

# max-a-million

## 450

Harry Murphy



The Rossi .15-powered FAI version. How many ships do you need to build for a season's competition in three classes? Author suggests plans for having a suitable stable of models.

Versatile and flexible, the '450' is FAI in total projected area and takes 15 to 25 engines for Classes A and B as well.

IT MAY BE quite timely to re-evaluate the apparent advantages of competing in various free flight events with the same model or models of identical or quite similar size and design. Aside from the obvious benefits of similar flight characteristics and interchangeability of model parts and engines, present environmental situations offer a growing influence in this regard.

For example, the family car is rapidly becoming smaller, making the task of packing models for the contest trek continually more complex. Like models of the same size and design would tend to somewhat alleviate this chore. However, "multi-purpose" models capable of competing in more than one class could considerably ease the problem by decreasing the number of models required to compete.

A more immediate and direct influence might be the current national emphasis being placed on "ecology" and "economy." Translated to model builder's language, this has simply resulted in material shortages and higher prices for all the necessary items from glue, dope, and balsa wood to engines, timers, and associated hardware. As the cost of model

building supplies skyrockets, sprinkle on a little ever-present competition for the hobby dollar from golf clubs, fishing poles, tennis racquets, camping equipment, etc., and a reappraisal of the real value of "multi-purpose" competition designs may well be beneficial.

An additional slant at the worth of the "multi-purpose" model arises from the "two models permissible per event" rule. As a result of this rule, most die-hard competitors feel stripped naked if they do not start a contest season at least two deep in all events. Never fear, I am not going to be hypocritical enough to propose that one good "multi-purpose" model would permit you to be highly competitive in three different events for a whole season. Nor will I tax your intelligence by further suggesting that you can now forget about building the other five models you would normally require. However, I do feel there is a sensible compromise somewhere between (one) and (six) such as: (four)—a "front line" model for each of the three events and one "multi-purpose" model to be utilized as an emergency backup in any one of the three events; or (three)—by utilizing one "front

line multi-purpose" model for two events by engine switching techniques, a second "front line" model for the third event, plus a "backup multi-purpose" model to cover all three events again. The sensible combinations are many and if you further consider the possibilities should all "front line" and "backup" models be of the same competitive multi-purpose" design, then the concept affords even greater flexibility.

The "Max-A-Million 450" was conceived with "multi-purpose" in mind, and it has proven to be most versatile and flexible. It is FAI size in total projected area and will comfortably accept all engine sizes from .15 to .25 thereby covering both Class "A" and "B" as well.

Per the plans presented here, it can be built to weigh out at 20-22 ounces for the two AMA Classes and leaded-up to weigh 26.5 ounces for FAI. Wing and stab constructions are directed at Monokote or Solar Film type coverings for durability and the fuselage is also designed to take its lumps. Yet, simple material substitutions and slight construction deviations have produced very light Japanese tissue-covered trophy-winning "A/B" models which have weighed out at 16-18 ounces. The weight-reducing options are quite obvious, but to list a few would include the following wing and stab revisions; delete the wing leading edge planking, replace  $\frac{1}{8}$ " sheet wing and stab ribs with  $\frac{3}{32}$ " sheet and designated  $\frac{3}{32}$ " sheet ribs made from  $\frac{1}{16}$ " sheet,  $\frac{3}{32}$ " sq. spruce wing turbulators can be balsa, solid balsa tip plates can be replaced with conventional slanted rib construction, and cover with Japanese tissue in place of the plastic types. Fuselage weight reduction changes could include the substitution of the  $\frac{1}{8}$ " spruce longerons by balsa and careful selection of lightweight sheet balsa stock for fuselage and pylon sheeted surfaces.

Therefore, before starting construction, carefully analyze and plan your ultimate particular requirements and construct your model (or models) accordingly.

**Wing:** Select the sheet balsa for the wing ribs of the thickness and weight relative to whether you intend to build the "multi-purpose" model, an FAI only, or a lighter "A/B" model per the above suggestions. Cut out all ribs as indicated and cut to the dotted line at the nose of the rib if you are not going to plank this area.

Conventionally, pin to the plans the inner panel  $\frac{3}{8} \times \frac{1}{2}$ " L.E.,  $\frac{1}{4} \times 1$ " T.E., and lower spars of  $\frac{3}{16} \times \frac{3}{8}$ " and  $\frac{1}{8} \times \frac{3}{8}$ ". Tip panels utilize the same stock sizes; however, note that both bottom spars get tapered to  $\frac{3}{16}$ " at the tip and the T.E. gets tapered to  $\frac{1}{2}$ " by slicing off the thick front edge.

After notching the T.E. to match the rib thickness, cement all ribs in place except the dihedral and polyhedral ribs "W1" and "W3". Add the  $\frac{1}{2} \times \frac{3}{8}$ " soft balsa tip block at this time. It is simpler if the excess material is not trimmed from the block until later. If you wish to add the  $\frac{1}{16} \times \frac{1}{8}$ " diagonals, you may do it more

easily at this time, except omit those either side of the polyhedral breaks for now. The diagonals lie on top of the lower spar and are also cemented to it. Originally, I added these on a model slated especially for "FAI" use as a method of adding a little more strength and I needed extra weight added somewhere anyway, but structurally they would probably be more beneficial on a very light wing. Do not add the top spars and turbulators as yet, for it is a lesser task if they are added after the polyhedral and dihedral are set.

Remove only the wing tip panels from the plans and re-cement all joints. Carve the bottom of the tip blocks across the end section diagonal as indicated, but do not finish trim the top until after the top spars and turbulators have been added.

Trim and cement the tip panels to the inner panels which are still pinned to the plans, blocking them up to the 3 1/2" polyhedral angle. Add the 1/16" plywood polyhedral braces "WD" and "WE" as shown and follow with the "W3" rib. The 1/8" x 3/16" top spar and 3/32" sq. turbulators may now be cemented in place on the tip panels only. When cement has set, remove the two wing halves from the plans and re-cement the remaining joints.

I prefer to finish trim and sand the wing tips at this stage as it is easier to manipulate one-half a wing rather than the entire wing. Trim and align the two wing halves

by blocking them up to the 1 3/4" dihedral angle and cement securely. Cement in place the 1/16" plywood dihedral braces "WA" and "WB", then the 1/32" plywood braces "WC", and follow with the center rib "W1." While this is thoroughly drying, you can start adding the remaining 1/8" x 3/16" top spars and 3/32" sq. turbulators to the inner panels.

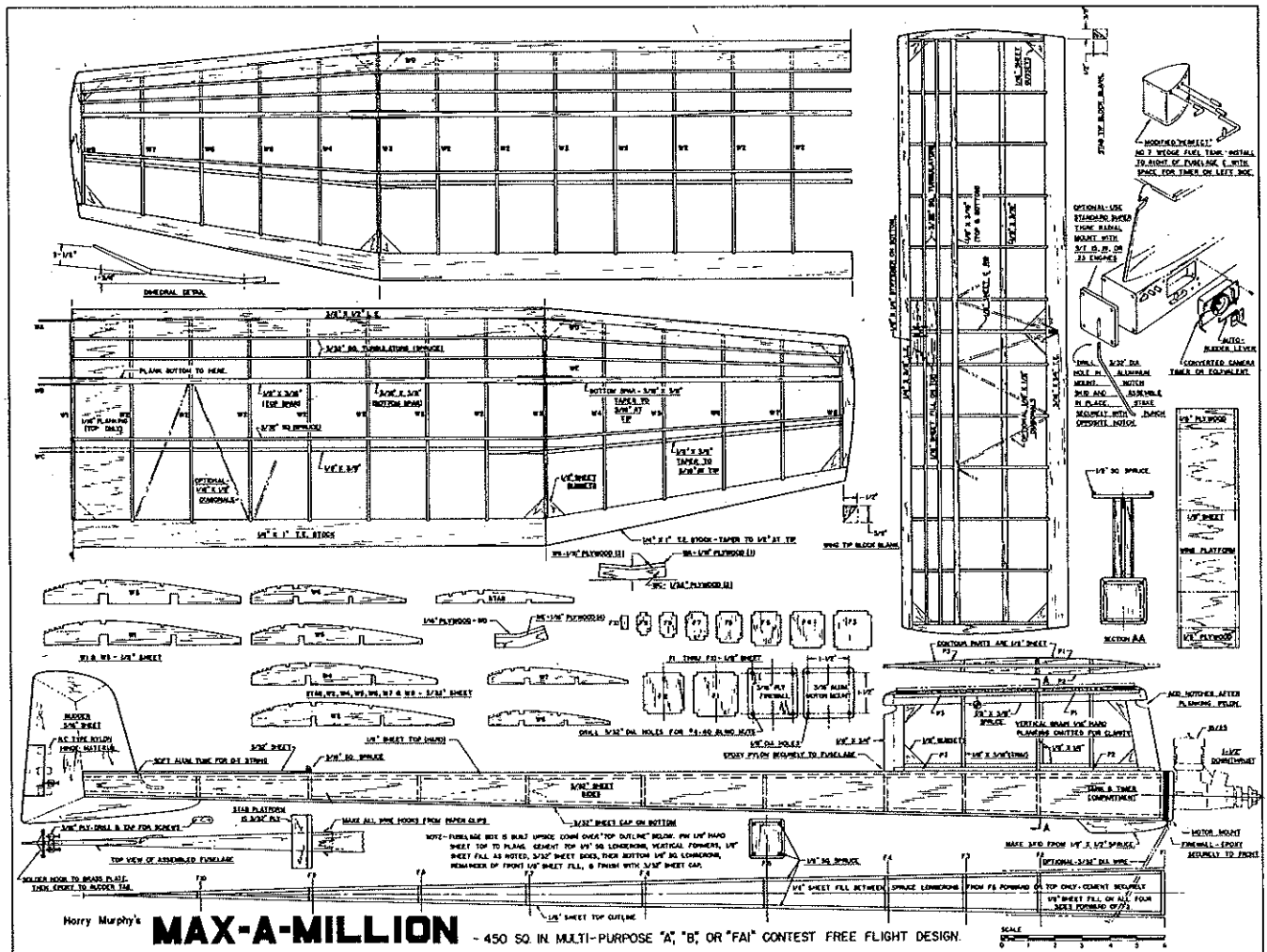
After removing the one-piece wing from the plans, add the appropriate rib gussets, the remaining diagonals adjoining the polyhedral breaks, the 1/16" sheet balsa leading edge planking, plus the center section planking as indicated. Carve away all excess balsa and finish sand with 400 grit sandpaper. Sand to a very smooth surface if you are intending to use the miracle plastic film coverings. I prefer to use transparent Monokote as it appears lighter and less brittle than opaque colors. Solar Film, I find to provide less surface tension than Monokote, but it will suffice.

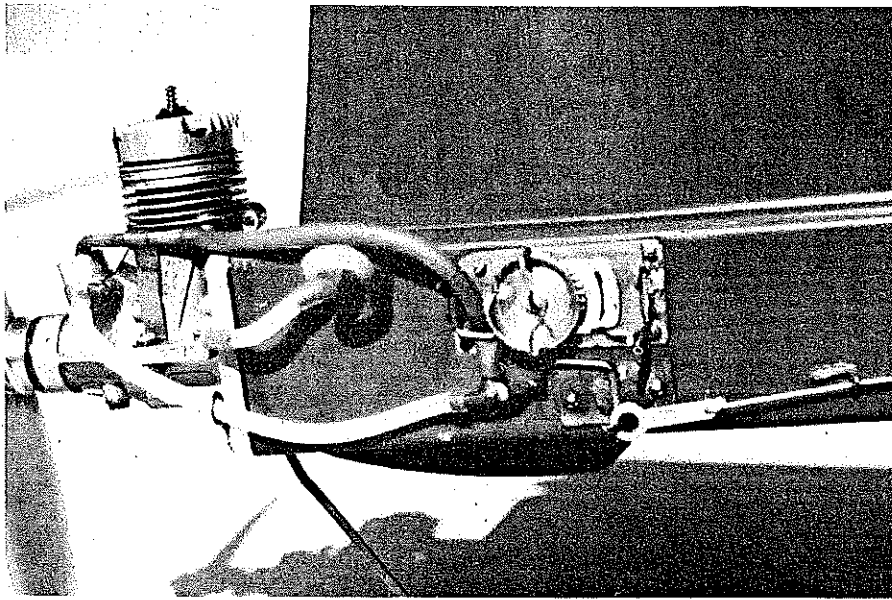
**Stabilizer:** Obviously, the same basic construction procedure is followed here as per the wing. It may even seem as though you are building a fifth wing panel as you proceed. Cut all 13 stab ribs from your selected balsa sheet stock. Pin the 1/4" x 3/8" L.E., 3/16" x 3/4" T.E. and dual 1/8" x 3/16" bottom spars in place on the plans. Notch the T.E. and cement all the ribs in place. Add the 1/2" x 1/2" blocks and follow with

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The Class A/B version is powered by a Super Tigre .23 in this picture. Note AMA numbers.





Close-up of the plumbing. Fuel enters tank from pressurized middle line, engine from lower line, while top line flood-off is pinched shut by timer—which also operates DT for stab.

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the  $\frac{1}{8} \times \frac{3}{16}$ " top spar and  $\frac{3}{32}$ " turbulators. Add the optional  $\frac{1}{16} \times \frac{1}{8}$ " diagonals if desired. When dry, remove the assembled stab from the plans and re-cement all joints. Add appropriate gussets and  $\frac{1}{16}$ " sheet balsa planking. Notch the front underside of the three center ribs and add the  $\frac{1}{8} \times \frac{1}{4}$ " hard balsa or spruce stiffener as shown. Carve the tip blocks in the same manner as for the wing and finish sand with 400 grit sandpaper. Cover the finished stab to match your wing covering material. Bend front and rear stab hooks from heavy duty paper clips or soft #20 gauge baling wire and epoxy in place.

**Fuselage:** This chore is a bit out of the ordinary as you probably haven't constructed a built-up pylon since your last Zipper or Sailplane, but I assure you this one is considerably more elementary.

Build the pylon frame directly on the plans by pinning down the  $\frac{1}{8} \times \frac{3}{8}$ " spruce wing retaining rail. Follow by cementing front and rear  $\frac{1}{8} \times \frac{3}{4}$ " posts and  $\frac{1}{8} \times \frac{1}{4}$ " bottom keel and center post. Cement the  $\frac{1}{8}$ " sheet gussets in place, then the right side vertical  $\frac{1}{8} \times \frac{1}{4}$ " center post on edge, atop the constructed pylon core. Cement  $\frac{1}{8}$ " sheet all right-side contour parts "P1", "P2", and "P3" in the locations shown. Complete the right side construction by trimming  $\frac{1}{8} \times \frac{3}{16}$ " strips to fit vertically between the top and bottom contour parts as indicated. These will serve as solid back-up studding for the sheet planking to be added later. When dry, remove this assembly from the plans and cement on left side uprights and contour parts to make the pylon symmetrical. Do not add planking as yet.

Piece together the wing platform of medium hard  $\frac{1}{8}$ " sheet balsa and add  $\frac{1}{8}$ "

plywood or spruce strips to the front and rear for added strength. I have yet to knock a corner off a wing platform since I started doing this. Cement the fore and aft  $\frac{1}{8}$ " sq. spruce side rails to the top and then cement this sub-assembly in proper alignment to the recently constructed pylon assembly. Set aside to await its position on top the fuselage box.

The fuselage is just that—a box. It is built upside down over the plans as noted. Even if you are building a light weight version, select quite hard  $\frac{1}{8}$ " sheet balsa for the fuselage "top" as this will become the foundation for the pylon attachment to the fuselage. Pin the "top" to the plans and cement the  $\frac{1}{8}$ " sq. spruce longerons atop the perimeter as shown. Add the  $\frac{1}{8}$ " sheet formers and then secure the front

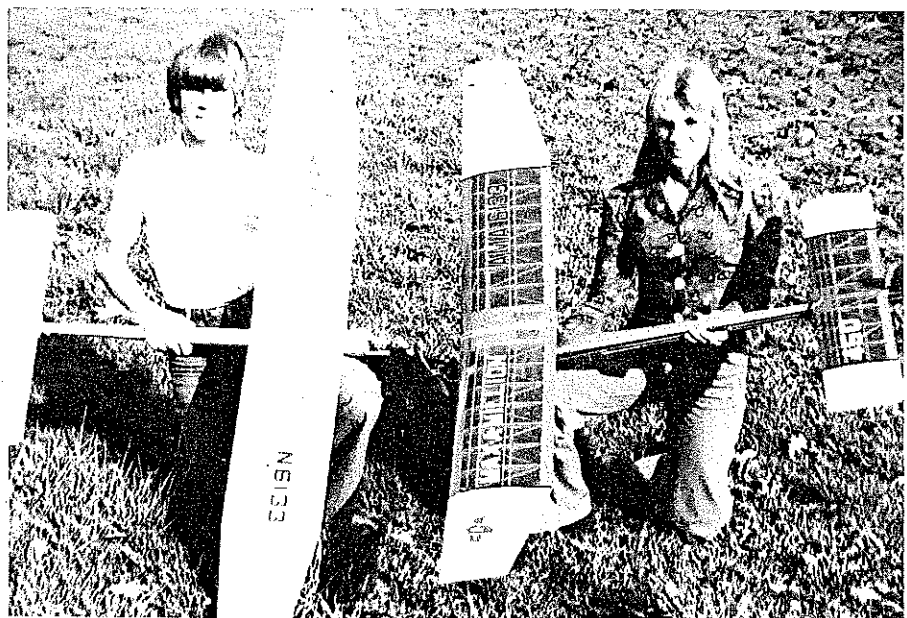
$\frac{1}{8}$ " sheet doublers between the formers from "F1" to "F5" with epoxy.

Cut both fuselage sides from the same piece of  $\frac{3}{32}$ " sheet balsa for uniformity and cement securely in place. Add the bottom  $\frac{1}{8}$ " sq. spruce longerons and carefully trim and cement the  $\frac{1}{8}$ " sheet side doublers in place between formers "F1" and "F2." Permit cement to dry thoroughly, then carefully remove your three-sided fuselage box from the plans.

At this time, fabricate and fit the fuel tank in place and establish the fuel shut-off location. I use a modified Perfect #7 tank and converted camera timer for these necessities. You may possibly wish to insert your favorite tank-timer arrangement as most modelers seem to have some personally tailored combo that they prefer.

After all internal items are completed, button up the insides with the  $\frac{3}{32}$ " sheet bottom cap. Press #4-40 blind nuts into the  $\frac{5}{32}$ " drilled holes in the  $\frac{3}{16}$ " plywood firewall and assemble the aluminum mounting plate with the four attaching screws. The fuselage front end is also designed to match up with the standard Super Tigre radial mount, if you are to use a S/T .15, .19, or .23. Fit and epoxy this assembly securely to the front of the fuselage box. Before the epoxy completely hardens, remove screws and aluminum plate to prevent breaking the screws should the hardened epoxy freeze them in place. As you will need the added weight for "FAI" use, I have been quite successful in adding a Tatone beam mount for my Rossi .15 out front in addition to the aluminum mounting plate. Also the optional wire skid is recommended and can be added as noted on the plans. Additional weight required later may be stuffed into the fuselage box through the fuel timer opening. Any counter-balance weight required in the tail can be added through a  $\frac{1}{4}$ " diam-

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FAI version at left must be "leaded up" to 26.5 ounces. Can be built to weigh out 20-22 ounces for A/B. Structured for Monokote, Solar Film. Japanese tissue jobs 16-18 ounces.

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eter hole drilled into the top just rearward of the stab platform.

Fabricate the complete rudder and lower fin from medium 3/16" sheet and cement it in place. Add the 3/32" plywood stab platform and 3/32" sheet balsa cap. Trim and sand this assembly completely with 400 grit sandpaper.

To locate the pylon assembly on the fuselage, temporarily assemble engine and timer and rubber-band the stab in place. Teeter this assembly on a round pencil laid diagonally across the corner of a table. Rubber-band the wing to the loose pylon assembly and slide them along the fuselage top until the horizontal balance point is determined. Then carefully align and epoxy the pylon assembly securely to the top of the fuselage box. The balance point should locate about 3" forward of the T.E. of the wing.

Disassemble the wing, stab, and remove all hardware from the fuselage. Plank the pylon area with 1/16" sheet running the wood grain vertically. Notch the pylon for front and rear wing retaining hooks. Sand the entire completed fuselage to pre-dope status.

Cut the auto-rudder trim tab out of the rudder area and re-install with thin nylon R/C hinge material. Sig packages a suitable material. Auto rudder hardware detail is shown on the plans. Install the bent aluminum tubing for the D-T string to come out the left side of the fuselage. Complete the fuselage either by covering with doped-on colored tissue or finish with epoxy resin and follow with Hobby-Poxy or K&B Super Poxo paints.

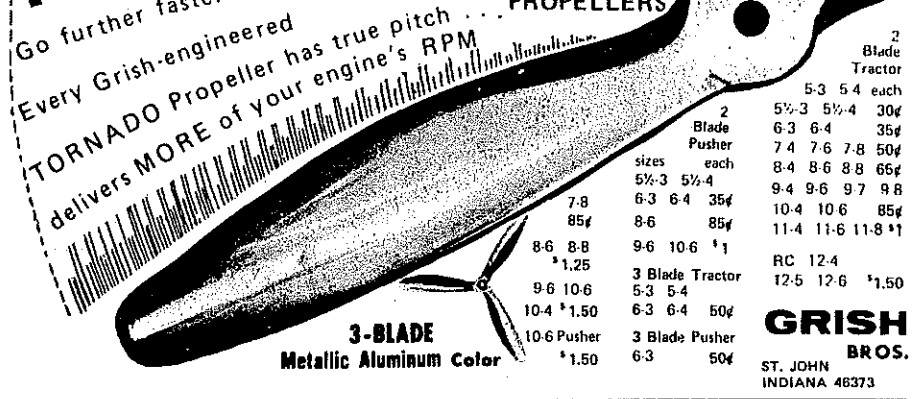
Start adding final hardware, rubber band hooks, D-T, and A/R string guides of short lengths of 1/16" I.D. aluminum tubing, snuffer tube, timer, A/R timer lever, etc. Completely assemble the model and cement on proper wing and stab alignment keys using 1/4" lengths of 1/16 x 1/8" spruce.

**Flying:** I have long since abandoned the conventional new model flight testing methods after smashing up too many models because of low speed stalls. The low power, prop on backwards, horizontal hand launch was exchanged very successfully for the VTO, full power, "go for broke" method. A 2-3 second engine run giving you full power from VTO launch, hauls your model directly away from the ground faster and does not permit time for it to return under power. Your engine quits further away from the terra firma and the model transits to the glide more realistically as it is traveling at a more normal flying speed. After the first flight, you are probably quite close to final trim as you skipped all that low-speed test procedure which is not in the normal competition flying mode for your model anyway.

The main ingredient for this approach is proper model preparation before the first flight. Obviously, you cannot grab your

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2 Blade Pusher	9-4	9-6	9-8
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2 Blade Pusher	11-4	11-6	11-8
RC 12-4	12-5	12-6	1.50

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model off the work bench and zap out to the test site without some reasonable idea of how the model should perform. Careful eyeballing and checking of all factors affecting power-on flight characteristics are required (something you should have been doing anyway). As a right power-right glide pattern is suggested, insure the horizontal stabilizer is perfectly flat, steam in an approximate 1/8" washout in each wing tip; the left inner wing panel is to be flat and the right inner wing panel is to incorporate an approximate 3/32" washin. The rudder tab should be adjusted about 1/16" to the right with the engine side-thrust zero to possibly some slight left-

thrust. A 1/16" shim under the stab T.E. might be wise at the start. A little stall in the glide is still better than a negative dive. Hand gliding tests can also determine if this is needed.

When satisfied that your homework has been completed, set the fuel shut-off for a 2-3 second engine run and VTO launch under full power with the prop on frontwards. Normally, final trim is completed by a few screwdriver adjustments on the A/R tab for power and glide and a little stab tilt up on the right side.

I hope you find this model design as rewarding as I have. Good luck and sic 'em!!

## RC Pylon Racing

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We are real proud that we have two juniors now flying in this district, Steve Barrett, age 12, and Mark Harter, age 14. This is Steve's first year in racing and he is flying real well in the QM event, and plans to enter the F-I Sportsman event. Mark has been racing for three seasons and is flying with the best of them in the QM and the F-I event.

**Southern California District:** The racing season started in this district on April 19-20 at Sepulveda Basin. Seventy flyers entered this F-I race with more entered in the Standard Class than the Expert Class. Kent Nogy, Charlie Shaw, and Terry Prather won the Expert Class with Terry turning the fastest time of 1:15.9. Bob Johannes, Steve Sica, and M. Hoem won the Standard Class with Bob turning the fastest time of 1:21.1.

**The Great Bakersfield Air Races:** With more than 100 entrants from various parts of the United States—even from Mexico and Japan—this nationally important meet more than lived up to expectations. Sponsored by MAN and BARKS, and held May 17-18, the contest was strong on organization and procedures, and witnessed some truly great individual performances. When the smoke cleared there was a three-way tie for first place: Jim Jensen (fastest time 1:17.1), Bill Preis (1:19.8), and Joe Foster (1:17.2). Other fast times were Terry Prather with 1:17.1, Ed Hotelling with 1:20.2. There were 52 entrants in Standard: Scott Johnson (1:28.8), Gary Hawk (1:29.4), Dennis Osborn

(1:28.2), Rudy Formanek (his second race 1:28.7), Angelo Sanchez (1:37.7). The fastest time in Standard was set by Doug Ruble, flying a Tiger-powered Prather Toni. From Visalia, Ca., Doug is 17 years old. He has been racing Quickie 500 for one year. This was his second F-I race—he turned 1:21.4. He's a boy to watch out for! His younger brother also is starting out. Nice young men with a father that likes to help.

California District sets another safety standard: Chain link barrier is placed around lap counters and #1 flagmen. Also chain link L-shaped barriers around #2 & #3 flagman, in addition to larger wood pylons. Another safety precaution is that no spectators are allowed down-wind from the starting line. Congratulations to Spickler and crew for always thinking about new ways to give us a safe race.

They had a free raffle for the workers and flyers. One ticket for each, for \$1500 in merchandise, including a Kraft Radio (all items donated). Sixty workers came to help and worked 1 hour shifts. They had telephone communications between all pylons, starting line and desk so that desk could hear the cuts called. They had a communications desk at the starting line to receive cuts called, and flips switch for correct lap counter and information relays. Cuts are shown both at lap counters and #1 Pylon which makes it easier on callers to pick them up.

The Tiger X-40 was the predominant engine, and the Prather Little Toni and LRIA the predominant airplanes. Ed Hotelling and Bill Pries were using K&B engines. Entries also came from Japan, Mexico, Fla., N.C., Ga., Ill., Idaho, Ariz., Md., and Va.