

TANZER

Speedwing

By John Tanzer

Having designed and built two 1930-era type aircraft, the 65-inch span *Sportwing* (FM 6/98, CD054) biplane and the 80-inch span *Cabinwing* (FM 3/97, CD019) what was missing was an 80-inch span low wing monoplane. So out came the paper and pencils, and the *Tanzer Speedwing* was born. Using some parts of the biplane and some parts of the cabin plane, a family resemblance was assured. The fuselage is similar to the biplane with a longer tail moment and the wing moved forward. The 80-inch wings are similar to the *Cabinwing*, using full length ailerons without flaps and having more dihedral. The tail group is simi-

Last of the Tanzer trio of 1930s style sport aircraft, this nimble low wing flies great with a big SuperTigre or a G-38.

lar to the *Cabinwing*. With its black and flame red color scheme the *Speedwing* makes a good looking addition to the Tanzer family of 1930s aircraft. What started out to be a simple conversion turned out to be a complete redesign, but well worth the effort. The three aircraft lined up on a grass runway make a pretty picture.

Starting with the wing

This is not a difficult plane to build; anyone with a few kits under his belt should have no trouble building from these plans. Lite ply, spruce, aircraft ply and balsa are used throughout. The fiberglass cowl and wheel pants are available from Fiberglass Specialties (51200 Milano Dr. Suite A, Macomb, MI 48042). Steve Durecki makes good epoxy glass parts that are light and easy to finish, no pin holes.

Start by cutting out sixteen W-1 wing ribs from $\frac{3}{32}$ -inch balsa sheet. Stack eight ribs at a time, enough for one wing panel. True up the spar notches, and the holes for the aileron servo cable tubes. Mark the top of all the ribs with a "T" to insure notch alignment when building. Build one wing panel at a time. Place wax paper over the plan.

Cut the spars down in thickness at the wing tips, as shown on the plan. Pin down the $\frac{1}{4} \times \frac{3}{8}$ -inch spruce main spar, then pin down the $\frac{1}{4} \times \frac{1}{2}$ -inch balsa shim at the rear spar. Place wax paper over the shim, pin down the $\frac{1}{4} \times \frac{1}{4}$ -inch spruce rear spar to the shim. Using one rib as an adjusting gauge, space between the spars by moving the rear spar in or out. Using a small square, glue all ribs (with "T" mark up) plumb with the main



PHOTOGRAPHY: FRANK FANELLI & JOHN TANZER

According to John, the Zenoah G-38 he put in the *Speedwing* gives it unlimited vertical performance. The big round glass cowl and wheel pants came from Fiberglass Specialties.



The size of the cowl easily fits the Zenoah and its muffler, but John opened a hole for access to the carburetor (above left). He can choke the engine more



readily for starting. Control setup is pretty conventional (above right), but be sure to use stiff strong pushrods. Use a good strong tailwheel unit also.

spar. Glue in the aileron end ribs leaving a $\frac{1}{16}$ inch gap between them and the full ribs. This will aid in cutting out the ailerons later. Glue on the $\frac{3}{32}$ -inch balsa false L.E. Remove the right wing from the plan and set aside.

Now build the left wing panel on the same plan only this time face the "T" mark on all the ribs down. Remove the left panel from the plan.

The wing tips are next. Cut two wing tips from $\frac{1}{8}$ -inch lite ply, cut two W-2 ribs from $\frac{3}{32}$ -inch balsa. Slide a W-2 rib onto the tip then cyano the tip to the end of the wing panel, centered between the spars. Bend the spars down to the tip evenly. Now glue in $\frac{1}{16}$ -inch sheet vertical grain shear webs to the main spar. Install the paper cable extension tubes.

Now you can join the two wing panels. Make the dihedral braces and the wing dowel plate from $\frac{1}{8}$ -inch aircraft ply. Weight the left wing panel down flat on the work bench with the $\frac{1}{2}$ -inch balsa shim under the rear spar. Join the right to the left with $1\frac{3}{4}$ -inch dihedral under the last W-2 rib.

Make sure the wing is straight with no warps. Epoxy the ply braces then clamp them till the glue sets.

Epoxy in the wing dowel plate, and reinforce with balsa tri-stock. Glue in all the sub ribs.

Remove the wing from the bench and glue in the balsa block between ribs behind the rear spar at wing center. Block plane and sand to shape. This block supports the wing bolts. Now sheet the wing bottom, the leading edge, trailing edge and wing center with $\frac{1}{16}$ -inch balsa sheet. Be careful not to induce any warps. The wing at this point is still quite flexible, so when sheeting the top, weight down one wing panel at a time flat on the bench with the $\frac{1}{2}$ -inch balsa shim under the rear spar. This will hold it straight till the sheeting is glued on.

At the trailing edge, clamp the sheeting between two yard sticks to keep it straight till the glue dries. When both sides are sheeted, the center can be sheeted. Once the top sheeting is on, no warps are possible, the "D" tube formed at the leading edge insures this. Next, glue in all the $\frac{1}{16} \times \frac{1}{4}$ -inch cap strips and the $\frac{1}{2} \times 1$ -inch balsa leading edge, then plane and sand to shape. Glue in the $\frac{1}{4}$ -inch balsa leading end caps. Now sand and shape the entire wing.

Next step is to cut out the ailerons. Sand the rear spars flush and glue in the hinge blocks. Glue on $\frac{1}{8}$ -inch balsa sheet to the rear spars. Now cut the aileron down as shown on the plan and glue on the aileron's $\frac{1}{2} \times 1\frac{1}{8}$ -inch leading edge. Bevel the aileron leading edge to a hinge point. Repeat the



There's a servo in the bottom of each wing to drive the ailerons. They nest in a servo bay with a hatch. Screws in the four corners hold the hatch. The other four screws hold the servo mount.

process for the other wing panel.

Next mount the ailerons with Sig Easy Hinges, but do not glue them in at this time. Glue in the $\frac{1}{8}$ -inch ply control horn mount. Install the servos and pushrods. I use Futaba

A Tanzer family portrait. The *Cabin Wing* is to the left, the *Sportwing* is in the center, and the *Speedwing* on the right. All borrowed the look of the Golden Age era aircraft.



Tanzer Speedwing

ba aileron servo boxes bolted to a 1/8-inch ply mount with a slot cut into it for the servo arm. This is screwed to hard points glued in to the wing bay. A neat installation. The wing is done for now.

Fuselage

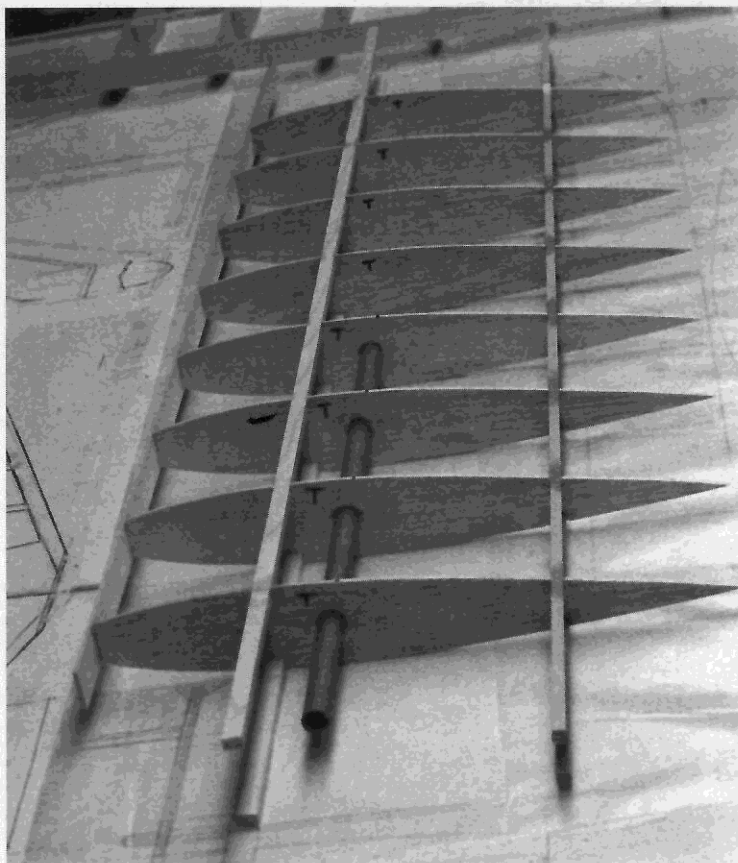
Begin by cutting out all shaped fuselage parts: the F-1 firewall, all formers, landing gear ply mount, ply wing dowel plate. Cut out two fuselage sides from 1/8-inch lite ply using the black arrowheads on the plan as a guide. Using the plan, cut and glue up all of the fuselage frames with 1/4 x 1/4-inch balsa and 1/32-inch ply gussets. When the fuselage is completed, the bottom cross pieces can be removed from F-3 and F-4 at the wing saddle.

Next pin all of the fuselage frames to the top view on the plan. Pin the 1/8-inch lite ply fuselage sides upside down to the frames and balsa tail post wedge. Make sure everything is straight and square then cyano all the frames and the tail post wedge. Glue in the wing dowel plate and wing bolt plate, and reinforce with balsa tri-stock. Glue in the ply tailwheel plate.

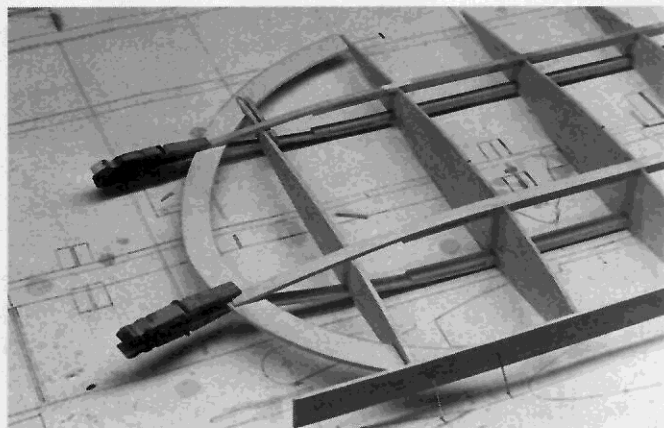
With the fuse upside down on the bench, lay the wing in the saddle. Align it with the fuselage, then using the dowel plate as a guide, drill the leading edge of the wing for a 3/8-inch dowel. Take the wing off and glue in the dowel.

Now return the wing to the fuselage, re-align it, then drill and tap the hold down plate for 1/4-20 bolts. Remove the wing and put it aside for now. Next, glue the firewall and landing gear mount to the fuselage, reinforcing it with balsa tri-stock. Glue all the formers in their proper locations. Glue the 1/8 x 1/4-inch spruce stringers to the top edge of the fuselage sides. Glue on the 1/4-inch sheet balsa fuselage and wing saddle doublers. Then install the 1/4 x 1/4-inch balsa stringers. Fair in the stringers at the rear of the fuselage.

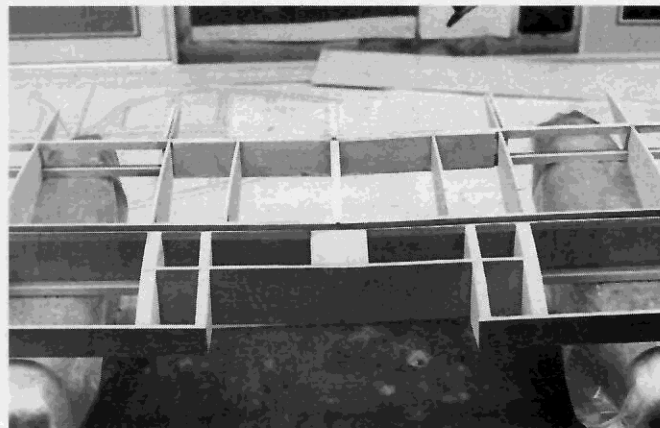
Glue in the 1/8-inch lite ply cockpit floor, then sheet the front top of the fuselage and lower front of the nose with 1/8-



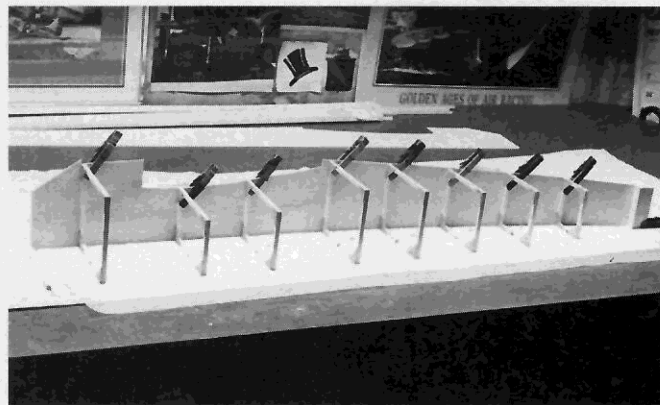
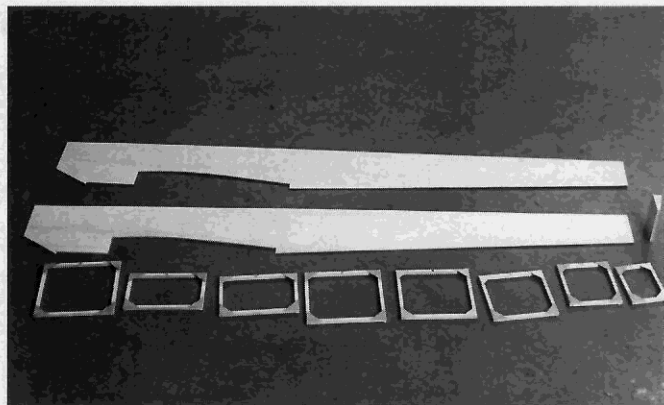
Wing construction is fairly simple. Here the right wing is ready for the tip. Note the "T" on each rib. When building the left panel over the same plan, the "T" is on the bottom.



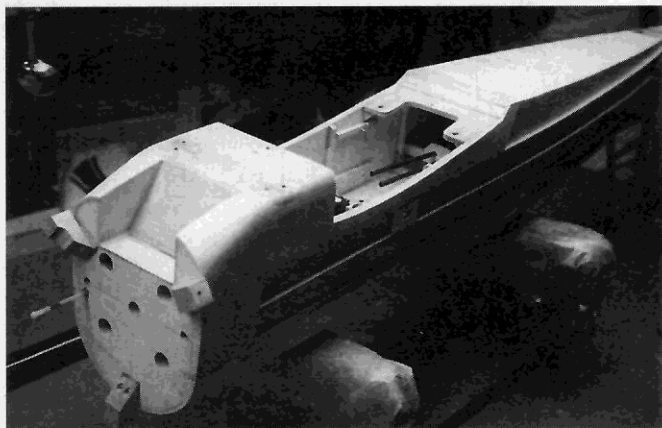
Clothes pins clamp the extension of the spars to the tip bow (**above left**). Note how the ends of the spars are sliced to half their thickness so they can bend more easily. John cyanoed a 1/4-inch wide .007 thick carbon fiber strap to the bot-



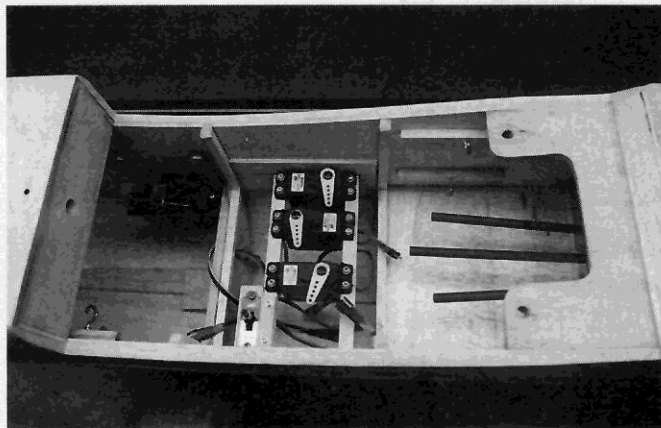
tom and the top main spars (**above right**). After the fuselage sides and the frames have been prepared (**below left**), the frames are squared and aligned upside down over the plan, then clamped to a side (**below right**).



Tanzer Speedwing



Those large holes in the firewall (above left) were drilled for the Cirrus Ventures vibration dampening mounts John used. The large cutout is the exhaust for the



cooling air. For proper muscle, there's a servo for each elevator, and a single one for the rudder (above right). Torque should be at least 70 ounce-inches.

inch balsa sheet. Fair in the balsa doublers at the nose and wing saddle. Glue all of the $\frac{1}{4} \times \frac{1}{4}$ -inch balsa stringers to the turtle deck.

Glue two balsa blocks to former F-9 using a $\frac{3}{8}$ -inch spacer to form a slot for the fin. Temporarily glue a $\frac{3}{8}$ -inch spacer at the rear for the stab slot. Now block plane and sand the blocks to shape. Remove the $\frac{3}{8}$ -inch spacer. Leave the $\frac{1}{8}$ -inch balsa sheeting off of the bottom of the fuselage till the stabilizer and rudder are temporarily fitted and the control rods have been installed. I used DuBro Laser Rods and anchored them to the frames along the way.

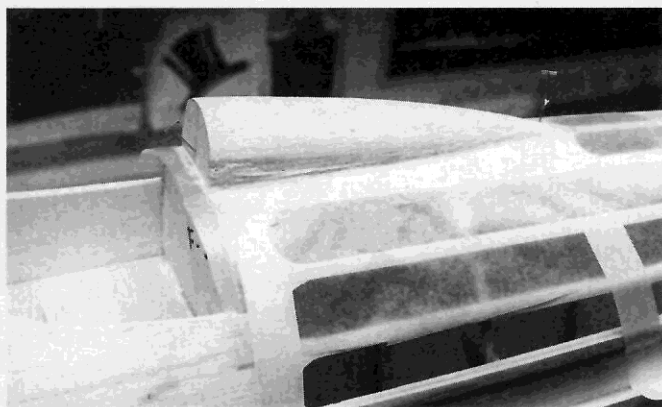
Tail

The stabilizer and rudder outlines are each laminated with four pieces of $\frac{3}{32} \times \frac{3}{8} \times 36$ -inch balsa strip around two forms made from $\frac{1}{2}$ -inch ply. If you'd like, you could cut out the centers of these forms. Plastic electrician's tape is used on the outside edge of the form then waxed so the actual piece won't stick to it. Nail the form to a flat board with wax paper under the form. To soften the strips for bending, a 2-inch P.V.C. pipe, 40 inches long is capped on one end then filled with water. Put twelve $\frac{3}{32} \times \frac{3}{8} \times 36$ -inch balsa strips into the pipe, cap

the top and let them soak over night. Remove the four strips, dry them off with a towel and apply carpenter's glue to the strips and squeeze them together.

Wipe them again, then, starting at one end, bend them around the form, clamping to the form with blocks to prevent dents. Let each frame dry overnight. Repeat for all units. For easier bending $\frac{1}{16} \times \frac{3}{8}$ -inch strips could be used also. But you would need six per frame to make the right thickness. Pin the frame to the plan and add the rest of the interior frame work.

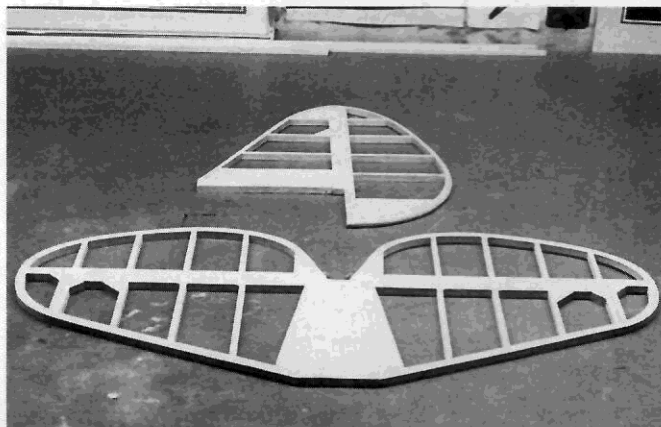
Make the stabilizer and elevator as one



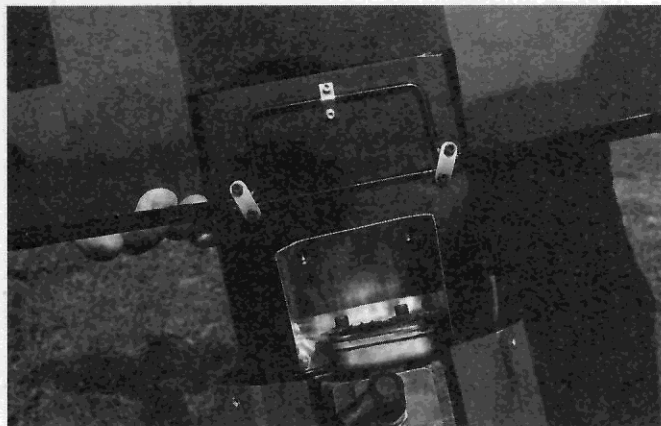
With a sheet of wax paper over the turtle deck (above left), the head rest is sanded and "battered" with spackling for a perfect fit. It will be glued on after covering. A small block plane (above right) quickly pares down the tail filler block,



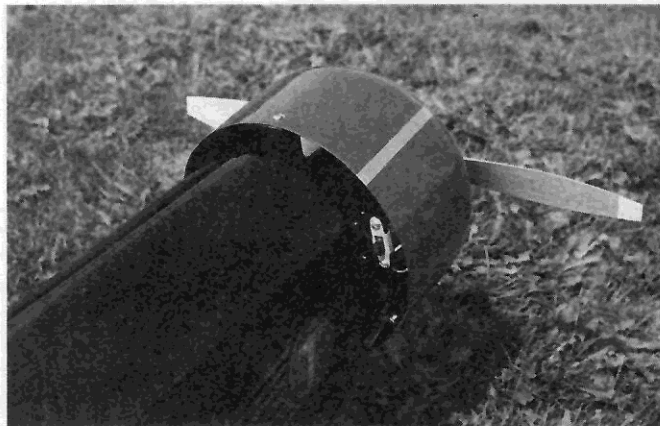
before final sanding. The bows of the tail group were formed around a template from a laminate of four strips of $\frac{3}{32} \times \frac{3}{8}$ inch balsa (below left). After the inner framework was added, the control surfaces are ready to be cut out (below right).



Tanzer Speedwing



Two $\frac{3}{16}$ -inch wire legs form the main gear (above left). The rear leg, with the rectangular bend, keeps the gear from rotating. Note the metal lining to the ex-



haust cutout. The cowl mounts to four standoff blocks, and the space provided offers a place to put the engine manual kill switch (above right).

unit. Same with the fin and rudder. They will be cut apart later. Don't apply any glue along the hinge line. Round off all edges.

Now cut away the elevators and rudder. Bevel the leading edges of the elevator and rudder, and mount with the easy hinges. Don't glue them at this time. Trial fit the fin and stabilizer to the fuselage with the wing mounted. Keep the stabilizer at zero degrees incidence, as well as the wing and engine thrust line.

The fin can be glued in at this time, but not the stab. It should be covered first. Install the control rods, then finish sheeting the bottom of the fuselage. Trial fit the engine and the cowl, then install the fuel tank and servos.

This is a good time to bend the $\frac{3}{16}$ -inch music wire landing gear. Use the pattern on the plan. Mount the gear to the fuselage ply plate with DuBro gear straps, 4-40 bolts and blind nuts. Wrap with copper wire, then solder. An aluminum gear could be substituted if you prefer.

Finishing it up

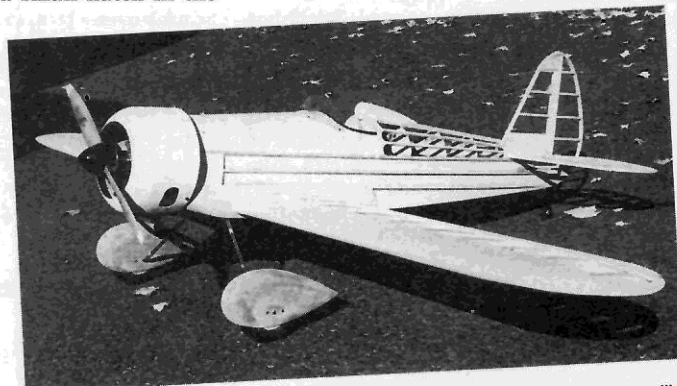
I covered the wings and stabilizer with Flame Red Ultracote®. The fuselage is covered with black MonoKote®. After all the parts are covered, the Sig Easy Hinges can be permanently glued in. I preferred to use Zap for this. Use Perfect Paint on the cowl. It's a perfect match to the Flame Red. I used

Ultracote Plus for the trim.

Install the $\frac{1}{16}$ -inch wire tail braces, and balance where shown on the plan. Add weight if needed. My *Speedwing* came out nose heavy so I cut a small hatch in the rear of the fuselage to add three ounces of lead. I set up the control surfaces for all the throw I could get, and then cut them down with the transmitter as needed.

In order to keep the G-38 short I removed the cup mount and spring starter, then used the stock flat steel plate mount and small stock muffler. I cut a recess in the lower firewall to accept the muffler. Starting now requires hand flipping or an electric starter. To hand start any magnetoequipped engine, rotate the shaft counterclockwise just till it hits compression. Make sure the prop will be at the 11 o'clock position. With the throttle at low, choke the carburetor till wet, turn the prop clock-

wise to 3 o'clock then flip the prop counterclockwise briskly. Follow through just like a golf swing. It should start in two or three flips.



With a robust framework, the plane can take either the plastic films like MonoKote® or Ultracote®. The fabric-like finishes would give a more authentic look.

Flying

The test flight was a pleasure. The G-38 is more than enough power for this 15-pound plane. The G-38 started and ran just fine, and range check with the engine running was okay. On the taxi-out to the center of the field, the ground handling was very good. Takeoff and climb-out were very good; just one click of up trim, one click of right rudder trim, and one click of right aileron trim were needed for hands off straight and level. I did a few low passes for the camera, then tried some maneuvers.

With the oversized ailerons the rolls are super quick and they stop like *now*. Snaps are almost too fast. If you like slower maneuvers use low rates. The *Speedwing* handles slow flight very well. At 15 pounds, and powered with the G-38 using an 18-10 Zinger prop, the vertical is unlimited, rolling all the way.

Landings are as easy as take-offs. With the 18-10 prop and the engine at low throttle the plane wants to keep on flying in ground effect. I think a 20-8 prop will reduce this effect.

If you would like to build a *Speedwing*, order a set of plans; the construction is not difficult. I am sure you will like it as much as I do. Happy landings—John Tanzer. 

Tanzer Speedwing at a glance

Wing span	80 inches
Fuselage length	57 inches
Airfoil	symmetrical
Wing area	1100 square inches
Wing chord	14 inches
Weight	15 pounds
Wing loading	31.5 ounces per square foot
Power required	35cc to 45cc gas 25cc to 35cc glow
Radio requirements (ail, elev, rud, pwr)	4 channel 6 servos