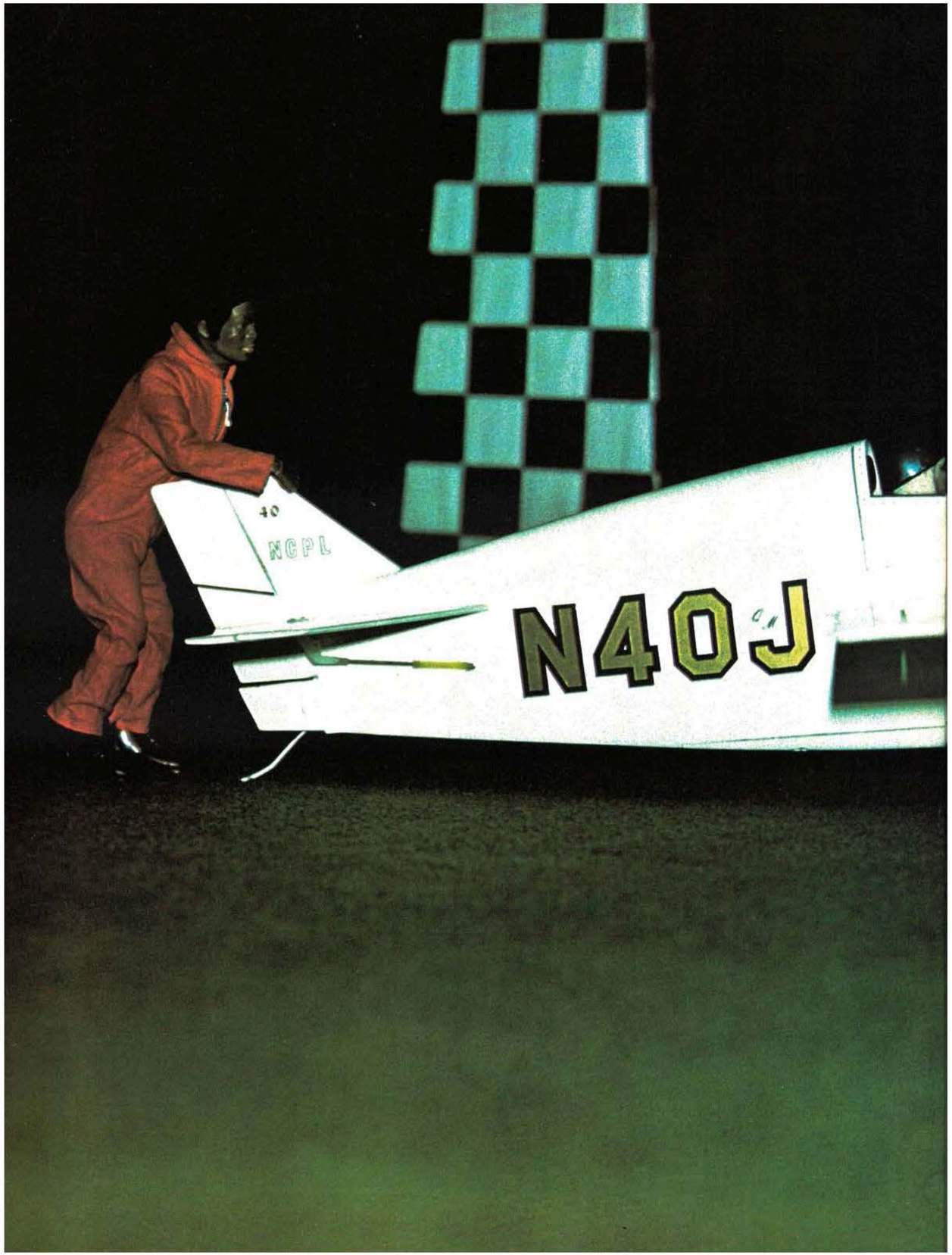
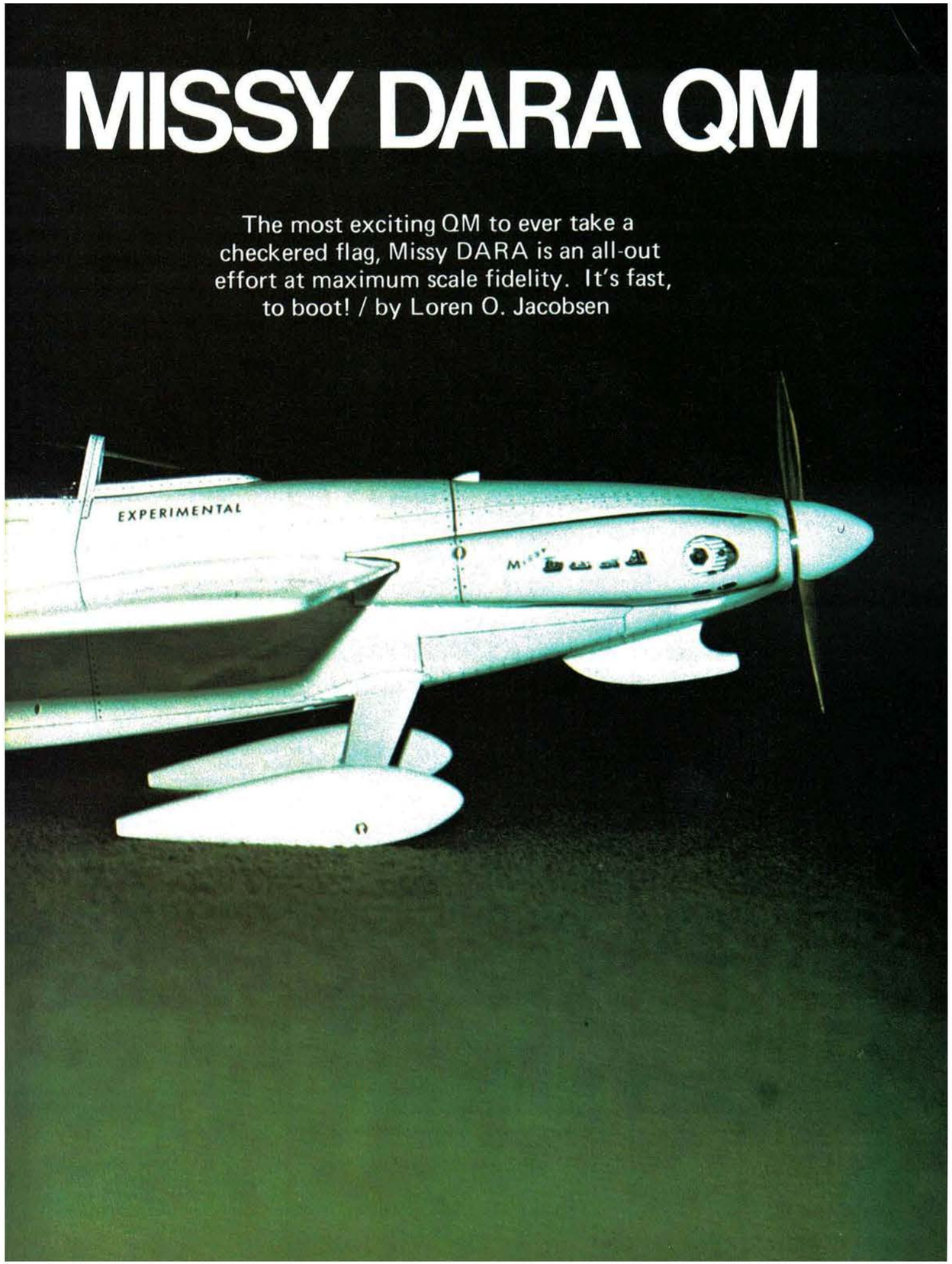
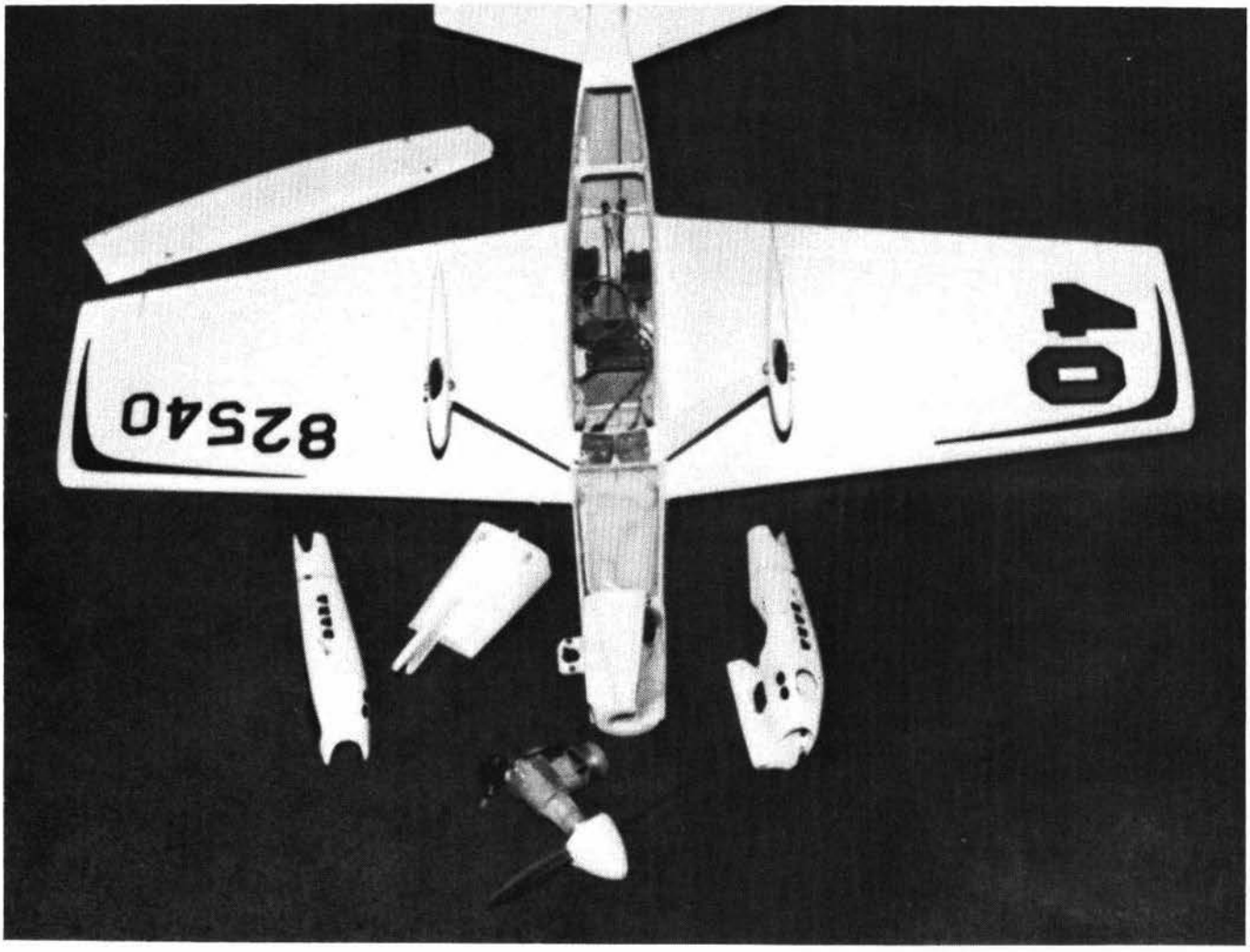
MISSY DARA QM

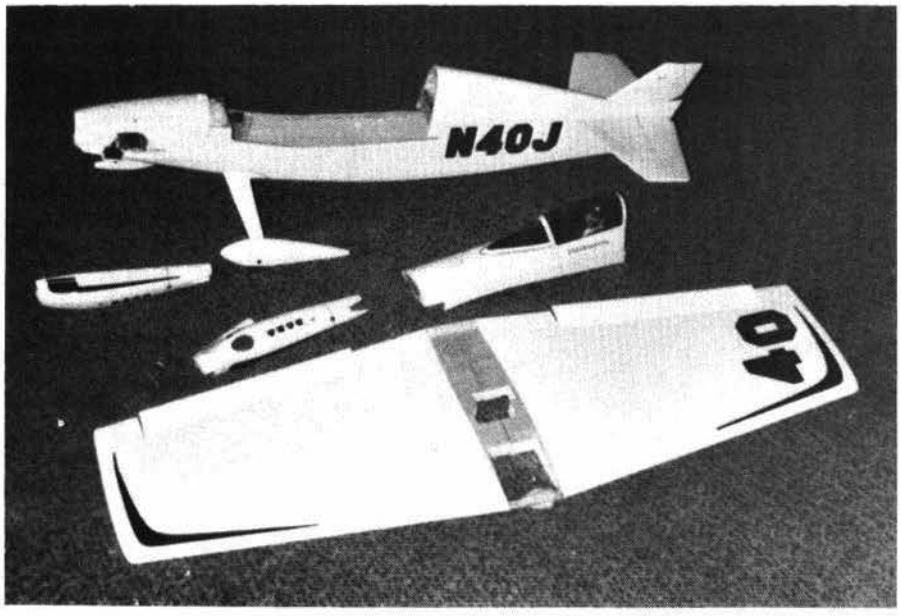
The most exciting QM to ever take a checkered flag, Missy DARA is an all-out effort at maximum scale fidelity. It's fast, to boot! / by Loren O. Jacobsen







Stripped down for routine maintenance, the model is a myriad of necessary hatches. All systems can be safety checked in a matter of minutes.

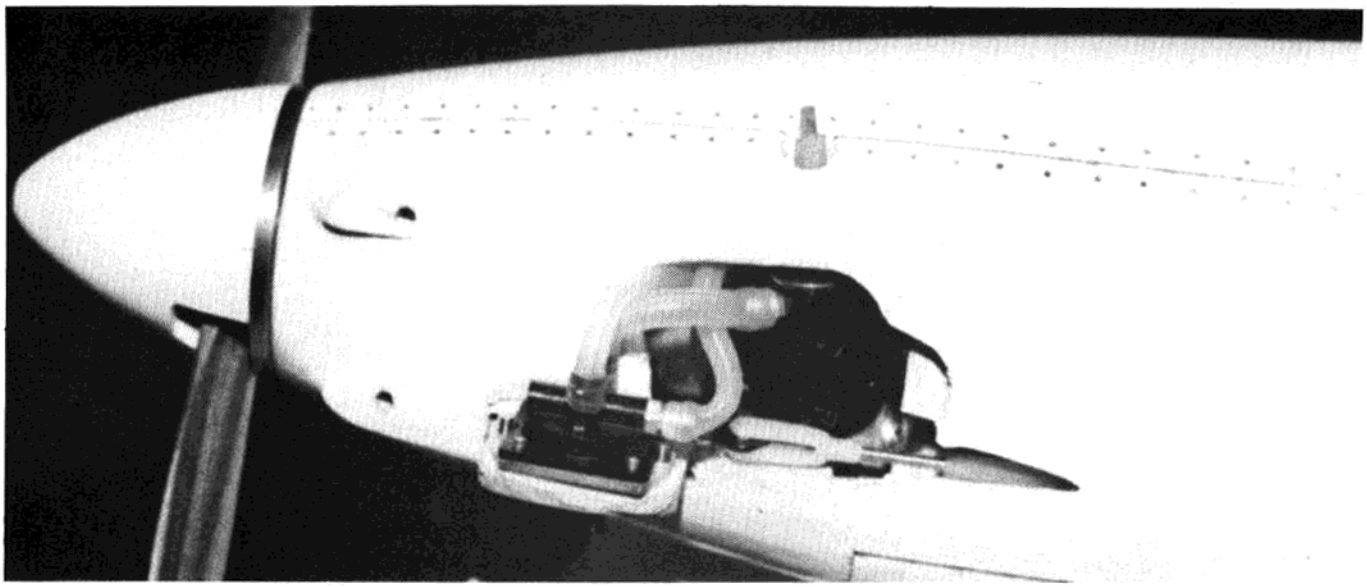


The wing is pre-MonoKoted, except for the gluing area. The canopy assembly will be permanently affixed later. It's nice to build in this modular fashion, since the components may be easily handled all the way through the finishing stages.

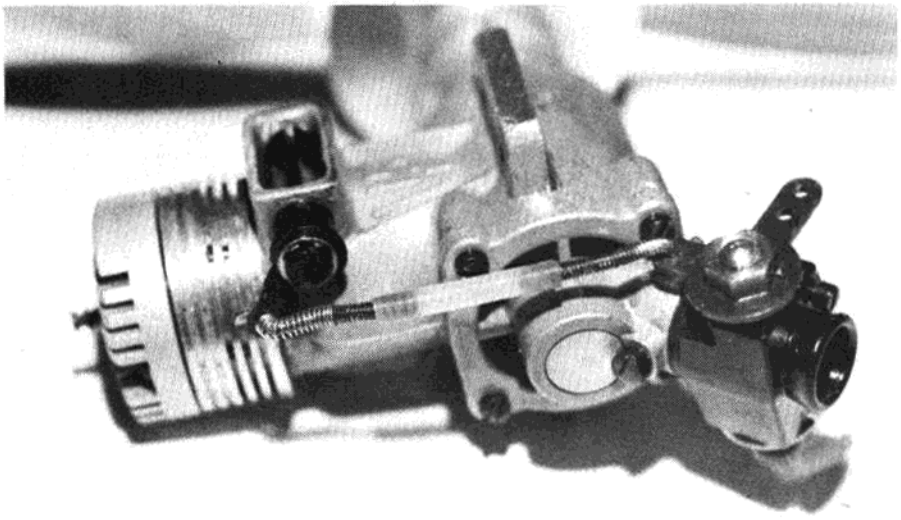
The original full-size Miss DARA was a Formula racer of the mid 1960s. After several attempts at competing, however, it suffered a fatal crash in a test flight and never appeared on the race scene again. I couldn't resist trying to recapture its appealing, unique shape in the form of a Quarter Midget (QM) racer.

It is my impression that many modelers buy modeling magazines for the inspiration from the photos of other modelers' efforts. Besides the information that can be gleaned from the articles, pictures of fellow modelers' planes inspire daydreams of the perfect flying model. Missy DARA was designed to race, but she should also inspire other QM enthusiasts to build racers which are more representative of their full-scale counterparts.

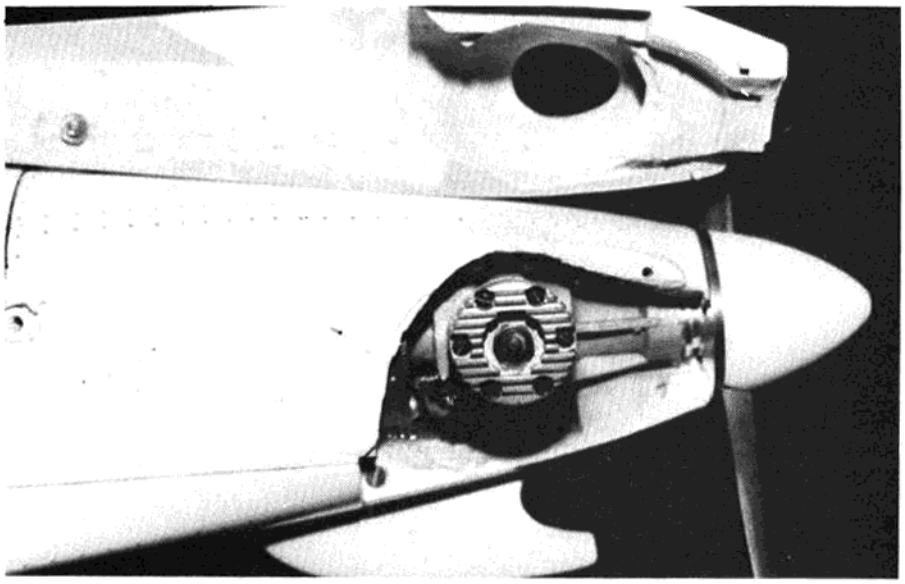
According to the rules, QMs should be "semi-scale or recognizable replicas" of aircraft that have raced in one way or another. Maybe the rules should say "easily recognizable," because, as the competition gets faster, the racers become less recognizable. Extremely distasteful to me is the kit practice of supplying a mass-produced fuselage of *minimum* dimensions, along with a variety of canopies and flying surface tip designs. The simple fuselage form, not resembling any full-size aircraft, is used merely to attach two or three features of the airplane it supposedly models. Whatever happened to the "Builder of



Jenesco fueling system hidden under the cowl keeps nitro uncontaminated.



ABOVE: The first prototype Missy DARA used a modified K&B Schnuerle. The backplate and rotor were rotated 180° for more efficient location of the carb (better breathing makes for faster running). Linkage conversion is a snap. BELOW: Tucked away nicely is the Schnuerle. It just sits there, saying, "I'm gonna get ya!"



the Model" pride cultivated by transforming either a drawing or a well-engineered kit into a good looking, recognizable airplane? I am not advocating super-scale, detailed QM racers—only more scale effect.

The 7/8" wing rule makes way for more scale wing planforms, which Missy DARA has. Fuselages built to the five-in. minimum depth, however, are hard pressed to capture the spirit of the racers after which they are modeled. So I chose to maintain the unique outline of the Miss DARA, despite the fuselage depth. I also decided to retain the low aspect ratio and outline of the Miss DARA wing. You can see that Missy DARA is not a scaled down Formula I racer, but was built to be a QM. But! Can a racer with a deeper, more scale outline fuselage be competitive? Missy DARA, though over six in. deep, answers YES!

The accompanying photos (for inspiration, remember) show her with a scale fin and rudder outline. She was flown many times this way, but she proved to be a wayward girl in the tight scatter pylon turn. The plans show her with a larger vertical fin, which proved to be the answer to keeping this little cutie in the groove.

Two other changes have been made to the model since the photos were taken. Competition in the North Central Pylon League (NCPL) here in the Minneapolis-St. Paul area, has become so fierce that I found I could afford neither the luxury of a sub-rudder and steerable tail skid, nor the large cheek cowls.

I found that Missy DARA could be raced without rudder control. Takeoffs are quite straight because of the right thrust in the engine mounting. I taped the rudder in place and eliminated the servo and linkage. The plans show an optional movable rudder.

Also shown on the plan are smaller, more scale cheek cowls, intended to present a more streamlined front end. Note in the photos that Missy DARA originally had a rear rotor engine installation, utilizing the left cheek cowl as the

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air intake for the carburetor. Also, only the simpler front rotor engine installation, which is easily maintained and allows more room for an uncramped fuel tank area, is shown on the plan. I believe that most model builders are innovators by nature and will make construction changes to suit their building techniques and engines.

For innovators who want to use rear rotor engines, I would suggest incorporating hardwood beam mounts, and allowing for fuel tank access from the radio compartment through F-2. Or you may want to move F-1 back, and use the long Tatone mount. I have included a photo of the rear rotor K&B 15 Schnuerle engine, which has had the backplate and rotor rotated 180°, in order to bring the carburetor around to the left cheek cowl. Linkage from throttle arm to exhaust baffle was made from nylon rod and two short lengths of 2-56 threaded rod. If you use this engine setup, the left cowl will have to be removable.

The strength of this design is in the one-piece unit of wing and fuselage. The wing can be built in two halves, and finished separately with Super MonoKote before joining. The lower half of the fuselage is constructed over the plan top view. The upper half of the fuselage is shaped from blocks of balsa, with the portion over the wing separating to allow for wing attachment. All parts of the fuselage can be painted and detailed before cementing the wing in place.

CONSTRUCTION

Wing: Cut the foam wing cores according to the templates shown on the plan. Be sure to make right and left cores and mark them as such. The cores will actually be oversize in planform, so that the leftover foam cradles can be used later as support for the leading and trailing edges during sheeting. Using a straightedge and sharp razor, cut LE and TE of cores per plan. Cut the front edge of the Sig 1/4 x 2" aileron stock to plan. This piece will closely match the taper of the core, and is epoxied in place. Epoxy 1/4" sq. LE spar to core and sand to airfoil shape. Locate the aileron torque rod postions and make slots for them. Cut sheeting with razor and straightedge and butt glue together, allowing extra sheeting over the core edges. Note that there is a 5/8" overlap of sheeting at the TE. Sheet the bottom of the wings and cut the aileron sections out of the cores.

Use rubber cement for balsa to foam joints and epoxy for balsa to balsa. Do not overlap these cements, and be sure to allow the solvents to evaporate from the rubber cement for at least 15 min. before attaching the sheeting. Epoxy the torque tube assemblies in place, raising them in their slots so that the centerlines are 1/32" above wing chord lines. Now sheet the top of the wings and trim excess sheeting to the core edges. Don't remove the entire 5/8" trailing edge. Add the 1/4" sq. LE and tips, and sand to shape. Cut the ailerons from 1¼" TE stock and locate the hinges and the holes for torque rods. Groove the ailerons so that the rods will lay flush in their front edges. I finished the wing halves at this point with Super MonoKote.

Join the wing halves with epoxy, using each respective cradle as a dihedral jig. Block up the tips so that the top of the wing is straight and the bottom offers a small amount of dihedral. This will not be a strong joint, but will hold until the wing is fitted to the fuselage.

Fuselage: Again, using a straightedge and a sharp blade, trim two sheets of 1/8 x 3 x 36" balsa, so that two edges are parallel and cut to the side view shown on the plan. Cut the 1/16" balsa doubler to outline and sand the front edge of the RIGHT doubler 1/32" shorter so that when F-1 is positioned, it will give right thrust to the engine mount. Mark the wing cutout areas on the fuselage sides, but do not cut them out yet. Accurately mark the wing chord lines on the fuselage, so that the LE is 3/32" above the TE in relation to the thrust line. Cut the slot for the stabilizer to the positive angle shown. Mark cheek cowl outlines so that you will not cut or sand into these flat areas. Epoxy or contact cement the doublers to the sides. The sheeting can be blocked up during doubler attachment to provide a slight inward curve. Bevel the rear inside edges to the fuse sides.

Cut F-4 from a flat piece of 3/8" balsa sheet to plan top view, and mark the centerline and the former locations. Pin F-4 down over top view and tack glue F-2 in place. Glue on F-3 and the fuselage sides, taping the rears together. Pull the front together to a 1¾" inside measurement and secure with tape. Push a couple of pins through the rear fuselage on the rudder hinge line. Angle these to aid in fitting the scrap balsa block for hinging optional rudder and holding skid wire.

Bend the 1/16" wire tail skid and sandwich between the ply pieces. Epoxy it in place flush with the fuselage bottom. Glue in the 1/8" sq. balsa corner longerons, and add 1/8" sheet bottom. Epoxy the 1/4" ply bottom servo hatch mount at F-3. Fit the 1/16" ply hatch mounting screw bases at F-3 and secure the landing gear mount. Then accurately cut 1/16" balsa sheets to fit between the pieces of ply and the fuselage sides. Glue the 1/2" sheet bottom to these parts without getting glue on the fuselage sides. Drill for No. 4 screws. The hatch will hold the fuselage sides in position when the wing is mounted.

Attach the Kraft-Hayes No. 19-B mount to F-1 for a Supertigre installation, or adjust F-1 to the desired engine and mount. Epoxy in place, checking the thrust offset. Epoxy the 1/16" ply triplers between F-1 and F-2, and fill the corners of the tank area with 1/2" triangular stock. Glue the 1/4" balsa nose doublers in place, and add the 1/2" bottom nose block. Fill all the corners of the engine area with scrape balsa. Cut out the right side of the fuselage until the engine is easily inserted into the mount. Now, with the prop and spinner on the engine, adjust the location of the nose ring and cement in place. The bottom fuel tank hatch is shaped from 1 x 3" balsa block and can be hollowed for the battery pack, if it will fit here.

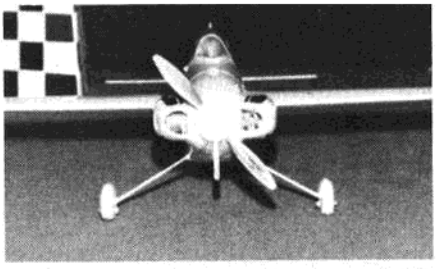
The lower fuselage is now a solid unit and can be turned over. Cut F-5, F-6, F-7, 2 x 2" turtle deck block and canopy block to their approximate outlines. Tack glue all of these in place and rough shape with a spokeshave and sanding block. When the basic shape is achieved, remove the blocks, hollow, and add desired cockpit detail. Cut F-4 and F-5 apart at the separation line at the rear of the cockpit. Glue all blocks back into place, but don't glue the separation joints. Attach canopy and add the 1/32" balsa fill to each side of it. Mask off the canopy for protection and finish shaping and sanding the fuselage.

Cut out the wing slots marked on each side of the fuselage and lift out the section above the wing location. Sand the wing openings until the wing can be easily slipped into place, inserting TE first. A force fit can twist the fuselage out of shape. Now, with wing in position, check alignment of stabilizer and vertical fin, and glue them to fuselage.

If you will be painting the wing and the fuselage together, cement in the wing now and add check cowls and fillets. If finishing fuselage separately, proceed now without wing in place. Leave flat cowl areas unfinished for a good glue bond. When you finish painting the fuselage, cement in the wing and top section and attach cowls. Be sure to epoxy 1/32" ply braces across wing center joint after wing is set in fuselage.

Landing gear: The landing gear (LG) struts were cut from a 1/16" thick aluminum blank. Although a one-piece unit would be best, I cut mine in two pieces from a Sig blank. File the LE and TE of the struts round and rubber cement 1/32" sheet balsa to top and bottom sides. Lightly sand the balsa to a streamlined shape and cover them with wide vinyl tape. Presto! A streamlined LG that is no thicker than 1/8" wire.

Wheel Pants: Missy DARA looks stark naked without her wheel pants on, so make the extra effort to give her some neatly shaped wheel coverings. The pants shown on the plan are trouble free on black-top landing strips. If you fly from a grass field, you might try larger wheels and move the pants a little forward on the struts. The inside 1/16" ply piece fits around the edge of the strut and is the key to keeping the pant in place. Adjust the width of the center balsa section to the wheels you intend to use. The epoxy bead around the edges of the wheel wells allows the pants to be sanded very thin if desired. The balsa fill around the ply pieces will make the sanding job easier.



Canopy and Cockpit: Part of the character of Missy DARA is in the shape of her canopy. If you don't want to mold one, you can still maintain her beautiful curves by carving a balsa canopy and painting it. Since you have to carve one in either case, to get the proper shape, you may as well use it for a mold.

Sig's .015 heat forming plastic works well for the canopy. Use a piece of 1/4" ply, large enough to allow a firm grip, for pressing the hot plastic over the mold. Cut a hole in the center to the top view shape of the canopy, making it 1/8" oversize. Attach plastic to the plywood with wood screws and two strips of wood on the bottom side. Drill two holes part way into the bottom of the balsa mold for 1/4" dowels and mount them in a firm base, such as a length of 2 x 4". Clamp the 2 x 4" to your beautiful dining table or a Sherman tank, or whatever you can find around the house to hold it. Preheat the oven to 425°, and put the plastic in the oven, setting it across a cake pan or the like so that the soft plastic won't touch the oven shelves. Now, wearing gloves, snatch the plastic from the oven and press down, with a quick, firm action, over balsa mold. The trick is to do it fast, without doing it crooked. The balsa canopy mold does not have to be coated with anything to fill the pores. Sand it with the grain to lay down the nap.

The two-in. Williams Bros. racing pilot had its head twisted to the left by holding a hot soldering iron close to its neck. Its shoulders must be trimmed to get it into the cockpit.

Finishing: The full-size Miss DARA was canary yellow with blue racing numbers, but somehow all my models end up white. Choose your colors and favorite finishing method.

I finished the wings with Super MonoKote. The fuselage was done with surfacing resin and auto enamel. The trim and racing numbers are from MonoKote trim sheets. The fillets were made with white General Electric brand silicon rubber. I have seen other colors, but they are not as easily available. This material can be smoothed with a finger dipped in alcohol, but cannot be reworked much. Practice on scrap first.

The panel separation lines and rivet marks were made with a black Bic fine line ball-point pen. Electrical tape works better than masking tape for the line guides. The ink lines must be fuelproofed. The clear epoxy finishes do well here, except over white, where they have a varnish tint to them. I used Testors Top Coat over the ink only—it is not a durable coating for large areas. The lettering was done with drafting dry transfer letters; later it was fuelproofed.

FLYING

You won't have to take a tranquilizer after every race. Missy DARA does her thing so calmly you'll hardly believe she is racing. She will not snap out of tight turns.

Be sure test flights are conducted, just as if it were the real thing, with a helper releasing her at full throttle. Face her a bit to the right of the direction of takeoff if the rudder is not used. Vertical fin is effective after a few ft. of takeoff role and a touch of right aileron after lift-off will straighten her out. Hold some up elevator after release until speed is increased; then ease off at lift-off for a gradual climb. She lands with a long, flat guide, ailerons remaining effective through flare out.

Keep the control travels to a minimum. For a smooth race, they should move only enough to do their job. Carefully observe her flight path characteristics during trim flights and eliminate any hunting tendencies she might have. Fine tune her grooving ability by raising or lowering the ailerons one or two turns. Try different combinations of minor adjustments in the horizontal thrust line and balance point; this will aid in producing a well-trimmed model.

I would like to thank St. Paul RC Club members, Don Granlund and Jim Cournoyer for their assistance. Don helped me with my first attempt at foam wing cores and even offered the lead spars he said I would need for such a wing. Jim advised, constructively criticized, and otherwise encouraged me to complete the material for presentation of Missy DARA in **AAM**. Thanks also go to a long time friend, Max Robinson, for his fine photo work.

Gentlemen. . .start your engines!