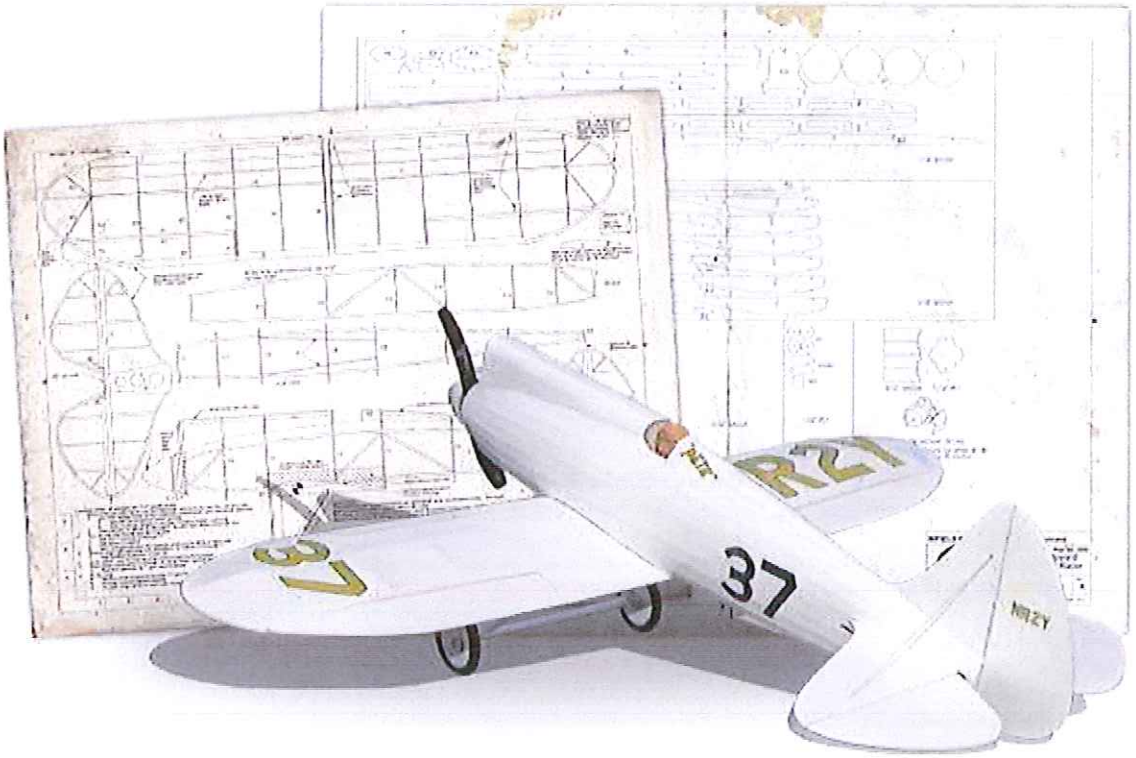


Specifications

Wingspan: 20 inches
Length: 17.75 inches
Weight: 3 ounces
Power system: UMX brushed motor or E-flite BL180
Battery: 1S 180 mAh LiPo

Construction article

Some time ago, while looking for a new aircraft to design, I ran across a photo of a little racer with a towering scoop in the nose. Leaning against the wing was a crafty-looking character whom the caption identified as Benny Howard. The airplane was the DGA-3.

Built in 1929, the DGA-3 was nicknamed "Pete" and flew on a 326 cubic-inch Wright Gipsy inline four-cylinder 90 hp engine. This setup allowed Pete to fly at roughly 160 mph, which wasn't that fast even for its day, particularly when one considers the competition that Benny faced when he raced for the 1930 Thompson Trophy.

Benny found himself up against two Travel Air Mystery Ships, the Laird Super Solution, and Capt. Arthur Page's ill-fated Page Racer—all of which had top speeds well above 200

mph. But Benny was tenacious and hung in while a number of other entrants dropped out because of mechanical failures and Capt. Page's fatal crash. When it was over, Benny captured third place and a purse of $2,000.

While the development of the Pete allowed Benny to cut his teeth as a racing airplane builder, this aircraft significantly advanced his career in other ways. The Pete's winnings funded the development of more powerful racers—namely a pair of DGA-4s nicknamed Mike and Ike. Eventually, the Pete was sold and its proceeds went toward the development of the Mr. Mulligan.

Miraculously, the Ike, the Mike, and the Pete are all still around. The Pete has been flown in recent years and is currently housed at the Crawford Auto Aviation Museum, part of the Western Reserve Historical Society, in Cleveland.

Design

The goal of this design was to repurpose an AR6400 "brick" from a worn-out UMX T-28. The brick is a compact little system that integrates a Spektrum receiver, brushed 1S ESC, and two servos into a tiny, 3.9-gram package.

The result is a 20-inch Free Flight-style (FF) airframe with full-house controls that weighs 70 grams. The tiny Pete flies well on the brushed 1S motor, but today there are more powerful bricks with 2S brushless ESCs in similar-size packages. My Pete will be ready for this upgrade as soon I can distract my son's attention while he's flying his UMX Beast.

The plans for the Pete have been cleaned up and are offered through Model Aviation as a free download. It's a simple little project that can be cut by hand. Alternatively, a nice laser-cut kit is available from Manzano Laser Works.

Building Pete

Begin the project by laminating the outlines for the tail group and the wingtips. This process will sound more difficult than it is. If you try it, you will find that the resulting outlines are stronger and lighter than those built-up from balsa sections.

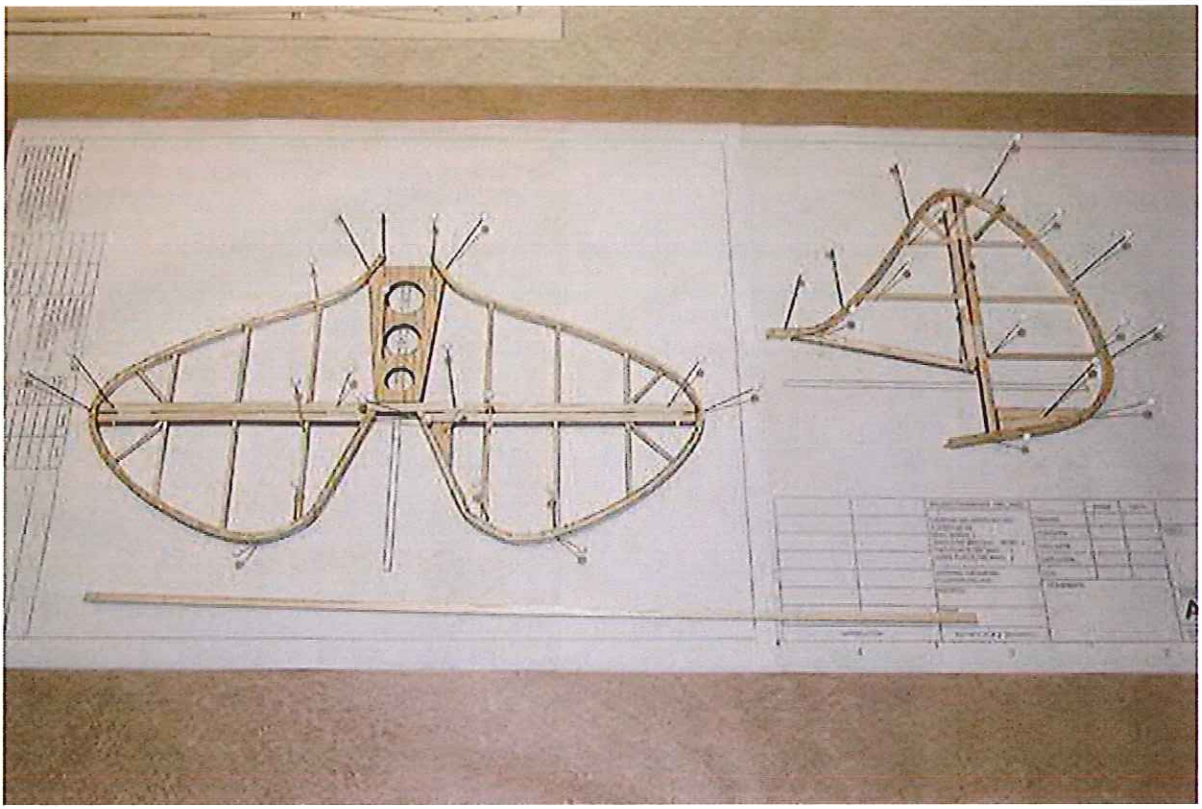
The first step is to cut 1/32 x 3/32-inch strips from the edges of the kit wood. Soak the strips overnight in water mixed with a splash of ammonia.

While the strips soften, make forms by tracing the inner edges of the outlines from the plans onto sheets of paper. Glue the tracings to foam poster board. Cut along the lines and pop the forms free. Cover the cut edges with clear packing tape so that glue won't stick to them.

After pinning the forms to the building board, pull one softened balsa strip tightly around each form, pinning it into place as you go. Apply carpenter's glue to a second strip. Stretch this strip around the first while moving the pins to hold the pair tightly against the form.

After it has completely cured, remove the outlines from their forms and pin them down to the plans. Glue the kit parts that form the inner structure in, followed by the 1/32 x 3/32-inch balsa bracing cut from the kit wood.

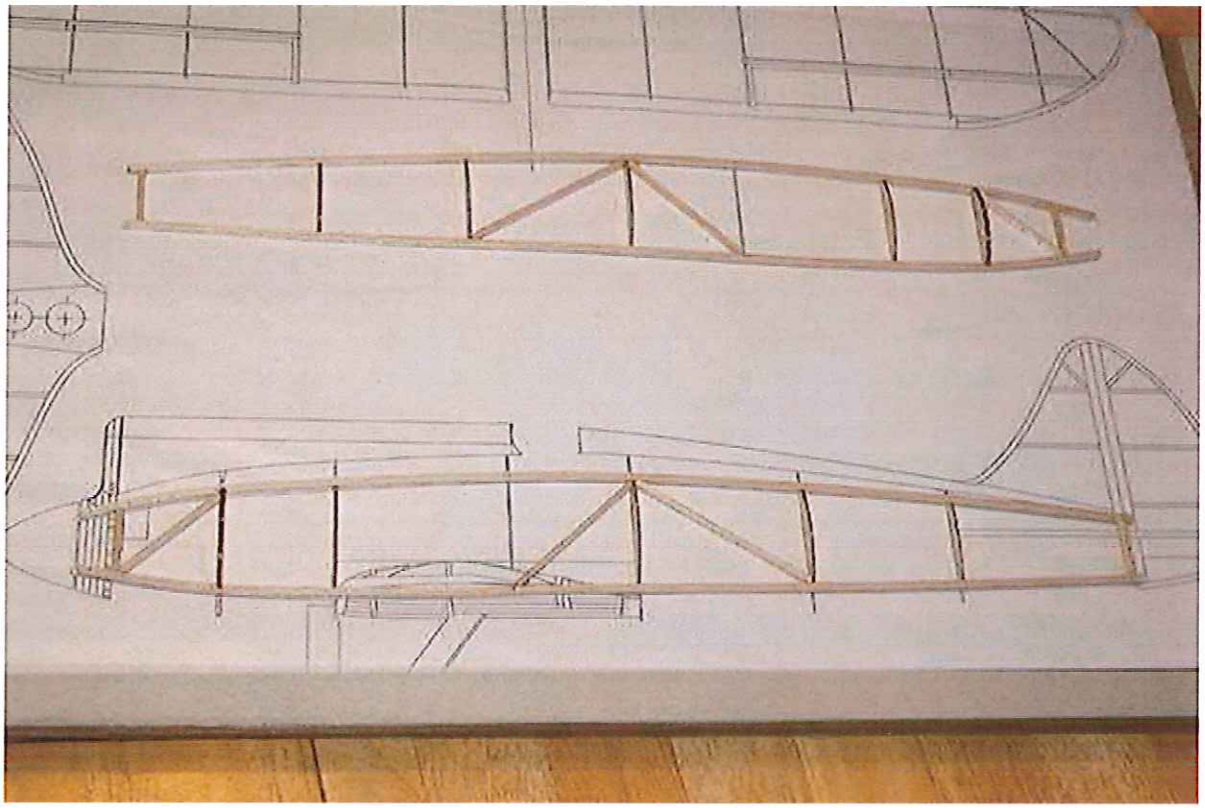
Split the control surfaces by cutting through the outlines where shown on the plans. Bevel the leading edges (LEs) of the elevators and the rudder to allow ample deflection. Narrow CA hinges work great on these tiny models.



Laminated outlines, kit parts, and 1/16 x 3/32-inch bracing make up the lightweight tail group.

The Fuselage

The fuselage is constructed in the FF style. Two flat side frames are built from 3/32-inch square longerons that are spaced by partial formers. After the side frames have cured, pin them over the top view and join them with the top formers. Tie the top formers together with the balsa keels K1 and K2 and a long stringer on each side where the scoop/turtledeck meets the fuselage.

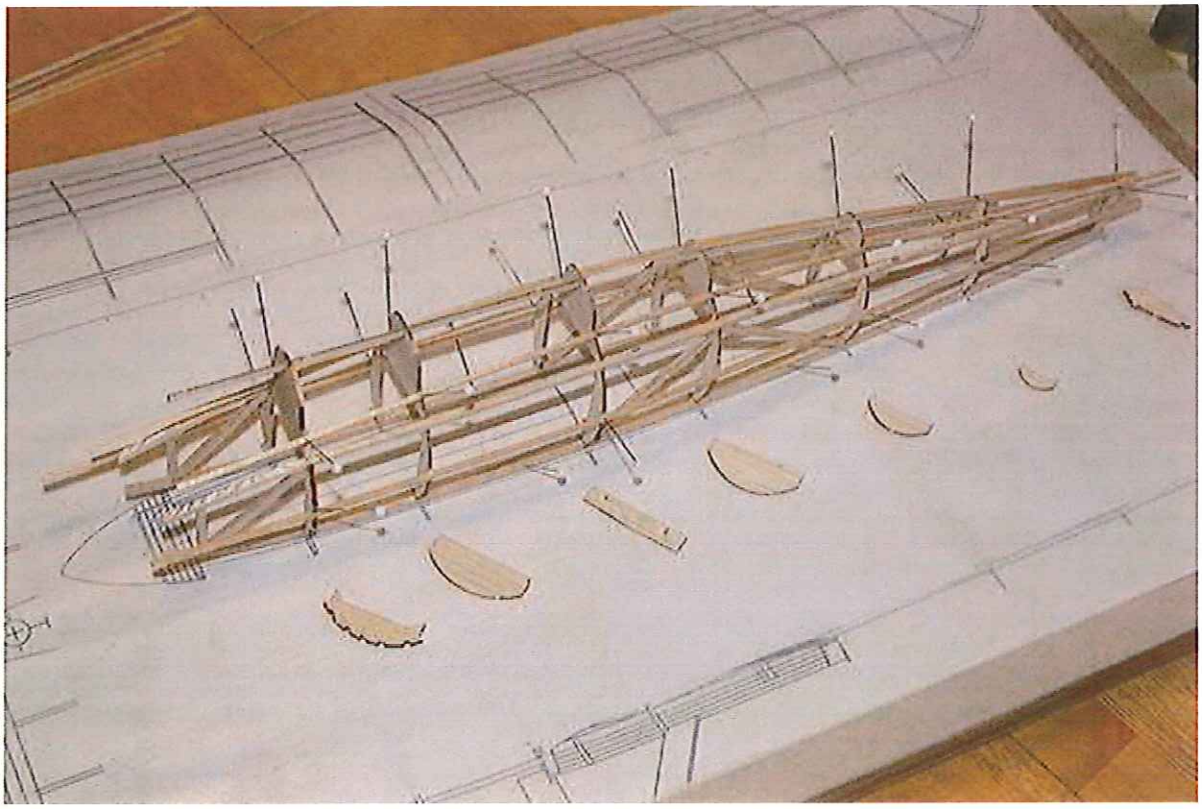


The left and right side frames are built from 3/32-inch square balsa longerons and side formers.

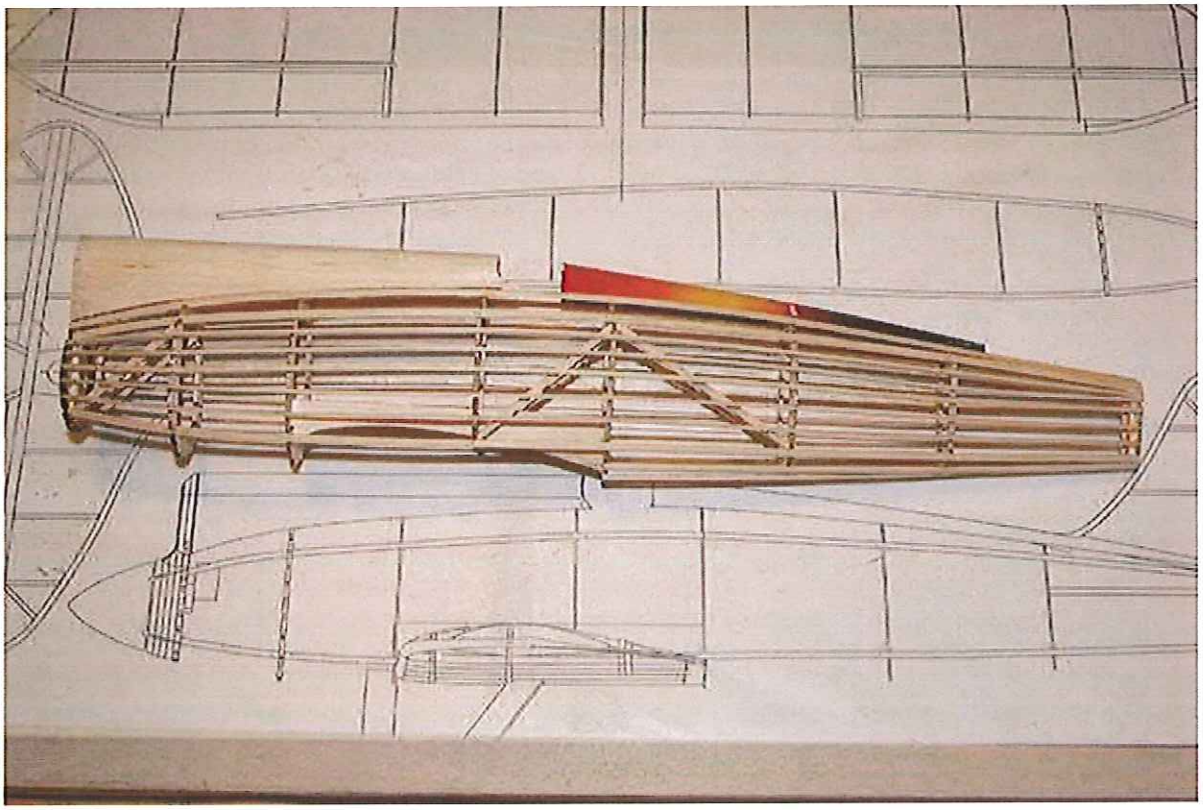
Carefully remove the assembly from the board and add bottom formers F2 through F7. Glue the end formers F1 and F8 into place at each end. Tie F3, F4, and F5 together with the wing saddles S.

Glue in five stringers on each side, but leave the belly open for now. This will make it easier to install the insides. These stringers all run from F1 to F8. Now that the assembly is rigid, sheet the scoop with 1/32-inch balsa and the turtledeck with heavy paper.

Glue the cowl parts C1 through C4 together by aligning the octagonal opening in the center. Glue the stack to the front of the fuselage. Make way for the wing by cutting out the lower longerons between F3 and F5.



Side frames are joined with upper formers, keels, and a stringer on each side. The bottom formers go in next.



After finishing the formers and stringers, sheet the scoop with 1/32-inch balsa and the turtledeck with paper.

Wing

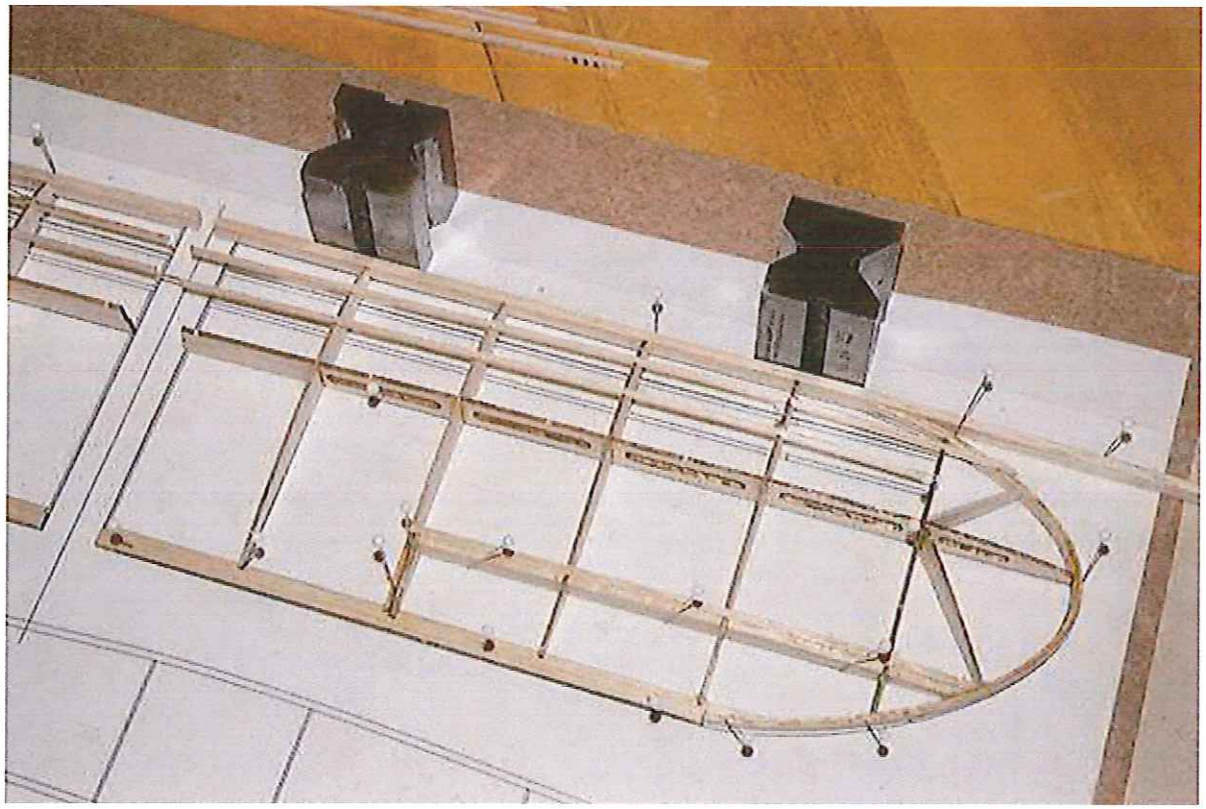
The wing is built up from a handful of kit parts, the wingtip outlines, and a few stringers. Begin by pinning the trailing edges (TEs) and main spars to the plans. Glue the laminated outlines to the TEs and main spars.

Use the dihedral gauge from the plans to set the angle of the center ribs while gluing them into place. Now glue in all of the remaining ribs perpendicular to the board. Tie the ribs together with two 1/16-inch square balsa stringers on the upper wing. Now glue in the LE cut from 1/8 x 1/4-inch balsa.

Finish the wingtips by adding the two wingtip formers. Now add the aileron parts in numerical order, but don't glue A1 and A2 together! These two parts form the parting line between the wing and the aileron. Unpin the wing and add the bottom stringers.

Sand a smooth radius into the LEs and a nice taper into the TEs. Now lightly sand both wings until all of the parts blend seamlessly.

Cut the ailerons free where shown and bevel the LEs of the ailerons to allow plenty of deflection. I used torque rods and CA hinges to control the ailerons on the prototype. After the controls are in place, join the two wings together. A wire wing pin in the LE and rare earth magnets at the TE were used to hold the wing in the pocket.



The wings are nearly ready to shape.

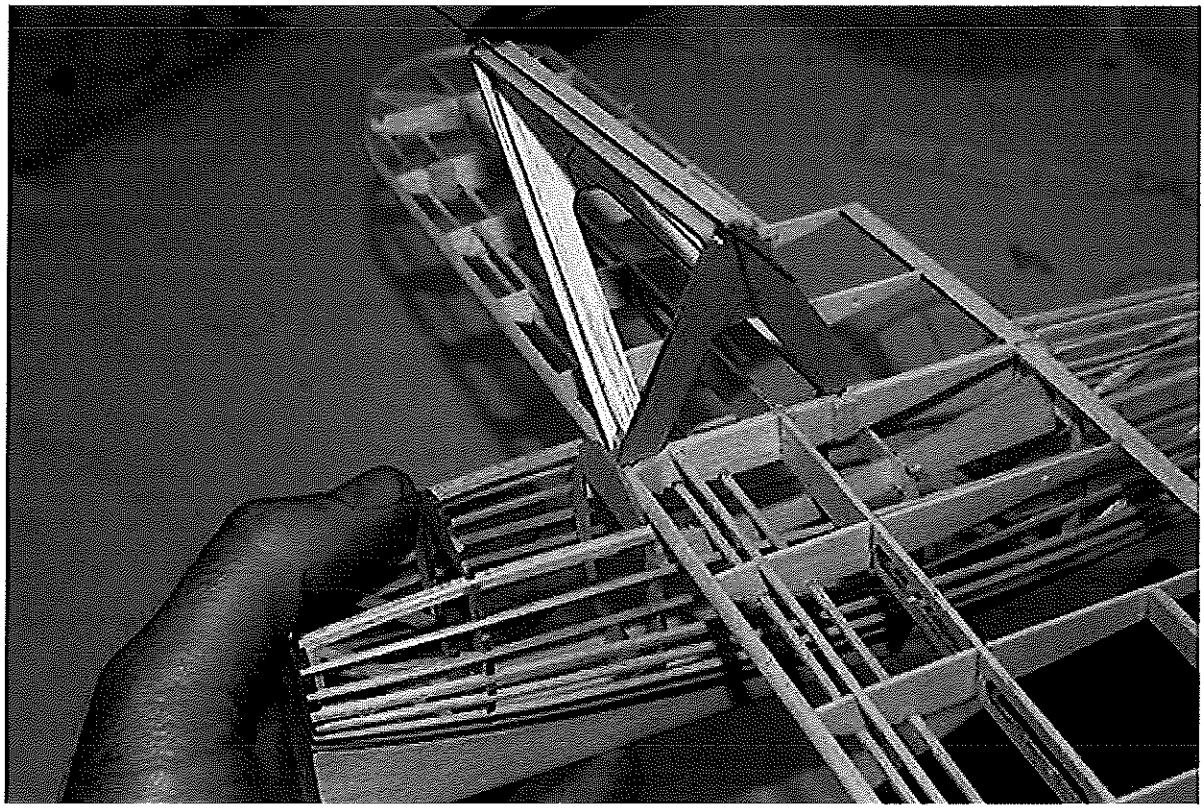
Landing Gear and Guts

The full-scale Pete has a funny triangular landing gear arrangement. This model replicates that with balsa struts that are reinforced with .032 music wire. This assembly plugs into the center ribs in just two points.

The full-scale Pete uses bracing wires from the axles to the mounting blocks in the wings to steady this arrangement. The 20-inch version needs bracing wires, too. Kevlar fishing line works well for this.

For the prototype, I used every bit of the deceased T-28's control system. The brick was attached to scrap balsa rails between F2 and F3 to keep the weight forward. The pushrods were lengthened because the Pete is slightly larger than the T-28.

The spinner was made from soft balsa turned on a drill. It is small, so only a few minutes with a sanding bar and a file to cut the propeller slots did the trick. The spinner was adhered with silicone to a 160mm x 70mm propeller attached to a UMX P-51 brushed motor and gearbox. After it cured, this assembly was secured with silicone to a scrap balsa plate in the nose by aligning the spinner to the front cowl former.



The center ribs are reinforced with scrap balsa to accept the Pete's spindly landing gear. Bracing wires running out to the wings provide needed support.

Covering and Paint

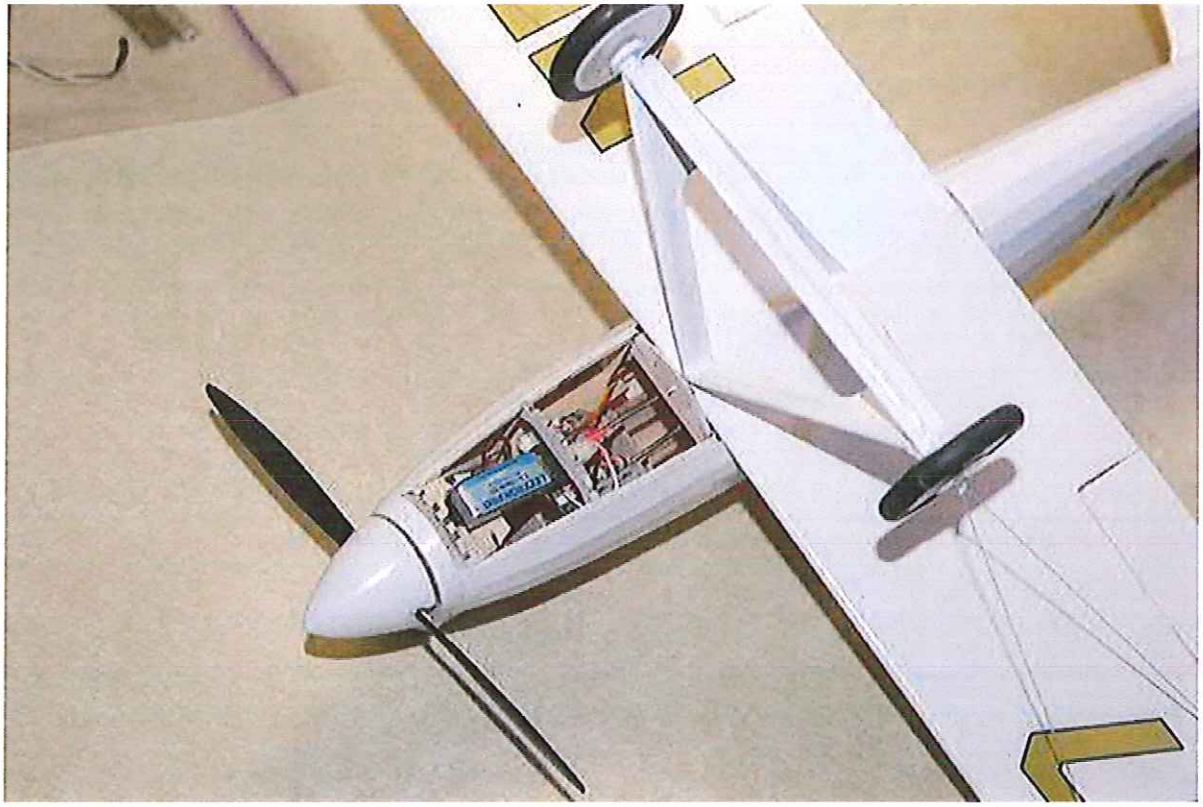
The Pete was covered with lightweight Japanese tissue from Easy Built Models. I applied Elmer's glue stick on the framework and then positioned lightly dampened tissue over each section. A little heat from a trim iron activated the glue while drying and tightening the tissue.

After all of the tissue was on, it was sealed with two coats of diluted water-based polyurethane. This was covered with three coats of thinned, gloss-white latex paint applied with an airbrush.

The prototype's markings are homemade decals printed from a custom file. My favorite is the illusion of the exposed engine—the cowl on the full-scale Pete was cut away to aid in cooling.

The decal was made from a high-resolution photo provided by Kevin Dahlhausen. Kevin's walkaround photos of the original Pete and the graphics file can be found in the build thread on RCGroups referenced in the "Sources" list. Vinyl graphics are also available from Callie Graphics.

The Pete is covered in tissue, sealed with water-based polyurethane, and is ready for the paint shop.



The Pete's internals and unique landing gear arrangement can be seen to good effect.

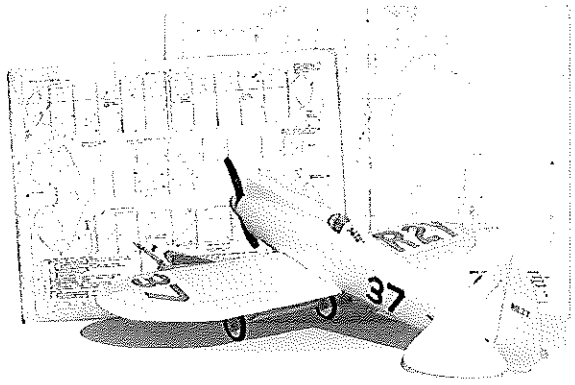
Flying

Although the Pete weighs nearly twice what the UMX T-28 did, it has no problem getting off the ground and zooming around the field using the 1S brushed setup. At 70 grams ready to fly, takeoffs require a moderate rollout, and landings are a breeze. But there isn't a tremendous amount of power for the aerobatics.

As previously mentioned, a variety of 2S power options have become available since I built the prototype. One of the more notable is the E-flite 180BL 2,500 Kv motor found in the UMX Beast and other 2S micros. I've added the outlines for a simple motor mount to the drawing for builders interested in using this powerplant.
—Paul Kohlmann
ptkohlmann@aol.com

Order Plans

Plans for the DGA-3 Pete are available for free at the top of this page. If you instead prefer to have the AMA plans service print these plans for you, use the buttons below to place your order.



Sources

Manzano Laser Works
(505) 286-2640
www.manzanolaser.com

Horizon Hobby
(800) 338-4639
www.horizonhobby.com

Build thread
www.rcgroups.com/forums/showthread.php?t=1364090

Easy Built Models
(334) 358-5184
www.easybuiltmodels.com

Callie Graphics
info@callie-graphics.com
www.callie-graphics.com