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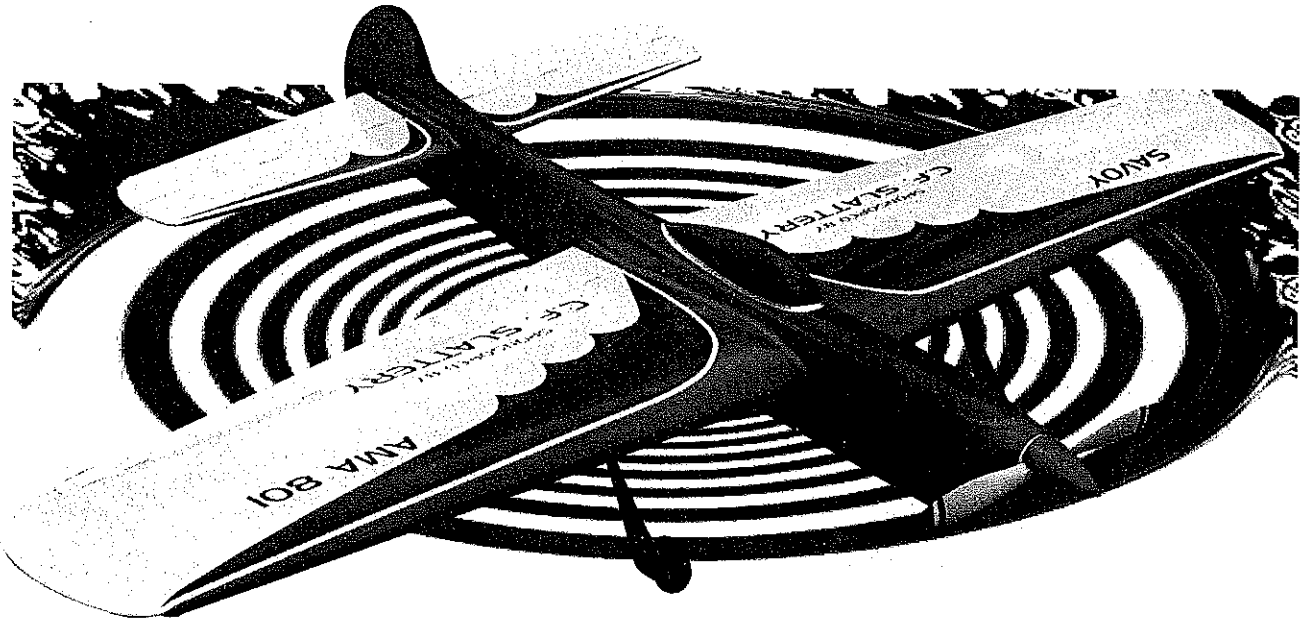



# AN "EVOLUTIONARY" CONTROL LINE STUNTER

# SAVOY

■ **Allen Brickhaus**

The Savoy has been an avant-garde/renaissance project for me.

The lineage of the Savoy began with the Envoy I and Envoy III series. Both of these Stunters used Ted Fancher wing aerodynamics.

The Envoy I (as published in the June 1986 *Model Aviation*) was a wonderful success in its short but trophy-laden career. The Envoy III began its service with the Lake Charles Nationals and placed 21st in Expert; this was my first Nationals, and I was pleased with the results. The Savoy followed the Envoy V and some changes have been made due to my further experience in Stunt and the gathering of knowledge (both written and verbal) from my friends on the contest trail.

The renaissance of the Savoy is highlighted in the use of Excitation aerodynamics, as published in the December 1981 *Model Aviation*. The bubble canopy is reminiscent of countless I-beamers of the 1960s. The wingtips are taken from Lew McFarland's Shark 45, and the rudder is a close-copy of the Stuntwagon. To my relief, this combination project did not become Edsel II!

The avant-garde portion of this Savoy is reflected in the newer flat-styled stabilizer and tapered elevators, the further improved iron-on/spray-can finish, and the tuned-pipe power plant. I am not here to argue with anyone about power plants. I own All American Seniors, Barnstormers, and Smoothies with Fox .35s. My Nats-winning Stuntwagon is pulled by an ST .46, and another .46 will go in an uncompleted Stuntwagon. I still own three ST .60s and have Classic projects set aside for them. The pipe has enabled me to fly as many Stunt patterns per year as my ST .46s and ST .60s of earlier times did. The .40 piped power plant gives me the power to fly fuller-sized Stunters on .015 braided-steel lines, keeps me in the air (not in the shop), and is cleaner to operate.

The Savoy pictured in this article has been flown, trimmed, and set aside for future contests. I am happy with the completed project and hope this addition to the Stunt bibliography will be helpful to the beginner as well as the expert.

## CONSTRUCTION

The foam wings for the Savoy are available from Scott Smith at Aerosmith Model Aviation. His address is listed at the end of this article. Scott can supply wings finished in any form. The fully sheeted version with the gear blocks installed saves much building time.

The fuselage doublers are 1/16 plywood. It is best to join the doublers to the fuselage with Hobbypoxy Formula 2 epoxy. Use only the smallest amount of glue necessary to assemble the fuselage sides and doublers. When putting the two parts together, tack-glue them with a drop of cyanoacrylate

/A) glue at four corners. This prevents parts from sliding around while the glue es.

Many of my Stunters have been put ether with ⅛-balsa doublers. This also rks well; it's slightly lighter, and enables builder to fair the spinner into the nose. ıalf-ounce carbon-fiber mat is used ween the two balsa parts (the fuselage e and the doubler); they're joined with bbypoxy Formula 2 epoxy and tacked ether like the plywood-doubler version. Choose the doubler you desire to use ıth versions will work fine) and get to the ılding board. Note how far the doubler ends past the wing. This not only ıpens any vibration, but it also forms the tom of the pipe trench. Note that I said *nch*, not *tunnel*. The trench not only ows the power plant and pipe to stay ıler (more efficient and predictable), but o helps the pilot to make adjustments ickly and easily. I make few changes ring the flying season, but some pipe ıvement, usually not more than ⅛ or ¼, ıeeded as the temperatures go up and wn. If changes are necessary, they're ier to do with a trench.

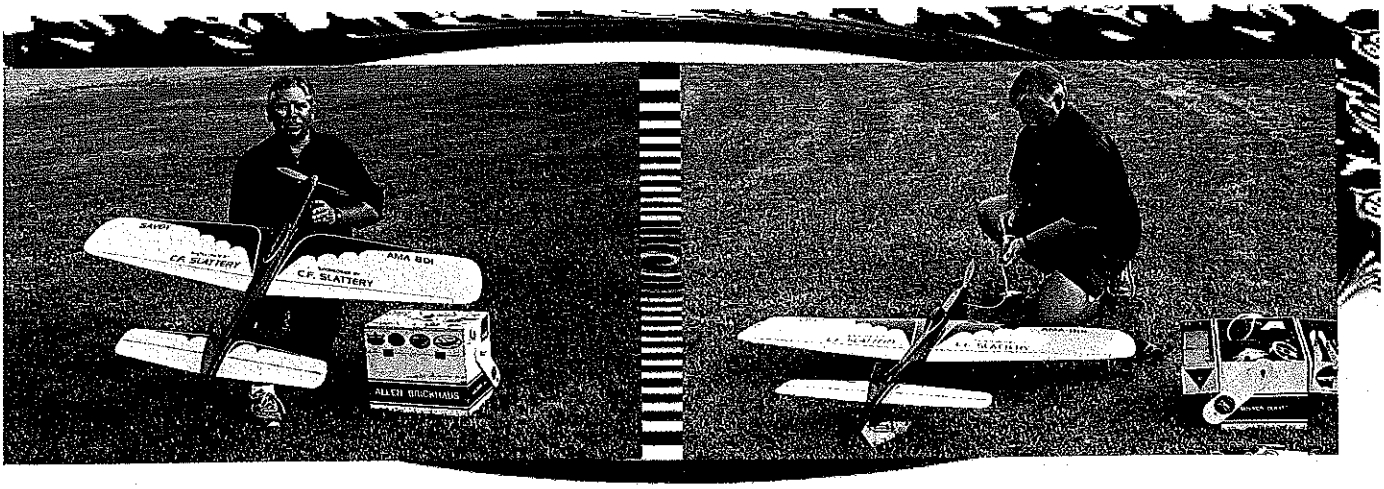
When putting the wing into the body, I ggest that the connection be made by slipping the wing through the wing cutout in the inboard fuselage side. A small triangular section of fuselage side can be removed to allow the pushrod to go past the side. This triangular piece can then be reglued into place. The horn is fitted before the wing is slipped into place. The wing jams the horn bearings between the fuselage side and the trailing edge of the wing. The pushrod and horn can be joined later to assert the neutral settings necessary for proper flying trim.

All fuselage formers, with the exception of the upper pipe trench section and F1 and F2, are made of 1/16 balsa. Note the grain direction on each piece. Slightly overcut each 1/16 balsa former and fit carefully by final-sanding the sides, top, and bottom until they fit snugly between the sides and are attached firmly to the other formers. Tight (but not overstressed) fits are needed for a straight fuselage.

The cowl bottom fits between the cowl sides, and keeps the cowl in place at the rear of the cowl and the forward face of F2. The cowl sides are set to conform with insides of the fuselage doublers. This should be a flush fit from the upper inside fuselage doubler down to the lower cowl insides. The cowl hold-down plywood is glued to the insides of the cowl side and freely extends upward between the fuselage sides. Fit the cowl sides tightly against the fuselage sides. Hold everything in place with pins or spot-glue the components in place. Add the cowl bottom and then fit and glue the cowl front block.

When the basic cowl is fitted, hold it tight against the fuselage with masking tape. Drill a 3/32 hole through the fuselage side, 1/16 plywood doubler, and cowl hold-down plywood. Remove the cowl and insert a 4-40 blind mounting nut in the cowl hold-down plywood with the nut facing outward. Make any appropriate drillings to allow the 4-40 socket-head bolt to pass through the fuselage side, stop at the doubler, and bring the blind mounting nut up against the inside portion of the fuselage sides. Then you can add the fuselage nose ring and cowl half ring, and final-sand the outer contours of the nose area.

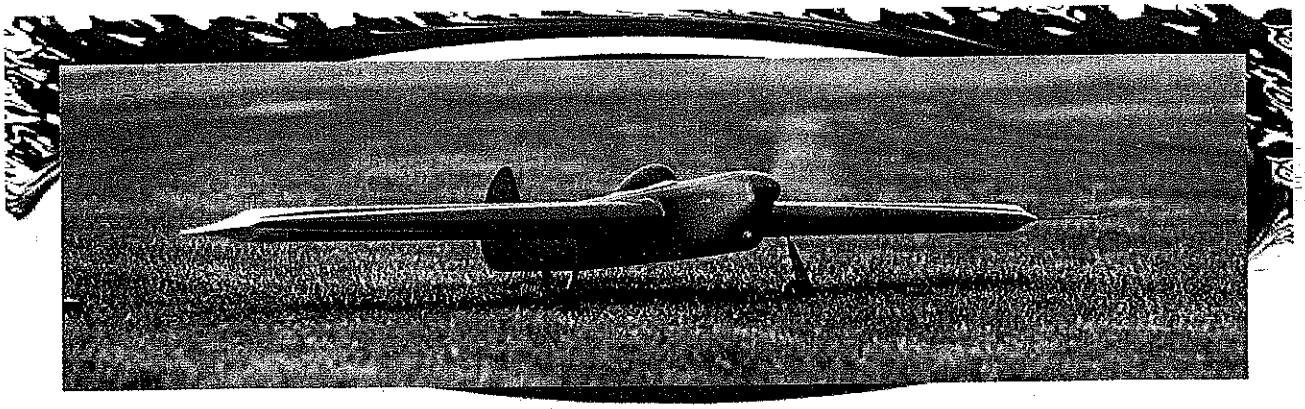
The 3/16 aluminum pad at the engine area is secured at the rear by the F1 former. The front is screwed down with a #2 x ½ self-tapping socket-head screw. Epoxy the aluminum in place prior to the F-1 and self-tapping screw finalization. The engine mounts are undercut to enable the flier to use a plastic tank if desired. Since plastic



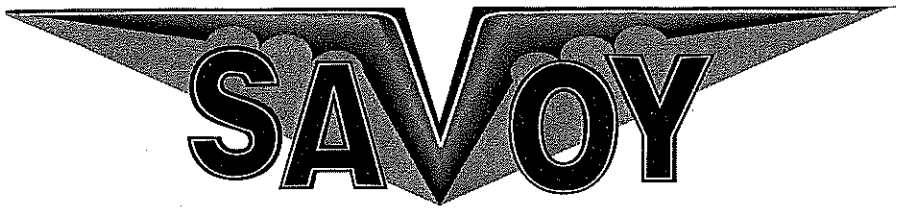

ıe author and the Savoy prior to its inaugural flight. First-flight ters made it hard to hold still for the camera!

The author fuels the Savoy before its first flight. An O.S. Max .40VF with a Smith/Werwage pipe powers the model.

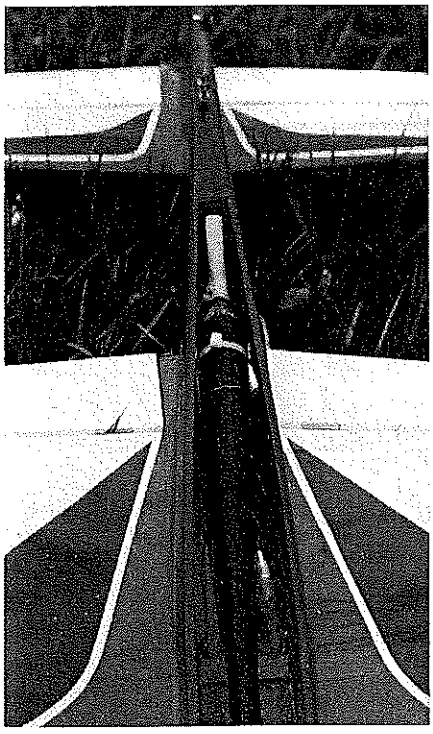
Photos by Jerry Norin Graphic Design by Carla Kunz



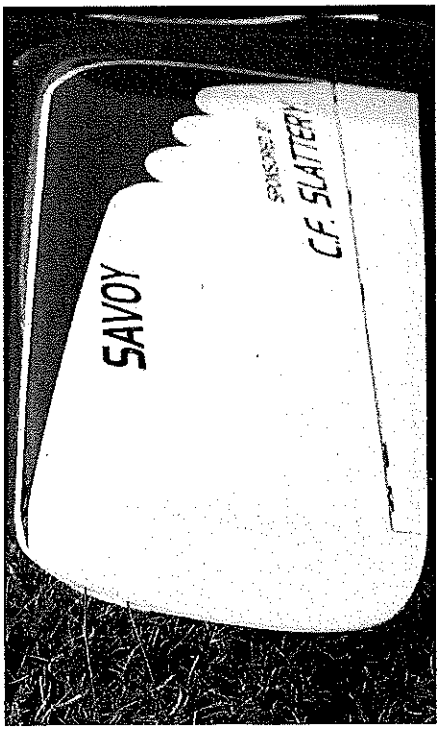
The Savoy is flown on 66-foot lines; its release rpm is between 10,600 and 11,000.




Note the neatness of the two-inch-diameter spinner, cowl ring, and engine air-intake hole. The prop is a Bolly 11¾ x 3.8.



The pipe trench helps the engine and pipe stay cooler; runs will be more efficient and predictable.




A Klett exit guide is glued to the wingtip. The bellcrank should be neutral when the leadouts are matched.

tanks are higher and shorter, the mounts will need to be undercut to allow proper shimming. A shorter tank allows a shorter nose if the airplane is nose heavy.

**Neutral Settings:** Designers stress light weight, plenty of power, and straight-and-neutral flight characteristics. Be sure to set the bellcrank in the neutral position before gluing the wing halves together. Cut the two leadouts evenly approximately 12 inches beyond the end of the wing. This lets you know that the bellcrank is in the neutral position when the two wires are matched.

Install the wing by slipping it through the fuselage as previously described. Bolt the engine in place and position the wing with levels, incidence meters, and rulers. Be sure that the wing is perfectly aligned with the fuselage and the engine (note that engine offset is used) and glue the wing in place.

Remember that your horn was fitted prior to entering the wing. I use a 3/32 x 1½ piece of music wire and fold it into an L shape. One part is inserted into the 1¼-high bushed flap horn; the other half lies against the end of the flap pushrod. Set the bellcrank in neutral, and do the same for the flap horn. Wrap the pushrod and L-shaped piece as shown on the plans. Solder this, and clean the solder joint of flux and material that might corrode the area.

Make the arrow-shaft pushrod, and have the stabilizer and elevator ready to install in the fuselage. Solder the aft end of the elevator pushrod to the elevator horn and place the stabilizer in its location. Block the stabilizer and elevators in neutral with balsa scraps, plywood, and rubber bands. Extend the former pushrod holes upward with an X-acto knife. Put the front of the pushrod in the #1 flap horn hole and place the entire pushrod/stabilizer/elevator assembly into its proper place. Final-fit the

**SAVOY**

**Type:** CL Stunt

**Wingspan:** 63½ inches

**Wing Area:** 665 square inches

**Power:** Precision Aero .40 (or equivalent) on pipe

**Flying Weight:** 61½ inches

**Construction:** Foam wing, built-up and balsa sheet

**Covering/Finish:** Iron-on film, fiberglass cloth

stabilizer/elevator in place and glue it solidly. The sections of formers 4, 6, 7, and 9 can then be reglued in place.

If everything is properly aligned during construction, the settings should be excellent for the rest of the building procedure. Alignment of each and every portion of the project is *imperative*. Fit items, take measurements, walk away, have a soda; then go back and recheck everything before any final gluing.

The leadout bushing at the bellcrank and the line connection is shown twice the scale size for clarity. Leadouts like Sullivan A-B or C-D (C-D must be used on the Savoy) will last a long time when bushed in this manner. The tubing selected for the bushing material should be softened over an open flame and allowed to cool slowly to room temperature. This tubing should just barely fit over the wire you've chosen for your leadouts. The softened wire will easily conform to the shapes shown on the plans. The bellcrank and leadout bushings are wrapped with #24 copper wire and glued with epoxy.

The center section of the wing and fuselage joint must be strengthened with Hobbypoxy Formula 2 glue and sections of two-ounce glass cloth. The cloth must be large enough to run from the front of the wing to the rear of the wing. It should be wide enough to cross the width of the wing between the fuselage sides and fold up along the sides approximately ¼-½ inch. This will securely tie the wing and fuselage together. This must be done on the top and the bottom.

Note the bellcrank plywood braces (top and bottom) shown on the plans. These braces need to be glued in place prior to the addition of the two-ounce cloth and epoxy. The same can be done with the stabilizer and fuselage joint in the rear; you can use epoxy and 5/10- or ¾-ounce cloth for this section.

**Finish:** Final-sand all of the surfaces with progressively finer sandpaper. Progressing to 600-grit paper is recommended. All of the sandpaper can be glued (use spray-on contact cement) to white foam that's similar to the material used for foam wings. These larger pieces of foam/sandpaper can be cut to the sizes needed for each application.

Use a tack rag and clean all areas well. Choose your favorite brand of iron-on film and apply it to all of the flying surfaces. I like to fit all of the elevators and flaps on their respective horns with the hinges snugly in place. This allows any final fitting prior to the application of the iron-on film. Always apply the film to the bottom surfaces first, and then add to the top portion. It works best to first seal the film around the edges and then heat-shrink the center sections. Using a soft glove or a washcloth to press down the material after heating the center section will help stick the film to the wood surface. Take the film to the fuselage and wing/stabilizer joints. Add a fillet later to cover this film-to-wood connection.

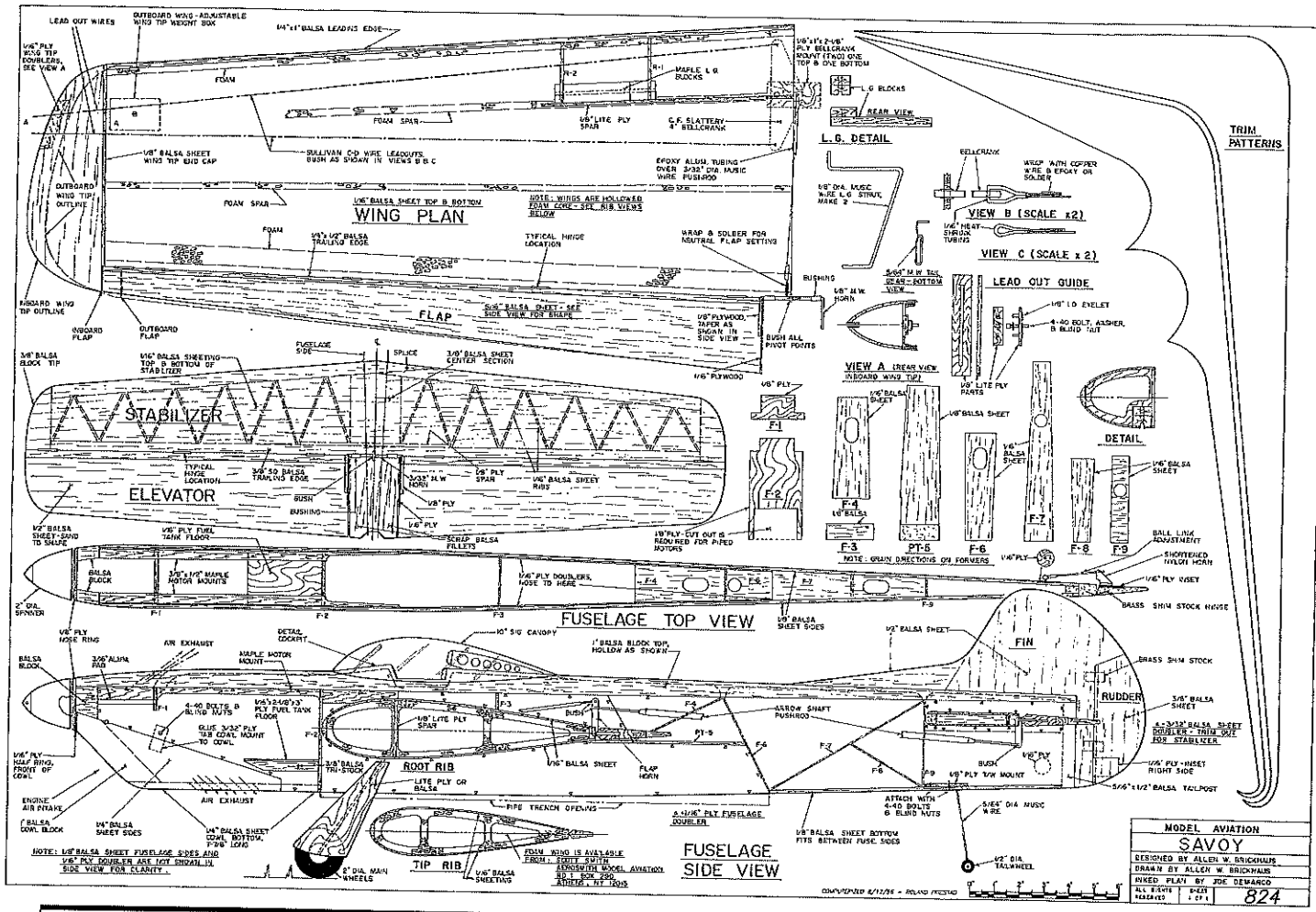
Apply 6/10- or ¾-ounce glass cloth to the nose of the Savoy from the spinner ring to the high point of the wing airfoil. The Hobbypoxy Formula 2 glue can be brushed on the raw wood and glass cloth. Once it is filled, take a roll of toilet paper and roll it over the model to absorb the excess epoxy. (Roll it in the direction where it does not unwind off of the roll.) This leaves only what is needed to strengthen the nose area. Do the same for the cowl, and set the assemblies aside to allow the glue to cure.

The surface will sand very easily with 400-grit wet-or-dry (used dry). I usually apply the same slightly thinned glue (use Hobbypoxy thinner) on the rest of the unfinished wood surface. After the epoxy has cured, sand all wood surfaces and add your favorite fillet material at the wing/stabilizer and fuselage joints.

Use ⅛-wide 3M fine-line tape (#06404) and mask off the wing from the fillet area, approximately ⅛ inch outboard of the fillet surface. Add masking tape past the 3M tape. Slightly thin some spackling compound until it forms a "slurry" mixture. Brush this on all of the wood surfaces and allow it to dry for six to eight hours. Sand with 240-grit sandpaper, then proceed to 400- and 600-grit. Apply additional spackle if you feel that you have not filled the wood surface.

Mask all of the iron-on film surfaces. Spray on gray primer; I use X-O Rust #1280 Gray Primer from the hardware store. Let it dry for 12 hours and it will

Full-Size Plans Available—see page 200



ıow you the spots you didn't fill, as well
; the high spots. Use full-strength
›ackling compound to cover any unfilled
'eas. Sand off the primer and filler until
ıly the grain of the wood is filled. You
ıould see wood with little white lines in
ıe filled areas. Remask and respray the
'ood with the gray primer.

All of the colors on the Savoy are
erived from colors available in the X-O
ust and Rust-Oleum lines. These brands
:e compatible, and cover easily.

When the fuselage is finished, draw a
aint scheme for the wing, stabilizer, flaps,
ıd elevators. Masking tape will pull fresh
aint off the iron-on film; design a scheme
'here won't have to mask over the first
›lors. Try the paint scheme on the bottom
rst; find out what went wrong (or what
ou liked), and then proceed to the top
ırfaces.

When the paint is dry, wet-sand all of
ıe surfaces with 600-grit wet-or-dry. Clean
ıe surface, add any decals, and prepare the
avoy for a final clear coat. Noted Stunt
esigner and pilot Jerry Worth mentioned
ıat Rust-Oleum-type paints can withstand
ıels that have up to 40% nitromethane
'ithout a protective clear coat.

The finishes of my aircraft have
nproved lately, and most of the credit
hould go to Byron Barker of New Albany,
ıdiana, and Mike Starrett of Georgetown,
ıdiana.

Sitting on the floor or bending over a table to sand my airplanes tired me out, and I would quickly lose patience. Byron developed a paint stand that enables me to sit next to the airplane and put it in any attitude I need. Whether I was filling or sanding I could work at a longer and more efficient pace.

Charlie Reeves is my other source of finish inspiration. When I feel like I have accomplished a lot with my finishing, I travel to Charlie's lower-level hangar and humble myself among his shiny Stuntwagons, Stilletos, and authentic-looking Fw 190Ds.

**Flying Trim:** My Savoy is powered by an O.S. Max .40VF with a Smith/Werwage pipe. This works very well, but it's no longer available. Randy Smith has worked with Nelson engines and has developed a fine-running engine in the Precision Aero .40 (PA .40). My PA .40 is on my Arcturus III; I will include some set-up parameters which you can use if you want to use this engine.

The PA .40 is supplied with a .181 venturi, which is similar to a .300 restrictor. The pipe is set for a length of 16¼ to 17 inches, measured from the center of the glow plug to the first baffle in the front of the pipe. To find this baffle, insert a piece of wire (or a dowel) into the front of the pipe until it touches the front of the baffle. Transfer this location to the outer surface of

*Continued on page 178*

## Savoy/Brickhaus

*Continued from page 23*

the pipe and glue on some colored thread around the pipe. This is an easy way to set the pipe if the need arises.

My setting now is at 16¾ inches. Always use a filter over the venturi. The fuel I use is 7½% nitromethane and 23% oil—half of the oil is castor and half is Klotz synthetic. I get my 7½% nitro mix by ordering two gallons of 5% and two of 10% fuel. I mix an equal amount of 5% to the 10% to obtain the 7½% results.

My setup is similar to that used by many other pilots. The propeller is a Bolly 11¾ x 3.8 (the pitch is measured at the number 10 slot on the pitch gauge). The total line length is 66 feet, from the center of the handle to the center of the Savoy. Release rpm is 10,600-11,000. The PA will sound a little fast on the ground, but it should settle down slightly after the first couple of laps. This setup should provide a lap time of approximately 5.25 to 5.4 seconds. The 665-square-inch Savoy weighs in at 61.5 ounces at launch time.

**PAMPA:** Having an airplane, engine, or other piece of equipment is useless without the knowledge to use it. I highly suggest that you look to join PAMPA as a resource to quicken your Stunt learning curve. *Stunt News* (edited by Tom Morris of Anniston, Alabama) is the definitive newsletter. Send a request for application to PAMPA at 158 Flying Cloud Isle, Foster City CA 94404.

Requests for PAMPA products, which include an immense Stunt bibliography of printed Stunt material, can be sent to Box 2026, Loomis CA 95650-2026.

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If you have any questions regarding the Savoy, please write to me. ✈

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