FIFTY CALIBER

A moderate-size, high-performance twin that's easy to build and exciting to fly.

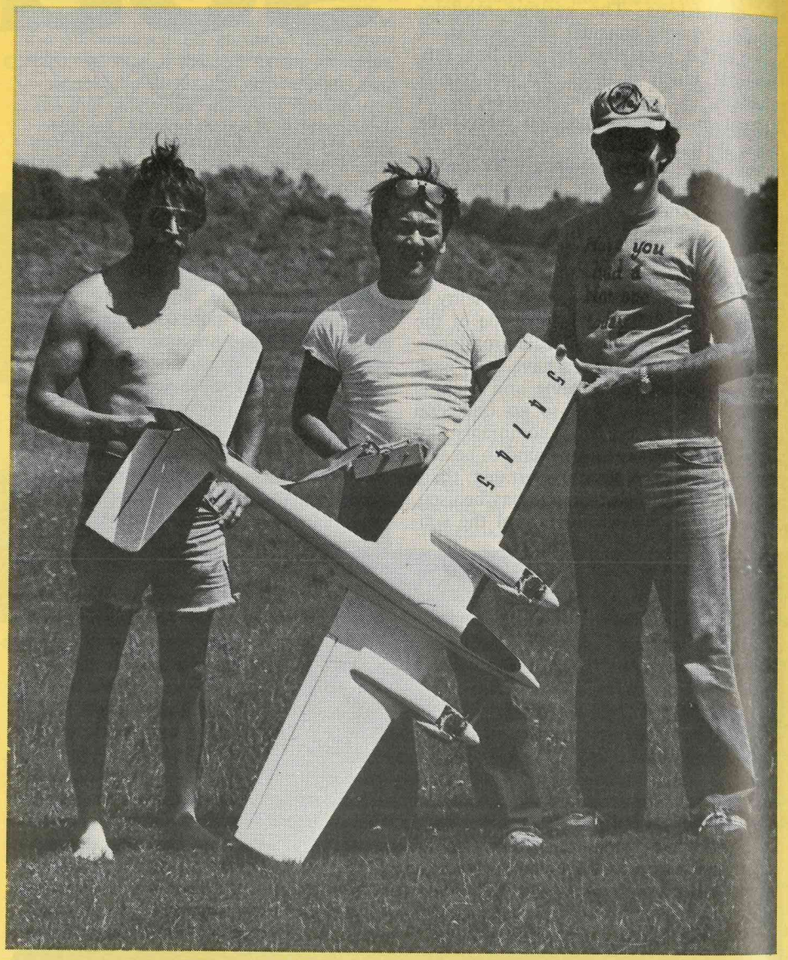
by Dick Sarpolus

FIFTY CALIBER
TYPE: Twin Engine Sport
WINGSPAN: 58 inches
WING AREA: 550 square inches
TOTAL LENGTH: 55 inches
WEIGHT: 6½ pounds

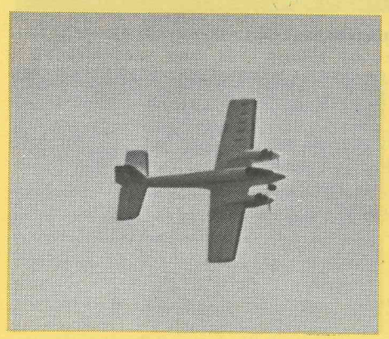
● The sound of a twin-engined aircraft flying is enough to justify the effort required to build it. A really high performance twin screaming through the air is, to me, a real RC flying thrill. Multi-engined scale models are becoming more common, but twin pattern or sport aircraft are not seen too often. Several years ago I designed and built a pattern twin, powered by two piped Schnuerle .40s, and its performance was exciting to say the least. My friend Mike Hom was impressed by that twin, but didn't want such a large model with its two fuel-gulping engines. We kicked this around a bit, and decided that a moderately sized model powered by two .19s would be an interesting project—the Fifty Caliber is the result.

The name came from the use of two .25s—O.S. Schnuerle .25s. The .25s were selected after the model was begun. The O.S. engines had impressed us with their power, quality, and reliable idle—they seemed an ideal choice for a twin. We wanted plenty of power, but even more, we wanted good, reliable engines—in any twin, single engine flying is not too relaxing.

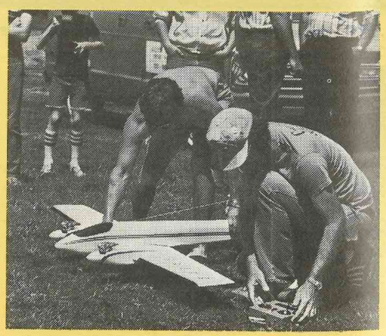
Aerodynamically, we have not broken any new ground. This is a conventional design—we wanted an easy flying, capable aircraft without trying to invent something different. The airframe is basically sized around a typical .40-powered pattern model. The wingspan is 58 in., wing area is 550 sq in., and overall length is 55 in. The wing planform is tapered of course, and the full symmetrical airfoil is a little more than 16% thick, for reasonable speed and enough lift for comfortable landings. The fin and rudder were made quite large to help flying when one engine decided to



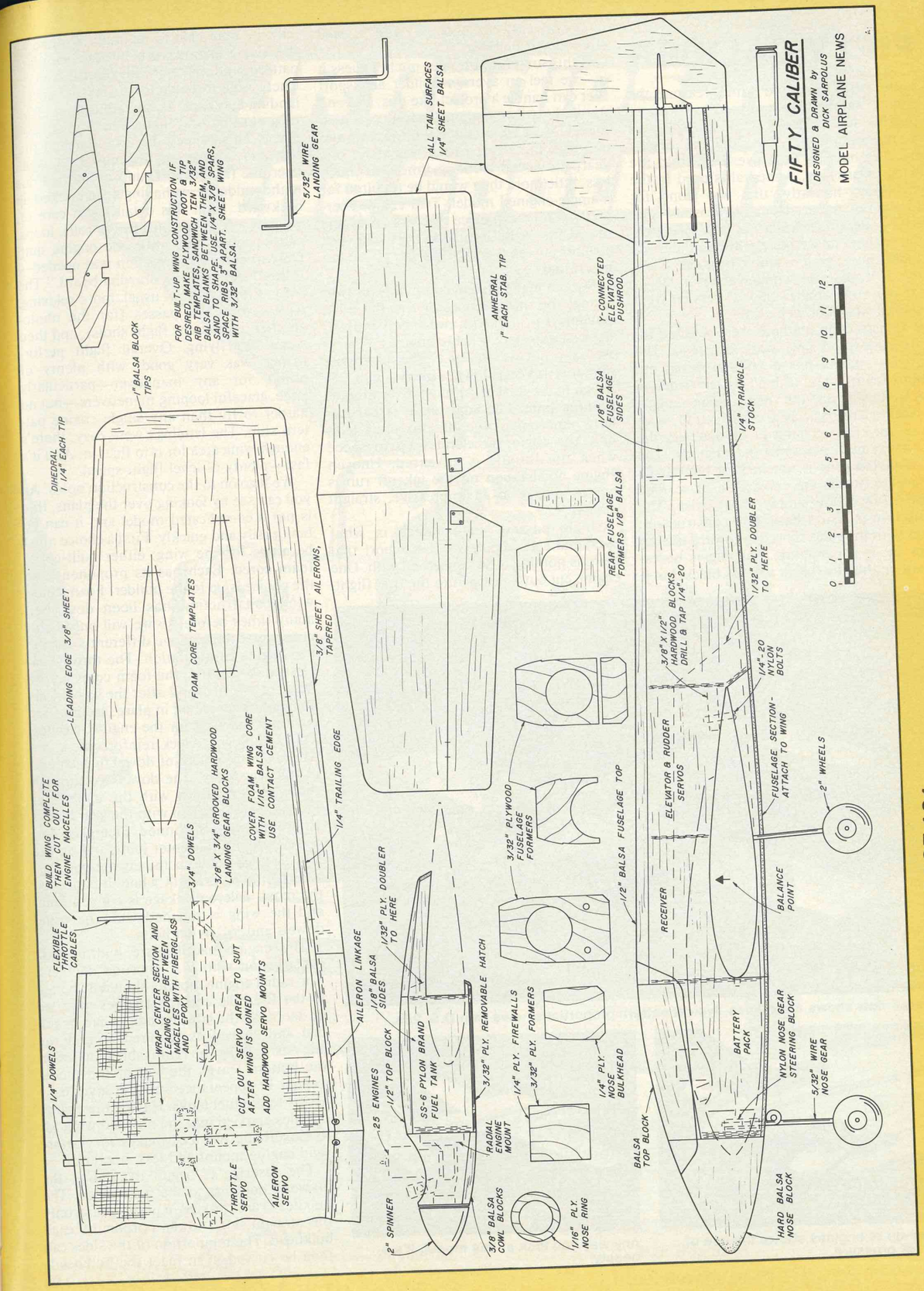
Happy threesome with model (L-R): Lance Schneider, Mike Hom, and the author.



For a change of pace at the flying field, try the Fifty Caliber.



Impressive-looking sport flyer being readied for another flight.



FULL-SIZE PLANS AVAILABLE . . . PAGE 121.

retire early. For the same reason, the engine nacelles were placed as close as possible to the fuselage. For strength, less vibration, and for balance, the engine nacelles have as little overhang from the wing as possible. Anhedral is used in the stabilizer—honestly, this was done for looks, not for aerodynamic reasons. The overall design is similar to my earlier twin .40 model, so we were confident that its flight characteristics would be good. Looking at it now, we wonder about a .40- or .45-powered single engine version that should work out well also.

Construction methods were selected for the easiest possible work involved. The original model has a built-up wing, but both foam core and built-up construction are shown on the plans. The engine nacelles are basic box construction, with the only real shaping to be done on the cowling blocks around the engines. The completed wing is notched for the engine nacelles, which are epoxied in place. The tail surfaces are simply sheet balsa. The fuselage is also a basic box construction, but with the sides curved in toward the top for more streamlining. Shaping is necessary on the nose block and top block, but it is pretty easy to end up with a well streamlined fuselage.

If this sounds like a sales pitch, I guess it is—we feel an average builder and sport flier can handle a project like this, and end up with a conveniently sized, exciting model. Mike Hom built the prototype, and although the elapsed time was about one year, the actual working time was much less, little more than would be required for a single-engined model. Two engines certainly don't mean twice the work. And this model fits easily into Mike's Toyota. For economy, even two O.S. 25s don't burn too much fuel.

We can make several comments on twin flying; the most important and the most obvious is to start with two tested, broken-in, well adjusted, reliable engines. (Do as we say, not as we do.) The prototype airplane was test flown with two O.S. 25s which had a total of, at most, five minutes running time. Idle adjustment is particularly important as the idle mixture affects how the engine accelerates up to speed when the throttle is advanced. Uneven engine acceleration on the takeoff run is not conducive to an impressive, straight takeoff.

Single engine performance is what everyone asks about. We can report that there is nothing to be concerned with. One engine cut out halfway into the first flight, and we were able to maintain altitude on the single engine, turn into an approach pattern, and make an uneventful landing. There was no tendency to fall off on the landing approach. It was a bit of an effort to get to that first flight. The first attempt had to be scrubbed due to a pinched fuel line and a loose engine mount. A week later, the first takeoff run was aborted due to the rudder servo having been hooked up backward. With this detail taken care of, we took off, tried consecutive rolls, loops, cuban eights, etc., until one engine quit. Only minor trim correction was needed—it flew "right off the drawing board." The second flight was, as usual, more relaxing, with several low passes (for the photographer to get some flight shots), and then some fun flying. Overall flight performance was very good, with plenty of power for any maneuver—particularly large, graceful looping maneuvers—but no harder to fly than any single engine pattern ship. The landings were easy, there's enough wing area for it to float in. And it's fast—plenty of level flight speed.

We'll go on to the construction notes. As you can see by looking over the plans, this is not a complicated model and it can be built easily and quickly. First a choice must be made for the wing: either built-up or foam cored. Each has its proponents, so the choice is up to the builder. Foam cored wing construction has been described many times before, so we will only point out several things done differently for the two engine configuration. The throttle cables can be set into the foam cores before they are skinned, and after the balsa skins are contact cemented in place, sections are cut from the wing for the engine nacelles. For landing gear block reinforcement, we like to epoxy a piece of dowel to each end of the gear block. The dowels go through the wing core, flush with the upper surface, and are installed with the gear blocks before the wing is skinned. Fiberglass and epoxy around the center joint, and on the leading edge between the engine nacelles, adds plenty of strength where it is needed the most. Aileron linkage is conventional and the wing is retained with the usual dowels and 1/4" nylon bolts.

The engine nacelles are built-up box construction with 1/32" plywood doublers. The radial engine mounts should be bolted to the firewalls and the engines installed on them, so the cowling blocks can be added and shaped as required around the engines. Putting the removable hatches on the bottom leaves the top of the model cleaner in appearance and still gives easy access to the fuel tanks. Having the engine nacelles epoxied into the notched wing for less overhang, we feel, makes for a more rigid engine mount and less vibration.

The fuselage is begun by adding the plywood doublers to the balsa sides. The bulkheads are epoxied in place, gluing only the straight-sided lower portion of each bulkhead. The top portion of the sides can then be curved in to meet the bulkheads

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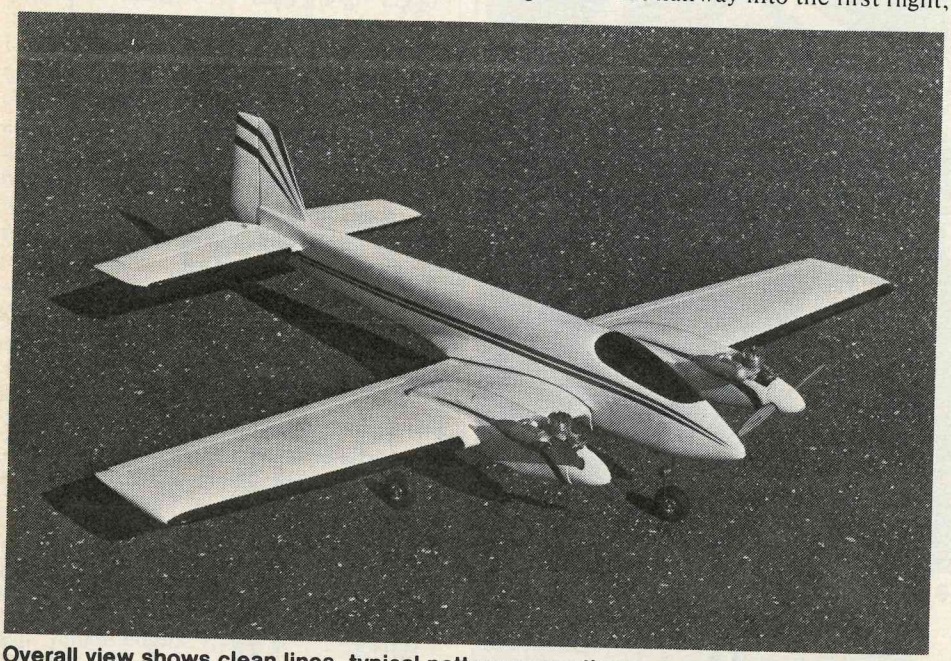
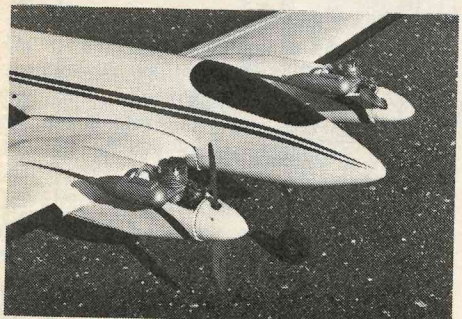
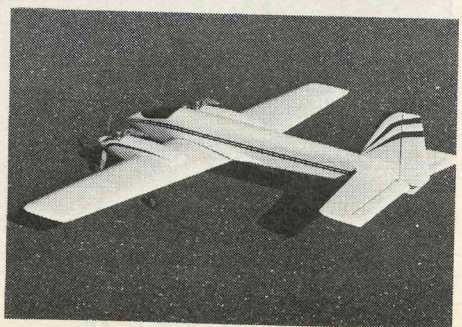


Overall view shows clean lines, typical pattern proportions; uses twin O.S. 25s.



Close-up of engines shows the use of muffler pressure.



Any way you look at this model, it's a beauty!

the CG farther forward than you will want it after you've had a chance to fly your bird, but it's a good, safe place to start. Move the CG back only after you are proficient at flying, unless the turkey is so nose-heavy that it flies like a ruptured duck the way it is.

Tow hook position: ahh, birdies, there's a subject for dispute, and you're gonna have a lot of salt on your tails before that one is resolved. However, the O.B. can suggest that once you've got your CG in place as we've planned, mount the tow hook *ahead* of a vertical line passing through the CG by about 1/8" to 1/4". After you have some experience, you may want to move it farther back—or more forward. On a high-start launch, the sailplane should go up almost vertically without whipping to the right or left and bashing the ground with its nose before you can recover. If you have neutral trim (we'll chat about that next time), and the right hook and CG locations, that turkey of yours will look more like an eagle; at least on the way up.

Now, before I forget it, covering adds weight in strange places; so do dope and paint. Believe it, Charlie! So, don't ever do a weight and balance and then paint the plane or cover it without rechecking the CG location and balance. *It will change*, I guarantee it! Best thing to do is paint and cover first, before installing gear and running the balance.

Your antenna can be run inside a piece of soda straw or Nyrod outer tubing led through the fuselage, provided that the control cables are not wire. If you use control cables of wire, the antenna should not be run parallel to them, or very close to them. If you use non-conducting control rods, then the antenna belongs inside the fuselage in its own little housing! Some folks prefer putting the antenna in the wings, by leading it through a small tube installed behind the leading edge, for example. Don't forget to remove it before pulling the wings off, though, should you decide you like the idea. On a flying wing, you don't have much choice!

Usually, unless the glider is huge, your antenna is going to be longer than the rest of the fuselage behind the receiver. That's okay, just let it come out the back of the fuselage—preferably away from the control horns—so as not to snag the controls. If you've ever seen the little graph that shows a piece of wire causing as much drag as an entire wing, you will always put your antennas inside. Why give away points? Besides, if you're neat, the antenna will stay cleaner that way. Who wants a dirty antenna with mud and dust on it, anyway?

See you next month, eaglets. Have patience—we're almost ready to fly. Keep on writing and sending pix. I need 'em. Jim Gray, P.O. Box 186, Peterborough, NH 03458. ■

SACRAMENTO GIANT SCALE

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were Wally Rinker's Stolp Starlet and Dick Hershey's Grumman Goose. Wally and Dick are the team that produced the incredibly successful Supermarine S5-A that was an "un-com" at Morgan Hill last August.

This first MAS-sanctioned Fly-in was impressive. Lee Taylor and all his hard-working crew can be proud of the fabulous weekend they engineered. If you are interested in this new and vital organization, you can get more info by writing: Miniature Aircraft Society, c/o Godfrey & Son Music, 254 Washington St., Binghampton, NY 13901. Include $10.00 and they'll make you a card-carrying member.

The aircraft info below is organized as follows: owner's name; aircraft type; scale; model source (scratch, plan, or kit built); engine; and weight.

1. Bob Duke; Bellanca Pacemaker; 1/4 scale; scratch-built from published drawings and photos of restored aircraft; engine to be determined; 20 to 22 lb.

2. Chris Evans; Beach Bonanza V35; 1/5" scale; scratch-built; Webra 90; 19.5 lb.

3. Don Harris; Half Breed; nominally 1/4 scale; scratch-built original with design features borrowed from the PJ260, the EAA Acrosport, the Skybolt, and others; 3.7 cu in. Roper; 26 lb. (That's the answer I promised you.)

4. Dick Hershey; Grumman Goose; 1/4 scale; scratch-built; two 3.7 Ropers; 90 to 100 lb.

5. Bob Morse; Boeing F4B-2; 1/4 scale; scratch-built, plans available; 2.2 cu in. Kawasaki; 23 lb.

6. Stan Powell; Fleet N2Y; 1/4 scale; modified Concept kit; Quadra; 21 lb.

7. Wally Rinker; Stolp Starlet; 1/2 scale; scratch-built; 6 cu in. 12 hp Husgavarna; 40 to 50 lb.

8. Bob Seigelkoff; Grumman Ag-Cat; approximately 1/5 scale; from plans in December '78 *Model Builder* (with extensive detailing added); 3.1 cu in. Kawasaki; 26 lb.

9. Bob Seigelkoff; Pitts S-2A; 1/3 scale; from Sheber plans; 3.1 Kawasaki; 30 lb. ■

FIFTY CALIBER

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and held in place with tape for gluing. The top block, forward block, and nose block are added and carved/sanded to shape. Before attaching the bottom planking, be sure to add the nose gear steering block and linkage, and the pushrods for the rudder and elevators. A Y-connected pushrod is necessary for the elevators due to the anhedral. The separately driven elevators also make it easy to accurately adjust them for trimming the model.The tail surfaces are all cut from 1/4" sheet balsa, sanded to shape and epoxied in place.

We believe it is best to assemble the entire plane, installing all pushrods, horns, servos, engines, etc., and checking out the operation of all linkages, before beginning the finishing procedure. All hardware can then be removed for finishing. The prototype was completely covered with Coverite Silkspun to fill the wood grain, and incidentally add a lot of strength. Automotive lacquer primer and spot putty were used for final sealing, before spray application of the finish. The model was painted with Ditzler acrylic lacquer with a

generous addition of Southern's Flex-All plasticizer to keep those nasty finish cracks from developing later.

Twice as many engines can give you twice as much fun—fly a twin! ■

F&B: BYRON MIG-15

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guarantee poor performance.

The engine chosen for our test plane is the O.S. 61VF rear-exhaust, ABC, pattern engine. This engine has tremendous power and very docile operating qualities, and is quite popular with the local pattern fliers. The crankshaft is so massive that it looks like something stolen from a 1979 Ford Pickup. The engine is finished beautifully inside and out, as is the entire O.S. line. The ABC piston-sleeve arrangement is excellent for tuned-pipe and ducted-fan operation as it makes the engine somewhat more resistant to higher operating temperatures. The engine comes with a removable venturi restrictor which we left in place. The instructions recommend that a pump be installed if the restrictor is removed, but we simply used pressure from the tuned pipe to the fuel tank and left the restrictor in. Performance was terrific at all times. Starting is easy with the extension provided, and the idle is smooth and steady even when taxiing (the engine is inverted when the plane is upright). The O.S. displays none of the finicky starting or tricky setting problems of some piped engines. Overall, I would consider it the optimum powerplant choice for the MiG. Evidently the Byron people think so too, as the O.S. is used in most of their demonstration aircraft. Our plane is flown on Cool Power fuel with 10% nitro, and the 12-oz tank gives 6-6½ minute engine runs at two-thirds throttle. Most of our flights are in the range of 4½-5 minutes and the plane is flown at three-quarters throttle once airborne.

And now for the "nitty-gritty." Does it fly? You can bet your glow driver it does! The test plane's maiden voyage was made from a grass field, retracts and all! I would recommend larger wheels, though, if it is to be flown routinely from grass. Our model weighs 8.6 pounds dry (thanks to the Aero Gloss dope) and takeoffs from grass or pavement are no sweat if the engine is on the pipe. If you get off with an incorrect setting, just lower the nose and climb at a shallow angle. The reliable O.S. will keep running, and the plane will not fall out of the air on you.

General speed and performance characteristics are very good. The MiG is a lighter, pattern planes such as the Kwik-Fli and Kaos without pipes. Landings are much like a pattern bird, but perhaps even more stable. In fact, if I had to use one word to describe the MiG's flight characteristics, it would be *stable*. Touchdown must be a little flatter than some ships to avoid scraping the tailpipe, but there is *no* tendency to tip stall or snap. Vertical performance is not quite on par with a prop-driven plane (no Clyde, it won't go straight up out of sight!), but still quite acceptable and realistic. The rudder is very responsive. Turns are no problem and the MiG will even roll on rudder if the nose is pulled up first. Don't try this at low altitude however! We did experience occasional aileron flutter when recovering from very large Split-S maneuvers, and perhaps larger torque rods should be considered if you plan to use one of the Rossi engines.

One characteristic you should be aware of, and Byron mentions this in their instructions, is the lag time when going from low to full power as in making a go-around on a missed approach. Any increase in stability and control must come from a real increase in airspeed. You do not get the immediate response characteristic of a prop job because there is no prop blast over the control surfaces. This is a quirk of full-size jets and presents no problem if you just keep it in mind. Just be a little careful at first, and pretty soon you'll be a real "honcho" (that's fighter jock talk for a hot MiG pilot!).

Starting is very easy with the airplane inverted, and a Robart stand is very helpful here. Needle valve adjustments are a little safer if you tweak the needle at idle, then remove your hand from the engine compartment and go to full throttle to check the results. The engine is very accessible through the bottom opening and there are no hatches to remove. Surprisingly, the interior of the airplane, with the exception of the thrust tube, stays very clean. Some overheating was encountered, probably due to our plane's nose being cluttered with retract unit, freon tank, fuel tank, etc. A helicopter-type heat sink took care of