F-86D "Sabre Stunter"

1st in Open Stunt at the 1969 Nationals: a Semi-Scale Controline design inspired by the Air Force "Thunderbirds." Fox .35 power in a 54" span machine.

The airfoil, the area, the moments for controllable flight. It grooves smoothly, yet the aircraft reacts with spirit to the control pressure.

by Bob Lampione

My *F-86D "Sabre Stunter"* was designed with one thought in mind.—The 1969 Nationals—to be held in Willow Grove the following summer. Having just completed the 1968 contest season in the New York, New England area, the need for a new ship existed and work began with letters to North American Aviation for details on the *F-86D* and to the Air Force *"Thunderbirds."* By using the appearance of the "D" combined with the paint scheme of the "Thunderbirds" I felt that this filled the bill for a Nationals airplane; giving a striking appearance both in the air and on the ground, along with a pleasing profile and the look of a fighter.

Five months later, my wife, Betty, and I rushed out to the field for the first flight. Lines hooked up, fueled and new airplane butterflies, she rolled thirty feet and effortlessly lifted to normal level flight. After a few climbs and dives to check sensitivity (nose weight), I started the pattern. I could hear Betty shouting from outside the circle, "not on the first flight." "The plane feels great," I thought, "so why not." Line tension everywhere, even turns inside and out, with no tendency to float on the top of the hourglass. Touchdown and roll for half a lap, I was thrilled with the initial performance.

Three months and three first place trophies later, we arrived at Willow Grove. We had talked up the Nats all year and came with only one thought; I was going to win or put the ship in trying. By the time qualification flights started, the *"Sabre"* had well over one hundred flights and we were ready. Scoring 33 points on appearance, I was starting out in good shape. By the end of qualification day I had qualified second in one of two circles.

Finals day came after a long sleepless night. While drawing lots for flying position, my hand was shaking so I could hardly unfold the slip which gave me my flying position number. Twelve—last flight! Now, the tension of the long wait, along with watching the scores getting higher and higher.

As I lifted off for the final flight a score of 594 was posted for Al Rabe. It was do or die as it turned out, for that was the present high. As my score was being posted Betty and I were shaking so badly, we could hardly walk to the scoreboard. 598!!! I won, I wanted to shout it I was so happy.

The following day was the fly-off for the Jim Walker Cup. Bob Geiseke explained the "Cup" to me and went on to say that the Walker Cup is held foremost in his esteem. At each Nationals, the Junior, Senior and Open Stunt winners fly against each other for this coveted prize. It should also be noted that it is not always won by the Open contestant either. It was raining and windy and my competition was keen. Young Dennis Adamisin and my friend from Minnesota, Mike Stott. The Walker Cup now holds a prime position in my trophy room until its return to the Nationals in 1970 since it is a perpetual trophy. Someday I hope to win it again, for this trophy has even more meaning to the stunt flyer since the passing of the man whose name it bears, Jim Walker.

The construction and overall detail of how to build the *"Sabre"* is tailored toward the modeler who might be building his first built up ship or ready for his first good finish. When you are building, keep one thing in mind; "a well built airplane usually flies well, a poorly built one—not so hot." Trim problems you don't need.

The start of any model requires a trip to your local hobby shop with a list of materials. Contest balsa should be used throughout, for selection of good wood is the easiest way to save weight. Excessive weight is one of the easiest ways to ruin a good stunt ship. Shoot for a maximum weight of 48—50 ounces finished. All contest balsa is not light weight, so be careful. For example, a block 1"x3"x36" should weigh no more than 5 ounces, a sheet 1/4"x3"x36" should be about 1/2 ounce maximum.

Let's Build:

I always start with the wing since it takes the most time. The wing must be built on either a jig or a good, solid, flat, warp free board. Make plywood or aluminum templates of ribs W1, W13 and W14 as shown on plans. Rib blanks are stacked together and shaped per drawing notes A through D. After shaping, remove inboard and outboard ribs W6 and trace over on 1/8" plywood and cut out. These ribs form the mounts for the landing gear.

Lay wing plans out on work surface, trace off left panel from centerline to W13. This will give you the right hand panel. This step is not necessary for the experienced builder but is handy for the younger set. Splice (2) 3/8" square trailing edge strips together, pin and trim to a finished length of 50". Place all ribs in their approximate positions over wing plans. At this time check to see that all cutouts and holes are in the ribs. Mounting holes for landing gear, leadouts, bellcrank cutouts, notches for top and bottom spars must be all completed before continuing. Mark

off rib locations on trailing edge and pin in position. Pin 1/4" square leading edge to ribs and splice in center. Lay 1/4" square top and bottom spars into the ribs and pin into position. Note no glue has been used up to now. Block up leading and trailing edge.

The wing must lay straight and free of twist. When satisfied that you have a straight wing, check it again. Measure from the center of the leading edge and center of trailing edge to the work board surface. If the wing is blocked up properly and is straight, the dimension will be the same. Now apply a thin coat of cement at each joint. Sig white glue is very strong and light weight. Remember, a thin glue joint is just as strong as one with a big glob and one half the weight.

Cut bellcrank mounting plate from 3/32" plywood, 2" wide and sandwich between both W2 ribs. The mounting plate is positioned with W1 in such a way that the bellcrank is lined up with the holes in the ribs for leadouts. Cement into position. A Top Flite 3" nylon bellcrank works well, but must be bushed. Bushings can be constructed by drilling out bellcrank ends, inserting small eyelets and soldering a flat washer to the opposite side. Pylon brand "C-D" flexible leadouts are used and are soldered inside the eyelet bushings and crimped as per the Pylon instructions.

Wing tip blocks are shaped from 1" blocks, laminated and shaped to the contour shown on the plans. Bend flap pushrod from 3/32" dia. music wire and solder washers on each side of bellcrank to form a bearing surface. Install bellcrank with pushrod and leadout wires attached on mounting plate and make sure the bellcrank is in exact position shown on plans. Check to see that action is perfectly free.

Add leading, trailing and center-section sheeting, bottom side first. Select all sheeting so that grain is fine and not pronounced. This will give you the advantage of dry bending. Wet bending produces warps easily and is for the experienced only. Cement and pin into position and check alignment. When dry, add top sheeting in like manner. Check alignment and block wing in position while drying. An easy way to set alignment is to measure all around leading and trailing edge from work surface. When straight, the dimension is the same all around. Cold bend wing landing gear and install using Perfect "J" bolts. Hollow inboard wing tip, add nylon leadout guides supplied with leadout wires. Weight both wing tips. Outboard tip should be 3/4-1 oz. heavier, so add weight if required to make up the difference. This is based on using 60', .015 dia. flying lines. Cement wing tips into position and pin until dry, then add all capstrips.

Flaps are cut from soft 1/4" sheet and joined with a large Veco horn. Drill out the middle and top hole and solder in a 1/8" long piece of 3/32 I.D. brass tubing. This provides a most excellent bushing arrangement which provides smooth action and long life. After sanding in the necessary taper, join flaps with control horn and add reinforcing tape. I used DuBro nylon hinges in the *"Sabre."* To install, slot flaps and trailing edges where hinges will be placed using #11 X-Acto blade. Drill or punch a 1/8" dia. hole in the center of each hinge flat. Coat the hinge joint with a thin coating of grease to prevent cement from binding up the action. Coat hinge flats, both sides, with epoxy and insert into trailing edge slots. Add the flaps at this point. When dry, insert pushrod into the top hole of the flap horn and install a retaining washer. A #2 steel or brass flat washer works well and is small enough to clear the retaining washer for the flaps to elevator pushrod.

Stabilizer construction is very similar to that of the flaps. Cut stab outlines to plan configuration from 3/8" soft sheet. Sand in taper, drill and bush center hole of horn and install hinges. Add reinforcing tape. By selection of good wood, your finished tail assembly will be about 1-3/4 ounces.

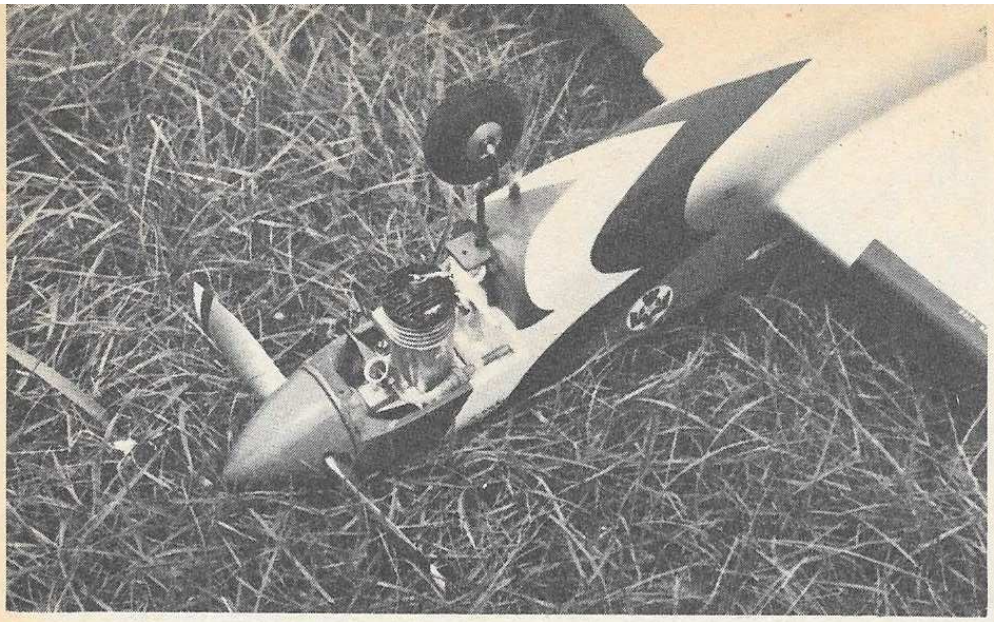
Fuselage construction begins with butting out the sides, doublers and all formers. Using Sig Epoxy, cement doublers and motor mounts into position. When dry, glue a 3/8" square spacer in rear of the fuselage. Clamp both sides together in rear and add F1 and F2. Clamp together and lay on work surface upside down with weights to maintain parallel sides.

Photos by Bob Lampione

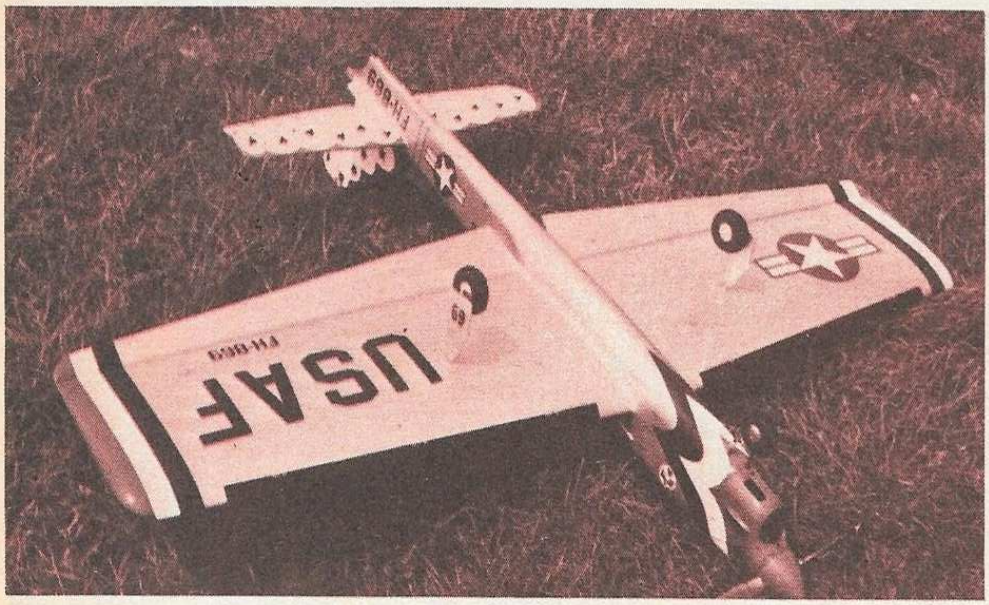
Bob eyes the business end of his Nationals winner. This hotly contested event calls for perfection in building skill, flight trim and pilot ability. The F-86D Semi-Scale "Sabre Stunter" measures up, a contest design.

In an effort to maintain a perfectly straight fuselage, a centerline is drawn on all formers and rear spacer. By using a centerline drawn on your work table, and blocking fuselage sides together while formers are drying, you will achieve a perfectly straight fuselage. Drill motor mounts and install Du Bro #4-40 blind nuts. Tack glue top and bottom blocks and tail block and nose filler blocks into position. Add engine with Veco extension shaft and Veco 2-1/4" dia. Spinner mounted.

It is desirable to use an old motor which is no longer suitable for flying as a building engine. With engine in position and cowling hollowed out, cut exhaust port and line cut-out with .015 thick brass or tin stock. Epoxy in place. Cowling can be made from a solid block and hollowed out or built up from 3/8" sheet sides and top with 1" thick front block. Carve and sand entire fuselage to shape shown. Tack-glue nose ring into position as nose can be shaped and any excessive space behind the spinner back plate can easily be eliminated if you slot the mounting holes of your engine. Now, remove top and bottom



There's a Fox in the house. It's the right blend of power for this ship. Aim for 50-51 ounce range. Watch wood weight and select straight grain.



Just in case you trip it upside down in front of the judges, you need not lose your "cool." The red, white and blue, plus Air Force markings will make them "all heart" on the scorecard. Maybe!

block and hollow. Finished wall thickness should be approximately 1/8". By inserting a pin here and there, this is easy to check. Cockpit must be done at this stage.

The amount of jazz is up to you but a decent cockpit certainly adds to the overall appearance of the airplane. The canopy on my ship is tinted. This is a very easy operation. Using one of your wife's good pots (pun intended) mix Rit or Tintex Dye with hot tap water. I used dark blue. Insert the canopy, then wait about ten minutes and check color. If you want it darker, put it back and wait longer. Remember, the sun will bleach out a little color, so go slightly darker than you want to end up with. An outline of the canopy base is cut into the top block about 3/32" wide. Install cockpit floor and make sure nothing in the way of a balsa scrap, dirt, etc. can get into the cockpit. In other words, the entire cockpit must be sealed off. Make a bead of epoxy glue and press in canopy. After it is dry, check to make sure the canopy is sealed well all around. At this point you will remember something you wanted to do in the cockpit. Save it for the next ship.

Final Assembly

If you are a serious modeler and do not have a good solid, flat and level table for alignment of an airplane, stop now. Fix yourself up with one. Crooked airplanes do not win stunt events and never will. A perfect surface for your new bench is drafting board crosshatch paper. This gives you all the lines you will need for alignment.

Select one of your table lines as the fuselage centerline and clamp in position after cutting bottom of fuselage to accept the wing. The fuselage is upside down in case you did not realize it. With fuselage jigged in position, install the wing. Incidence in the wing will cause a plane to turn differently inside and outside, but if you follow the procedure outlines below, this problem will be eliminated: Before gluing wing, measure position against crossline of table so that wing is perpendicular to the fuselage. In addition, using hinge line of flaps along with the centerline of leading edge of wing. If measured from your table, dimension should be same at the root of wing to tip giving you an incidence free assembly. Bend pushrod to length shown on plans. Remove the fuselage from jig and cut out fuselage to accept stab and elevator as indicated on plans. Now solder your pushrod to flap horn and elevator horn and lay back on table and re-jig. By moving stab and elevator back or forth a little, you can achieve a perfect neutral between flap and elevator. Cement in position. The fuselage is on a centerline along with the wing and stab and elevator and everything is squared to a crossline and dead level. Presto! A perfectly lined up airplane. Get the picture? While on the table, you can install gas tank and nose wheel gear.

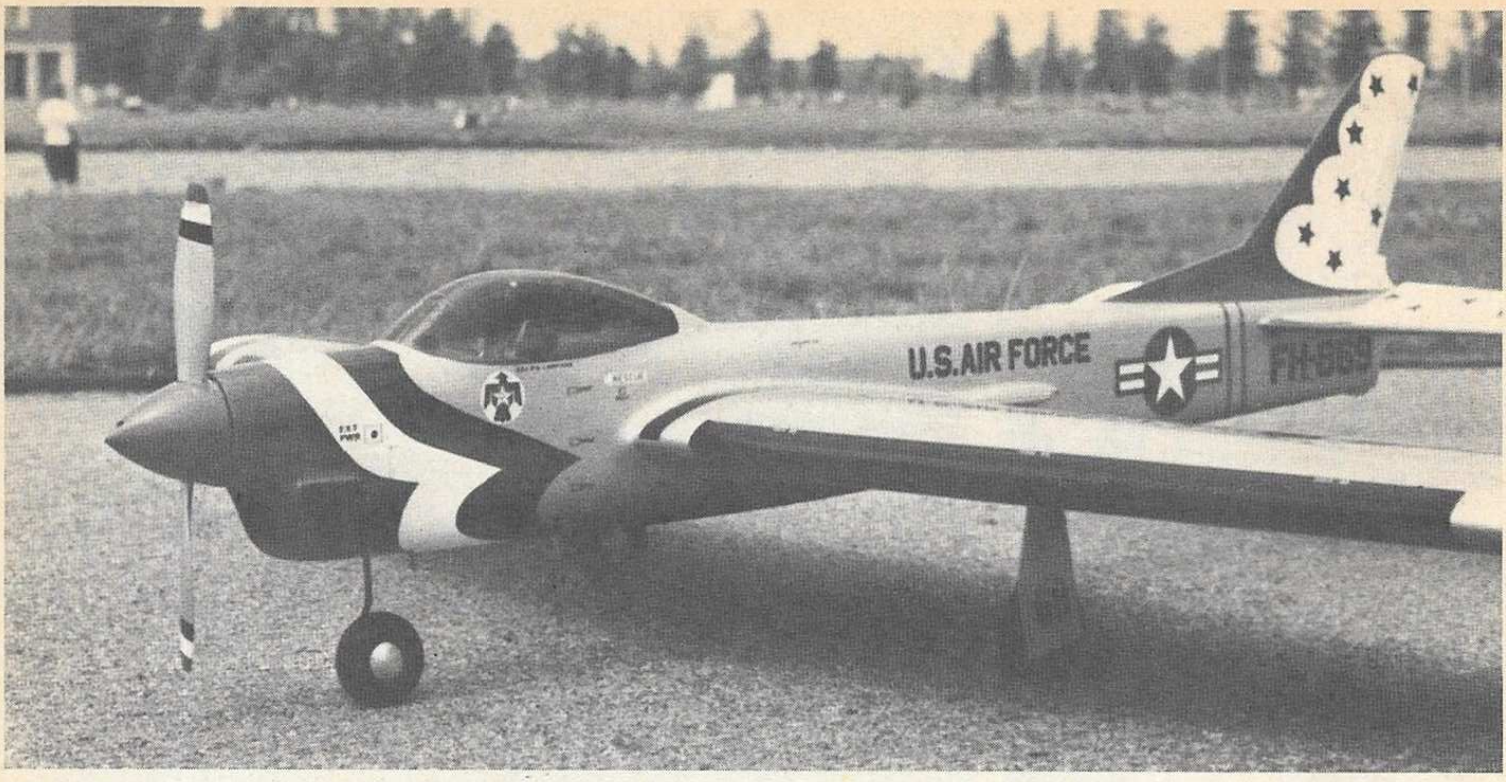
A word on the fuel tank. Most tanks come with brass tubes. You would do well to unsolder the tank on one end, and replace with 1/8" dia. copper tubes. I use only a single vent coming out the bottom. Simply block off the top vent.

After drying, remove from table and add top and bottom blocks, nose ring and tail block. This will complete final assembly with exception of the rudder, which can be glued in position at this time. Make sure that the rudder is square to the tail surfaces.

Finishing

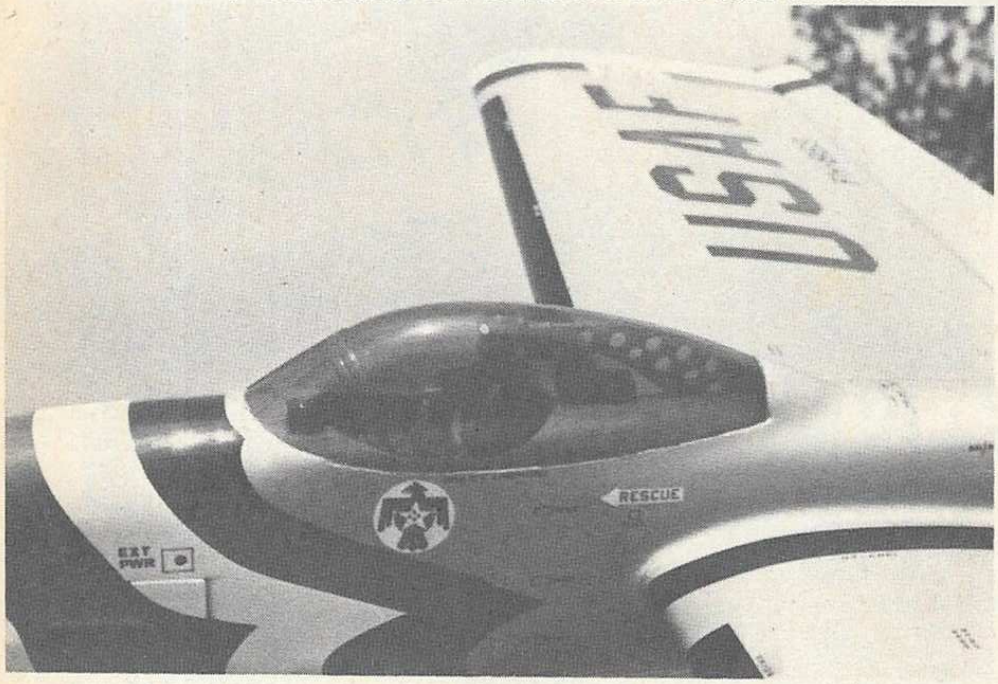
This is where most models are ruined. Primarily because the finishing process is rushed and the sanding of the model is done with too coarse a grade of paper. Although many fine articles have already been published on finishing, let's run through the procedure again. My method may differ slightly from others, but the end result is about the same. Apply three coats of unthinned clear to the entire airplane. Drying time between all coats is twelve hours. Sand entire ship with #400 wet/dry garnet paper used dry. Now install all fillets. I have found that Sig Epoxilite works very well. It can easily be shaped with your finger dunked in water and the working time is about 1/2 hour so you will not have to rush. Cover entire airplane with medium weight Silkspan. Clear dope used to apply the covering should be thinned 50%. The Silkspan should be stopped about 1/16" short of touching the fillets. This is an aid in lift prevention. Silk can be used on the wing, but remember it takes more dope to fill the silk which makes for greater total weight. Some people have trouble covering the fuselage, but if you take your time it's not so bad. Wherever you have to join the Silkspan, overlag the edges by about 1/16". When the model is completely covered, you can sand off the overlap so it will appear as if the model was covered with one piece of material. Before adding any clear to paper, apply a fast brush coat of thinner. This will soften the three coats of dope first applied and make the paper stick from underneath, where it counts. Apply three coats of unthinned clear. Sand carefully using #400 dry. Be careful so as not to go through capstrips and edges. Apply a heavy but smooth coat of sanding sealer. Sand very carefully with #400 wet. When finished, hold a light so it will reflect off the airplane. Any shiny spots are low spots in the finish and must be built up. If they are excessive, put on another filler coat. Dents and all the other bad things can be filled with "Balsa Filler" or Hobbypoxy "Stuff."

Sanding with fine garnet paper is required in order to produce a finish free of scratch marks. The finished product will be only as good as your sanding. Take



Low on the runway, the Semi-Scale "Sabre" ground handles nicely. Wing fillets into the fuselage nicely. A typical trike gear well mounted.

Tint your canopy in a pot of dye. Bob feels it adds to the decor. Canopy set into epoxy. Cabin cockpit details can add to your point scores.



your time. Up to this point, all clear and filler could have been brushed on, although if you spray the filler, you should have less sanding to do.

After you are satisfied that everything is filled and smooth and all blemishes have been removed, you are ready for color. Pigmented dope is heavy, so no more than a good covering coat is required. Thin down to no more than 50/50. If you have good spray equipment you can go to about 70/30. The problem is that excessive thinner soaks through and causes bubbles and lifting. Let finished color coat dry at least 24 hours. Apply trim as desired. When masking for trim, apply a thin coat of clear over the edges of the tape before applying the trim color. This will keep the colored dope from running or bleeding under the tape. Wait about one hour before removing the masking tape. Pull tape off gently, straight back over itself. This will give you clean sharp edges. When completely dry, wet sand trim color edges to remove sharpness. At this point apply all decals, lettering etc. Finishing Touch decals are both fuel and dope proof and are virtually trouble free. Small lettering like "access" and "oil cooler" were added using Letra-Set dry transfers.

Apply your clear finish. Not everyone does this but I find the additional effort well worth the trouble. I started with 1-1/2 quarts of unthinned clear, then cut it 40% and applied it. One coat goes right on top of the other. Put it all on. This will seal the entire airplane, decals and all. If the airplane is around 50-51 ounces you can fly the following day. Do not rub out the ship yet. Wait a week or two so the finish can harden up. Wet sand the entire model with #500 wet/dry paper, then rub out using DuPont white polishing compound. It makes a beautiful finish for you. Well, the next airplane will be even easier, since after your first good finish, each individual usually develops his own method for doing things.

Flying

For your initial flight, balance the airplane about 1" back from the leading edge at the fuselage. The airplane should seek to fly at hand level. The sensitivity of a ship is primarily a function of its balance. If you want sharp sensitive controls, move the balance point back. Move the C.G. forward to make it turn harder. I use a Fox .35, with a K&B idle bar glow plug and Rev-Up 10-6 EW prop. The needle valve is leaned so the engine runs two cycle at launch and a fast four cycle in the air during level flight. The idea is to have the engine break into two cycle when you start a maneuver and come back to four cycle upon return to normal level flight. The idle bar plug eliminates any chance of the engine quitting during a very rich condition or surge. The 10-6 EW prop pulls this airplane through all pattern maneuvers with ease.

I would like to take this opportunity to express my thanks to two long time friends, Sonny Colagrande and Gene Schaffer, who worked with me through the torture of learning the pattern and then making it look like something and also to Hank Womble who was a tremendous help to me in writing this article.

Any questions you might have concerning the *"Sabre"* or anything else for that matter, I will be glad to try to help you out. Just drop me a line. I am especially interested in hearing from you about what you think of the airplane.

The original *"Sabre"* used a Foam-Flite foam core wing for which I am the Eastern representative. Much time can be saved using this approach. Good luck and happy stunting.

Bob Lampione
32-15 35 Street
Astoria, New York 11106