

Planes are designed for many different reasons; frequently I build a new plane so I can use a new engine in it. That's how the *Four/Runner* project was started—I saw an OS FS-40 four cycle engine and was so impressed with its appearance, sound when running, and quality, that I just had to have a plane to fly powered by an FS-40.

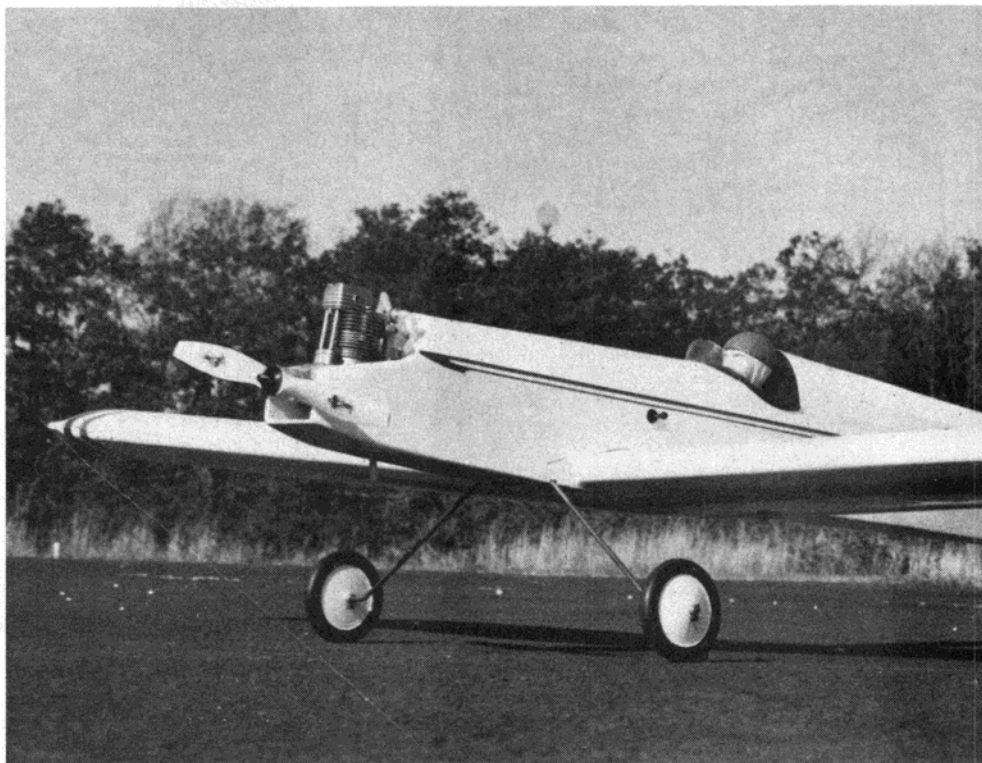
Four cycle engines for R/C use have been around for a while now, and their virtues have been well reported—economical on fuel, very quiet when running, a realistic sound, etc. They're not for the high performance fan who wants high RPM power, but for more relaxed use of sport flying. In our local R/C club, four cycle engines have not yet shown up in any great numbers. They still draw a crowd when seen at the flying field.

I wanted a plane that would be appropriate for four cycle power; a plane that would be relaxing to fly but still capable of aerobatics and would "look right" with the engine. Rather than cowl it in, I wanted the engine to be exposed, to show off the rocker arm cover, pushrod tubes, and small exhaust pipe. This engine is different, and the right plane would show it off.

The result is an airplane with 1930's styling. A tail-dragger of course, low wing for aerobatics but big enough to be an easy flier. Semi-symmetrical airfoil and a constant chord wing. Generous moments. Simple, fairly light, rugged construction. The wire landing gear mounted in the fuselage keeps the wing uncomplicated. Open cockpit and a raised, stringered turtledeck for a vintage appearance. An open cowling to expose the good looking engine.

Fifty-eight inch wingspan, 580 square inches wing area, 17% semi-symmetrical airfoil, 22% horizontal stab area, 42 inch long fuselage—these numbers are nothing revolutionary but are a conservative approach to a nice flying sport model.

The prototype *Four/Runner* belongs to Len DiGiovanni, a skilled builder and an enthusiastic sport flier who wanted this type of airplane. I prepared a set of parts from my preliminary plans, and Len quickly built up the model. Our test flights proved it to be just what was desired. On the takeoff run, the tail

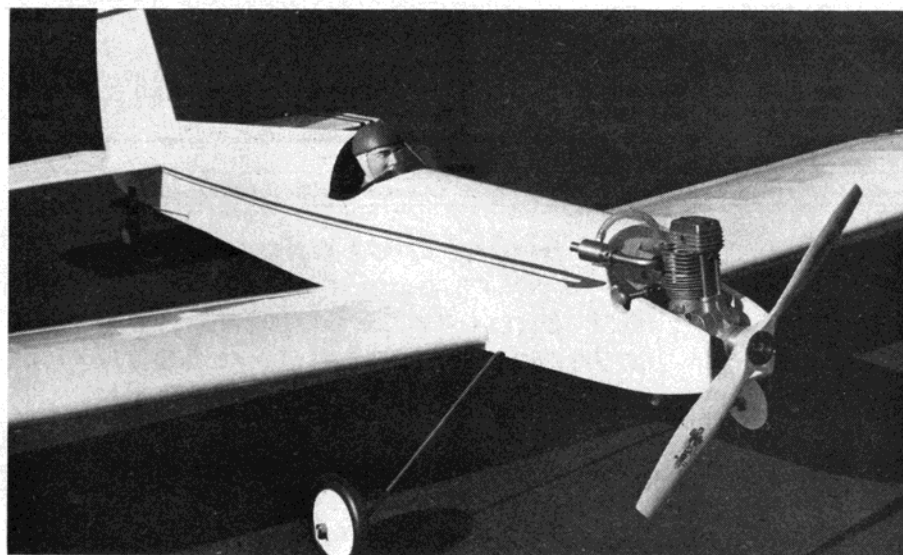


PHOTOGRAPHY: DICK SARPOLUS

Four Runner

By Dick Sarpolus

Looking for something to put that new four-cycle in? This new "vintage" design looks just right.



An airframe which takes advantage of the ever more popular and prevalent four strokes, the *Four/Runner* used the OS FS-40. The plane tries to capture the appeal of the 1930's era of aviation.

lifts up by itself while the plane tracks straight ahead and gently rises off the runway. It's very stable but when desired can be put through almost any maneuver. It would be a good choice for a first low wing model. With the quiet running OS FS-40, people assume it will be flying slowly—but with full throttle it does move out.

The plane is deceiving; docile and gentle when throttled back, always quiet, it's surprising to see it move so well through the maneuvers. I'm sure it would be a good airplane with the usual two cycle powerplant, but the four cycle power makes it something special. If this makes some sense, it's like flying a small version of a gas engine powered quarter scale airplane. It's probably the low RPM power that provides the similarity.

Light weight is important to the good performance achieved; the structure is strong but it's not overdone. The built-up wing with generously sized spars and $1/16$ sheeting is strong and light. Tail surfaces are $1/4$ inch balsa sheet. The fuselage is a basic box with curved $1/8$ inch balsa forward planking and open stringers on the rear turtledeck; no



The prototype *Four/Runner* was built by Len DiGiovanni (above), an excellent craftsman and enthusiastic sport flier who was looking for something like this. One of the design considerations was a fairly light plane. The stringered turtle deck (below) helps achieve that and some added vintage appeal.

heavy blocks or thick sheets here. The taildragger landing gear is light and simple, although we did allow for the weight of a C.B. leaf spring tailwheel assembly, a worthwhile accessory.

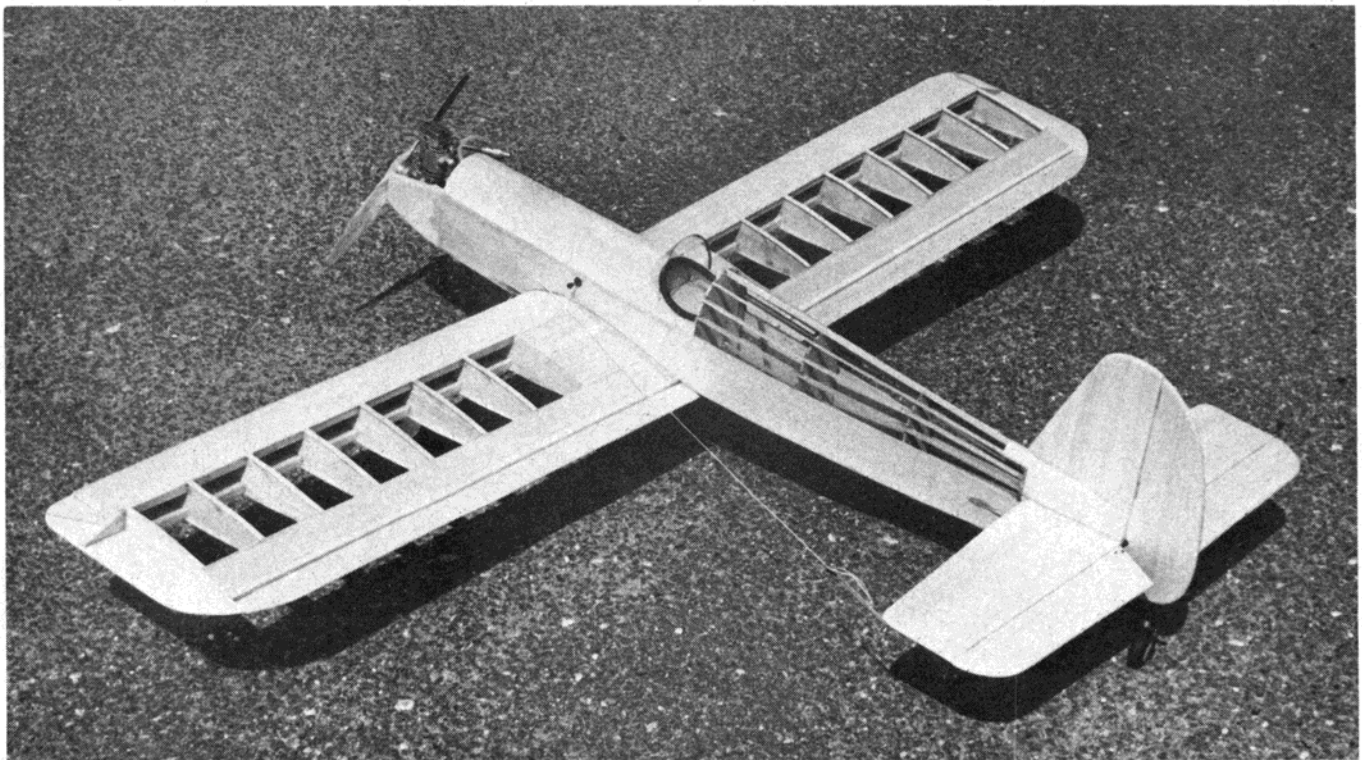
Len used a plastic film covering which, of course, saved weight. I believe the wing area is sufficient to handle the added weight of a painted finish if desired, and still be lightly loaded. Judging by the performance of the *Four/Runner* and the way it was received at the local field, I expect to see a lot more four cycle engines showing up. We have no inter-

est in trying a two cycle engine in the plane; it's too much fun with the four cycle.

If you'll be building a *Four/Runner*, it won't take long to cut out the necessary parts and prepare a kit for yourself. All the wing ribs are identical, so several stacks can be easily cut on a jig saw or band saw. Even if you cut them one at a time it's not a long job. Getting all the parts ready and having the wood stock on hand before beginning assembly will save time.

Starting with the wing, each rib has a "foot" at the trailing edge so the wing can be

assembled on a flat building surface with no chance of warping. Put waxed paper over the plans and position the lower wing spar, then pin the ribs in place on the spar. The upper spar is added, along with the leading and trailing edges. The leading and trailing edge sheeting is applied, and when the glue is dry, the wing panel can be removed from the building board. Turned over, the feet are trimmed off the ribs and the bottom sheeting added. Capstrips, wingtips, and center section sheeting complete the wing panels. Join the two panels at the proper angle and rein-



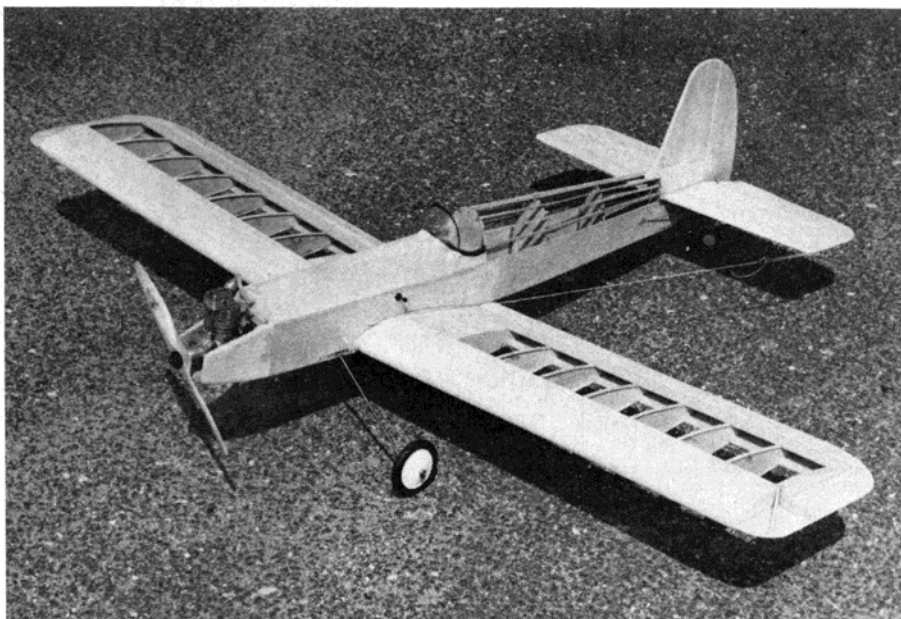
force the center joint with heavy fiberglass cloth and epoxy. Strip ailerons and the usual aileron linkage are used.

Fuselage construction begins by gluing the plywood doublers, wing saddle pieces and hardwood wing mounting blocks to the basic fuselage sides. The sides are then joined with the firewall and the next two bulkheads; the sides are parallel from the wing trailing edge forward to the firewall. Pull the tail end together and glue in the three rear bulkheads, keeping the fuselage straight. Add the rear turtledeck stringers. Before adding the fuselage bottom sheet, cut holes in the bulkheads for the elevator and rudder linkages.

The fuselage forward top section is sheathed with $\frac{1}{8}$ inch balsa; wet the wood to permit it to bend over the curved bulkheads or plank this section with $\frac{1}{8} \times \frac{3}{8}$ inch strips, whichever you prefer. Bolt the engine mount to the firewall and add the cowl blocks; shape and sand them as required. Epoxy the grooved hardwood landing gear blocks in place; $\frac{1}{8}$ inch plywood is used on the rear bottom to accept the leaf spring tailwheel assembly.

The tail surfaces are cut to shape from $\frac{1}{4}$ inch balsa, hinged, and glued in place on the fuselage. Two balsa filler blocks are shaped to be added behind the rear bulkhead, to the fin and the stabilizer. The wing is mounted in the usual fashion with a dowel in front and two $\frac{1}{4}$ inch nylon bolts in the rear. I prefer to fit the wing to the fuselage hardwood blocks. I then tap the blocks and enlarge the bolt holes through the wing.

Finishing can be plastic film or paint; Len covered the prototype airplane with white MonoKote™ and trimmed it with red and



A constant chord wing makes for easy building. Open engine cowl (above) shows off the nice appearance of the FS-40. The *FourRunner* was finished in white MonoKote™ and trimmed in red and blue (below). The plane is deceiving, so docile and quiet when throttled back. With full power it really moves through maneuvers.

blue. A plastic windshield and pilot provide realism, and the vintage style wheels seem to go with the design.

The OS FS-40 is a pleasure to operate. We found a prime into the exhaust pipe was necessary to insure an easy start, whether by hand or using an electric starter. We're now using 10% nitro fuel, an 11-6 Zinger prop,

and the OS seems happy when adjusted to turn it at 8000 rpm. When the engine gets more operating time, we will experiment with other propellers and running speeds.

If you haven't yet tried four cycle power, don't hold back. It will add some variety to your R/C flying, and you will enjoy the *FourRunner*. C

