit details (plus a "pilot") appearing in most nowadays. So our Bonzo is a "natural," considering the high sustained interest shown in Goodyear Midget racers for nearly 20 years.

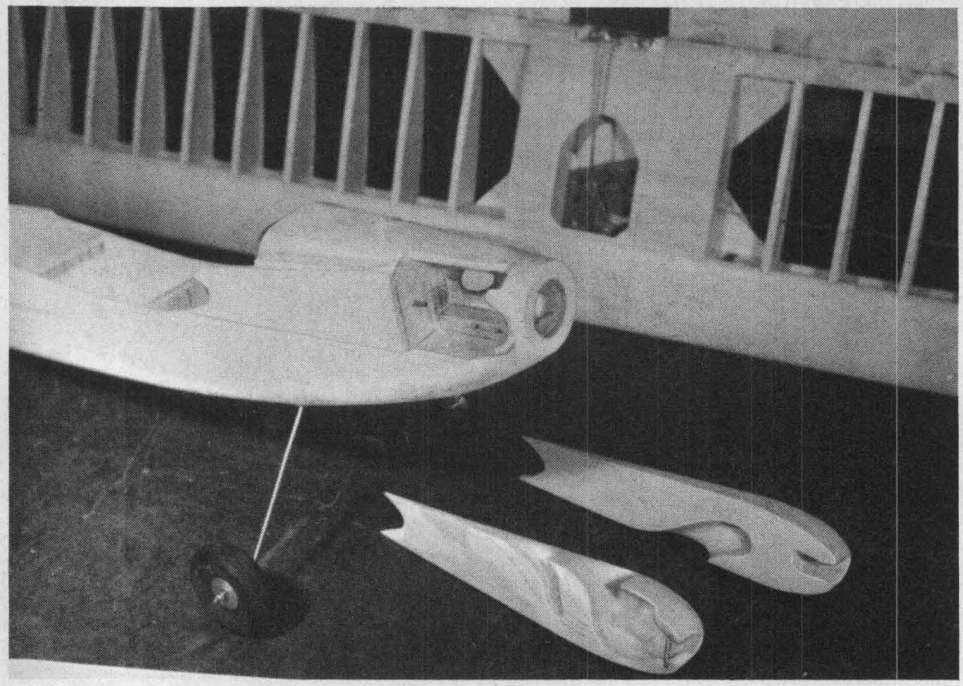
In profile, our Bonzo is entirely scale; only the horizontal surfaces are puffed up to Stunt proportions. After all, how far can one deviate from the "norm" in Stunt? All the top contest winners (without exception)

possess similar nose/tail moments, areas, airfoils and CG placement—only the profiles vary. It is the author's contention that Steve Wittman has a lot of our top stunt model designers beat at their own game! To obtain the desired overall fuselage length of 40", the side view was scaled at 2¼" to 1'—it is practically a "ringer" for the Nobler, which needs no introduction to Stunt afficionados.

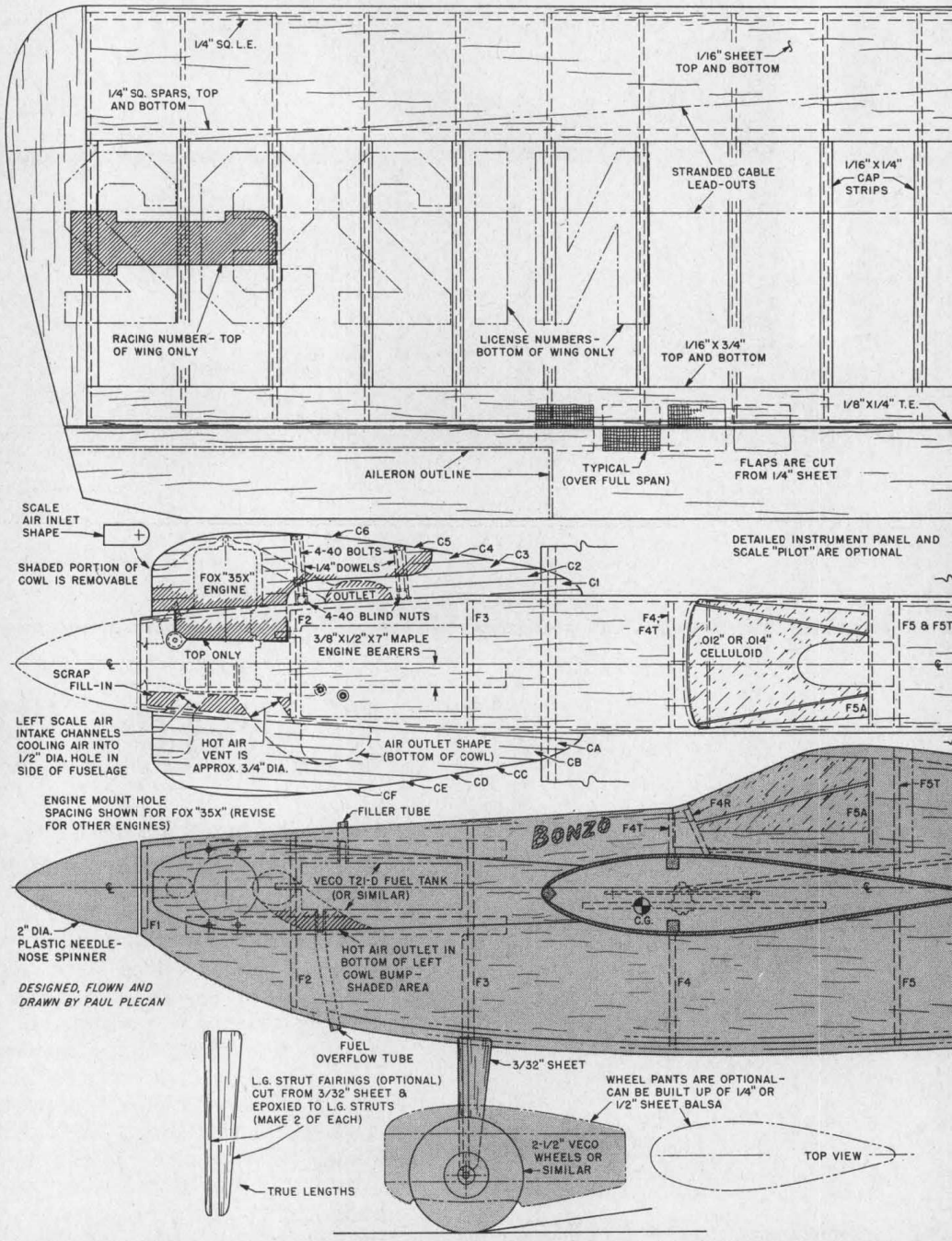
Our model tipped the scales at 40 ounces, ready to fly. Wing area is 520 square inches, a bit more than the Nobler's 503 (which is quoted as 550 on kit plans and in many technical discussions). Control linkage is orthodox; there's nothing tricky about this ship. Even the paint job is simple—all yellow, with blue spinner, L.G. struts, wheel pants (if used) and numbering. Engine is mounted in "sidewinder" fashion so that it is concealed in the scale cowl bump on the right side of the fuselage. As one can see, the ducting system for engine cooling air has been thoroughly worked out. Left air inlet feeds into a ½" hole in fuselage side, directing a cooling blast of air at the crankcase (yes, it gets hot there). Since hot air expands, we provide a ¾" hole near the aft end of the engine compartment; this leads to an outlet on the bottom of cowl bump, where a hole is apt to least upset scale effect. Right cowl air inlet is in perfect position for feeding fresh cooling air to engine cylinder and intake port. A large outlet aft of cylinder dumps hot air down through bottom of cowl bump. A hole just aft of the cylinder head draws off hot air from this critical area and dumps it downstream from main outlet. Original was about 5/16" diameter; it could be ½" or more. On the Fox 35X we used, exhaust stack was in an ideal position; facing down, it disgorges the gunk stream away from the model. Neat, huh?

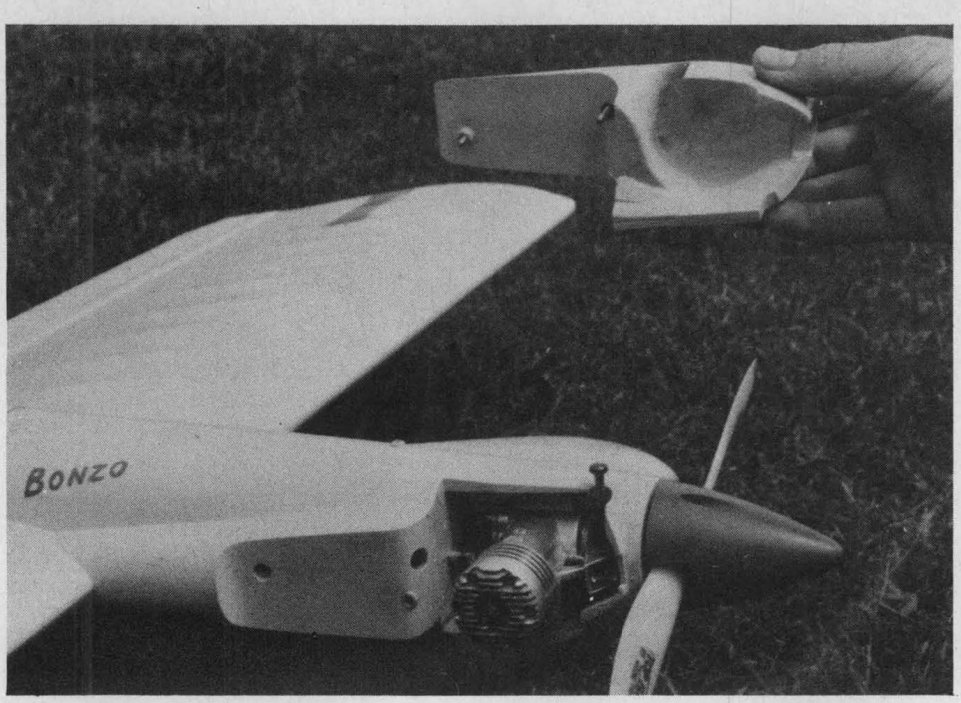
So try our Bonzo Stunter. Cut out all wing parts first; the 24 ribs are identical. T.E. capping strip is 1/16" x ¾", be sure it is straight. If not, cut from 1/16" sheet balsa with aid of a metal T-square or yardstick. Splicing will not be necessary on spanwise members if 48" balsa is used (available from Sig dealers). If splices are required with standard 36" stock, make them as far away from center of wing as possible. Line up pieces accurately and overlap ends, making cut through both pieces with aid of metal straightedge, employing a fresh X-Acto blade for a clean cut.

Pin T.E. to wing plan, cement all ribs in place, then add top T.E. capping piece. Rear ⅛" x ¼" T.E. strip is cemented in place next. Use ½" sq. strip to block up front ends of ribs at this stage, so wing is supported at the front. Any strip will do, as long as each rib has its rear section flat on workbench for a "true" assembly. Cement and pin L.E. (¼" sq.) into notches in ribs. Ditto for ¼" sq. top spar. Sheet covering goes on next. Do not use fast-drying cement at this stage—we found

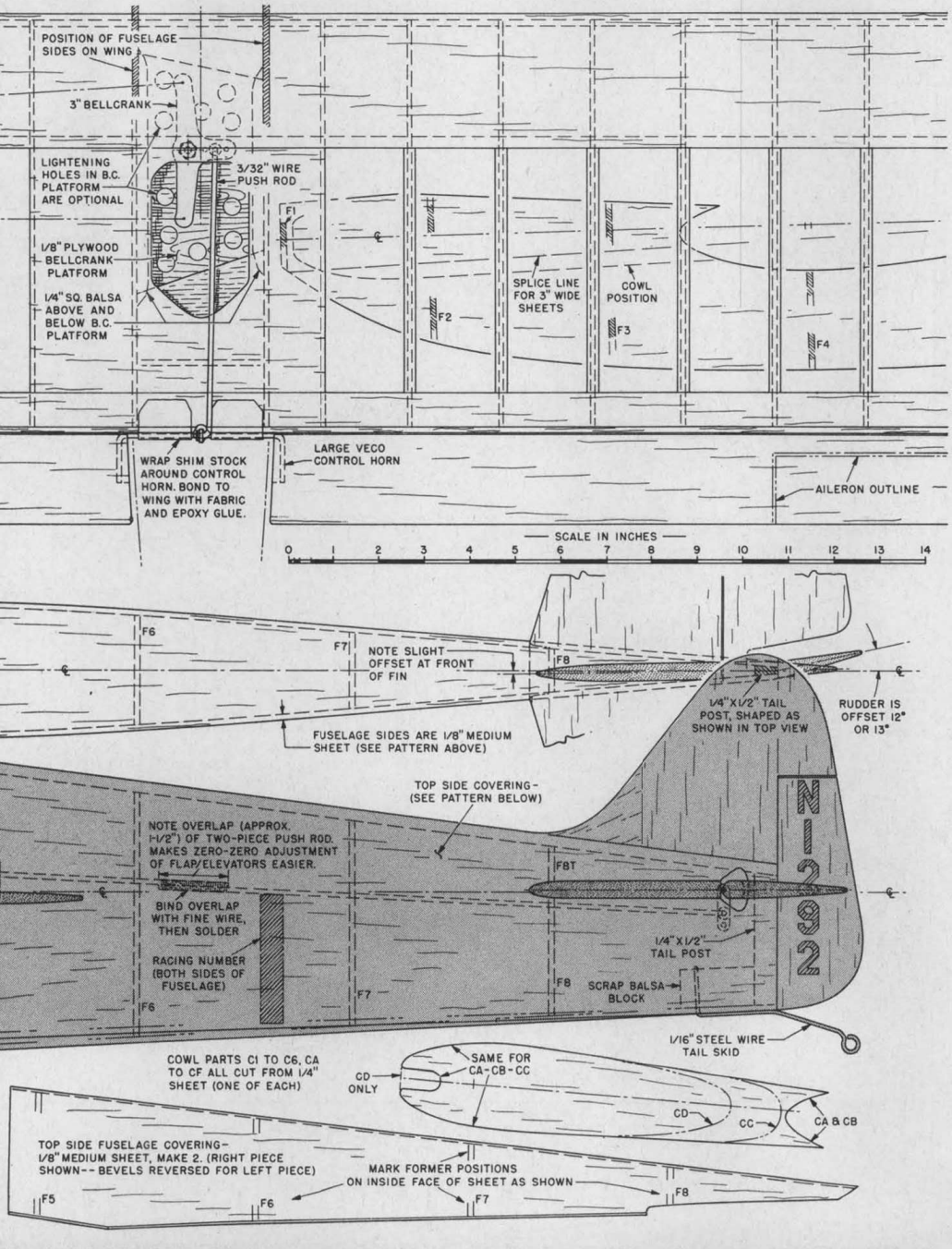


Construction was planned very carefully by designer Plecan to be both simple and sturdy.





Cowling was also specially developed; article gives reasons for venting system; read it.



regular Ambroid fine here. Run a bead along exposed face of spar, then place medium soft 1/16" sheet so that rear edge is flush with aft face of spar. Pin sheet down, spacing pins about 5/8" to ¾" to keep sheeting firmly in contact with spar.

If you are using proper grade of balsa, it will not be necessary to moisten sheeting to follow rib contour down to L.E. A bead of cement along L.E., a dab on each rib, then bend sheeting until it meets L.E., pinning it down as you go. The beauty of using cap strips is that previous cemented construction is given further chance of drying. These 1/16" x ¼" strips should be medium grade balsa, cemented and pinned securely. Tips are cut to shape and rounded off along their outer perimeter before being cemented in place. Allow at least an hour for cement to dry before removing wing assembly from workbench. You can cut out the flaps and/or tail surfaces meanwhile.

Once the cement has hardened, pins can be removed from wing and it is flipped upside down so that the bottom spar can be cemented in. Bellcrank platform is securely mounted now, followed by bellcrank assembly and lead-out wires. We prefer to use standard stranded cable for this—.012" quadrupled or .018" doubled, with ends doubled back and bound with fine copper wire and soldered. Or you can use epoxy glue to help bind the strands together. Whatever your favorite method, lead-out wires should not bind at bellcrank end for easy pivoting and wingtip end should have a neat loop to accept the strong safety hooks you use on the ends of your flying lines.

When bellcrank and lead-outs function properly, it is time to duplicate sheeting/cap stripping of the "other" side of wing. Flaps are the usual ¼" sheet with fabric hinges (or whatever other method you favor). A Veco control horn actuates flaps via a 3/32" wire push rod. Bending the push rod has to be "just so" in order that the flaps show neutral when bellcrank is in similar position. If you get slightly more down flap than up, it's all right—this translates to more of up at the elevators, which is desirable. In perfectly level flight, flaps always droop a very small amount, with elevators correspondingly up. Once the center section sheeting is in place, thorough sanding is the next order of business, followed by covering (either medium Silkspan or silk, the latter preferred).

Fuselage sides and formers are cut out, particular attention being paid to accurate cutting of wing opening and stab indent (we want a zero-zero incidence setup here). Assembly is as simple as 1-2-3, so we'll not dwell on it. Before top section of fusleage can be assembled properly, the wing should be mounted. Handling of partly-assembled model now will require care; be careful lest you lose out on a smooth finish by banging the model against projecting lamps or shelf corners. Tank should be mounted before too much of front of fuselage is covered over. The same goes for L.G. strut. In mounting

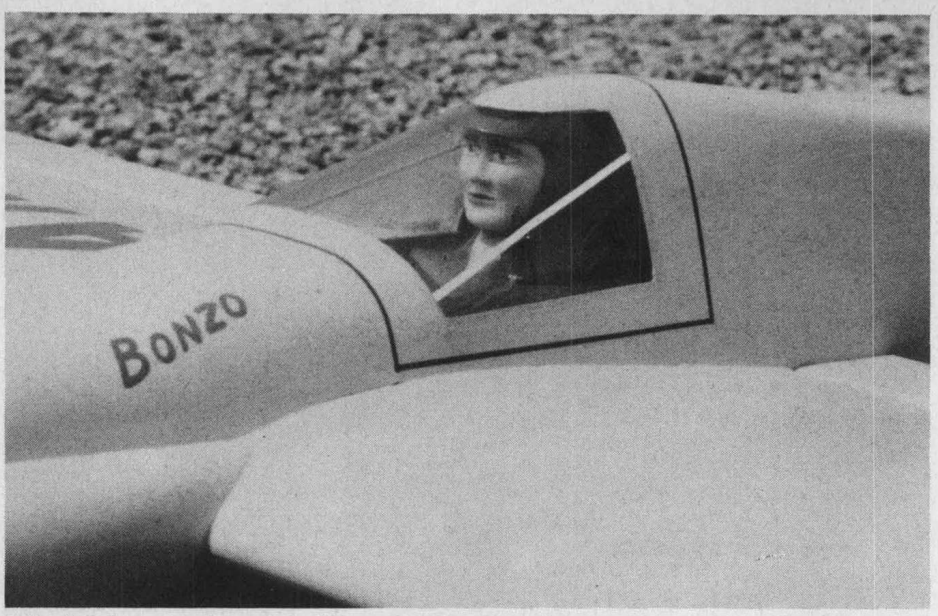
the wing, stab, engine bearers and landing gear strut, we have come to rely on the great strength of such epoxy glues as Weldwood or Pettit's Hobbypoxy. Most any name-brand variety will do. In any event, the mixing of these two-part glues must be accurate to obtain maximum strength with a minimum "curing" time. Mix quickly and thoroughly in small batches, as there is only 15 minutes "working" time before the stuff thickens. In a half hour it is thoroughly unusable.

The solid 3/8" sheet tail surfaces are mainly for simplicity's sake, but you can build up a 1/4" core and sheet it with 1/16" sheet to obtain the same 3/8" final thickness. Topside members of fuselage are carefully cut out of 1/8" sheet; note that bevel is on outside edge along top, inside edge along bottom. Another factor to keep in mind is that a left and right piece is needed, with bevels on second piece being on opposite sides, compared with first. Bevels enable side sheets to butt with a minimum of seam showing and allow the 1/4" sheet top capping sheet to lie flat against top side sheets and tops of formers.

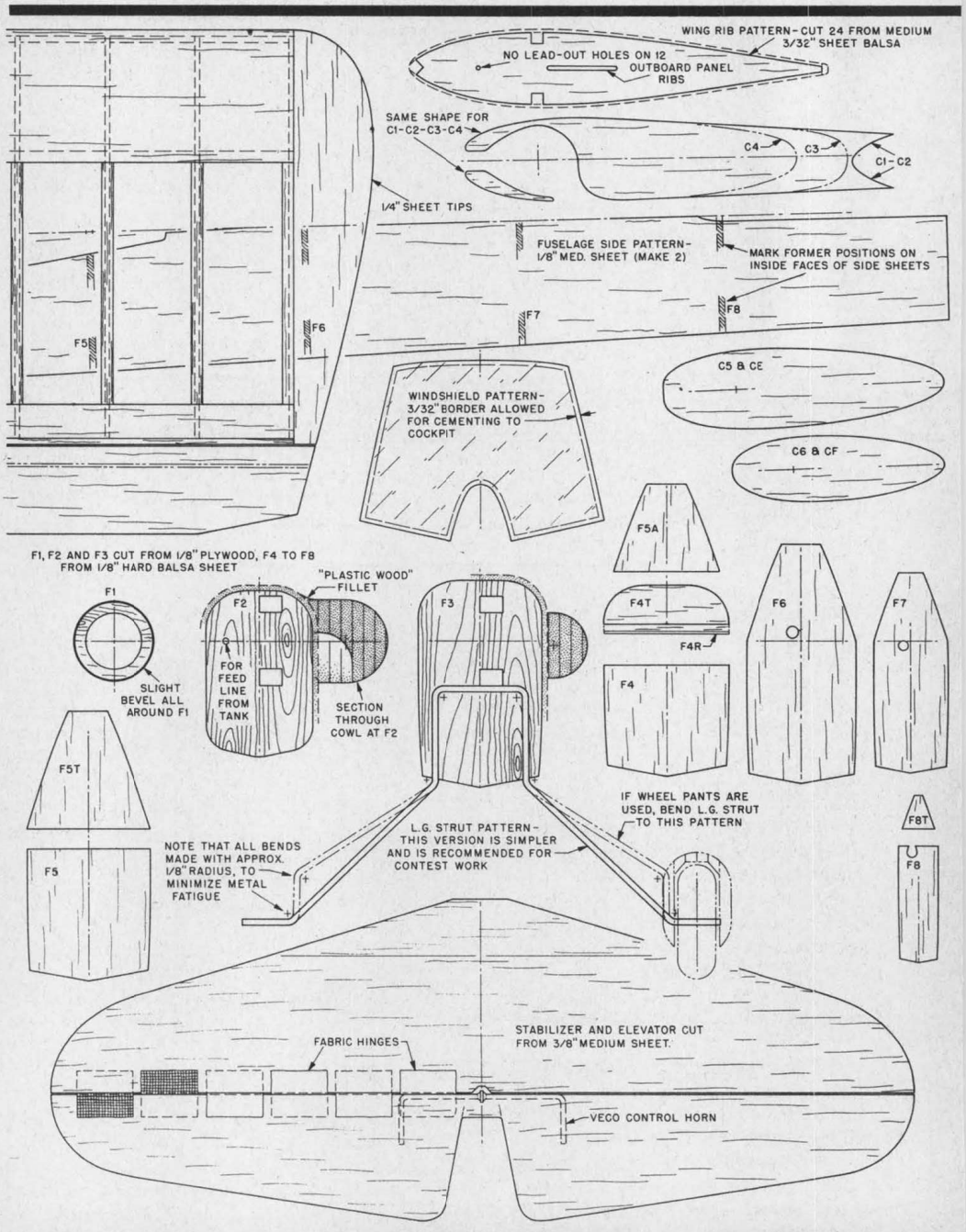
After you have double-checked fit of top side members, lay them aside and bend elevator push rod to shape. Unless it gives you zero flaps in conjunction with zero elevator setting, re-bend push rod. If you usually experience difficulty at this stage, it will be better to bend two pieces, trimming the "meeting" ends for a 1½" overlap. With flaps and elevators taped zero-zero, bind push rod overlap with fine bare copper wire and solder. This is very simply accomplished if the joint is lightly coated with soldering paste and if multi-cored solder is used. After retaining washers have been soldered to push rod ends, stab can be epoxied in place. Time to take a break (to allow epoxy to cure), after which top side sheets can be cemented/pinned in place. Top off top 1/4" sheet capping member.

Nose structure can be built up at this stage of construction. In an effort to minimize vibration (with less drumming sound from the model in flight) we filled in almost all empty fuselage space forward of the F4 former. Very soft mushy balsa was alternated with scrap chunks of expanded polystyrene (commonly called Styrofoam). If Styrofoam is used, hold pieces in place with a common white glue such as Elmer's or Carter's or a made-for-the-purpose type, such as Styrogrip. In our original model, entire area between F2 and F4 was filled in 100% with mush-soft balsa and Styrofoam blocks. Our next step is to use more of the soft stuff in wing construction, as that is the portion of most models guilty of acting as a sounding board. Only minor details now remain.

Cowl bumps can be built up of 1/4" sheet or carved from solid blocks. Be careful when carving and sanding so you wind up with the correct shape. Actual shape of ducting



Following the current trend in "humanizing" control line aerobatic entries, Plecan installed pilot. Full size working drawings for Bonzo stunter are a part of Group Plan #1264 available from Hobby Helpers (1543 Stillwell Ave., New York 61, N.Y.) for 85 cents postpaid.



Bonzo

for engine cooling is not critical; you might want to do it differently. But be sure of one thing—use the scale air inlets as shown; provide even larger outlets for the heated air to make its exit. If you so desire, making the air inlets 1/16" or 3/32" wider won't hurt engine cooling a bit; we doubt if even a top scale-model expert will notice any difference.

We used Testor's Butyrate dope on original model because their orange-yellow (#8) is just right. Most shades of blue dope will be too dark, so white will have to be added to obtain true blue. Just stick to one brand all the way through paint job. Depending on the finish desired and time available, use anything between one and four coats of sanding sealer or filler coating. We used two. With proper drying time and thorough sanding, pores in the balsa can be thoroughly sealed. First coat sinks deep; surfaces dry fast, so sanding can be done within an hour of doping. On succeeding coats, thorough drying takes longer, so check the 280 or 320 grit sandpaper (Wet-or-Dry type). If it is clogging up too fast, more drying time is called for.

Once you have the surface finish you desire, it is time to apply two coats of clear dope. This helps fill in overlooked pores and gives a slightly harder finish. Lightly sand between coats with 320 or 360 grit paper. We assume you have previous experience (this is hardly recommended as a "first" try at modeling) so if we failed to point out one detail until now, you'll forgive us? Said detail is use of clear dope on the Silkspan or silk wing covering—sanding sealer won't ruin the job, but will build up weight too quickly. Three coats of clear should fill in the pores of the silk, so that the colored dope can then be used. We recommend four coats of yellow all over, with moderate sanding between first pigmented coats tapering off to no sanding between last two coats. If you have not been stirring regularly the pigment at the bottom of the jar, you may want an additional coat or two more than we specify. In any event, the yellow should be of a constant shading, with no thin splotches or streaks (we brush succeeding coats at different angles; spanwise for first coat, lengthwise for second). Some coats we apply diagonally. It's all for the same purpose—to eliminate streaks.

Blue trim can be doped on or cut from Wondur-Cal sheets. The blue plastic spinners available in most hobby shops will clue you in on the shade desired. If you have a July '61 *AM* handy check the cover painting, that will help. We assume that you have the wheels in place by now and have soldered on retaining washers for same. All that remains is to cut windshield celluloid to shape and cement in place. If your construction technique is less than perfect, you may want to make a sample windshield of light cardboard or heavy paper to check outline before cutting same from celluloid (especially if there is none to spare). Pin or tape in place, using just enough cement to do the job without a smeary mess. For this part of construction, we recommend clear Testor's or Pactra cement, the tinted Ambroid amber may show.

We would like to repeat Dave Hemstrought's advice, "Practice makes perfect. Do maneuvers downwind, keep your eyes on the plane and think about what you are doing at all times. Before long, you will be doing what comes naturally and you will derive many satisfying hours of good stunt performance."

We would add that you should go to your flying site well-prepared. Extra props, glow-plugs, a well broken-in engine and a tube of cement and a roll of masking tape for minor field repairs will do for a start. And don't be caught without the necessary wrenches needed for prop or glow-plug changes.