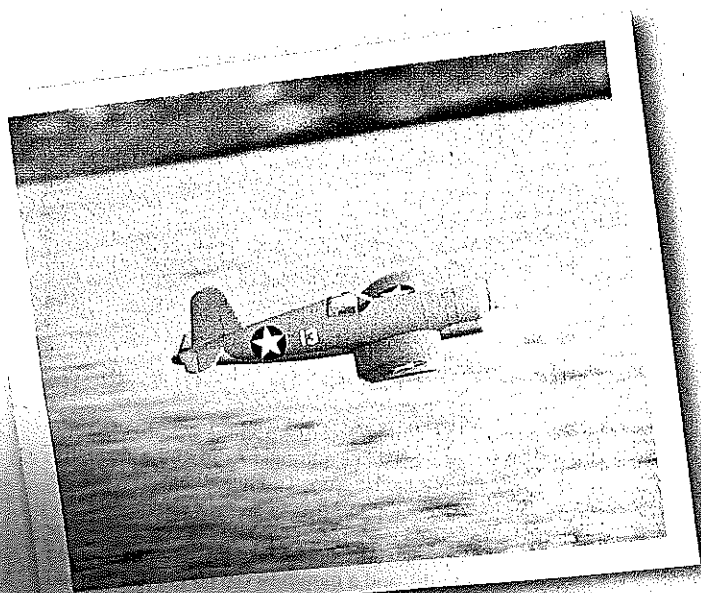


■ Jim Ryan

SPEED 400 CORSAIR



Surely no other fighter has a more distinctive appearance than the Vought F4U. With its inverted gull wing and powerful lines, the Corsair is unmistakable. For the hard-pressed Marine and Navy aviators who had been battling Zeros with Grumman Wildcats, the appearance of the Corsair in early 1943 was a miracle. Even with initial teething problems, it was possibly the best fighter in the world at the time, and it could outfly the vaunted Zero in every way that mattered. For the first time, US airmen could dictate combat on their own terms. It was an advantage they retained for the balance of the long war.

WW II Navy fighters are among my favorites, so designing an Electric model of the "Bent-Winged Bird" was inevitable. Rather than deal with the complex rotating retracts, I elected to go with a small hand-launched version for Speed 400 power.

The end result is a small, inexpensive model that captures the grace and performance of this classic fighter. The Corsair is a born aerobat that does just about everything you could ask of a three-channel Scale model. Big loops and Cuban 8s are no problem, and the roll rate is solid. Inverted flight is also predictable. With the standard direct-drive setup, you should use speed, rather than brute horsepower, to carry you through the vertical maneuvers.

Let's get started!

CONSTRUCTION

The fuselage is a balsa semimonocoque structure, and the wings are foam sheeted with $\frac{1}{32}$ balsa. The weight goal for the finished empty airframe is seven ounces. I use regular thin cyanoacrylate (CyA) glue for most construction, but this adhesive will attack foam. For all wing construction, I recommend foam-friendly odorless CyA or an aliphatic adhesive.

Wing: The wings consist of three sections: a constant-chord center section and two tapered outer panels. To simplify sanding and sheeting, build the center section as one piece and cut it apart after it has been sheeted and sanded.

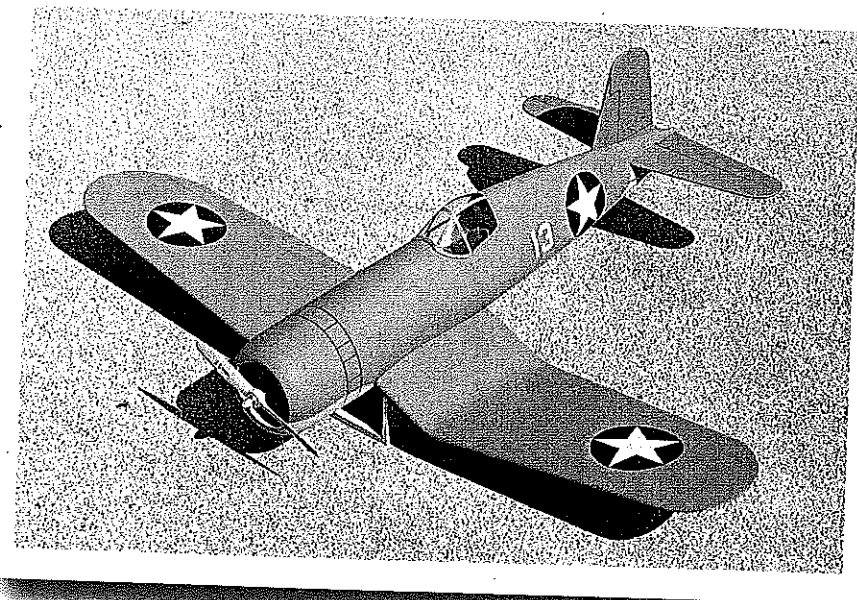
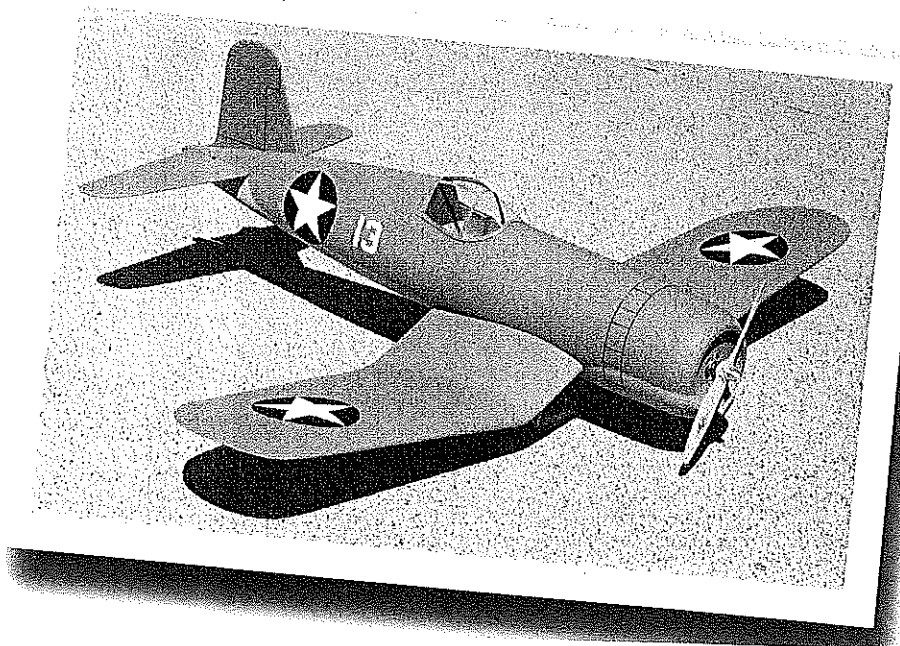
The foam cores are lightly sanded and cleaned with a shop vac or tack cloth. The $\frac{1}{16}$ subleading edges are installed with odorless CyA and trimmed flush. The wing skins are glued from $\frac{1}{32}$ balsa using sandable Pica Gluit. After sanding and carefully cleaning the skins and cores, you're ready to sheet the wings using light coats of 3M® Super 77.

A parts pack consisting of foam wing cores and vacuum-formed canopy is available for \$22 including shipping from the author.

The sheeting of the outer panels takes some explanation. In order to form the rounded, beveled wingtips, sheet the top surface of the outer panels only, then cut the wingtip to the shape shown in the top view and draw a guideline as shown on the foam of the bottom surface.

Use a coarse sanding block to bevel the foam bottom of the wingtip so that you have a smoothly tapered surface from the guideline to the top sheeting. Sand the foam smooth with a fine sanding block and dust the assembly again to make sure that it's absolutely clean.

Install the bottom skins with 3M® 77. Smooth them into place carefully and then press them down to follow the shape of the wingtips. The $\frac{1}{32}$ skins should conform easily.



Photos by the author Graphic Design by Carla Kunz



Speed 400 CORSAIR

Type: $\frac{1}{15}$ scale Electric

Wingspan: 30.4 inches

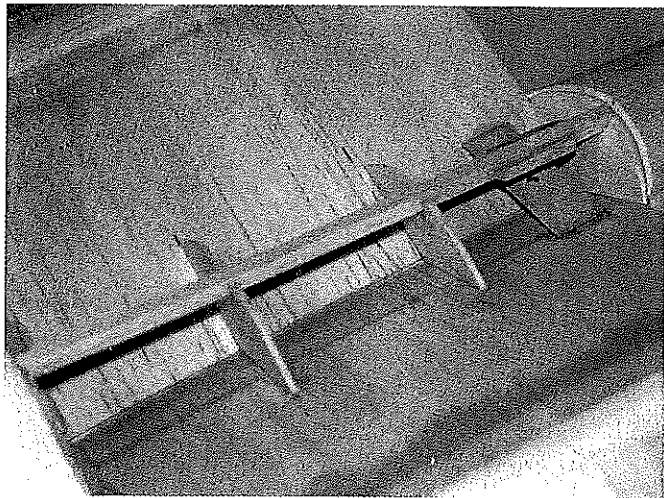
Motor: 6V Graupner Speed 400, Micro BEC speed controller, 7 or 8 Sanyo 500ARs

Flying weight: 18 ounces

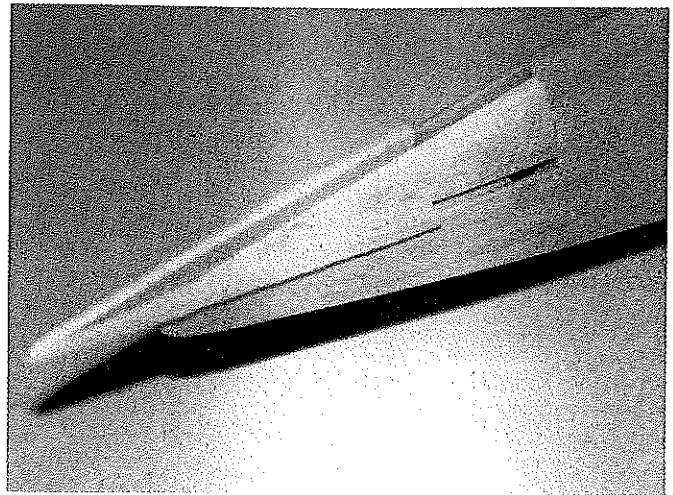
Functions: speed control, elevator, aileron

Construction: Balsa/foam

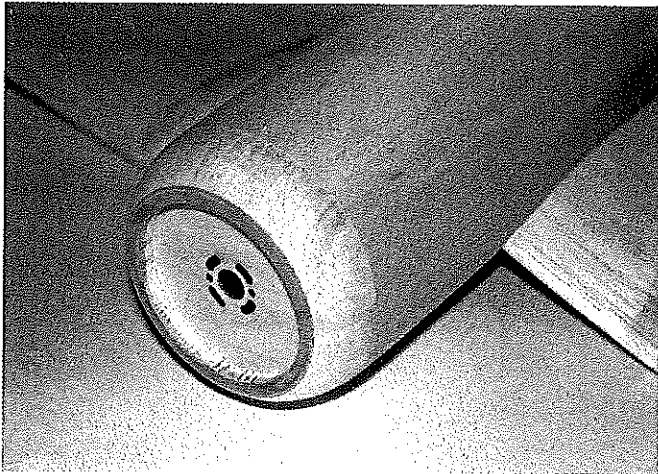
Covering/finish: Glass cloth/epoxy and Floquil



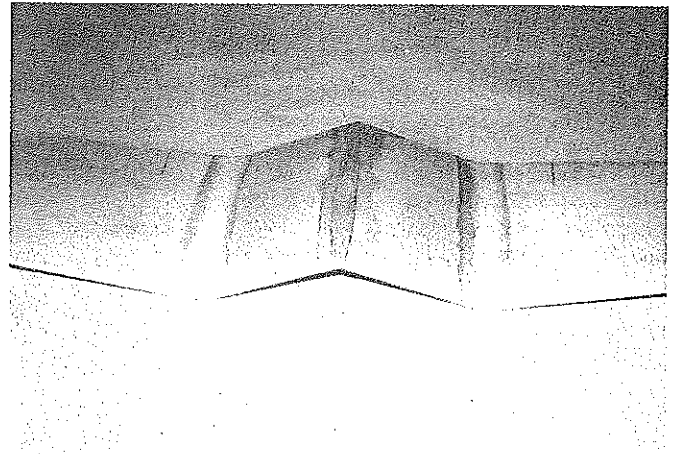
Tail fillet blocks are glued in place using T-shaped spacer as guide, then carved to shape before spacer is removed.



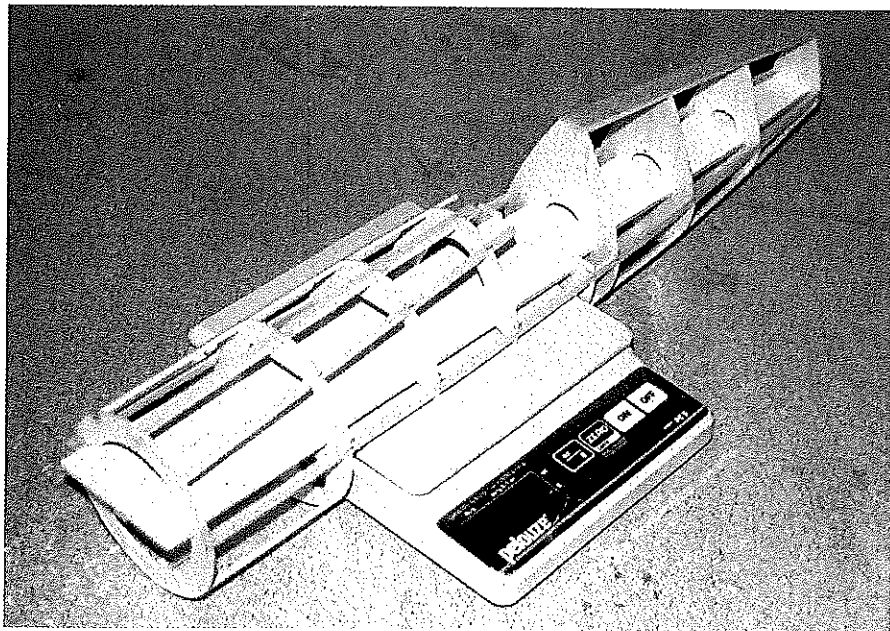
Wing is mounted in place and formers for belly pan are glued to it. Wing is then removed and the belly pan is sheeted.



Carved balsa cowl block makes for a light but very sturdy motor mount that can stand up to belly landings.



Here's the assembled wing. All that's left is to cut out the ailerons and make the aileron servo wells.



Fuselage is constructed on removable balsa crutch for light, straight assembly.

Run a bead of thin odorless CyA around the wingtip to firmly bond the top and bottom skins, then trim the bottom sheeting flush with the top sheeting. Install the $\frac{1}{8}$ balsa leading edge cap.

Repeat for the other outer panel.

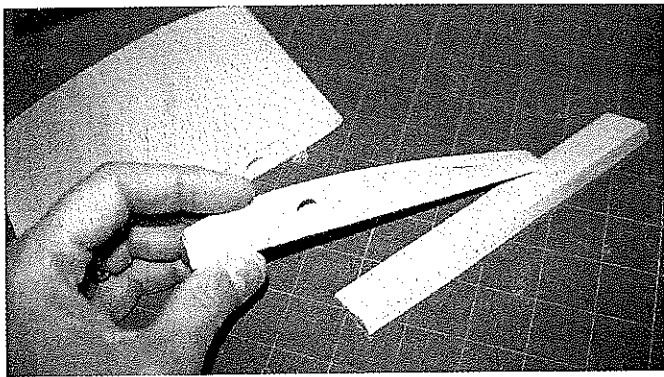
Assemble the center section normally, installing the $\frac{1}{16}$ subleading edge, sheeting the top and bottom surfaces, and trimming the skins as shown on the plans. Install the $\frac{1}{8}$ balsa leading edge cap.

Carefully shape all of the leading edge caps; accurate shape has a large bearing on flight behavior.

Cut the center section into two four-inch-wide panels, being careful to keep the ends square as possible.

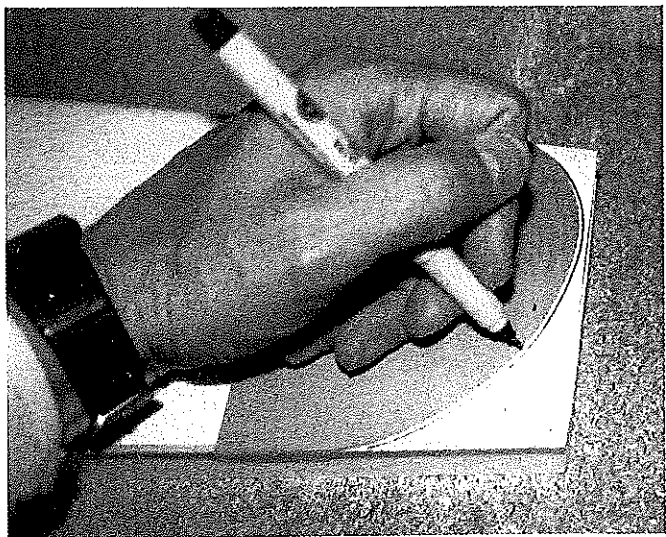
Cut the servo wells in the bottoms of the wing panels. I used tiny Cirrus CS-10BB submicro servos on the prototype, but there's room for anything up to normal micros servos of the HS-80 or S-133 family. Line the bottom of the wells with $\frac{1}{16}$ balsa for reinforcement.

The wiring conduits are carefully bored with a piece of sharpened $\frac{3}{8}$ brass tubing. Make sure the conduits in all panels line up with one another.



Shaped balsa angle blocks join the wing panels to form the inverted gull shape that's the Corsair's signature.

After sheeting the top surface of the wing panels, mark the curve of the wingtips and then cut the tips to shape.



Joining the Wing Panels: The 16.5° soft balsa angle blocks at the wing joints allow you to produce a scalelike radius where the wings bend. I suggest you begin by using the wing panels to mark the upper surface of the airfoils on both faces of the angle blocks and then trim them to shape. Do not shape the bottom surface at this time, as this aids in wing alignment during assembly. Bore holes in the blocks for the aileron leads.

Use thick odorless CyA to glue an angle block to each center section panel (be sure you make a left and a right wing). With the center section resting flat on your building board, glue

the outer panel to the other side of the angle block. Block the tip up 1/2 inches above your work surface and allow the assembly to cure. When dry, use a sanding block to shape the angle blocks to a gentle radius as shown on the front view in the plans.

Use the same technique to preshape the 23° center angle block, and use it to join the wings. This time, block up the assembly so that the wingtips are 2 1/8 inches above your building board.

Shape fillets on the top surface of the wings to make a smooth radius as shown in the front view. I recommend applying masking tape 1/2

inch from the center of the angle block and then spreading lite spackle with a credit card and allowing it to dry at least overnight before sanding to shape.

When you're happy with the appearance, glass the wing joints with 1 1/2-inch-wide strips of two-ounce glass cloth and thin odorless CyA. Sand the joints smooth, and the basic wing is complete.

Control Surfaces: Cut the ailerons from the wing panels as shown on the plan view and apply 1/8 balsa to the exposed TE. Trim 1/4 from the LEs of the ailerons and install their 1/2

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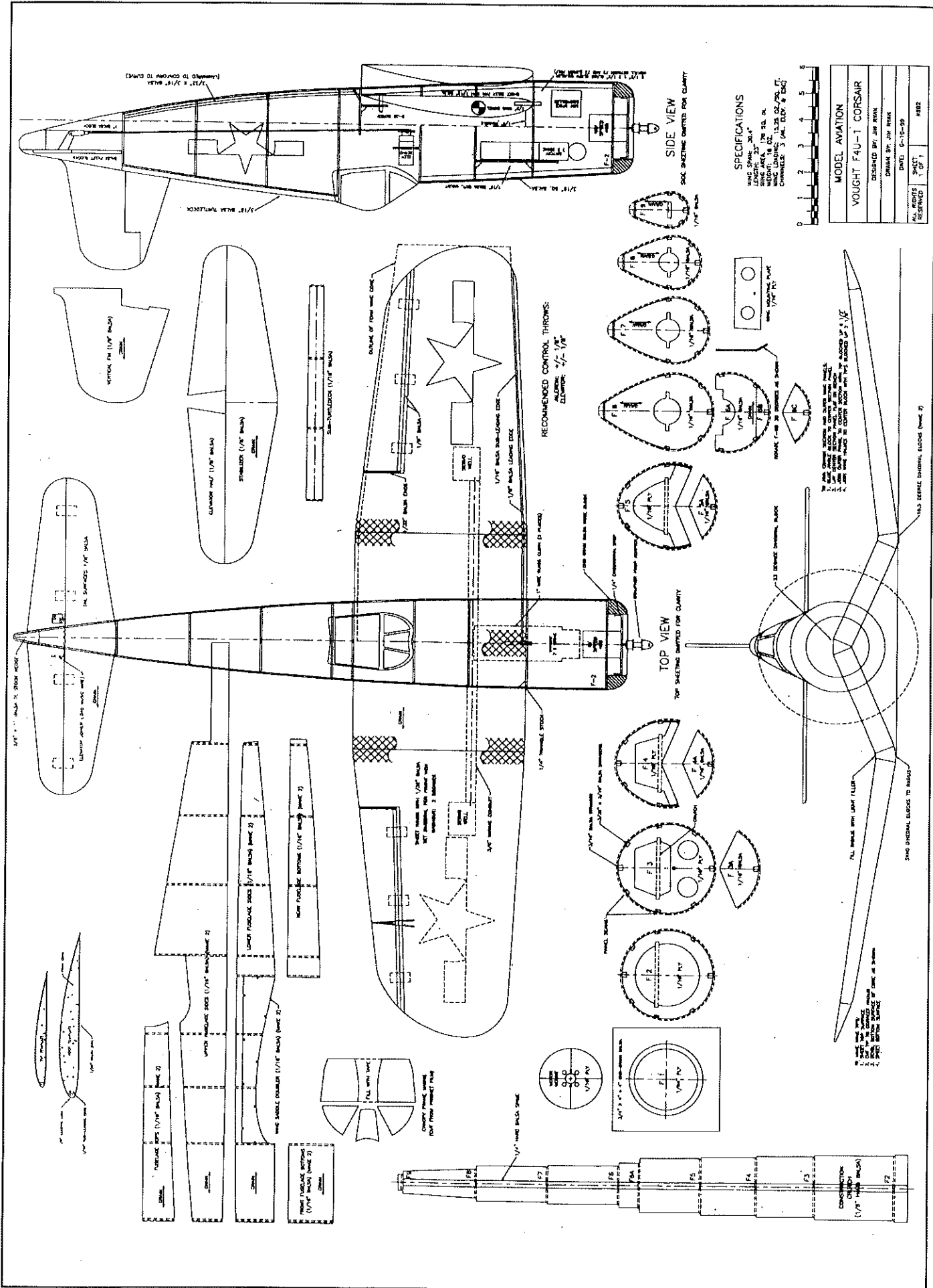
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MODEL AVIATION	
VOUGHT F4U-1 CORSAR	
DESIGNED BY: JIM ARN	
DRAWN BY: JIM ARN	
DATE: 6-19-89	
SHEET: 1 OF 1	SIZE: A8E
ALL RIGHTS RESERVED	

SPECIFICATIONS

- 1. WING SPAN: 30.4"
- 2. WING AREA: 376.1 sq. in.
- 3. MAIN WING CHORD: 20.25"
- 4. MAIN WING CHORD AT TIP: 14.25"
- 5. MAIN WING CHORD AT ROOT: 32.25"
- 6. WING AREA: 376.1 sq. in.
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- 20. WING AREA: 376.1 sq. in.

RECOMMENDED CONTROL THROWS:

- 1. Ailerons: 5° - 10°
- 2. Flaps: 10° - 20°
- 3. Landing Gear: 10° - 20°

NOTE:

- 1. ALL DIMENSIONS ARE IN INCHES UNLESS NOTED OTHERWISE.
- 2. ALL DIMENSIONS ARE TO CENTER UNLESS NOTED OTHERWISE.
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LEs. If you wish, you can trim the ailerons shorter and face their inboard ends with 1/2 balsa.

Fuselage: The fuselage is built over a crutch, which makes it easier to ensure a light and straight assembly. The crutch shown on the plans is cut from 1/8 hard balsa and marked as shown. The 1/4 balsa spine makes it more rigid. Note that the crutch is to be removed when the fuselage is complete. Do not glue any of the formers to the crutch!

Slide each of the precut formers over the crutch into their indexed positions. Note that F-6A and F-6B must be beveled and joined at the proper (30°) angle to allow removal of the wing.

Dry-fit the 3/16 square top stringer into place on F-2, F-3, F-4, and F-5, and after making sure each former is perpendicular to the crutch, glue the top stringer to the formers with thin CyA.

Install the 3/32 x 3/16 side stringers, being sure to keep the formers square to the crutch. Install the 1/16 balsa subturtledeck atop formers F-6, F-7, F-8, and F-9, and block-sand its edge to the proper angle.

Install the 3/16 square bottom stringer, again making sure the formers are square to the crutch. Note that the rear bottom stringer is actually laminated from two 3/32 x 3/16 stringers to allow it to conform to the bend. You should now have a light and straight framework.

The precut fuselage panels should fit almost perfectly over your framework. Install the upper sides first, being careful to glue them in place so they overlap exactly half of the side stringers.

To minimize the chance of warpage, I recommend that you glue the lower edges of both sides into place and tack-glue the upper edges at the same time by pinching them down against the formers, starting at the middle and working toward the ends. Finish securing them by gluing the upper edges to the stringers at the nose and the subturtledeck in the tail.

The fuselage tops should mate with the edges of the upper sides and should join tightly over the 3/16 square top stringer.

The lower sides are carefully glued to the edges of the upper sides and are then pressed into place and tack-glued at each former. If the alignment is correct, glue securely to the lower side stringers. Glue the bottom panels in place, and the fuselage is now planked.

Glue the tail pieces together with a piece of 3/8 x 1/8 aileron stock as a spacer, making certain they're straight (the pointed tail of the crutch helps here). Tack-glue the one-inch balsa tail block in place with thin CyA and carve it to shape. Remove it and hollow it out before gluing it permanently in place.

Glue the wing saddle doublers in place as shown on the plans. Trim or block-sand the edges of the lower fuselage sides flush with the formers, being careful not to change the shape of the wing saddle. Install 1/4 triangle stock to the joint between the wing saddle doubler and F-3 at the leading edge of the wing. This will help to reinforce this high-stress area.

Lightly block-sand all panel seams, then hand-sand the fuselage smooth.

Wing Installation and Belly Pan: Test-fit the wing in the wing saddle. You can get a tighter joint by slipping a strip of fine sandpaper into the joint and sliding it back and forth to "lap" the saddle, but don't get carried away—you don't want to change the incidence!

Tap the 1/16 plywood wing mount for a 6-32 nylon screw, glue the mount in place in the fuselage, and reinforce the joint with 1/4 balsa triangle stock. Drill the screw hole through the wing and install the 6-32 nylon wing screw. Square the wing with the tail, pinning it in place in the proper position. Drill the leading edge of the wing to accept the 1/8 locator dowel (a long drill or round X-Acto® file can go right through the opening in F-2).

Remove the wing, install the dowel, and reinstall the wing with a sheet of waxed paper sandwiched between the wing and fuselage. Install the belly pan formers on the bottom of the wing, being careful not to glue them to the fuselage.

Glue the front and back formers (F-3A and F-6C) in place, then dry-fit the keel stringer. Slip the middle two formers (F-4A and F-5A) in place. If necessary, trim them so they can fit without bowing the keel stringer upward; this makes the belly pan much easier to plank.

Remove the wing from the fuselage and install the 1/16 belly pan sheeting. It's easiest if you do this with separate halves and trim them so that they join tightly over the 3/16 keel stringer. Trim and sand the front and rear edges flush with the formers.

Cut a 1/8 access hole over the wing hold-down screw and reinstall the wing on the fuselage. Sand the joint between the belly pan and fuselage sheeting flush, being careful not to sand through the sheeting.

Empennage: Assemble the wing to the fuselage and trial-fit the stab on the stab base. Make certain the stab is parallel to the wing, and if necessary, sand the base or add shims to correct any error. Remove the wing and stab and glue the tail fillet blocks into place using a T-shaped 1/8 balsa spacer as a guide (be careful not to glue the spacer in place). Carve and sand the tail fillets to shape.

The balsa spacer is now removed from the tail fillet. If you've been careful with the glue, it should slide right out. Add a 1/8 balsa spacer to support the tail fillets behind the stab, but make sure you leave room for the music wire elevator joiner.

Cut a slot in the turtledeck to accept the key at the forward end of the vertical fin. Dry-fit the vertical fin and stabilizer and test-install a 1/16 music wire elevator joiner (if you prefer, you can use a 1/8 dowel joiner).

I found it best to wait and permanently install the vertical fin and stabilizer after covering.

Cowl Block: The cowl is a 3/4 thick block of end-grain balsa that is carved to shape. Note that the block is bored for the motor opening and a 1/4 wide strip of cross-grain balsa is glued in place to provide a shoulder for positioning the motor mount.

Draw datum lines on the front of the block and use them as a guide for installing F-1,

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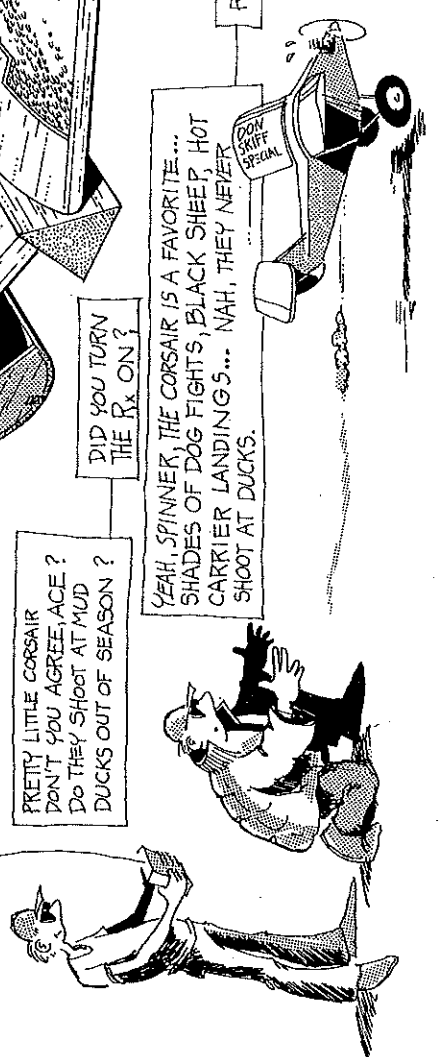
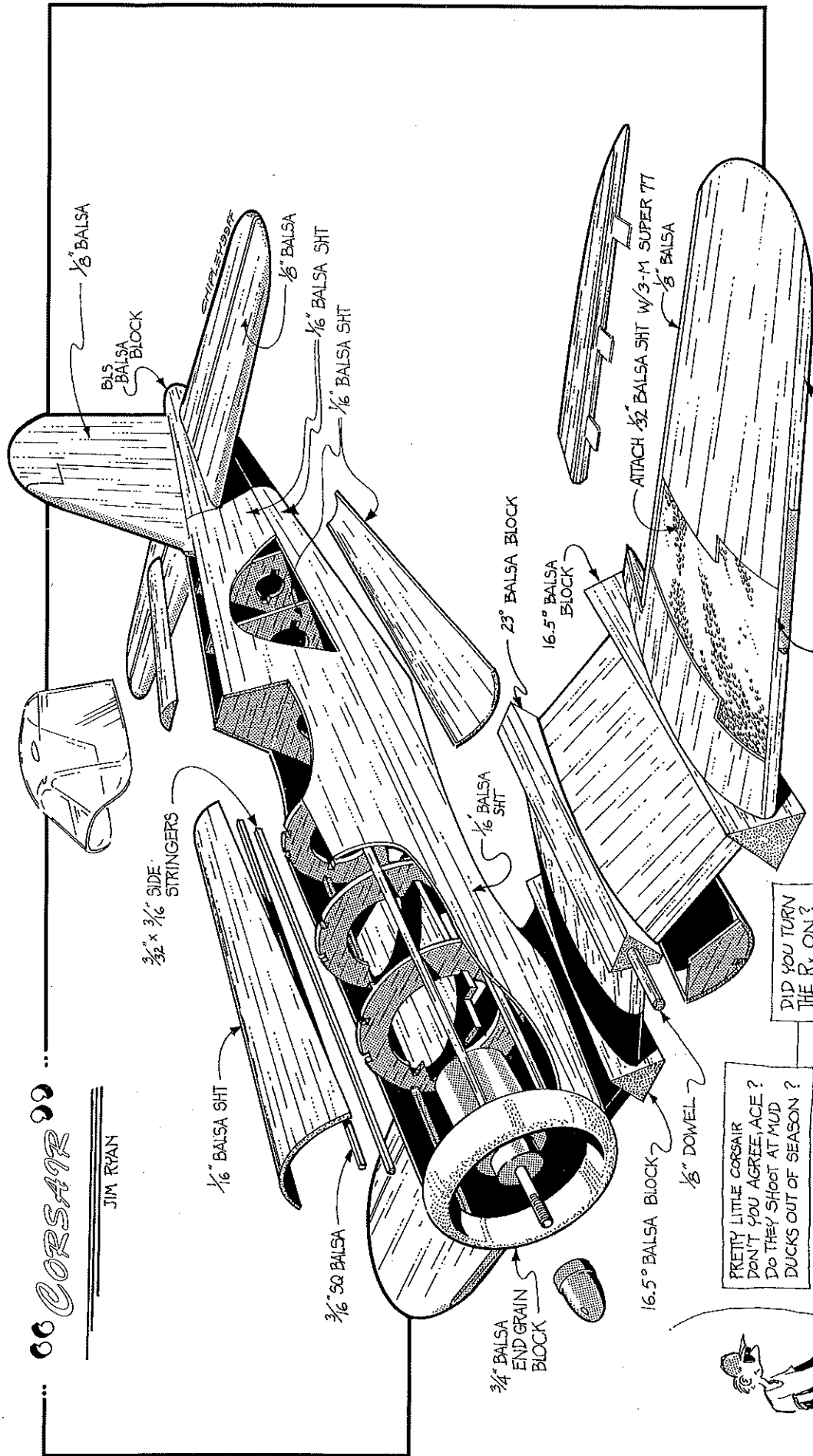
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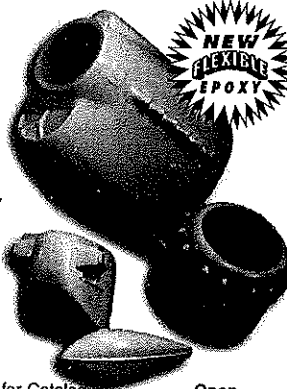
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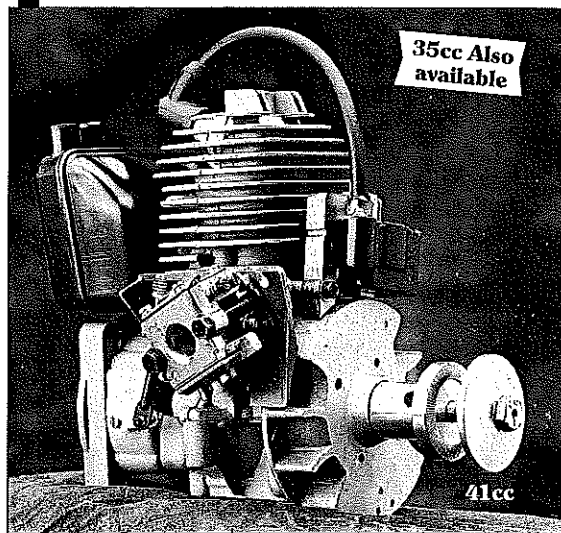
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which is really just a sanding guide. The block is then glued in place onto F-2 and is carved and sanded to final shape. I recommend waiting until the model is covered to install the 1/16 plywood motor mount with thin CyA.

Final Details: Cut the battery mounting plate from 1/16 balsa and install it on F-3 and F-4, using 1/4 triangle stock to reinforce the joint. Apply a strip of Velcro® to the mounting plate so that the Ni-Cd pack can be secured. The servos can be secured with double-stick mounting tape.

I used .038 music wire for the pushrods to keep weight to a minimum. Another option for the elevator is to install Kevlar® pull-pull cables. If you opt for music wire, I've found that Sullivan 2-56 brass couplers (part #512) are perfect for these small models; just solder them in place and add a small nylon clevis.

Finishing: As one of the longest-serving piston-engine fighters of all time, the Corsair gives you plenty of choices for color schemes. For small Navy models like this, Corsair Blue Goldberg UltraCote is a great choice; it looks scale and is very light. I covered the prototype with .56-ounce fiberglass cloth and epoxy and painted it with Floquil military paints. As my subject, I chose the F4U-1 flown by Marine Lt. Ken Walsh when he became the first Corsair ace in May of 1943.

The canopy framing can be painted using the frisket masks shown in the plans. Make sure you protect the inside surface of the canopy from overspray. After painting the framing, remove the masks and glue the canopy in place with RC-56 or equivalent canopy glue.

Install the hardware, and you're ready to go fly.

Flight Testing: Be very careful checking the Center of Gravity (CG); small warbirds aren't very tolerant of an aft CG condition. I suggest you start with the balance point two inches behind the leading edge of the wing, and adjust it to suit your tastes. If you keep the weight down to approximately 18 ounces, the Corsair should fly just fine.

I strongly recommend getting a capable assistant to hand-launch the model on the first flights. The model needs to be thrown straight and level; if the launcher lobs it upward, it's likely to stall. Hold the wings level and let it climb slowly as the speed builds up.

Landings are made with a straight-in approach, and the model is simply held just off the ground until it settles in. The Corsair has little inclination to tipstall, and landings are a breeze.

It was the Corsair, thanks to the 1970s TV series *Baa Baa Black Sheep*, that first kindled my interest in RC modeling, and after 25 years, I finally have one.

It was worth the wait! *MA*

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