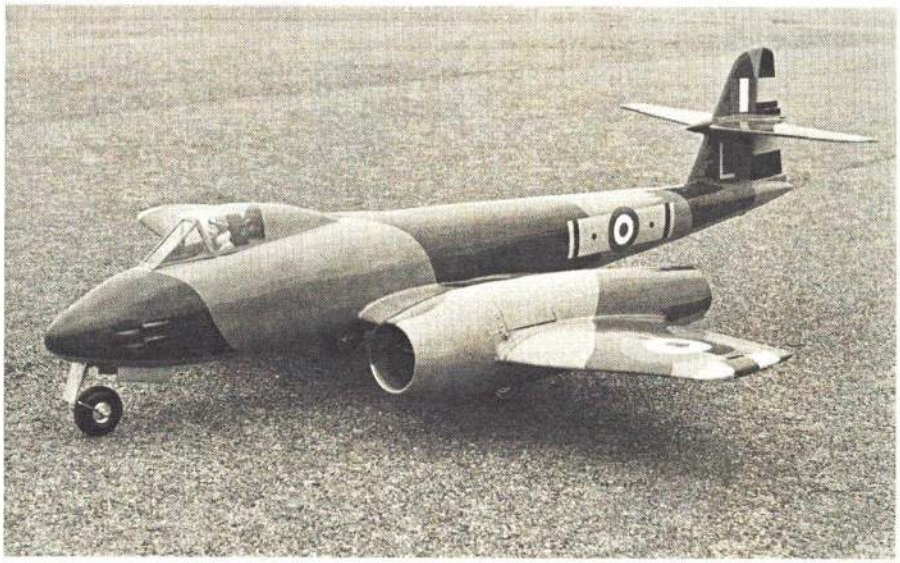
METEOR F MK8



TOP: It is a most inspiring model made up of three cylindrical shapes. Someone could easily make these in fiberglass. Many pleasing color schemes apply to this plane. ABOVE: How nice to see a jet that doesn't fake it with a propeller. The model is a fine CL Scale ship, but also suitable for RC—almost as is. Imagine the sound it must make—a roaring whoosh.

The Gloster Meteor first flew on March 5, 1943 and was Britain's first Jet Fighter. Meteor Mark 1s took part in the final stages of the war against Germany. By 1948, the design had progressed to the F. Mark 8 and this Mark was Britain's No. 1 Fighter for five years. It also served with many other nations well into the 1960s taking part, for example, in the Korean war in the hands of the Royal Australian Air Force.

The model presented here was scaled from original drawings kindly supplied by Hawker Siddeley Aviation Ltd., with additional information and details from Profile Publications No. 12 and *The Gloster Meteor*, a Macdonald Aircraft Monograph by Edward Shacklady. The only deviation from scale outline concerns the jet pipe diameter which has been enlarged.

Experiments carried out on a Mig 17 using restrictors in the tail pipe to cut down the effective diameter proved that with this power unit setup 3¼ in. dia. was the smallest allowable without encountering a serious loss of thrust. A tail pipe diameter which is the same as the fan would be ideal, but would rule out 99% of possible subjects. By the same ruling, the intake area should be greater than that of the fan. Again, this is not practical, so additional intake area must be incorporated by providing cutouts forward of the fan covered with mesh to make them less conspicuous.

Construction

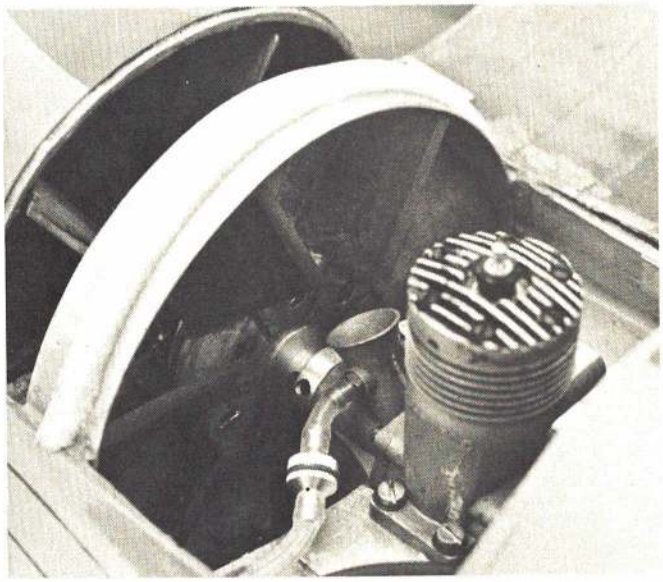
It is assumed that only the experienced modeler will tackle a model of this type. Although the structure is more or less conventional, a more than usual amount of time and patience is required.

Special construction techniques described on the plans apply mainly to the nacelle and fan construction. I am convinced that the thought of having to make a fan propulsion is the reason most modelers are reluctant to try ducted fan propulsion. It is a great pity because the fans are very easy to construct, and both fans plus a spare can be completed in a couple of evenings' work. Who knows? If you persevere, you may even come to enjoy building them. In fact, it can be fascinating to experiment with different blade shapes, numbers of blades, pitch, etc.

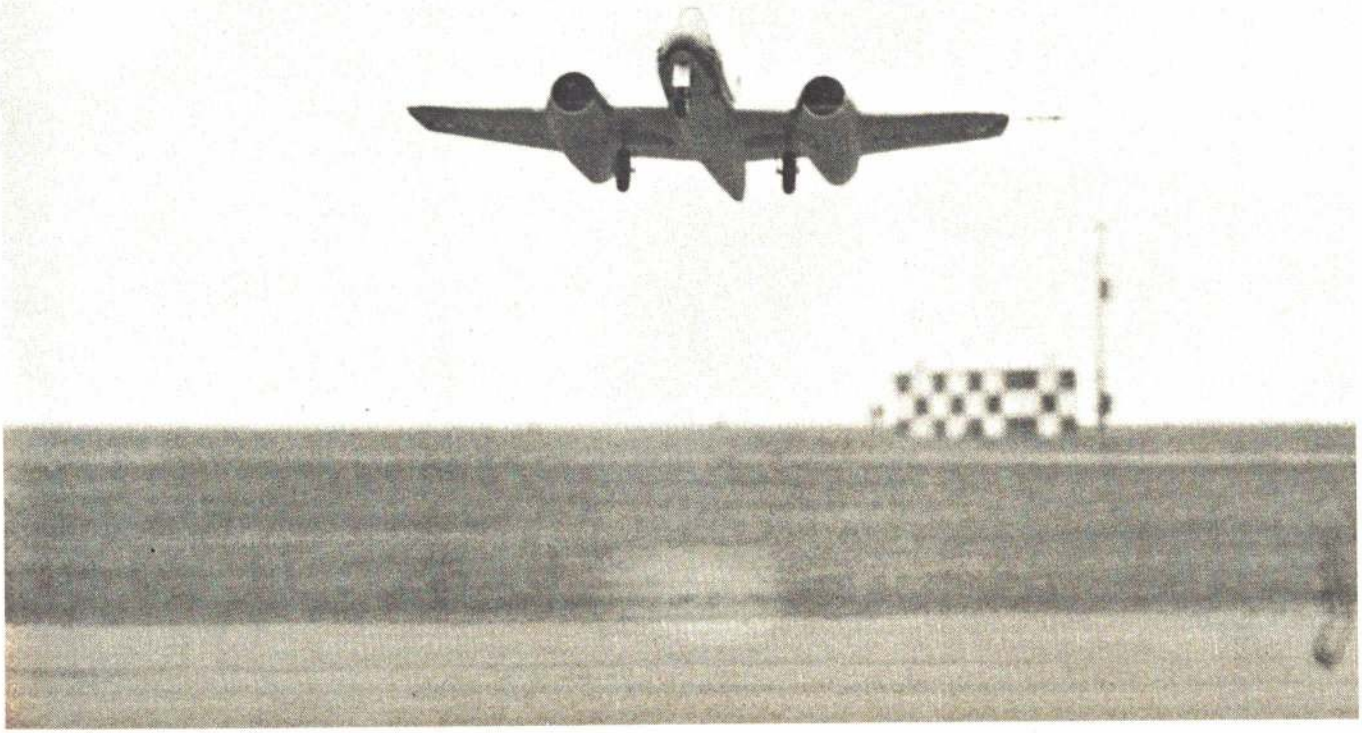
Although the plans describe fan construction, it may help if the material used for the blades is described more fully. It is a laminated, cotton fabric, phenolic resin-based, plastic sheet called Tufnol. The grade I use is Carp brand. It is available in the U.S., but queries about your local engineers' sources of supplies should unearth a homegrown equivalent in other countries. Try asking for Conolite, Phenolite or Tayloron to specifications NEMA LI 1-1965 LE.

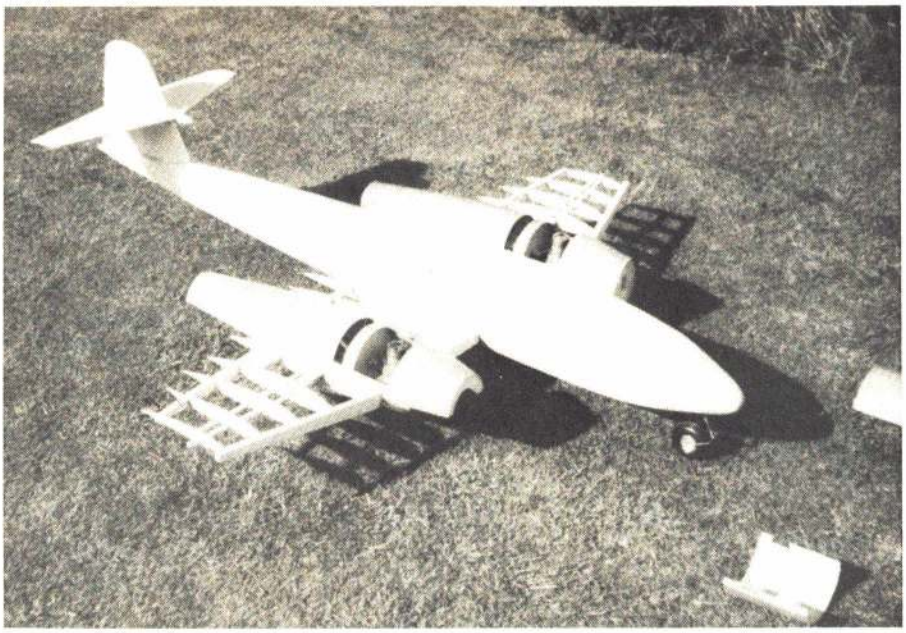
To bend the curve into the blade, grip the short edge in a vice about 1/8".

Ducted fans fascinate many modelers, and soon there will be commercially available fan systems. Here's one of the best aircraft for DF propulsion and a practical model for you to build. Takes two strong 40s. / by David D. Nelson

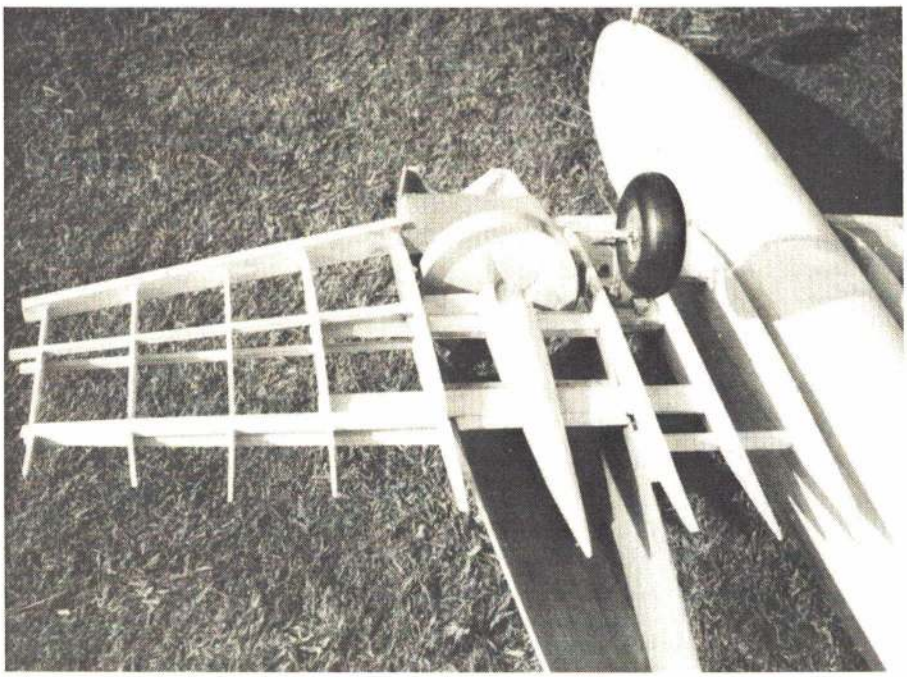


ABOVE: The heart of the matter is the fan system. The author has been working with DFs for a long time to learn how big, how many fans, what airfoils, etc. The installation is like a pusher's. LEFT: Your happy author holding his plane illustrates that this is a big model. By the way, the real plane also has a smooth skin since most of it was plywood-covered.





As it is designed, the Meteor takes lots of careful planking around many bulkheads. The end result is a light, strong, monocoque assembly. Wings are quite strong when sheeted.



Inside surface of duct is lightly fiberglassed for protection and smoothness. The flow straighteners and internal cone are essential to proper performance of the fan system. Note a disc is used here to keep the shroud perfectly round and close fitting for the fan.

Apply gentle pressure to the top edge. At the same time, heat the bottom half of the blade with a butane torch keeping the flame moving back and forth at all times to avoid blistering the material. The material will be felt to give when the heat has sufficiently softened it. When the curve has been formed, keep the pressure on until it has cooled slightly. Obviously, pressure cannot be applied by the bare hands and an asbestos glove is one form of protection. Alternatively, use a piece of hardwood as a pusher shielded on one side by a patch of metal or wood screwed on as a flame shield.

As the flame should be moving back and forth continually, the patch should not become hot enough to scorch the wood underneath. Practice will be required before consistency is achieved and a few blades will be blistered in the process. Persevere, however, and it will soon become second nature. Full instructions for assembling the fan will be found on the plan.

The nacelle construction is rather laborious, but it should be possible to make one half shell per evening. Sand each half shell smooth and silk or nylon cover before removing from jig. Then sand the insides smooth before applying fiberglass. If you can dream up a quicker form of construction, remember that the nacelle adds rigidity to the wing and, therefore, must be of reasonably rigid construction itself.

The main airframe assembly is built up around the sub-assembly of S1 and S2, plus the main undercarriage members, bellcrank and aluminum engine mounting plates. Add formers F6, F7 and F8 noting that these do not lie square to S1. Glue the 1 x ¼" crutch to these formers and add the rest of the fuselage formers, taking care that assembly is true. F1, F2 and F3 are glued to F1A, the nose-wheel leg is installed, and the complete unit added in one go. Fit one or two strips of planking to hold assembly rigid, always checking that no distortion creeps in. Assemble fin with bellcrank fitted, and glue in place. Note that the leading edge of the fin includes the front outline of the bullet fairing. Fit all pushrods and leadout wires. Glue ribs R1, R2 and R3 in position plus the ½ x ¼" rear spar which is glued to former F9.

Complete all planking. Fit ribs R4 and ply spars S3 and S4; and rib R5, then the ¼" sq. spars and the remaining ribs. Add ½ x ¼" rear spars and the leading edge.

Bolt motors in place with shroud ring template and shroud ring positioned. Fit top half of nacelles, add flow straighteners, lead out tubes and balsa cone, then fit bottom half. Use strong rubber bands to hold the two halves together while setting. Reinforce seam inside with fiberglass tape and fill any gaps outside with balsa and filler. Finally cover with a strip of silk or nylon. Keep a ply disc or tin lid of suitable size wedged in the end of the tail pipe to assist in maintaining a circular section. Remove when necessary and always replace after work is finished. Do

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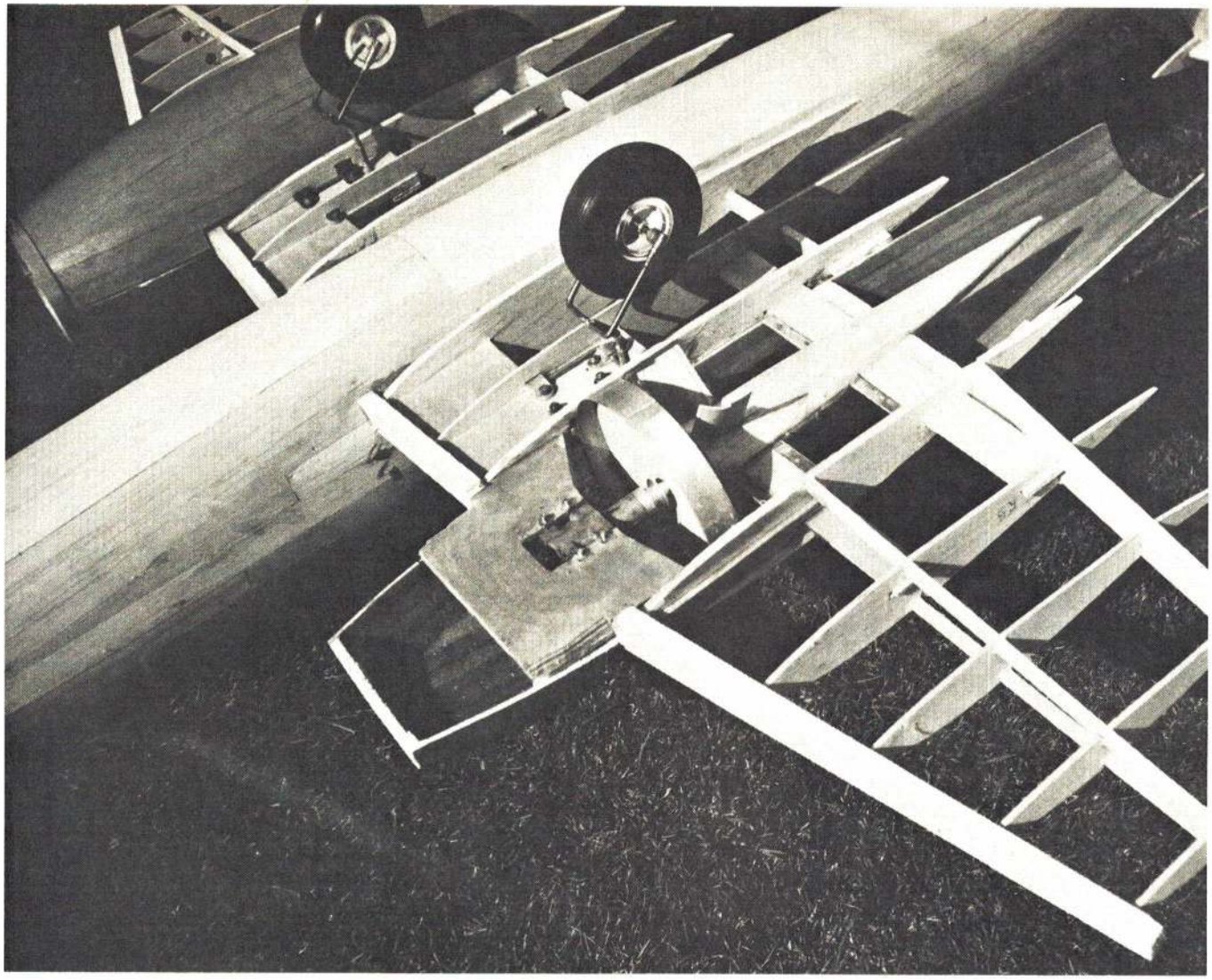

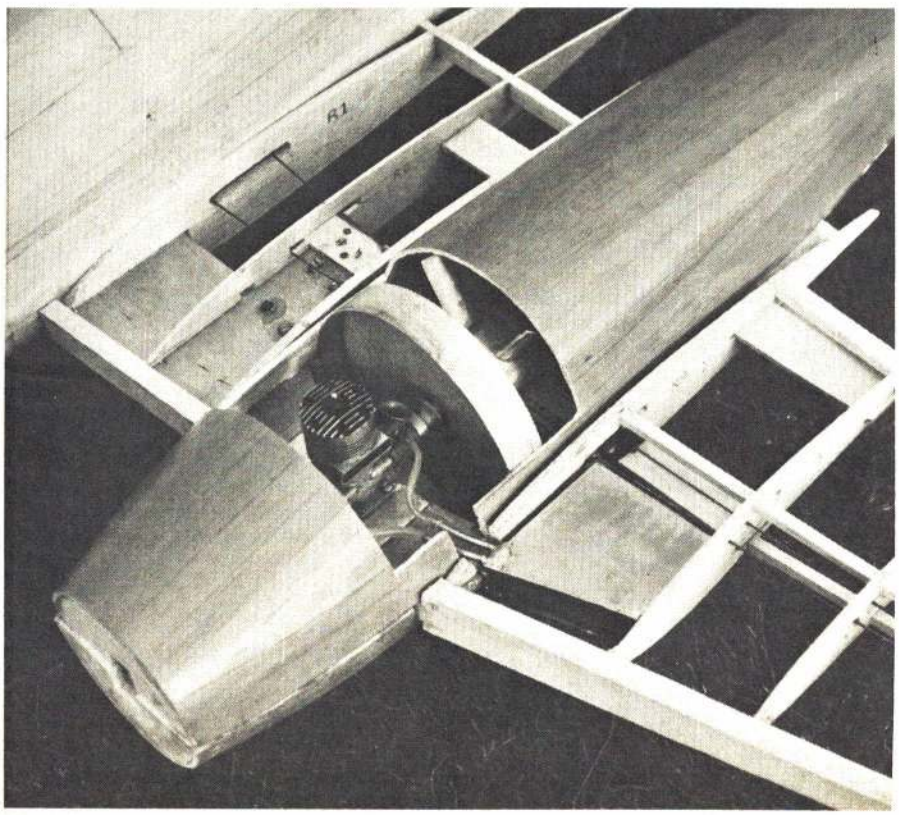

ABOVE: The rather big wheels on the model are actually scale. Obviously, they produce gobs of drag. Retracts would help performance as well as the jet impression. LEFT: Engine sits on an aluminum plate sandwiched in a plywood mount. This must be exceptionally rigid. Any vibrations could cause the fan to hit its shroud with disastrous results. Note fuel tank location in the wing.

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not discard completely until model is finished.

Fit fuel tanks and sheet wings. Add fairings and wing tip blocks. Cover with tissue. The tailplane is the only part that can be built flat on the plan. After sheeting and carving, the leading and trailing edges fit to fin. Connect elevator horn, add elevators and sheet fin. Carve to section the rudders. Glue fixed portion in place first and build up bullet fairings. Add top and bottom rudders. Offset can be incorporated if desired. Remove hatch areas on the nacelles with a razor saw, make fiberglass hatch cover and fit. Cut out auxilliary intake area and cover with aluminum mesh.

The cockpit canopy was adapted from a commercial canopy cut to fit the aluminum framed windscreen. Fit remaining details, e.g., undercarriage doors, gun covers, tail bumper, etc. If desired, the ailerons can be cut free, reinforced and fitted back as separate items.

All that remains is the finishing and this is up to the individual. A wide choice of color schemes can be found in Profile Publications No. 12.

The Meteor is the fifth ducted fan model built over the last four years starting with the Saab J21R, following with a Mig 17, Saab Viggen and Meteor Mark 4. All flew and the lessons learned have been used on the Meteor Mark 8. The model flies well, but requires careful handling until flying speed is attained. Acceleration is notoriously slow and a smooth paved takeoff area is desirable as 1 to 1½ laps will be required to get airborn followed by a shallow smooth climb out. Once airborne, the model is a spectacular sight, flight is stable and shallow climbs and dives are permissible. Always remember, however, to keep control actions smooth and gentle.

Make no mistake, this model is no rat racer or stunter. If, for example, sufficient speed for takeoff cannot be obtained, it is possible that the model is tracking out of the circle causing excessive drag. Cure by twisting the undercarriage legs so that when the model is pushed from behind it travels in a straight line or even turns slightly into the circle. The all up weight of the model should be between 12 and 13 lb. which will include about 12 oz. of lead in the nose. I cannot over emphasize the need to use light wood only for the tail assembly; an ounce or two saved here could save several ounces of nose weight. Any saving of weight is reflected by an increase in performance.

Starting the engines using a pulley cord is not difficult as long as you have a helper to hold the model on the ground firm and steady. Hold the pulley cord with one end in each hand so that a loop is formed. Drop the bottom of the loop to fit in the pulley groove. Turn engine over a few times to pressurize the fuel tank. Then pull cord sharply with the left hand letting go of the cord with the right hand at the last moment. Stand in front of the nacelle facing the rear of the model for starting. Always use a clothes peg type clip on plug connector. Do not use the push on type as these can come adrift and get sucked into the fan with disastrous results. I speak from experience. See that the glowclip is secure at all times during starting and when tuning the engine. To install engine and fan, place fan in the shroud ring. Then put the engine in position placing fan and pulley on shaft. Add nut and tighten up finger tight only. Bolt engine securely in place. Insert tommy bar in pulley and tighten nut with a spanner. Always use the tommy bar to stop the fan assembly from turning. Gripping the fan by the blades will stress and possibly crack the blade at the root causing it to shear under running stresses.

Even if you have no intention of building this particular model, my objective will have been acieved if your interest in ducted fan propulsion has been aroused. Models nowadays have a tendency to become stereotyped and even scale modeling suffers from an excess of Mustangs, Zlinns, Spitfires, Fokker DV11s, set.

Ducted fan propulsion is not new. It has just never been fully expoited. Yet it can open up a completely new field of experimentation and prototypes. It has recently been proven with model helicopter design that, if a sufficient number of people tackle the problems involved and are enthusiastic enough, wonders can be achieved in a very short time. Maybe this could happen with ducted fan design, even to the extent of manufacturers getting interested. The model jet aircraft is an ideal subject for the application of foam core wings, molded fiberglass or ABS plastic fuselages and nacelles. Perhaps one day we will be complaining about an excess of F86 Sabres, Phantoms, etc., in Scale competition.