Building your pattern skills? You'll need a . . .

Hammer

By Dick Sarpolus

Nail down the basics with this .19-.25 size pattern bird. Build it with internal or external pipe.

Nineteen to .25 powered aircraft have been popular for the obvious reasons of low cost and smaller size, as compared to .40 and .60 models. The engines cost less, they burn less fuel, and the aircraft are smaller and easier to transport. A .19-.25 aircraft can accommodate today's standard size radio equipment; ultra small R/C gear is not needed. The .19-.25 size ship can be flown in almost any weather conditions. In R/C pattern competition where a .60 is the maximum engine size allowed, the competitive edge will always be with the larger, more powerful aircraft. But the smaller models do serve very well for sport, practice, or local club activities.

Probably due largely to the competitive demands of 3.5cc (.21) R/C car and boat racing, there are many good, powerful, schneurle ported R/C engines in this size range on the market today. Like the .60 engines, tuned pipes and their header adapters are available in the smaller size also. Mac's Products has adapters and pipes to fit most of the .19-.25 schneurle engines, and some of the engine manufacturers offer their own pipe set-ups.

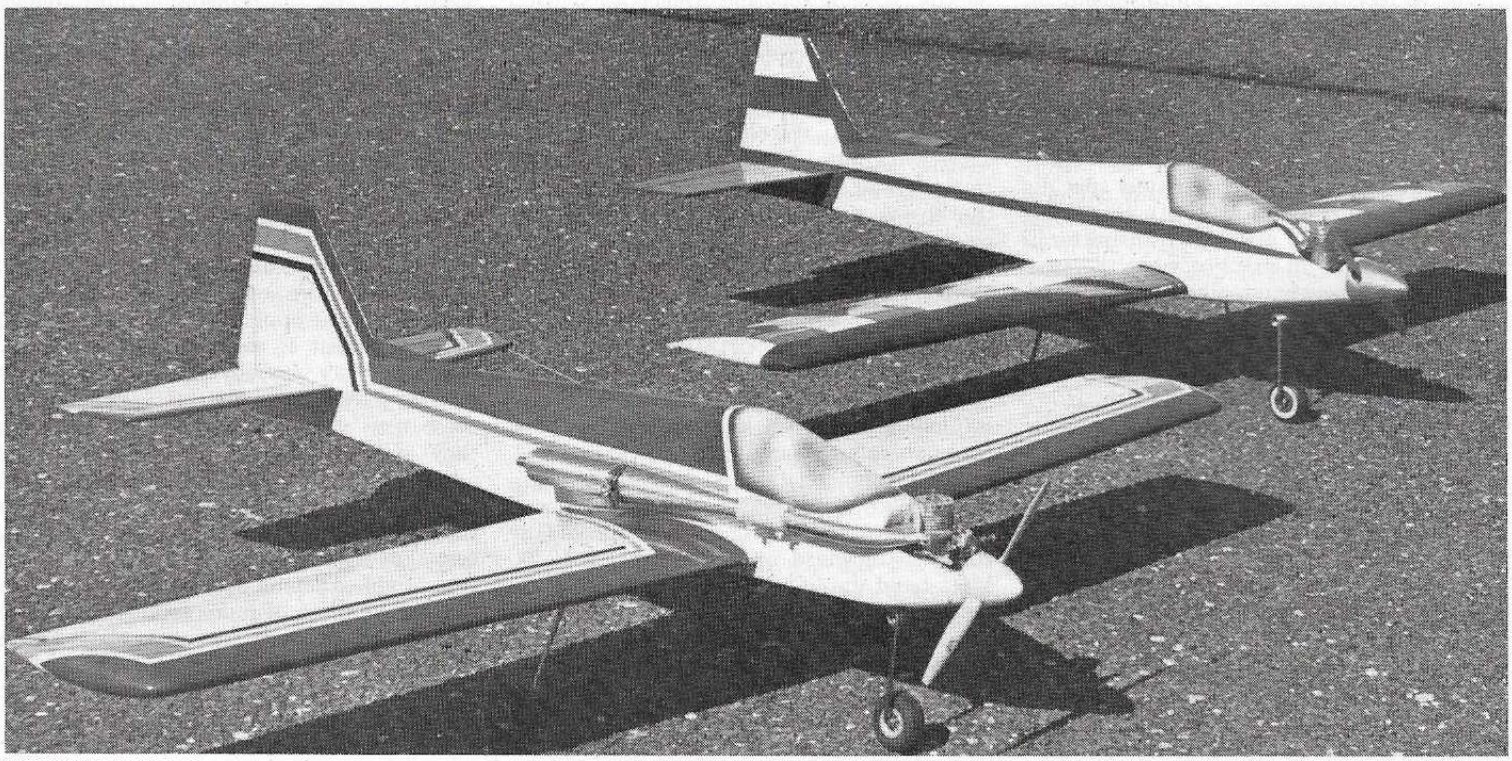
I designed and built the Hammer in order to try some pattern flying with a smaller aircraft, and to see just what the new hot engines would do in a pattern aircraft with a tuned pipe. This aircraft resembles today's typical .60 powered pattern ships in a smaller size. Fixed gear was used as I felt any retract set-up would add too much weight.

Two versions of the Hammer are shown on the plans; my first version accommodates an upright engine with external tuned pipe or muffler beside the fuselage; or, the engine could be side mounted with the pipe running beneath the wing. For a rear exhaust engine, another fuselage variation was laid out. Mac's Products offers a raised pipe adapter just for this sort of installation. The top of the fuselage was made removable to facilitate installation of the pipe; to provide interior room for the radio gear, the wing position was lowered to the bottom of the fuselage. The design was thus compromised to mount the pipe internally and it worked out quite well.

The aircraft has a 50 inch wingspan, 420 square inches of wing area, tapered wing planform and a 15% full symmetrical airfoil. The fuselage is 41.5 inches long with a generous amount of forward side area. Structure is conventional and simple; the wing has two spars, planked leading and trailing edges, and capstrips. The tail surfaces are simply 3/16" sheet balsa. The fuselage is a basic box with thin plywood doublers, and angled upper fuselage side pieces with a rounded top block. The upper fuselage sides could have a more rounded appearance if the bulkheads were cut with curved rather than straight sections; take your choice. I framed up the prototype in less than a week's work, and a foam wing core would make it even easier.

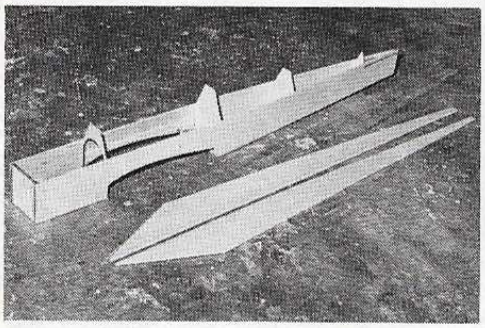
The tuned pipe is good for at least 1000 to 1500 additional RPM on most schneurle engines, and is not a problem to install and tune. As an example, I'll go quickly through the steps taken to establish the tuned pipe length for a .21 engine used on one of the prototype Hammers. When discussing the length of a tuned pipe set-up, the measurement given is the distance from the center of the cylinder to the initial largest diameter of the tuned pipe, measured along the centerline of the pipe and its adapter. This length varies with the engine, prop, fuel used, etc., but with the broad tuned pipes used for pattern flying it's not nearly as critical as the specific RPM pipes used for racing events.

We set up an engine in a test stand, decided on an 8-6 prop as appropriate for this model, and ran the engine with 10% nitro fuel. With no muffler or pipe, just the open exhaust, it tached 13,500 RPM. The first pipe installation

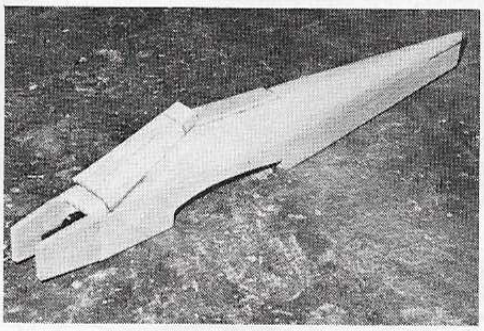


PHOTOGRAPHY: DICK SARPOLUS

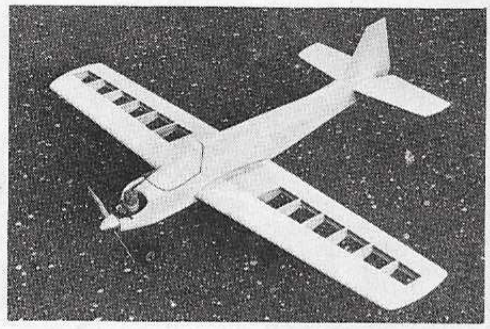
A duo of Hammers, one the enclosed pipe version, the other the outside pipe version pose together. This new creation of author Dick Sarpolus is intended for a number of purposes; sport, pattern practice, or general club activities. With .19 to .25 power, it is also economical.



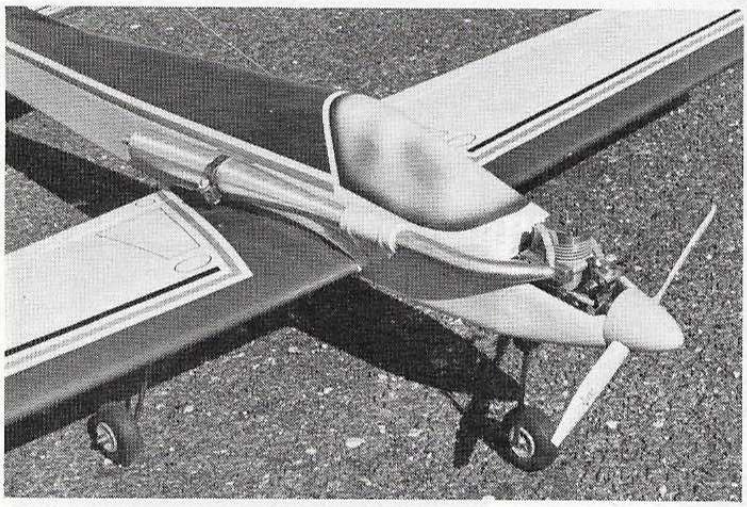
Fuselage frame is built in several easy stages. As shown above (outside pipe version), sides sandwich the formers. Turtle deck sides, already cut, are then added to top half of formers.



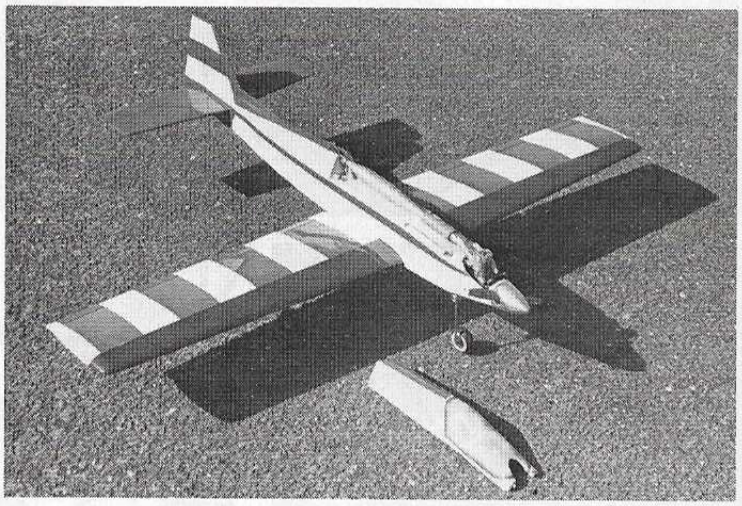
To complete the front, top, canopy section of the fuselage, balsa blocks are glued in place and then carved and sanded to shape. Section forward of firewall is done in the same manner.



The pattern-like lines of the Hammer give a clue to Dick's purpose in designing the plane for pattern flying on a smaller engine. Retracts weren't added because of weight factor.



If you choose to do the outside pipe version, here's one way to do it with an upright engine. You also can side mount the engine if you like.



This is the optional, enclosed pipe version of the Hammer with the turtle deck removed to show actual set-up. Not much extra effort needed.

had a length of about 15 inches, measured as described. The RPM indicated was 13,500, and while it was quieter, we had no increase in power. The adapter was shortened several times, and at a length of 13.5 inches, the engine was turning 15,200 RPM. We switched to a different pipe, a non-muffled tuned pipe, and the engine turned less than 15,000 RPM. When this pipe set-up was shortened to 12.5 inches, the RPM went up to 15,200 again.

Shorter lengths tried with both pipes resulted in lower RPM's. Obviously, the correct length also varies between different styles of the pipes. It's better to have too long a pipe than too short; if too long the gain won't be as great, but if too short the engine can go excessively lean, a potentially damaging condition. So after an hour or so of bench running we had arrived at the correct pipe length for use of two different pipes with this particular engine, and had gotten 1700 additional RPM, along with a lower noise level. For optimum aircraft performance, different size and style props could also be tried. If all this seems like too much trouble, use an engine with its stock muffler and relax.

Flight testing of both Hammer design variations was rewarding. The plane has no bad habits although it's certainly not for a novice pilot; smaller planes are not automatically easier to fly. I prefer the version with the external pipe while my friend Lance Schneider, who built the enclosed pipe version, feels his flies just as well and is faster. They do all the maneuvers that we can ask them to do, and look good doing them. The rolls are particularly nice; four-points are quite easy. The plane snaps and spins easily and tightly; when the controls are neutralized, it stops spinning immediately. During the coming season it will be interesting to see how the Hammer makes out in our club's pattern competition flying against larger aircraft. One thing that is welcome is the burning of less fuel; and the planes are easier to get in the car and carry around. I plan to do a lot of flying with my Hammer.

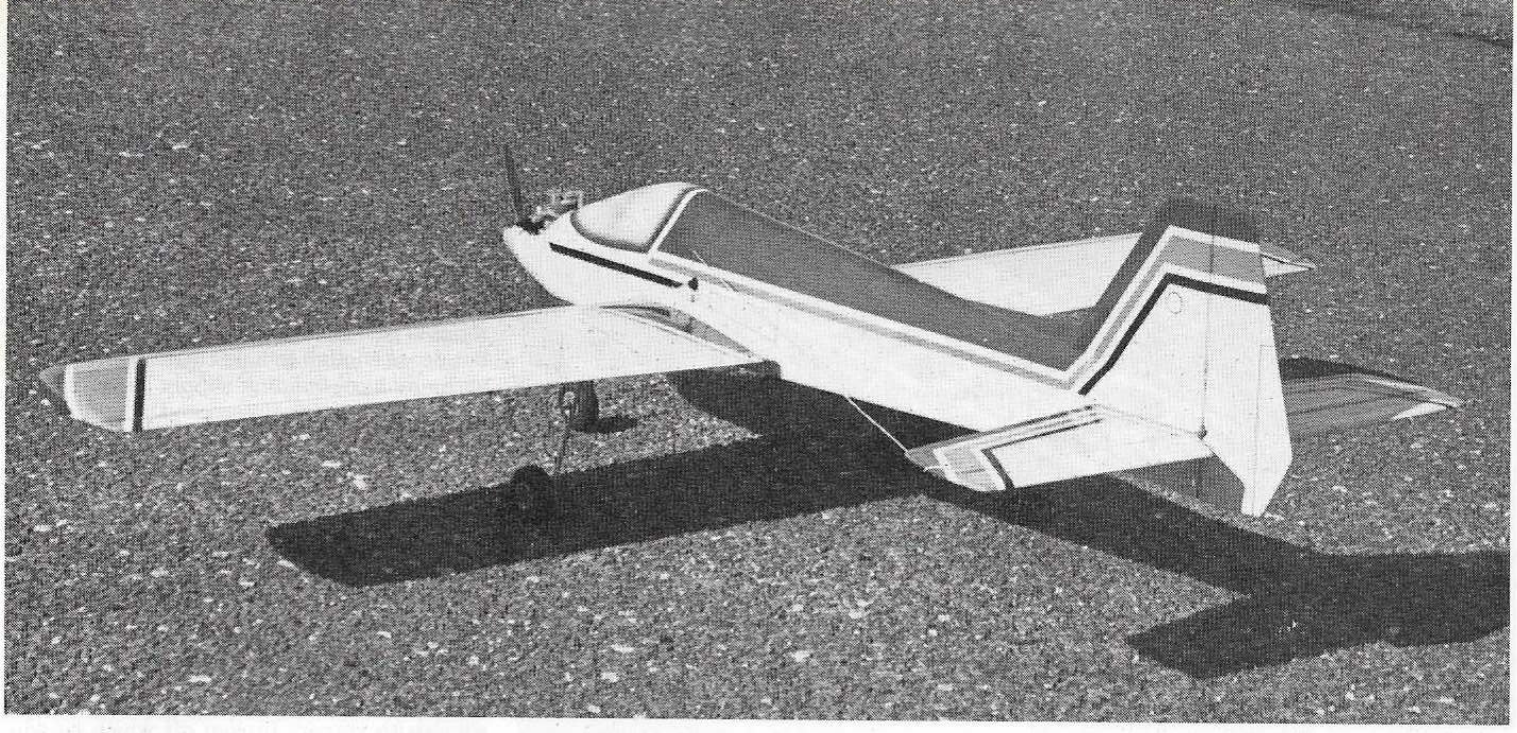
Now to get into the construction of this model. The usual first instruction for scratch building applies; cut out all the parts first and make your own kit. This will speed up your work as you won't have to stop and cut out parts as you build. This is also the procedure that stops many modelers from building from magazine plans. If you haven't scratch built before, start now. There are so many good designs presented in the magazines, particularly FLYING MODELS, to choose from — and — it may lower the cost somewhat also. Many modelers enjoy the extra, basic work involved in scratch building. Cutting out the parts is of course easier with the help of a band saw or jig saw, but it can be done with a modeling knife and a hand coping saw if necessary. I usually cut up the plans and glue the part templates to the wood with rubber cement, then stack up as many layers of wood as necessary, hold them together with a few small wire brads, and cut the stack out on a power saw. I frequently make two or three "semi-kits" of my designs for friends. For only one model, one or two pieces of balsa can be carefully cut by hand with a sharp modeling knife. A foam core could be used for the wings and would eliminate the need for cutting out wing ribs, the hardest cutting job. Foam wing cores for the Hammer design are available from Lou Wolgast, 40 Castlewood Trail, Sparta, NJ 07871 at a cost of $15.00 a pair.

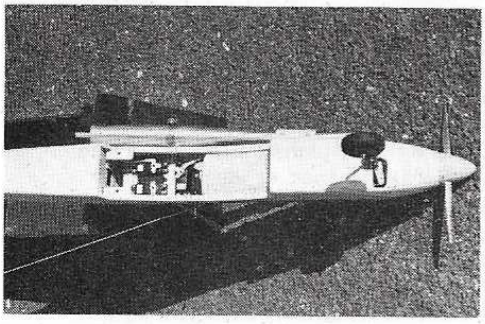
Wing

Starting with the wing, I cover the plans with waxed paper and pin the lower spar in place. The ribs are added, along with the upper spar, upper trailing edge sheeting, the leading edge, and then the leading edge sheeting. When the glue is dry, the wing panel is removed from the building board, turned over, the building "feet" trimmed from the ribs, and the bottom sheeting added. The landing gear blocks and their doublers must be glued in place. Add the trailing edge, capstrips, center section planking, and wingtip blocks. The wing planform is equal taper, so the left panel can be built over the same plan by reversing the ribs; the spar location is shown on the plans for this. Sand to shape and the two wing panels are glued together, blocked up for the proper dihedral angle. Fiberglass cloth and epoxy are used to reinforce the wing center section joint.

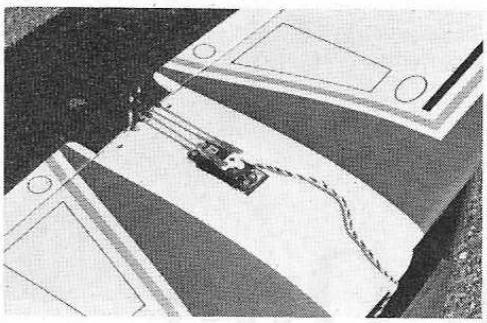
Fuselage

Fuselage construction is begun by gluing the plywood doublers to the balsa side pieces; be sure to make a right and a left side. I use epoxy for attaching the doublers. Also add the wing saddle doublers, the hardwood wing mounting blocks, and the lower edge triangle stock. The two sides are now joined with the firewall and the next two bulkheads; the sides are parallel from the firewall to the wing trailing edge location. The sides are pulled together at the tail and the two rear bulkheads glued in place. The upper side pieces are beveled on their edges to fit and then glued in place, followed by the top blocks. Install the pushrods for rudder and elevator control before adding the fuselage

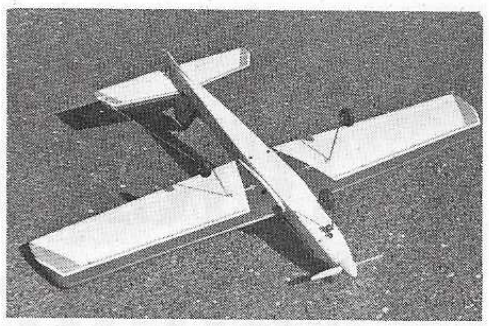




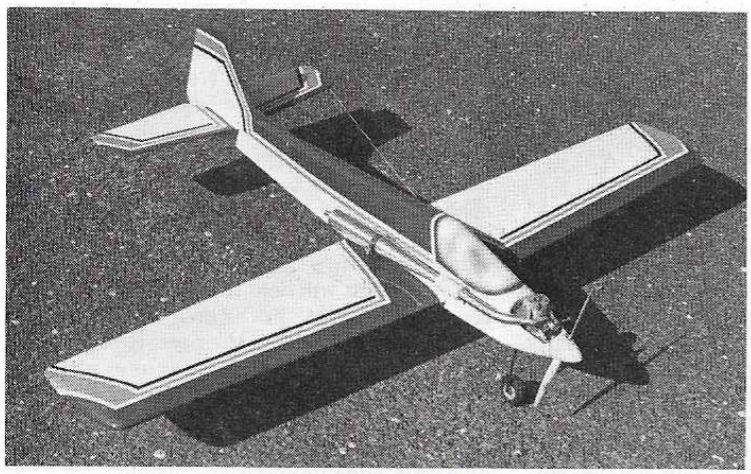
Despite its economical size, the Hammer can adequately handle any of today's radio systems without having to shoehorn them in to fit.



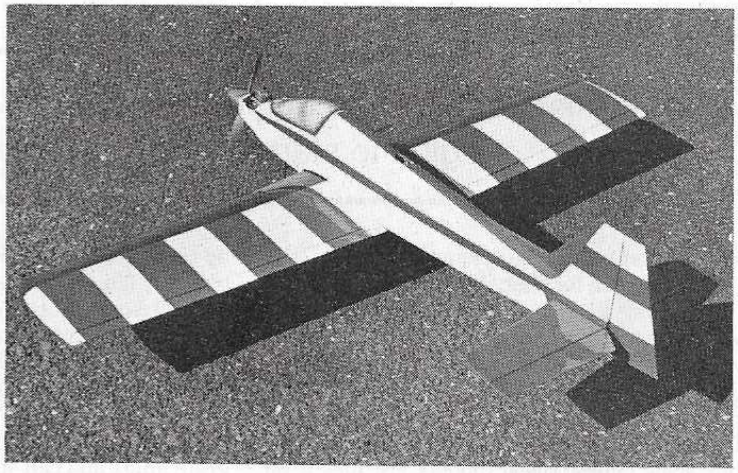
Aileron linkage is the traditional torque link hookup. Again, it's not difficult to install radio equipment, as shown in servo in wing.



Full house pattern performance with the exception of retracts. In the enclosed pipe version the wing is mounted lower on the fuselage.



If you've never used a tuned pipe before and have considered it, this may be your chance due to so. Many pipe engines in this .19-.25 size.



The Hammer is very adaptable to your choice of finish. Lance Schneider's, above, used MonoKote on the wing and Superpoxy paint on the fuselage.

bottom planking. I then install the engine mount and the engine, plugging the engine to protect it from sawdust, then add the cowl blocks, fitting them so they can be shaped to fair into the spinner.

If the enclosed pipe version is built, the forward top fuselage section is made removable for access to the pipe. The hatch can be held in place with several small screws into hardwood blocks.

Tail surfaces

The tail surfaces are simply cut and shaped from 3/16 balsa sheet. Check alignment carefully as you fit the wing to the fuselage and glue the tail surfaces in place. All surfaces and the engine are mounted at 0 degrees incidence.

Finishing

I covered the wing and fuselage on my prototype Hammer with Silkspun Coverite, and finished it with Sig butyrate dope, sprayed on. A Kraft engine mount with built-in provision for the nose gear steering simplified that installation. I used a Sullivan SS-6 fuel tank and four Royal S-23/Mini Titan servos with Royal's small four channel receiver. Lance's red, white, and blue version had a Monokoted wing and SuperPoxy painted fuselage and tail surfaces.

My model was flown first with an OS .21 schneurle engine, and Lance is using a K&B 3.5 in his Hammer. We both used Mac's Products fine tuned pipe adapters and pipes.

I'm very pleased with this experiment into a capable .19-.25 sized pattern ship and plan to build more models in this practical size.

Late news

A kit for the Hammer is planned by one of FM's advertisers. Write to Champion Model Aeroplane Company Inc., P.O. Box 891, Woodbridge, NJ 07095, for information on their Hammer kit.