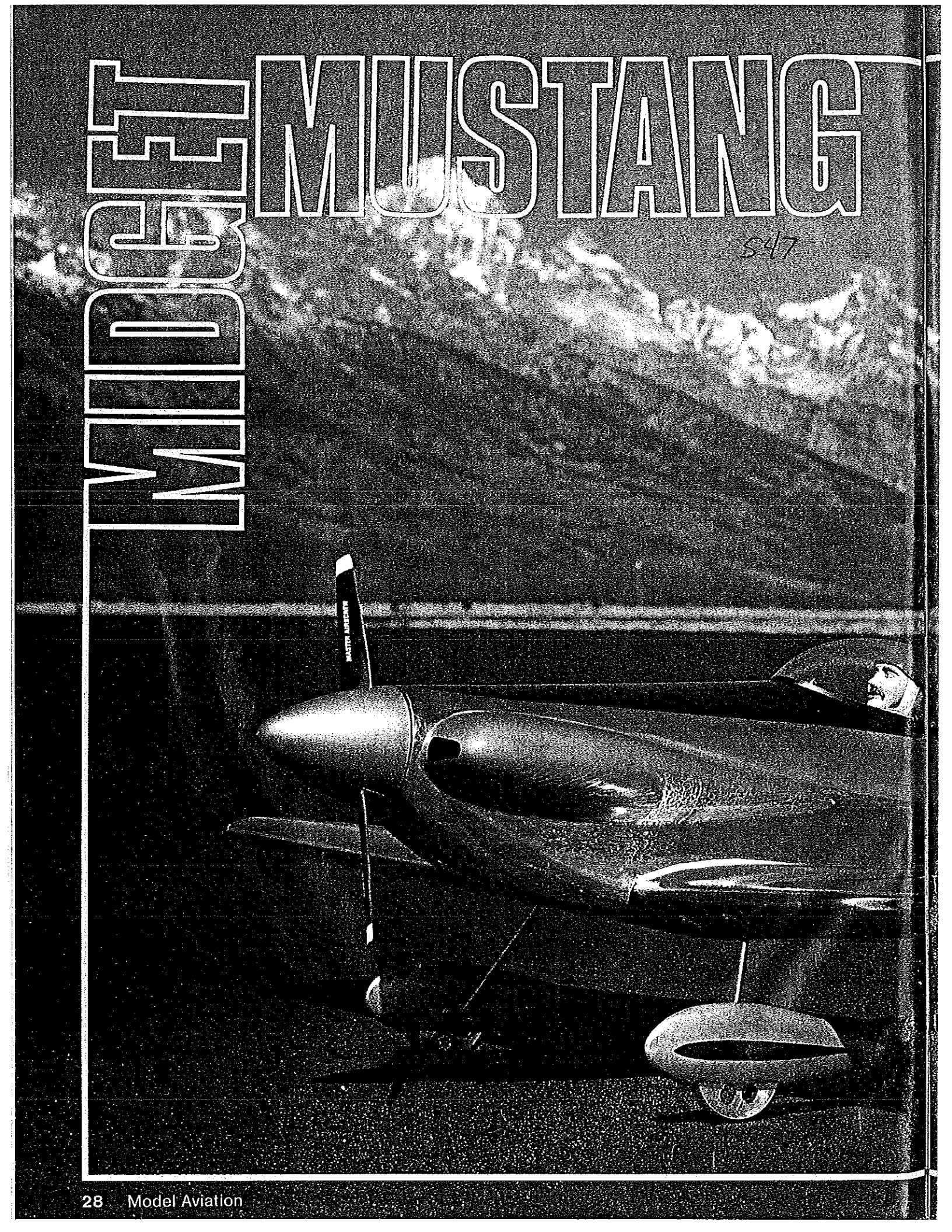
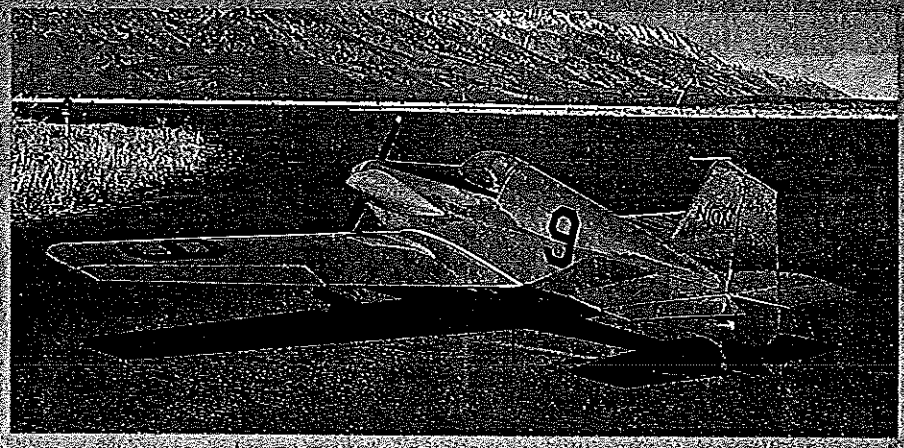
MINI P-51 MUSTANG



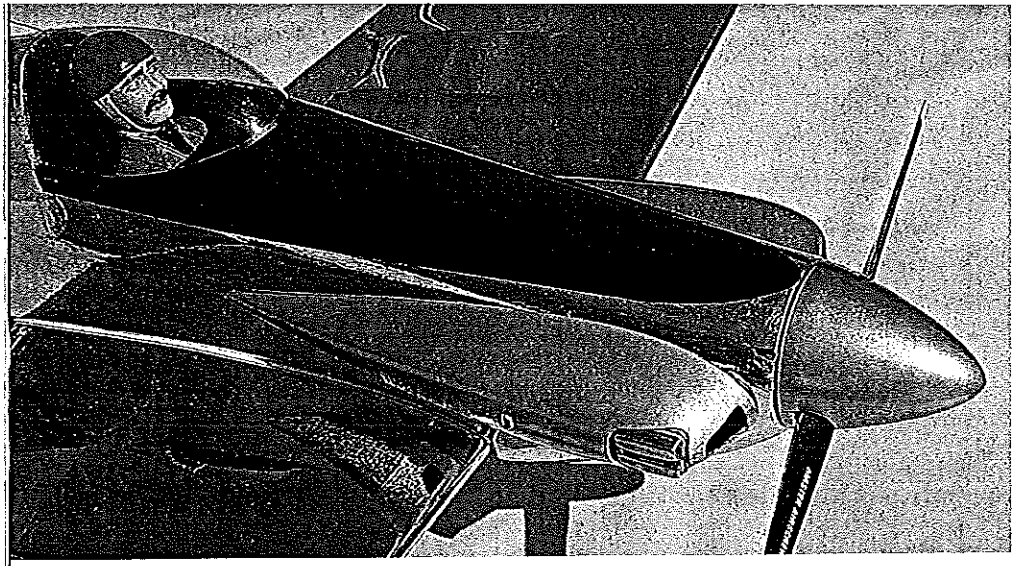
With a .40-size four-stroke engine and lightweight building as per the plans and instructions, this semiscale Radio Control model is amazingly versatile and forgiving in flight.

■ Fred Reese

LAST YEAR I designed and built a lightweight sport Pattern model called the Swallow which turned out to be a really fine flying machine. The Swallow, along with a lightweight Scale Taylorcraft built by fellow club member Harry Stewart, became the inspiration for a contest we called the 3½-lb. Four-Cycle Challenge. The rules called for a Scale model weighing not more than 3½ lb., with a wing area of at least 450

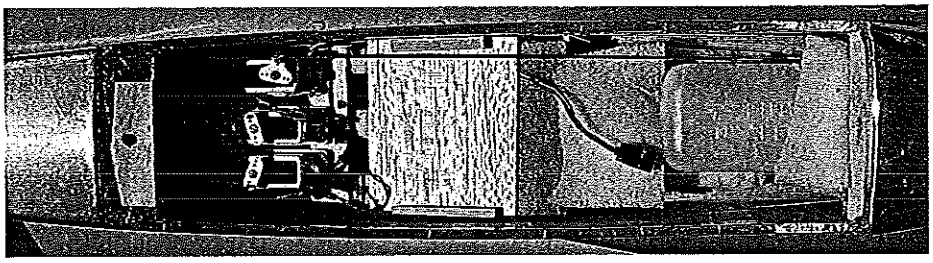


The full-size Midget Mustang is an all-metal home-built aircraft with a wingspan of just 18 ft. Designed originally to race around the pylons, most of them are flown for sport or aerobatics. There are over 300 Midget Mustangs flying and another 1,200 under construction in garages and workshops all over the country. The model has a slimmed fuselage



Sig Mustang 450 cheek cowls, forward section of a Sig bubble canopy, Du-Bro 3-in. spinner, and Williams Bros. pilot are readily-available accessories. A 10-7 Master Airscrew has been found to give the best performance on the four-cycle .40s for sport flying and aerobatics with a lightweight model. Only the valve cover protrudes through the author's cowl.

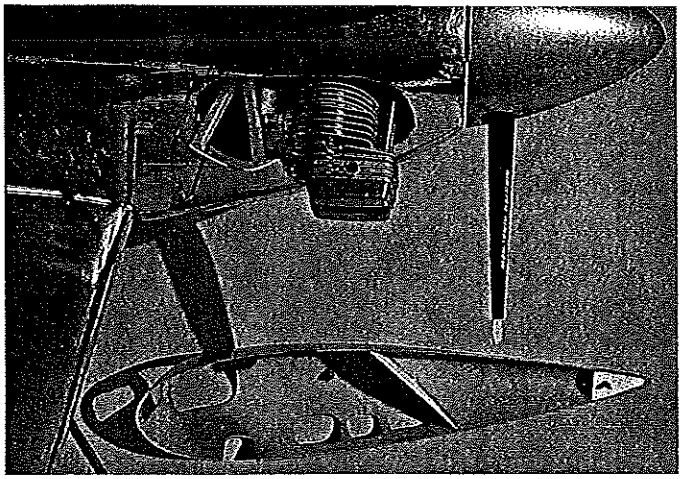
Fred Reese at the September fly-in at Alpine, WY. The two-day event draws fliers from Idaho, Wyoming, and Montana. Lots of airplanes and visiting with old friends—no contest to get in the way. Lightly-loaded models fly better at the higher altitudes in Wyoming.

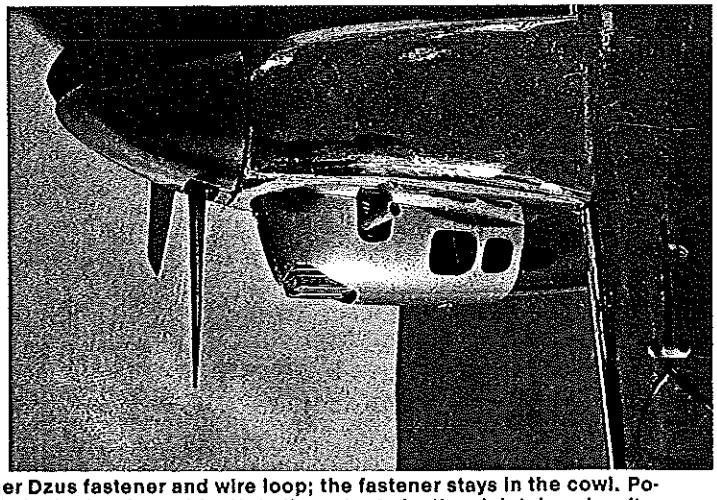


Even though the plane has a very short nose, the servos were mounted as far rearward as possible to offset the comparatively heavy four-cycle engine. The receiver and 250 mAh battery pack are below the cockpit, held in place by a sliding tray of 3/32 balsa and ¼-in.-sq. rails glued to the fuselage sides. The original 6-oz. fuel tank was replaced by a 4-oz. one. The smaller tank gives plenty of flying time with the four-stroke O.S. .40.

sq. in. and powered by a four-cycle .40 to .46 engine. Simple Scale judging and an uncomplicated flying routine coupled with a barbecue almost doubled the anticipated turnout.

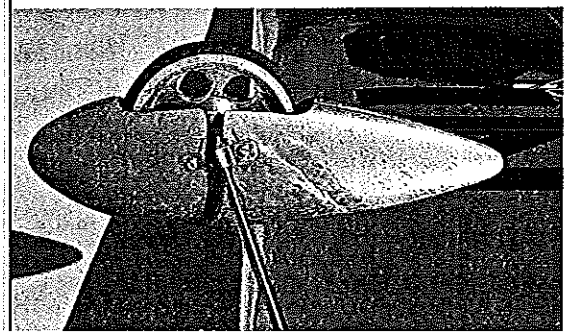
The real incentive, though, was the promise of a great-flying airplane when the hoopla was over. Unfortunately, I was not able to attend the contest, but I designed and built the Midget Mustang anyway. The full-size plane has always attracted me (particularly the polished aluminum look of the #67 P-Shooter and #9 Midget Mustang), and I knew someday I'd have to have

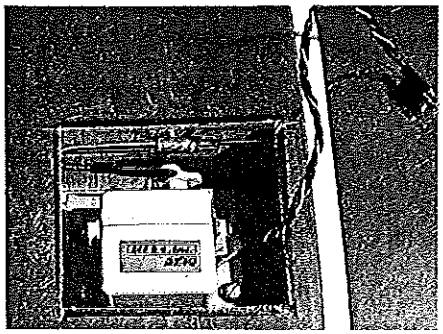


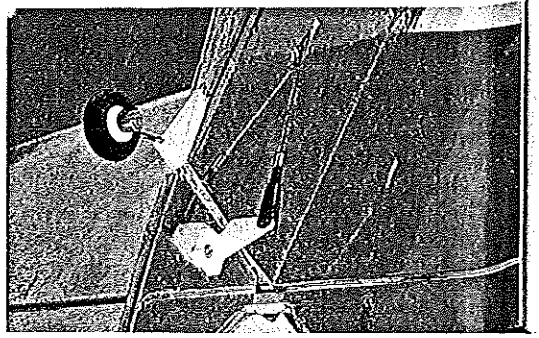


Left: The right cheek cowl is removable. It is held in place by a Prather Dzus fastener and wire loop; the fastener stays in the cowl. Positioning of the cowl is by a dowel peg at the rear of the cowl into a hole in the fuselage side. Note the cutouts for the air intake, air exits, exhaust pipe, and valve cover. The glow plug is lit via a wire from the hold-down loop to the plug. Right: A new short exhaust pipe was made from ¼-in. aluminum tubing and a pipe-flaring tool. The air exit should be about three times larger than the intake opening.

Left: Typical wheel pant mounting on a wire gear. The brass clip is soldered to the wire gear. A ⅛-in. plywood plate is epoxied into the wheel pant. Two 4-40 blind nuts are set into the plywood. Center: Ace RC Micro Servos were used by the author, but any small servos are OK. The servo tray is homemade of balsa and ply. Wire pushrods from the bellcranks and the clevis wire are joined by soldering together in a short piece of brass tubing. Right: The Goldberg tail wheel bracket is Zapped into the fuselage; excess plastic is then trimmed off. Ace RC ¾-in. tail wheel is secured with a 1/16 wheel collar. The rudder throw was increased to the maximum as testing went on.



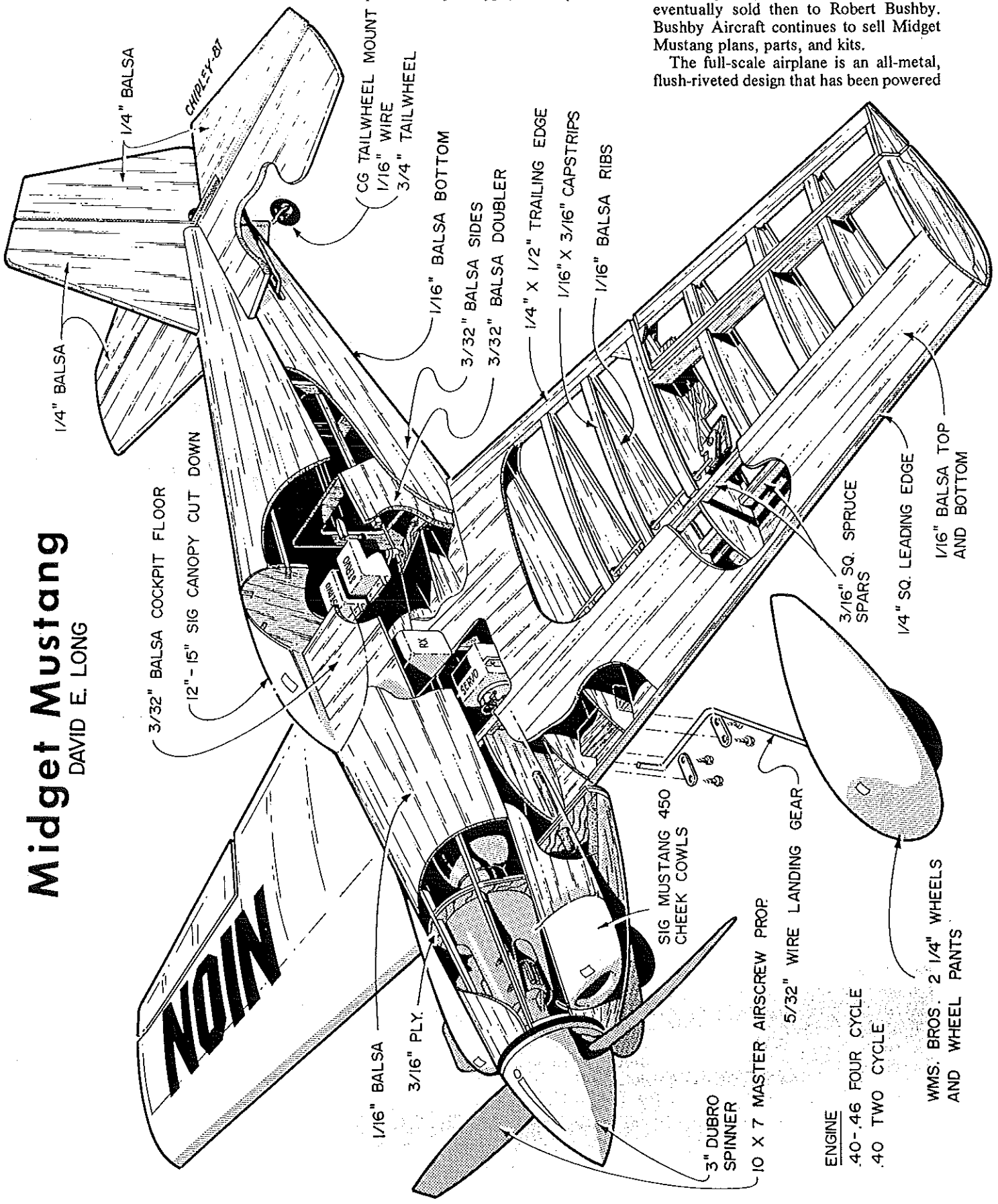


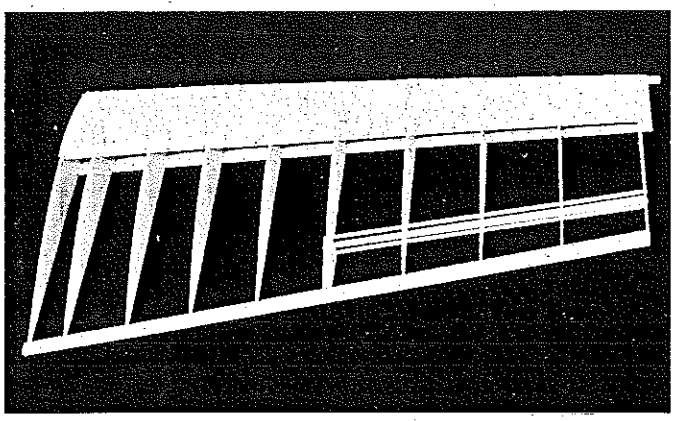


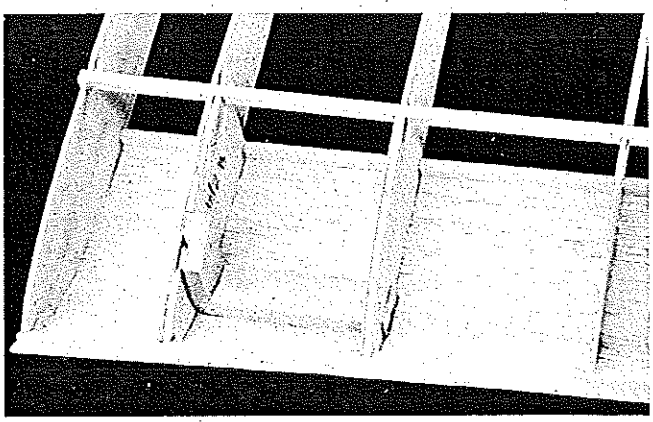
a model of it.

The original P-Shooter was built in 1948 by David Long for fellow pylon racer Luther Johnson. The plane raced in the then-new Goodyear class at the 1948 and 1949 National Air Races. In 1952 Schweitzer Aircraft Company decided to produce the Midget Mustang as a high-performance sport aircraft. While testing the production prototype, N10N (the model I chose), the engine quit and pylon racing suffered a great loss when David's parachute failed to open. Schweitzer abandoned plans to sell the Midget Mustang and sold all tooling and parts to Dr. F. Torrey, who eventually sold then to Robert Bushby. Bushby Aircraft continues to sell Midget Mustang plans, parts, and kits.

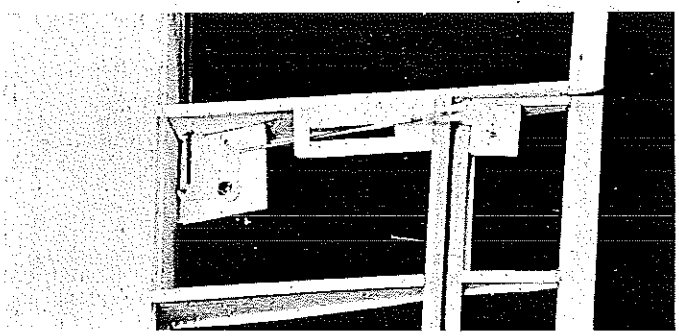
The full-scale airplane is an all-metal, flush-riveted design that has been powered

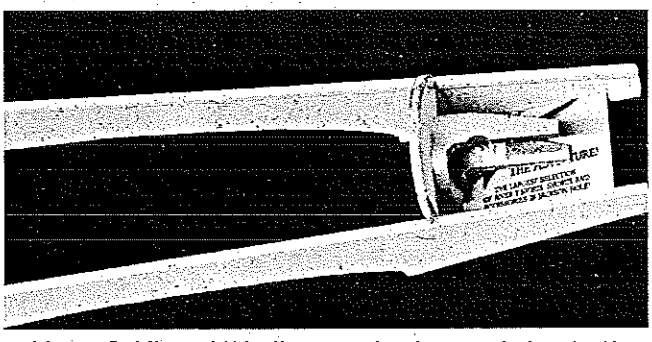






Left: As the wing is flat from the spar to the trailing edge, it can be built flat on the workbench. Balsa ⅛-in.-sq. strips notched into the wing ribs on each side of the aileron joint allow the ailerons to be cut out without breaking the ribs. Right: Landing gear blocks are glued in before sheeting the top of the wing. Notch out the bottom sheeting for the gear blocks using the blocks and rib notches as guides. The vertical blocks are short sections of the slotted gear blocks glued to the 1/16 plywood W2A. Additional 1/16 balsa partial ribs are glued in place ahead of and behind the vertical gear blocks shown as W2B in the picture. Study all the information before beginning.





Left: Bottom view of the wing showing the aileron bellcrank and control horn. Goldberg 1/16 aileron pushrods came in handy. Note the 1/16 balsa pushrod exit. The ¼-in.-sq. hinge blocks weren't in place yet. Right: Bolt the engine mount to the firewall and install the blind nuts. Glue the firewall (F3) first to one side, then the other; use a card-stock template from the plan to get the correct angle.

by engines from 65 to 150 hp. At first the 85-hp type was the most popular but over the years the trend has been towards the larger engines. Stressed for 9 Gs, the Mustang is well suited for aerobatics and cruises at 175 mph on the 135-hp engine. Configurations have varied from versions with retracting landing gear, tricycle landing gears, and folding wings. A larger two-place Mustang II is also available as a home-built project. There are approximately 300 Midget Mustangs flying and another 1,200 under construction in garages and workshops across the country.

The model is almost, but not quite, quarter scale. The wing is exactly quarter scale, but the fuselage is a little smaller, closer to fifth scale. The fuselage was slimmed in width and height by ½ in. to utilize a 3-in. spinner instead of a 3½-in. Both Du-Bro and CB make 3-in. spinners.

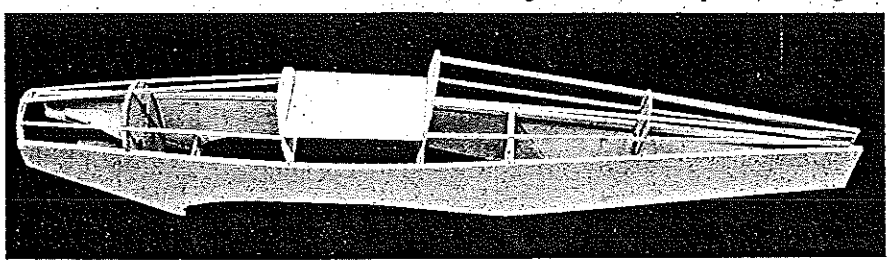
The object of the design was to produce a Pattern-capable Scale model using either the O.S. or Enya four-cycle .40s—engines which, while very quiet, obviously don't have the power of a comparable size two-cycle engine. However, when bolted onto a 3½-lb. airplane they will deliver amazing performance. Of course, there is also the Enya .46 with its commanding 2,000 rpm advantage that could give this model unlimited vertical performance. I prefer the model as it is, though, with its low noise and mild manners.

With the .40 four-stroke the Midget Mustang still happily flies the IMAC Sportsman pattern and does very pretty inside or outside square loops and figure eights. The wing is close to symmetrical, and the model requires just a touch of down elevator when flying inverted. The large side area of the fuselage makes for nice knife-edge flight with very little, if any, aileron correction.

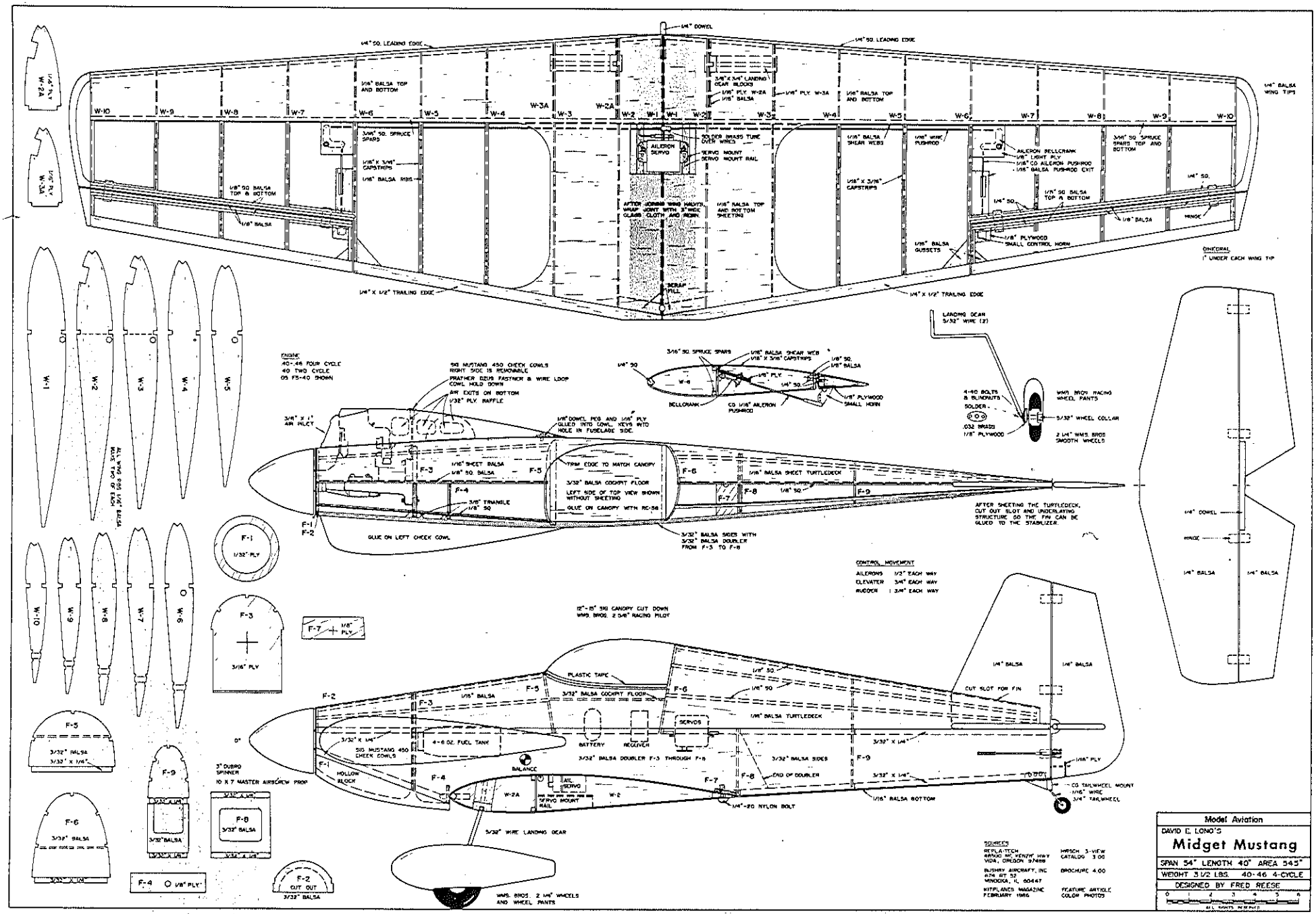
The only thing it doesn't do well is snap rolls—the forgiving wing and light wing loading won't allow the quick-breaking stall necessary for this maneuver. The snap rolls can be improved, though, by sharpening the leading edge of the wing out near the tips. I pinned triangle stock stall strips on the leading edge for a while, and they helped. The balance point shown on the plan is as far forward as it should be—but it can be located as far back as the spar. At the rear location the elevator is a bit sensitive, but the snap rolls and square corners are improved.

Another of this model's strong suits are its takeoffs. It takes just a touch of right rudder to keep it straight as the tail comes up, and it stays on the main wheels until you lift off. It will make realistic flat, smooth takeoffs or it can be ripped off the ground in 10 ft.—whatever suits your flying style. Landings take a little getting used to: the light wing loading keeps the airplane flying at very low speeds. You have to start the landing pattern farther out and lower than what seems right for other models this size. Eventually it will slow down and make the smoothest of landings; you just can't rush it.

For this season our club has extended the Four-Cycle Challenge to allow for a greater diversity of plane/engine configurations. The rules have been further modified to include manufactured kits as well as original designs. Again, the main ideal is for those who participate to end up with a great-flying airplane after a day of competition and fun. The following chart outlines the minimum wing area and the goal weight for each engine displacement category.



The completed fuselage structure before gluing on the top sheeting. The cockpit floor is cut from 3/32 balsa sheeting. The top rear stringers are glued to a temporary ⅛-in.-sq. post at the rear. The post holds everything together until the top sheeting is applied.



Full-Size Plans Available . . . See Page 172

Displacement	Minimum Wing Area	Weight Weight
.20 cu. in.	400 sq in.	50 oz.
.30 cu. in.	425 sq.in.	52 oz.
.40 cu. in.	450 sq. in.	56 oz.
.45-.46 cu. in.	500 sq. in.	64 oz.
.60-.61 cu. in.	650 sq. in.	80 oz.
.75 cu. in.	675 sq. in.	84 oz.
.80 cu. in.	700 sq. in.	88 oz.
.90 cu. in.	750 sq. in.	100 oz.
1.20 cu. in.	1,000 sq. in.	136 oz.
2.40 cu. in.	1,250 sq. in.	176 oz.

Scoring

Static	General impression	30 points
	Craftsmanship	10 points
Flying	Flight Demonstration	60 points
Total		**100 points**

Scoring is the same for both Scale and non-Scale models.

Overweight aircraft will have their score downgraded—by dividing it by the goal weight percentage. There is no bonus for underweight models.

Proof of Scale is the responsibility of the contestant, but if the Contest Director can determine that the design is a replica of a full-scale aircraft, the contestant will be allowed to have his entry considered Scale.

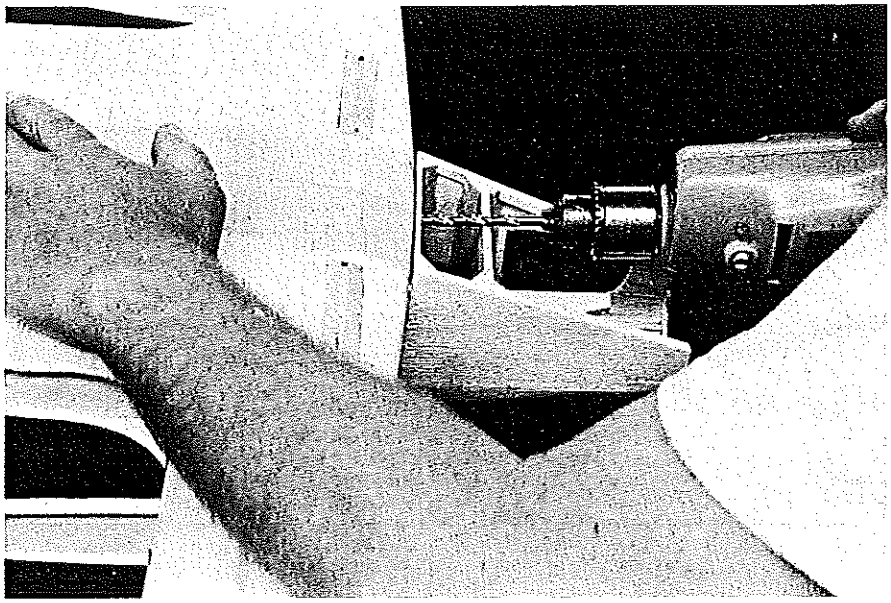
Flight demonstrations will consist of one or more rounds of four-minute flights which demonstrate the capabilities of the design. It is the responsibility of the contestant to present the design at its best. The builder-of-the-model rule is waived for the flight demonstration. The simple, low-key rules encourage a larger participation by club members.

The wing areas presented for each category are only minimums. I would probably add 10 to 20% to these figures to bring the wing loading down from 18 to 14 oz./sq. ft., especially on the designs for .60-size engines and less. My Mustang came out with 14 oz./sq. ft.

Construction of the Midget Mustang follows normal methods; you just use less—or thinner—wood. The fuselage sides are only 1/32-in. balsa but have a 3/32-in. doubler through the radio compartment. The curved top of the fuselage is 1/16-in. light, straight-grained balsa, stiffened with several 1/8-in.-sq..stringers. The result is a very light balsa shell fuselage that is more than adequately strong for any flight loads. You have to be careful handling the models as you could easily stick a finger through the turtledeck, but then you could also stick a finger through a MonoKoted wing if you grabbed it wrong.

I like to store and carry models in a Robart foam stand or a cut-to-fit tray from a foam TV packing tray. In eight months of flying and about 200 flights, the only damage I have caused is holes in the MonoKote on the bottom of the wing from gravel thrown up by the propeller.

The wing is also typical construction using light 1/16-in. balsa ribs and sheeting. The wing builds flat on the table since it is flat-bottomed from the spar to the trailing edge.



Don't glue on the chin block until the wing is fitted and mounted. With the wing in place, drill through F4 with a 1/4-in. drill for the front dowel key mount. The wing panels are joined at the center with 3-in.-wide fiberglass cloth and resin. The landing gear blocks are sanded flush with the wing sheeting. Note the triangular stock glued around F4 and the firewall.

The complete airframe, ready to fly, less radio and engine, should only weigh about 1½ lb. This is not hard to do—you just have to be careful. As you build, forget you ever heard of epoxy. All construction is done with Zap CA+. Even the firewall and landing gear blocks are Zapped into place.

I put all the small parts on the end of the plan sheet so they can be photocopied without cutting up the plan. The cut-up photocopies are then glued to the wood with spray contact cement. If the paper sticks to the wood too much after the parts are cut out, rubber cement thinner, sold at office

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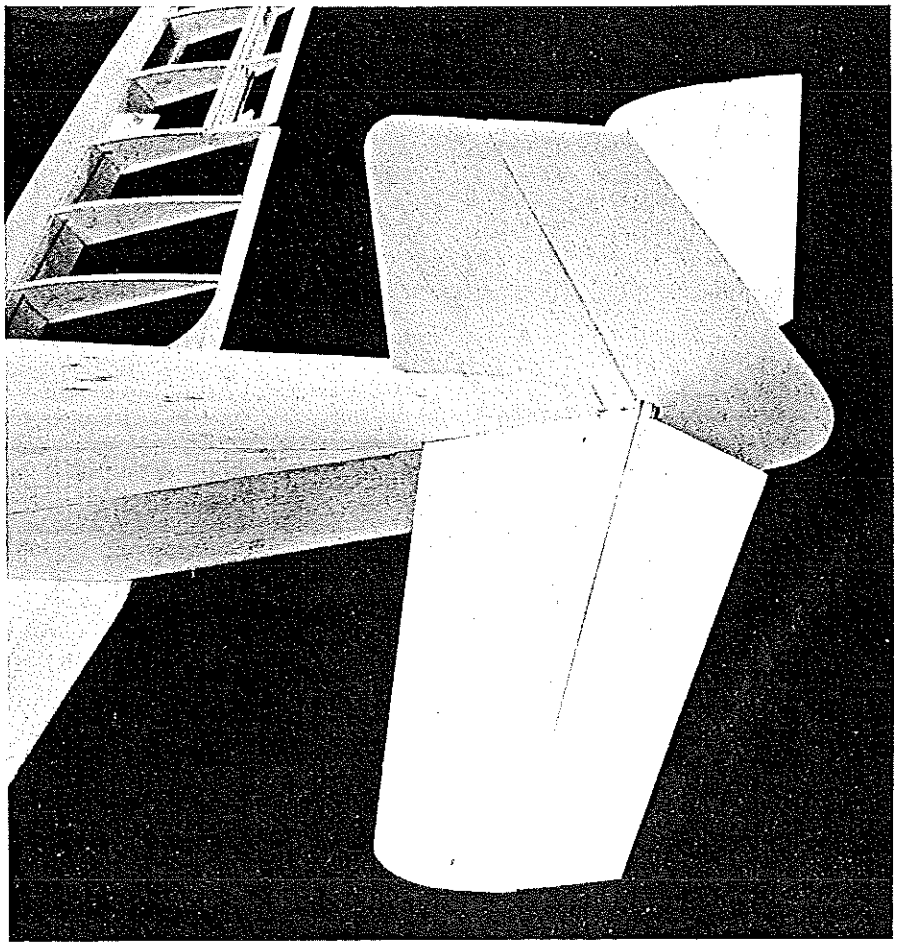

Cut slots in the fuselage for the vertical fin and stabilizer with a razor saw. The fin goes down to the top of the stabilizer. Join elevator halves with 1/4-in. dowel or 1/4-in.-sq. spruce.

Radio Technique/Myers

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receivers. "The key to the future is a better receiver." I've said that many times since 1983, and it is still true. Some transmitters will have to change—but **almost every receiver in use today must be replaced.**

A small number of RC systems already satisfy the requirements of the AMA Guidelines. Among them are the Kraft synthesized RF transmitter modules and receivers, the Kraft KPR-8FD (crystal-controlled, fixed-channel receiver), the Circus PCM-9 with the ABS receiver, any Airtronics FM system which includes their 92245 receiver (currently available as an accessory part at $64.95), and two low-priced imports. The imports are the Acoms FM system at $150 and the Futaba Conquest PCM at $250.

You may look at the above list and say, "I'll buy one of those right now and jump right into the new 'narrow-band only' section of the spectrum, where I'll be safe from all that trash in the high end of the band." Not quite! If the manufacturers cooperate, you won't be able to buy crystals for RC14, RC16, RC18, RC20, RC22, RC24, RC26, RC28, RC30, RC32 or RC34 until about September of 1987 (leaving aside the people who already have Kraft SRF modules).

Let's say that you find a way to get the low-band crystals. You can use them during sport flying (away from AMA-sanctioned contests), *but you won't be allowed to use them at sanctioned contests* unless the Contest Director decides to make some kind of special arrangement for you. Once again, FSGAME will help you assess the problems such a decision might create.

The AMA rule book won't actually *require* narrow-band performance (as defined by the AMA Guidelines) from RC systems used on the low-band channels until 1988. So what? The rule book doesn't try to *prevent* you from using narrow-band equipment there, either.

You automatically have AMA permission to use narrow-band equipment (i.e., narrow-band transmitters and receivers) on Bn/W, Blu/W, R/W, etc., as well as on RC38 through RC56, right now. All the advantages of a narrow-band set will be available to you right now, and when January 1988 rolls around all you will have to do is swap a pair of crystals. It is unlikely that retuning will be necessary for a swap from RC18.5 (Blu/W) to RC18, for example.

Eventually all radios from RC11 through RC60 will be required to be narrow-band. If you buy a narrow-band system on RC38 through RC56 today you may be establishing an early claim on the use of that channel, assuming your club works on an "assigned-channel" basis. Quite a few clubs already do that, and it won't surprise me to see a lot more of them doing it when we have 50 channels to work with.

George M. Myers, 70 Froehlich Farm Rd., Hicksville, NY 11801.

Midget Mustang/Reese

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supply stores, will soften and remove the glue.

Cut out the parts with a Dremel jigsaw or sharp X-Acto knife and then true them up with a large sanding block. I cut out both sets of wing ribs at the same time by gluing two sheets of wood together with contact or rubber cement, separating the parts as soon as they are cut out. The spray contact

cements, such as Scotch brand, don't make the quick permanent bonds that the brush-on contact cements do, so they should be used here.

Wing. Pin the bottom leading edge sheet to the wax-paper-covered plan. Glue the 3/16-sq. spruce bottom spar to the back edge of the bottom sheet. You could substitute ¼-in.-sq. hard balsa for the spars. Pin the ¼ x ½-in. trailing edge to the plan. It is easier to at least partially taper the trailing edge with a razor plane before building the wing. Pin down a strip of 1/16-in. balsa just ahead of the trailing edge to hold the back of the ribs up 1/16 in. for the cap strips.

Glue on ribs W-1 and W-10. Glue the 1/16-in. plywood doublers to W-2 and W-3. Glue in the rest of the ribs and add the top spar. At this point the ribs are only glued to the spars and the trailing edge, and the bottom sheet is still down flat on the plan. Glue on the ¼-in.-sq. leading edge and now pull up the bottom sheet and glue it to the ribs and the leading edge. Using the notches for the landing gear blocks in W-2 and W-3 as guides, cut slots in the bottom sheeting for the landing gear blocks. Glue the gear blocks into the wing. Use short pieces of landing gear block material for the vertical blocks glued on W-2. Glue 1/16-in. balsa in front and back of the vertical gear block for additional support. Run a 3/32 drill down the notch in the vertical block and through the landing gear block to hold the wire gear.

Pin the wing back down to the workbench and glue on the top front 1/16-in. sheeting. Glue in the 1/16-in. vertical-grained shear webs between the spars and ribs. It is important that the wing be pinned down to a flat surface while doing this, or you could build a twisted wing.

I thought of the following method for aileron construction after I struggled through the sequence on my Swallow model. By gluing in the ⅛-in.-sq. top and bottom pieces, the ailerons can be cut out without breaking the ribs. If you don't want to notch the ribs, 1/16 x 3/16 balsa could be glued to the tops and bottoms of the ribs, both in front and back of the aileron gap. Once the rib ends are trimmed, face the ailerons and the back edge of the wing with ⅛-in. sheet balsa. Note that the notches in the ribs for the ⅛-in.-sq. aileron spars are shallow so that the top edge of the spars are even with the cap strip. Glue on the cap strip and the center section sheeting.

Glue in the ⅛-in. light ply bellcrank mounts and control horn mounts. Install the 1/16-in. wire pushrods. Cut each pushrod ½ in. longer than the wing panels so they will overlap and can be easily soldered. Notice that the hole in rib W-4 is small—to act as a bearing and prevent the wire pushrod from flexing.

Install the aileron bellcranks and the Goldberg 1/16-in. aileron pushrods to the control horns. The control horns are attached to the ailerons with two #2 sheet metal screws instead of the nylon screws

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Midget Mustang/Reese

Continued from page 127

they come with. Actually, the bolts provided will hold in the plywood if threaded into a 1/16-in. hole. Glue on the 1/16-in. balsa pushrod exits to the bottom of the wing. These give a finished edge for the covering around the pushrods. Glue on the 1/4-in. balsa wing tips. The wing tips can be cut from scrap left over from the stabilizer.

Sand the root ends of the wing panels to the proper dihedral angle with a large flat sanding block, and glue the two wing halves together. Block up one wing tip 2 in. under W-10 for the correct dihedral angle. There are no spar joiners. The strength of the wing joint is provided by a 3-in.-wide piece of fiberglass cloth and finishing resin. Ace RC sells the 3-in. cloth, which is easier to use than a strip cut from a larger piece of cloth. Use resin and microballons to fillet the edge of the cloth and the balsa sheeting. Blot off any excess resin with toilet tissue. There should be just enough resin to saturate the cloth—but no puddles. Feather-sand the edges of the glassed area. Sand the wing for finish with fine sandpaper.

If you plan to use an Enya .46 for power, move the wing forward in the fuselage 1/2 in. because of the additional weight and larger fuel tank required. You will also have to adjust the widths of formers F-4, F-7, and F-8 to accommodate the Enya.

Fuselage. Cut out the sides and glue a 3/32 x 1/4-in. strip down the top edge from the nose to the tail. Glue on the balsa doubler between the front edge of the firewall and past F-8. The back edge of the doubler extends past F-8 at an angle for 1 1/2 in. There is also a piece of 3/32 x 1/4-in. from the nose to F-4 along the bottom edge of the sides.

Cut out the firewall, F-3, from 3/32 plywood and attach the engine mount with 4-40 bolts and blind nuts. Cut a cardstock template for the firewall angle using the top view on the plan as a guide. Using the template, glue the firewall to one of the fuselage sides and then glue on the second side. Cut out the other fuselage bulkheads and glue on the 3/32 x 1/4-in. strips to stiffen the balsa bulkheads. Glue in F-4 and F-8 and pull the tail together and glue. Add F-9 and F-7. Glue in F-5 and F-6 and the cockpit floor. Glue in F-2 and the 1/8-in.-sq. top forward stringers. Glue on a 1/8-in.-sq. tail post, shown on the side view of the plan, and glue on the top rear 1/8-in.-sq. stringers.

The top 1/16-in. sheeting is applied in two pieces—one from F-2 to F-6 and the other from F-6 to the tail post. Choose light, straight-grained balsa for the top sheeting and piece together sheets to make pieces slightly larger than necessary. Tape the forward sheet in place and mark it for the canopy opening. Cut the canopy opening smaller than the canopy so it can be trimmed for a close fit later. Before gluing on the top front sheet, add any finishing detail you want to the cockpit. All I did was

paint the inside of the cockpit flat black. Don't glue in the pilot until you glue on the canopy.

Apply a bead of glue along the top ⅛-in. stringer and glue on the top front sheet. Pull each side of the sheet down around the bulkhead and the fuselage sides. Trim the top sheet to the fuselage sides and the back edge of F-6. When the fit is right, finish gluing on the top front sheet.

Follow the same procedure for the top rear sheet. You will need to make a relief cut in the sheeting, down the centerline at the rear, to be able to make the sharp bend required. Dampen the sheeting on the outside after gluing to the top stringer. Pull the sheet down and around, trim to fit, and finish gluing.

Cut out the fuselage side for the engine. Don't cut the opening larger than the cheek cowl will cover. Bolt the engine into place, slip F-1 into place, and mount the spinner. Center F-1 to the spinner and fit it to leave 1/16-in. space behind the spinner. Glue in F-1.

Fit the wing to the fuselage by holding it in place and sliding 80-grit sandpaper along the wing saddle until the saddle fits the wing. With the wing in place and centered, drill a ¼-in. hole through F-4 into the leading edge of the wing for the ¼-in dowel wing mount. Drill a 3/32 hole through the trailing edge of the wing and F-7 for the rear mounting bolt. With the wing still in place, run a ¼-20 tap through the wing and F-7. Drill the wing hole out with a ¼-in. drill and set the threads in F-7 with a drop of Zap. Run the tap back through F-7 to clean out the threads.

Glue on the bottom rear 1/16-in. sheeting. Tack-glue the chin block in place; carve and sand it to shape. Cut the block free and mark the positions of the firewall and F-4 on the inside of the chin block. Hollow the chin block to about 1/16 in. thick, but leave ridges to glue to F-3 and F-4.

The fin extends down through the turtledeck and is glued to the top of the stabilizer. Cut out the tail surfaces from ¼-in. light balsa and sand to a symmetrical airfoil shape. I sand the elevator as one piece and do not cut out the "V" for the rudder until after shaping and gluing in the ¼-in. dowel joiner. A slot has to be cut through the turtledeck for the fin. Cut the slot carefully with a razor saw, as the cut will remove the little ⅛-in.-sq. post and taper the ends of the stringers. Cut a slot in each side of the turtledeck just above the fuselage sides for the stabilizer. The stabilizer is glued to the top edge of the sides. Glue the stabilizer in place and then glue the fin into the slot and to the top of the stabilizer.

Finish sanding the fuselage and tail parts with #200 aluminum oxide or garnet sandpaper. Remove the engine and mount and give the entire fuselage and tail a coat of Balsarite. Brush at least one coat of Balsarite onto the radio compartment and three coats onto the engine compartment, and around F-4 and F-7 to protect the wood from oil and fuel. Lightly sand off any balsa fuzz.

Cover the model with EconoKote or MonoKote. The original Midget Mustang and P-Shooter were polished aluminum—like chrome—and trimmed with black. I chose chrome MonoKote, but it seemed more difficult to work with than their other colors. Sig has a chrome in their new line of Polykote iron-on coverings that may be easier to use, although I haven't tried it. At first I did not like the chrome color scheme in the air as orientation was difficult, but I have since got used to it and don't have any problems flying it now.

Midget Mustangs have been painted in many colors. There is a very nice one at the EAA Museum that is mostly white with red trim. Paul White, also an excellent RC builder and flier, built a Midget Mustang in his old Formula One paint scheme of yellow with red and black trim. This airplane is so meticulously finished that there is no sign of a rivet or panel line. Paul, by the way, was also the builder of Phil Kraft's Super Fli.

For those looking for more documentation, there is a picture of Paul's Mustang in the February 1986 issue of *Kitplanes*. Replatech International has the Hirsch three-view drawings of N10N and N9N, Mammy. Mammy was done in overall black with yellow trim and race numbers.

For the black trim on my model, I used Coverite's new Graphics trim sheets. This trim is available in red, black, white, yellow, and blue. The material is a very thin vinyl that is fuel-proof. There is no sign of the vinyl coming loose from exposure to the fuel even after a year of regular use. It does not shrink with heat, but it will melt. Keep your iron off it.

The forward part of a Sig 12-15-in. bubble canopy works great as the canopy for this model. Lay the canopy over the plan to find the section where it matches the shape. The back edge of the canopy overlaps the turtledeck and F-6 by about 3/16 in. for gluing. Mark around the canopy on the balsa top with a pencil and trim away the excess wood. Leave a 1/8-in. edge for gluing. Pierce the covering every 1/8 in. to allow the glue to get into the wood. Glue the canopy in place with RC-56. A 1/4-in. strip of plastic tape in a color to match is applied around the canopy joint for a nice finished edge.

I used Pactra's Formula U silver to paint the cheek cowls and spinner. I tried one of those chrome epoxy sprays, but it wasn't fuel-proof, and it wasn't any more chrome-colored than the regular silver paints.

I originally used Formula One racing wheels and wheel pants as they are the lightest possible units. However, after a couple of months of flying, the wing sheeting above the gear blocks began cracking. The "O" ring wheels were transmitting too much landing shock to the wing. Consequently, I changed to standard Du-Bro 2¼-in. wheels, and the problem stopped. These wheels could be used with built-up wheel pants or Sig's Citabria or Cessna 150 plastic wheel pants.

I called out on the plan the slimmer Williams Bros. racing wheel pants which are made for their 2¼-in. smooth contour wheels. As much as I like wheel pants, I have been flying my Midget Mustang without them. The main problem with wheel pants on a model with a wire landing gear is that they rack backward on a hard landing and punch a hole in the bottom of the wing. Fortunately, on this design the wheel pants only tear the covering, which patches easily.

Fit the Sig Mustang 450 cheek cowls to the fuselage sides. Paint the left cowl before gluing it to the fuselage. Once the right cowl

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fits the fuselage side without the engine, install the engine and make any cutouts needed. Cut out the air inlet and exit holes. The exit holes should be about three times the size of the inlet. Glue in the air baffle and the rear positioning peg, and drill a matching ⅛-in. hole in the fuselage side.

The Prather Dzus fastener cowl mount is the best way to hold on a cheek cowl. The fastener locks or releases with just a quarter-turn of a screwdriver, and it holds tight. The wire loop is held to the firewall with two sheet metal screws and can be adjusted in and out. Once positioned correctly, tighten the screws and Zap the wire and screws. With the wire in place, locate the hole in the cowl for the Dzus fastener and drill the hole with a 1⅜₄ drill bit. Once pushed in place, the fastener will turn easily but will not fall out.

Make another cutout for the exhaust pipe. I made a short exhaust pipe for my O.S. FS-40 from ¼-in. aluminum tubing and a pipe-flaring tool. The short, straight pipe gets more of the oil and exhaust under the wing and keeps the airplane cleaner. The new pipe is 1 in. long, and I use it for the ground wire of my starting battery.

I soldered a piece of insulated wire to the glow plug and to the fastener loop to start the engine. Be sure to wrap the wire once around the plug and twist before soldering. Wrap a couple turns of the insulated wire around the wire loop before soldering the end. Vibration kept breaking the wire until the strain was taken off the solder joint.

Alligator clips can be attached to the wire loop through the air exit and to the exhaust pipe for starting. I did not bother with a needle valve extension as I can reach the needle valve with a finger when the cowl is off; once set, it rarely needs adjusting.

Originally, I used a 6-oz. fuel tank but changed to a 4-oz. tank, as the model was a little nose-heavy. There is still adequate fuel for the O.S. FS-40. At the IMAC Nats last year, both Dennis Carlson and I flew the Midget Mustang through two uninterrupted sequences—and still had several minutes of fuel remaining after landing. If you opt for a two-cycle .40 or an Enya .46, you will need a larger fuel tank.

Mount the servos as far to the rear as possible. The receiver and 250 mAh battery pack fit under the cockpit and are held in place by a sheet of 3/32 balsa and ¼-in.-sq. rails glued to the fuselage sides. The balsa sheet will slide forward for access, but the foam padding will hold it in place. I use ¼-in.-sq. balsa pushrods with 1/16-in. wire bent at right angles to attach to the servo outputs. The adjustable clevises are at the control horns. Wrap the wire ends to the balsa pushrods with thread and secure with a drop of Zap.

The Swallow, my other lightweight O.S. FS-40 model, presented in the October 1986 issue of *Model Aviation,* and the Midget Mustang are the two nicest-flying airplanes I have ever had. I call them out together, as they are very similar in size, power, weight, and configuration. These two airplanes have given me hundreds of flights that are both relaxed and exciting. They've put a new level of fun in flying for me. Because of the easy way they fly through maneuvers, my skill as a pilot has improved greatly—especially my landings.

I felt comfortable right from the first takeoff with both models. They are rock-solid stable with no tendencies to tip-stall. I once did a downwind touch-and-go, then pulled up sharply for a quick go around to do it again to do it again. All this induced a stall (naturally), and I watched the Mus-

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tang begin to shudder as everything stopped flying right in front of me. No problem with this plane, though; just apply more power and continue as if nothing had happened. There was just a slight pause in the climb - out. The gallery behind me agreed that if it had been any other airplane, it would have crashed at least six times.

The light wing loading and forgiving nature of the airplane will let you get away with things that might kill a heavier model. A few weeks ago, on a very windy day, I couldn't resist the temptation to try hovering the model into the wind. The ground speed dropped to zero, and I could make the model rise or fall by playing with the throttle, but otherwise it sat motionless just over my head. The Midget Mustang is such a versatile airplane that it really does makes flying fun.

Scale Doc./Kruse

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model to its drawings if the scale ruler is omitted; your loss of points will be disastrous.

Color and Markings Documentation. If you have a separate authenticated statement on color and markings, paint chips, or photos specifically included to show color and markings, here is the place to include these things. Also include some sort of labeling system or brief commentary on the intent and purpose of the display so the judges will know what you're trying to show.

Photos and Other Supporting Materials. This last area, along with the three-view, is probably the most critical as far as securing good static points. The photos displayed should be of the aircraft you have modeled. Photos which do not support your efforts should be discarded unless there is some specific logical reason for their inclusion. If possible, a brief caption line under each photo is also useful to help the judges see what you want them to see. Good crisp black-and-white photos, no smaller than 4 x 5 in., are very useful. Color pictures are even better, unless the colors are not those of your chosen aircraft.

All of the documentation material should be placed sequentially in a binder of some sort, I prefer a three-ring, loose-leaf binder, preferably in a color complimentary to the model. Since several people will be handling your material during the course of a contest season, it's best to place each page inside a clear acetate page protector available from any office supply house. The scale ruler should also be placed within the binder. If possible, it should be attached in some way to prevent it from being lost. If it is made of card stock, holes may be punched so it will fit in the three-ring binder. If it is a plastic ruler, try attaching Velcro to it and the inside cover of the binder.

As stated in the FAI RC and CL Scale rules, "Proof of scale is the responsibility of the contestant." Hopefully, by exercising the same diligence in collecting, organizing, and packaging scale documentation that is typically evident in the construction of a model, any builder will find himself in the winner's circle far more consistently.

Good luck on your next Scale project.

RC Soaring/Blakeslee

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also outstanding builders with creative ideas—such as Ken Stuhr who builds some beautiful and fast models comparable to anything coming out of Europe. Jim Riggle of Portland is currently indulging himself in a Marks Models ⅓-scale ASW-20 project, which should be a beautiful sight to see. I could go on and on, but I know all clubs have those individuals we never hear about but wish we did!

"Our hill heights vary from 600 to 1,100 ft.—with wind direction being of little consequence, as at least one site should work in any condition—all within a 15-mile radius. Incidentally, over on the Oregon coast is a most spectacular site known as Cascade Head. It is 1,295 ft. high and looks directly onto the ocean. If the lift dies, landings can be made on the face of the hill in quite nice grass. Anyone wanting to fly with us can contact me at 632 Meadows E., Richland, WA 99352."

Thanks for the report, Wil. It sounds like your slopes are just what Bill Liscomb is looking for! Wil sent quite a few photos with his letter. One was taken from the top of the slope and shows a huge and absolutely beautiful valley down below. Unfortunately, it lacked sufficient contrast to print in the magazine. Wil's other photos show the range of plane types that can be flown from a slope—from ¼-scalers, to Thermal ships, to jet-