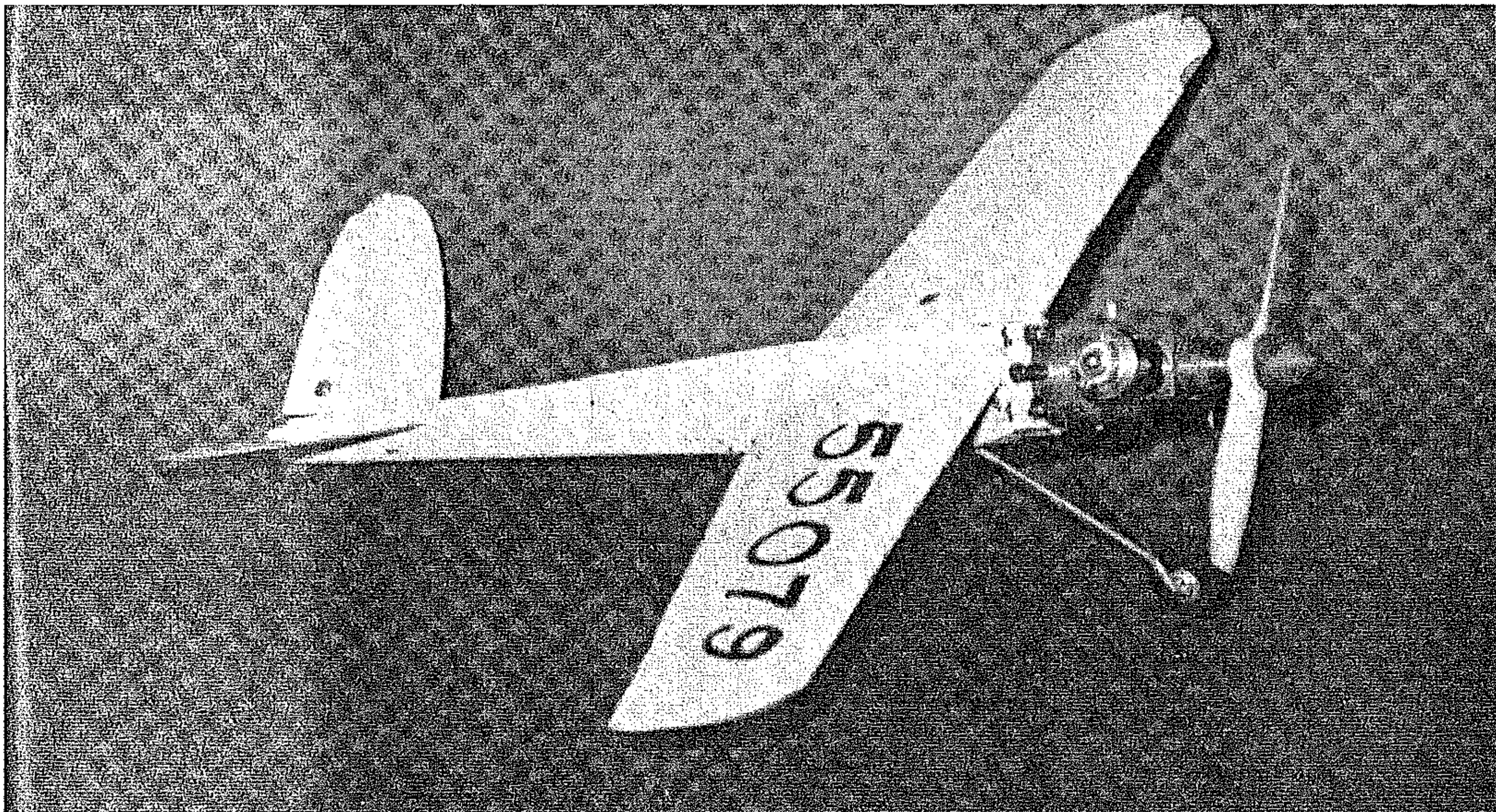

little white mouse

Built and flown by his son Christopher, Frank's little whizzer is indeed a better mouse trap. More than the usual stuck-together quickie, it is engineered for a true team effort under racing conditions. ■ Frank Scott

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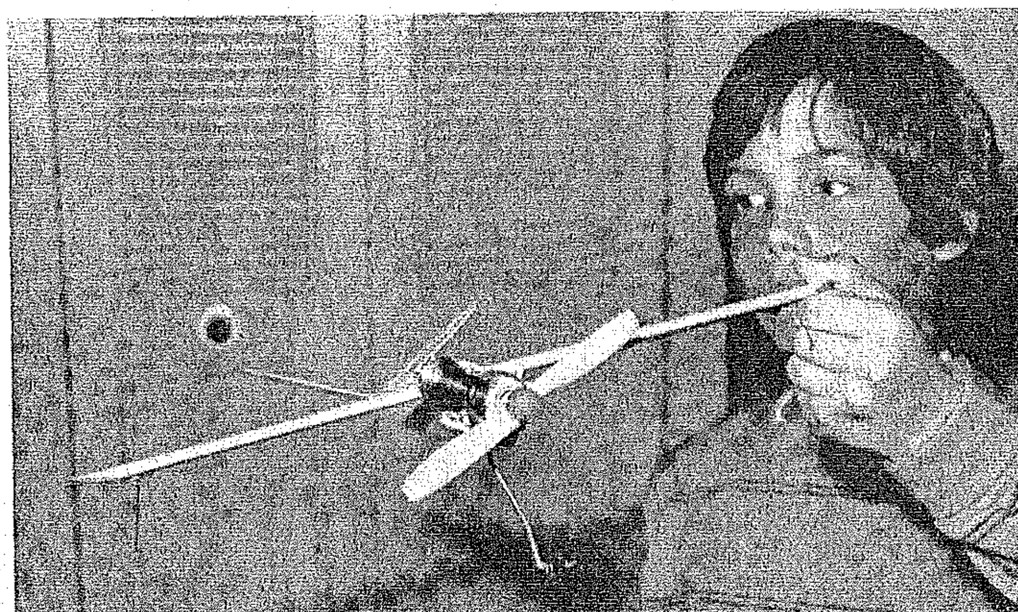
SURELY THE most really competitive race to be found under current CL rules is the Mouse Race. True, there are far more sophisticated and much faster events, but the glory of Mouse Racing is that any youngster can be as competitive as the Nationals winners, and yet have change left over from a twenty-dollar bill. Not only that, but he'll be having a lot of good fun in the process. The Little White Mouse is just such a machine, inexpensive, gloriously uncomplicated, and best yet, a genuine, certified, winner.

It is our opinion that the Little White Mouse is as small a mouse racer as is practical. It is both very fast and docile; a smaller wing would only have to fly at a higher angle of attack to maintain flight and thus would be slower. Finally, while light, the Little White Mouse is quite tough enough to take the knocks of a spirited race.

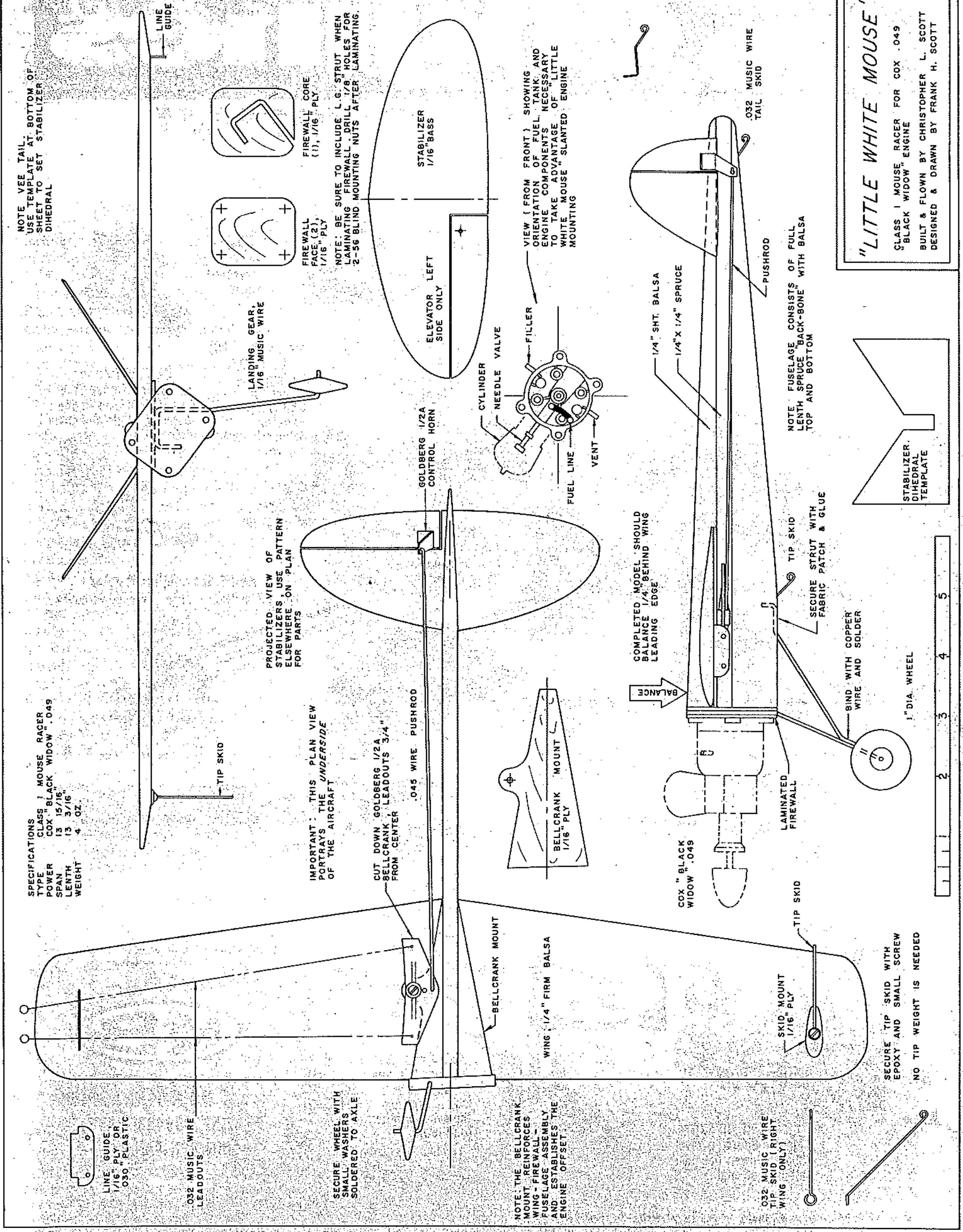
Our contest strategy has always called for the fastest possible pit stops, and our experience with Cox reed-valve engines suggested that their fine starting ability might well more than compensate for their somewhat slower running speed—even against the mighty Tee Dees.

With the Cox Black Widow engine thus decided upon, the next task was to adapt the engine for use with a Hot Hand. This was readily accomplished by using the airplane's unusual angled firewall which allows the Hot Hand's electrical contacts to fall naturally upon the glow head and ground on the crankcase. This mounting has the further considerable advantage of eliminating damage to the cylinder or needle valve in the event of the model flipping over during a landing. Finally, a Vee type tail was considered a must, as up elevator in such a configuration will also



By angling the engine mounting, the Hot Hand used by Chris falls naturally on the glow plug and the ground on the crankcase. The elevator on inside of stab adds line tension with "up."

FULL-SIZE PLANS AVAILABLE . . . . SEE PAGE 104



provide an "out" rudder force component so very useful in maintaining line tension during takeoffs and landings.

Construction is most easily begun by gluing firm ¼" balsa fuselage pieces to the ¼" sq. spruce fuselage spine. For assembly, we used a fast curing epoxy glue throughout. The landing gear is next bent to shape and assembled into the three-piece firewall. Blind mounting nuts for the engine should also be installed at this time.

The wing is shaped from firm ¼" sheet balsa. Our airfoil has a flat bottom and rather sharp leading edge. After the wing has been sanded quite smooth, it is glued to the plywood bellcrank mount. This triangular mount is largely responsible for the model's strength and should not be changed. The wing then can be assembled to the fuselage, and the firewall then attached to the model. Note that the wing root leading edge is shaped so as to provide an out-thrust angle to the firewall. In our experiments with engine offset, we have not found any perceptible decrease in speed, yet handling, especially during takeoff, is markedly improved.

The tail surfaces are cut to shape from 1/16" bass wood and carefully sanded to a streamline section. The single elevator is hinged with fabric hinges in the traditional manner, and is used only on the left stabilizer.

Shallow grooves are cut in the fuselage just above the spruce spine to assist in aligning the stabilizers when they are next epoxied in place. The dihedral template on the plan may assist in establishing this angle during assembly.

A single landing gear strut is only barely adequate for the job. Consequently, it is recommended that a brace be bent of 1/16" wire and then bound with wire and soldered to the main strut. The rear end of the strut is epoxied into the fuselage and the joint reinforced with a fabric patch. Small triangular hardwood blocks are epoxied to reinforce the critical firewall-fuselage joint; as an alternative, epoxylite fillets will also serve very well.

The tail skid is bent to shape and secured with glue and a fabric patch. The plywood right wing tip skid mounting plate should also be installed at this time.

Give the model a good overall sanding and inspect carefully for sound construction before applying the finish. As with any competition model, use a maximum amount of "elbow grease" and sanding, and a minimum amount of paint. We want it smooth and light in weight. So as far as finish is concerned, we recommend an epoxy-type paint as being the most durable against both fuel and bumps. White was chosen for visability, as we often practice in the evening and other colors tend to disappear in the twilight.

The wing-tip skid is secured to the tip reinforcement by a small woodscrew, and the plastic leadout guide is glued in the position shown on the left wing tip. This is followed by the installation of the control system. It would be well to lock the screws and nuts securing the bellcrank and elevator horn with a drop of Hot Stuff.

Before mounting the engine, remove the fuel tank back plate, and move the fuel pick up tube within so that it will be able to pick up fuel properly with the engine mounted at a slant. In this regard, we have found it useful to actually wire the fuel line right to the nearest fuel tank screw. The fuel tank body should then be rotated so that the vents are at 90 degrees to the

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Meet the "hot" pilot of the Scott son-and-pop team, smiling young Chris who consistently finished at, or close to, the top in major competitions. The ship packages a lot of pay-off features—mainly it's a matter of a quick starting reed-valve Black Widow and slam-bang pit stops.

Maybe it should be called "Mighty Mouse." The center trophy represents a first-place win at the 1976 Nats. Chris also won big at the Junior Aviator Air Races in Cleveland, and just recently set a "Fall Flying Fair" record of 2:07.8 to win the AMA CL Postal Meet. (See Feb. MA, pg. 72.)

ABOUT TIP SHAPES

There are perhaps as many different tips on wings and stabilizers as there are models. Every modeler shapes his own to his artistic talent level. In the back of your mind, the concept that if it's pleasing to the eye it's good aerodynamically, may be influencing your choice of tips. This popular idea is not necessarily true.

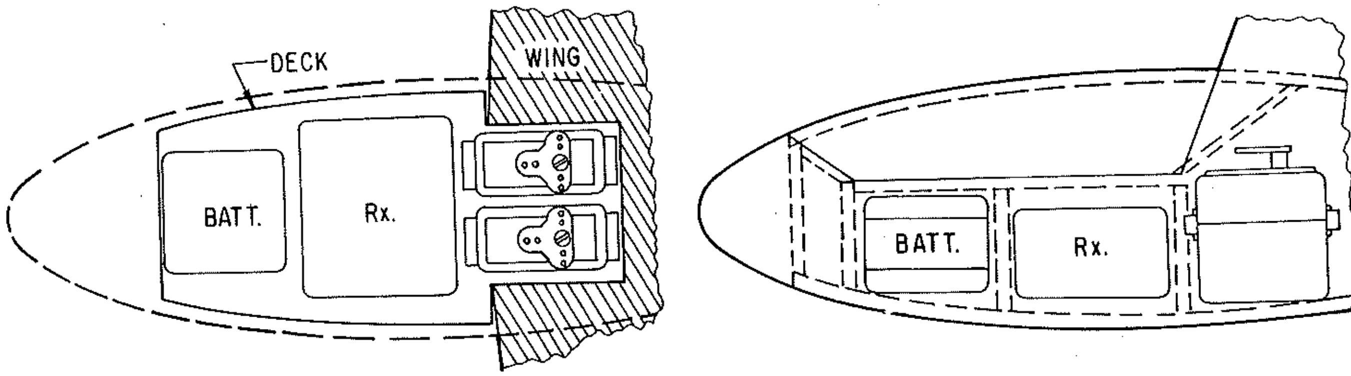
Seldom in aerodynamics does the simplest, least complex design produce the best results. The wing tip is one. The square, sharp-edged tip shows the best test results. The effective versus the geometrical aspect ratio reaches a high of 99%. A must is that the trailing edge corner have no less a span than any point on the tip chord. This tip is easy to make, strong structurally and easy to duplicate, all benefits to the builder/flier.

For those with an artistic bent, the tip nearest to the square in performance is the upswept tip. This is found quite frequently on all shapes and sizes of models. Perhaps it is popular because it works and has a pleasing planform shape. This tip has the maximum span at the high point of the wing section. A sharp edge here is also helpful. A section through this tip is in the form of a triangle with the top flat and the bottom sloped upward and outward. The effective versus the geometrical aspect ratio is a moderate 95%, however, this is not the whole story. Tests show that the tip vortex core (center) is some 50% of the wing thickness higher than other tested tips. This is the same as adding a tip plate which produces a 4% gain in effective aspect ratio for a wing with a geometrical aspect ratio of 3.0. This type of tip then is very good for low aspect ratio wings.

As for wing tip fins or end plates (winglets), some simple do's and don'ts will clear the air. The higher the geometrical aspect ratio the taller the winglet must be to improve the effective aspect ratio. Tests show that the addition of area in the form of span increase (aspect ratio increase) is more beneficial than winglets. This leads us to the conclusion that winglets are of most use when the span is limited and the aspect ratio is lower. Don't put a winglet both above and below the wing tip; this doubles the interference drag. Tests show a winglet extending below the wing is no more beneficial than one extending upward. The upward winglet has the big advantage of reduced structural damage possibility. An attempt should be made to keep the area of a winglet as low as possible. This area is destabilizing and effects the required vertical tail size.

Horizontal and vertical tail tips labor under the same aerodynamics as wings, so the same comments hold true. Horizontal tails sometimes have tip fins or rudders. This improves the effective aspect ratio of the horizontal tail but reduces the power of the vertical surface necessitating an increase of their area. A tee tail has the effect of increasing the effective aspect ratio of the vertical by 50% with no loss in horizontal tail effectiveness. A further improvement may be had by orienting the aft body (in the vicinity of the vertical tail) in a horizontal direction instead of the more common vertical orientation. This produces the effect of an end plate on the lower end of the vertical stabilizer.

"Fluid-Dynamic Lift," by Dr.-Ing. S. F. Hoerner and H. V. Borst, is full of helpful information for those who like to dig out their own data. This book (a reference in many aerodynamic groups) may be purchased for less than $30 from Hoerner Fluid Dynamics, P.O. Box 342, Brick Town, NJ 08723. (By Dave Jones.)



With the recent appearance of "mini" systems other than Cannon's—Ace and Kraft being two examples—the AR25 is not a one-make-of-radio airplane. The top and side view details shown here depict MA's suggestion for an alternate installation for the Ace system.

the boom on the left side ahead of the stabilator horn. Epoxy a clevis on the stabilator cable and attach the clevis to the horn. Fit the fin to the boom. When you are sure everything is working and free, epoxy the fin in place. Now plank the pod.

Add the nose block and sand the planking to the round cross section. Shape a soft block for the canopy/hatch. Hollow it to fit your equipment. A skid has been fitted to the bottom of the pod, but it is prone to instant removal during crosswind landings. With this in mind, a plastic skid (Scuff Guard) or several layers of masking tape provide all the protection needed. If you are adept with fiberglass, the pod can be covered with, or made from, light fiberglass and resin. This will insure an extremely strong model.

Control Surface: The wood for the stabilator must be light and reasonably rigid. Very little work is done to it, so spend your time selecting a good piece of wood. A flat plate section is used for simplicity. It is true that it will stall at low angles of attack, but by using a square trailing edge, the wake is thin. This allows very small deflections to give control response. Some

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be a question. A model will have good rough air performance if it penetrates well and does not change heading as it drifts with the wind when flying cross wind. Low drag and ample thrust provide good penetration. A properly located center of lateral area will help maintain headings in a cross wind.

Construction

Since I wanted a low wing loading and optimum performance, no foam or fiber glass is used. (Templates are provided for a foam wing.) A foam wing will add at least a ½ lb. With foam the C.G. of each panel will be moved farther out on the wing with a loss in wing stability. A fiberglass fuselage could be produced, but the nose length would probably have to be increased for balance.

Wing: Structural strength is enhanced by the use of stressed skin. Practically all of the strength comes from the outer skin. In this case, the skin *must be* a laminate. Although the wing has wood covering, it is not satisfactory to just fill the wood by the resin method, or cover it with the stretchable plastics. A fabric needs to be tightly bonded to the sheet covering. I used Silron fabric attached with common dope. It goes on easily and once in place, requires little sanding and filling. An alternate is ¾-oz fiberglass cloth applied with resin—more work and a bit heavier. With the stressed skin principle much of the internal structure is eliminated, adding to simplicity. The landing gear mounts, etc., are used to do the work additional structure once performed.

The wing assembly method is a recent development which assures an absolutely true wing, making the assembly simply a job of "sticking" parts together. A dihedral board is a must. The jig is set up so that the bottom of the wing faces up; the angle of the board will match the dihedral of the *top* of the wing. Wing assembly "saddle jigs" are fabricated. Using the wing plan for dimensions, the locations of these jigs are determined on the board, then they are secured in place. Sheeting for the top skin is glued up and roughly sized. Press the sheeting into the saddle jigs, using appropriate ribs. This determines the exact outline of the wing sheeting, and the final sizing can be made. Assembly commences with the spar, followed by the ribs, all of which form the sheeting into the jigs. Then it is simply a matter of sticking the various parts in place, and finishing the main structure by planking the bottom with 3-in. sheeting.

The wing tips are different. No blocks are used, saving several ounces in a critical area. No carving or shaping is needed. When the wing is out of the jig, the top sheeting will extend past the end ribs. This is cut to the tip shape shown. Then with a large flat sanding block, the bottom is trued up to accept the tip plate. This is done by sanding fore and aft, so that the tip plate will mate neatly to the end rib on the bottom and the edge of the tip sheeting on top. The tip plate should form a smooth surface with no sanding required.

Tail: Stressed skin is used. The same jig method can be used. However, you might want to use the other method shown which works well with small structures. This is the centerline method. Begin with leading and trailing edges. When they are placed on the building board, their width is great enough that no portion of the structure will touch the board. Centerlines are scribed on all the ribs as well as the leading and trailing edges. With the edges in place, insert the ribs between them, obtaining alignment with the centerlines. Once they are fastened, add the sheeting and, when ready, flip over the structure and add the sheeting on the other side. Shaping completes the job.

Fuselage: Except in the nose cowl and pod area, the fuselage is the typical "box" faired on the top, and for a change, the bottom. We "planked" the top fairing, and sheeted the bottom. Planking goes on as easily as any other method. A recent innovation is to coat the inside of the planking with resin or Hobby Poxy No. 2 glue, adding greatly to strength and durability.

The foundation of the pod is the maple crutch. As formidable as it looks, simple machine tools can make it a cinch—and it costs only pennies! Scrounge a small piece of 5/4 (1⅛") maple from the school shop or lumberyard scrap pile and you have the making of *two* crutches. The wood is easily shaped with a scroll, jig, or band saw. It can even be done with a drill press. Drill a zillion holes around the outline and break away the scrap. With a straight sided router bit, the true outline can be ground to shape. If you shaped the full 5/4 maple, the crutch can be run through a table saw and presto, you have two!

The fuselage mount for the crutch is ¼" plywood, a simple shaping job. In locating the shear pins and hold-down screws, first position them in the crutch. Then, with the crutch clamped to the fuselage mounts, use the crutch holes as a drill guide.

Cowlings often are a chore. If you enjoy carving and shaping balsa blocks, the described method of construction avoids the usual agony. Assemble the cowl in layers; engines vary in shape from the crankcase up, as does the clearance required. Mount the engine, hook up the throttle linkage, and chop a hole into a piece of 1" balsa. Slip the balsa over the cylinder, then enlarge the hole by eye until necessary clearances are attained. Cement this first layer to the fuselage; precision fits are not required. The next layer covers the cylinder fins and head. Make a 1½" diam. hole in another piece of 1" stock, and slip it over the cylinder. The fit to the cylinder should be close, and clearance for the carburetor and muffler will need to be provided. The final layer will simply cap off the cylinder head, and fair the whole into the bottom of the fuselage. As to the outside, you can rough shape the layers as you build them up, otherwise you will have a big glob of balsa to attack with your carving knife. The sizing of the outside is not difficult because you can hack off huge chunks during the rough shaping. It is important to bring the final shape down to a minimum while maintaining smoothly flowing curves.

Covering and Finishing: We all have our

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Douglas World Cruiser: The discriminating plastic model builder with a feel for aeronautical history, and a love of airplanes, is well aware of the Williams Bros.' line of history makers. Now added is a 1/72-scale rendition of the Douglas World Cruiser, one of the small group of planes that flew around the world in 1924, with an elapsed time of 175 days. Decals allow finishing model as any one of the five planes from the group. An important plus is the provision for wheels or pontoons, since the planes used both during their 27,553 mile route. $4.95. **Williams Bros., 181 Pawnee St., San Marcos, CA 92069.**

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favorite ways. The one I used (Silron and dope) works extremely well, requires little effort, and provides excellent durability. Cover forward section of the fuselage and the pod with ¾-oz. fiberglass cloth and finishing resin. This is durable, and 100% fuelproof. Cover the aft section of the fuselage and tail with Silkspan paper and dope. Finish with one heavy coat of Super Poxy primer, followed by colored Hobby Poxy as desired. The final step is a coat of clear Hobby Poxy to seal everything in place. If you wish a super finish, sanding out the clear and adding more coats will give you the optimum.

We hope the Solution will add to your flying pleasure. We know it will save you money.

RC Aerobatics/VanPutte

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"Since adopting this tailwheel shoe system I have not lost a single empennage due to snagged tailwheels. If the tailwheel runs into a gopher hole, the rubberband breaks, the tailwheel shoe comes free of the fuselage, the plastic clevis pops open, and the plane lands safely, ready to be flown again after assembly with a new rubberband."

A short time ago I received a note from the editor which contained the following information: "We have had fantastic success with the Simitar; it is our number one plan. As of two months ago, Bill Evans had sold more than 3,000 wing cores. This indicates a state of fusion that goes beyond the magazine. I saw this happen only once before when *Model Airplane News* sold more than 8,000 Smog Hog plans. What makes this new information interesting is the variety of types that Bill had derived from the original design."

There's no doubt that a different looking airplane always draws interest at the flying field. If it flies well, there is bound to be a lot of copies on the building board shortly afterward. That's what had happened to Bill Evan's Simitar. The Simitar XV first appeared as a contruction article in the December '76 issue of *Model Aviation*. Nationwide interest and response to this definitely different craft gives every indication that the Simitar design will be given credit for making the flying wing a practical reality within the grasp of all RC pilots.

Bill has designed and built no less than 30 flying wings. Among these have been both gliders and powered airplanes. Gliders: the Saracen (*RCM*, April 1976), a 72" glider; the Little Saracen, a 48" glider; and the Super Saracen, a 120" glider. Power: ½A Simitar (*RCM*, December 1976) and Simitar XV (*MA*, December 1976). The Simitar XV now has been improved upon to include motor control and steerable tricycle landing gear, an epoxy fiberglass fuselage (with molded-in canopy, air intakes, firewall and removable engine cowl). With a Simitar XV and a K&B .40, you have the Simitar 540.

But that's not the end; Bill has now developed a series of Simitar Twins. The first, pictured above, is powered by two Cox Medallion .09's. This is two channel, only using elevons, with no engine control. After one engine quits this 3½-pounder maintains altitude on *one* .09. There is also a .049 Twin as well as a .19 Twin now flying. A .40 Twin is soon to come.

What next? Well, Bill says that his bottom line will be to complete the negative stagger twin-engine Simitar Bi Wing. Guess we'll have to wait to *see* that!

Next month's column will include the

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Seen at Toledo: Four-bladed, rigid rotor, fully aerobatic helicopter. American RC Helicopters, Inc., 23811 Via Fabricante, Mission Viejo, CA 92675.

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