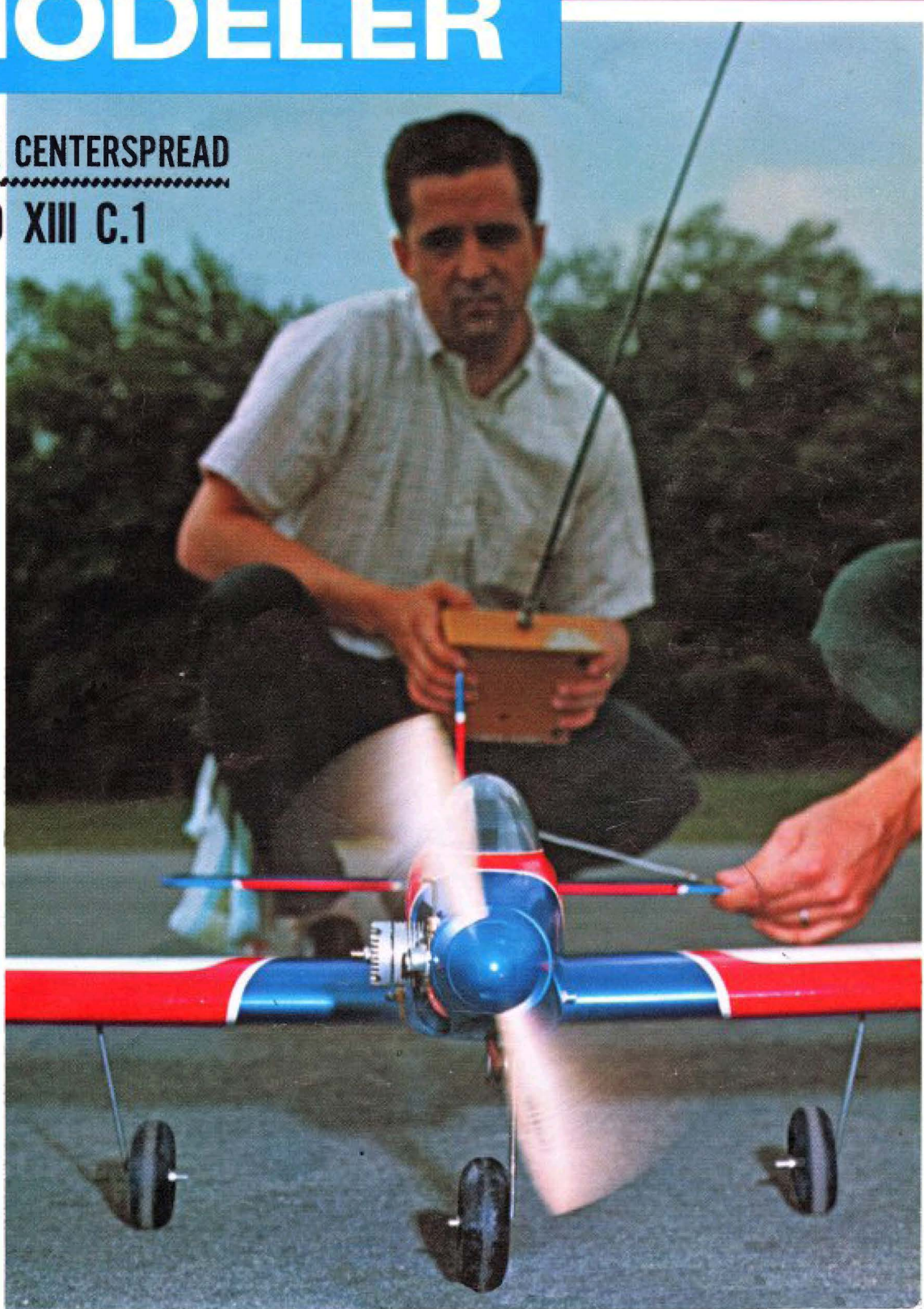


american
aircraft
MODELER

DECEMBER 1968 60c 7/-

**SKY MITE —
AN R/C TREND**

FULL-COLOR CENTERSPREAD
.....
SPAD XIII C.1



Something New in R/C

Sky Mite

Using all the latest modeling techniques with foam wings, fiberglass fuselage, and balsa tail, this is a 23-powered small-size competition machine.



JERRY HIBBARD

WE are rapidly entering a new era in the R/C aircraft field. The key word is "miniaturization." Many R/C'ers are experimenting with small full-house designs and, eventually, I believe small contest and sport airplanes will be the rule rather than

the exception — perhaps sooner than later.

This is made possible by the new miniaturized radio equipment. Particularly in the last year, we have seen almost all manufacturers miniaturize their systems to a size and weight compatible with small

full-house designs. There is no longer a need to build our 45- and 61-powered aircraft.

The advantages of smaller designs are varied, but convenience and economy are most apparent. Convenience depends on the degree of miniaturization. As for economy, smaller airplanes are generally, less expensive, both to build and maintain.

The Sky Mite is the third in a series of smaller designs built and flown in the last year. All three were about the same size with wing spans from 48 to 52". All were powered by 23 engines.

The first airplane was a shoulder-wing design with shorter moments than the Mite. It performed well but was difficult to fly smoothly. Inverted characteristics were fair and the airplane did snapping maneuvers well.

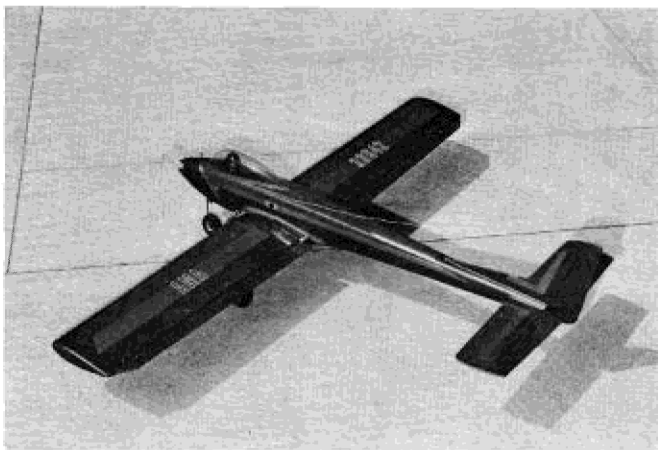
I tried a low-wing design on the second airplane, using the same constant chord wing, and basically the same moments. The inverted characteristics were better, but smoothness through maneuvers was still difficult, and low speed characteristics left much to be desired.

The Sky Mite is much like the second design but with two exceptions. The tail-moment was increased and the wing was tapered with a thicker percentage airfoil at the tips than at the center section. The wing has a center-section airfoil of 18% thickness which increases to 21% at the tips. The thickness of the wing remains constant from root to tip.

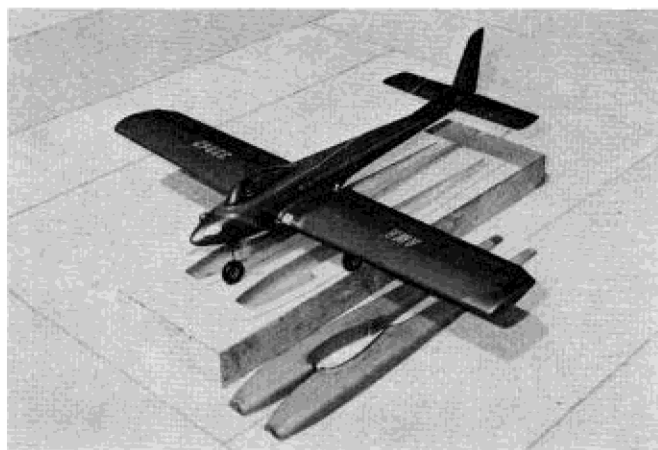
The longer moments make the Mite a great deal smoother than the previous designs and also allow the balance point to be moved back. The progressive airfoil,



Engines from hot 19's to light 29's easily motivate the Mite. Designed for windy weather, it lands softly but has lively responses. Canopy is aerodynamically functional.



In spite of its small size and light weight, the Sky Mite is designed to fly like a big model. Ideal for close-in small-field stunting.



Cardboard-covered foam wing has constant thickness and mild taper. Section changes, and percentage increases, toward tip.

coupled with the longer moments, gives the airplane excellent low-speed characteristics. I did have some concern about snapping maneuvers when the tail moment was increased but since the balance point was moved back the airplane does them with ease. In fact, the airplane easily does all AMA and FIA maneuvers and does them well.

After flying the Mite for the last couple of months, I am convinced that airplanes of this size can perform as well as the larger designs. Maneuvers can be flown much tighter and in better view of the judges. The over-all advantages in convenience and economy will cause many modelers to turn to airplanes of this size and smaller.

Wing: A foam wing was used. Each panel should be cut from a 25" block of foam. Center-section braces are 1/4" dowel as shown on plans. Landing gear mounts are made from laminated 1/8" plywood and glued in with Hobby epoxy Formula II. The cores were covered with Chromecoat. This is a light cardboard material that is very easy to work with. For adhesive I used 3M

Sprament. Both products should be available through most larger stationery or office supply stores. Wings constructed with these materials are the best I have ever used. They are light, rugged, easy to finish, easy to repair, and very inexpensive.

Tail surfaces: All tail surfaces are cut from 3/16" medium balsa as per plans. After vertical and horizontal stabilizers are cut out and sanded, they should be epoxied together at 90 degrees. Movable surfaces may also be installed at this time. The entire assembly will be inserted and secured in the fuselage as a unit.

Fuselage: Most modelers will agree that fiberglass fuselages have many advantages over fuselages built with conventional materials, but most will also agree that fiberglass molding is a difficult and meticulous process. First a male mold must be constructed. Then a female mold made. Finally the fuselage halves are molded and joined together.

The most tedious step in this process is the building of the male mold. Usually the male mold or "plug" must be carved from

pine or spruce blocks. This is not only a time-consuming task, but it is also very difficult to keep the two halves symmetrical.

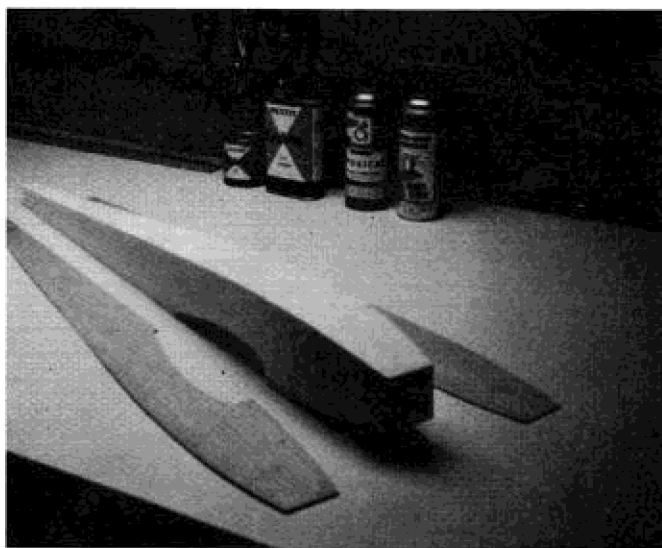
The plug for the Mite fuselage was constructed from foam in much the same manner that foam wings are cut. The entire process for making the plug, less finishing, will take about 45 minutes to an hour. The first step is making templates from the fuselage outlines. You will need two side profile templates and one top profile template which will be divided at the centerline. These templates should be cut from 1/32 or 1/16 plywood and the centerline should be plainly marked. You will also need to cut out a 2" diameter round template and divide it in half.

Select two pieces of 2" foam approximately 38 x 6" and make certain that neither piece is warped. Temporarily join the two pieces with 3M Sprament Adhesive. Mark off centerline on all sides of the joined block. The top and bottom centerlines will fall on the joint of the two blocks.

Now you are ready to mount the side pro-

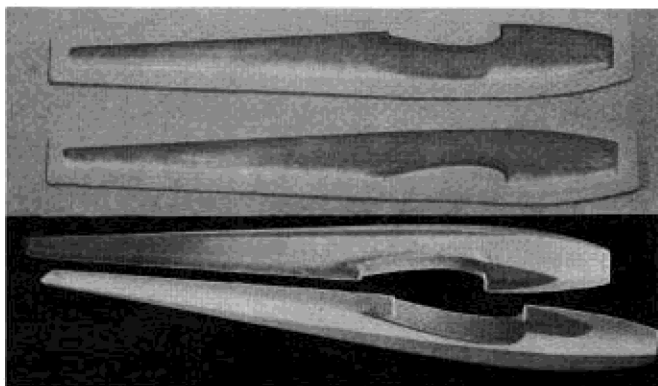
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Simplified fiberglass fuselage technique uses common modeling materials. Construction starts with template-cut styrofoam block.



Foam block is carefully shaped, covered with paper towels using white glue, then finished to perfection and mounted on a board.

Fiberglass female molds are made from mounted male plugs. Ready-to-join fiberglass shells are made in the female molds.



Sky Mite

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file templates. Drill $\frac{1}{16}$ " holes about every 6" around the perimeter of the side profile templates about $\frac{1}{4}$ " from the edge. Using round toothpicks, mount the templates on each side of the block lining them up on centerlines and squaring them across the block. You are now ready to cut out the side profile. This is done in exactly the same maneuver that foam wings are cut. Templates may be marked off in segments and numbered but this should not be necessary since the templates are only 4" apart and it is fairly easy to keep the cutting wire square with the templates.

After cutting, remove side templates. Prepare top profile templates for mounting. Since the top and bottom profiles are identical, you use half of the top profile template on the top and the other half on the bottom. This means you cut $\frac{1}{2}$ of the top/bottom profile at a time. Mounting and cutting are done exactly as you did on the side profile.

Next, separate plug halves and permanently mount each plug half on one of the side profile templates. Now temporarily rejoin the plug halves with templates sandwiched in the center. Also, permanently mount both half circle templates on the front of the plug.

The next step is rounding the corners of the plug. You should first cut the 90 degree corners off with a sharp X-acto knife. The corners should be cut in pairs to keep the halves symmetrical. The plug will then be octagonal. The remainder of the rounding should be done with 320 sandpaper and a sanding block. The flat surfaces on the sides should also be sanded smooth.

You are now ready to cover the plug. The best material I have found for covering

in this application is Scott paper towels. This material covers compound curves amazingly well when used with white glue. First separate the halves since each half will be covered separately. Spread a thin coat of white glue on each plug half. Now cover each half with a length of towel, three sections will be enough. Stretch towel around curves until surface is smooth. Do not cover the wing saddle at this time. Allow glue to dry and then trim excess towel away. Use thin cardboard or blotter paper and white glue to cover the wing saddle.

You are now ready to permanently mount and finish the plug halves. Any flat smooth surface is sufficient to use for a mount. Plywood or masonite work well. Secure the plug halves to the mounting surface with white glue. Now spread a coat of Hobby-poxy formula II over the plug halves. Use enough epoxy to saturate the towel but remove any excess glue from the plug halves. Allow to cure overnight.

The next step in finishing is to brush on about three coats of thinned Hobby-poxy Stuff. Allow each coat an hour drying time. Wet sand with 320 sandpaper between coats. Next spray or brush on one or two coats of auto primer, sand and spray on final finish. I find acrylic lacquer to be about the best finish in this application.

The remainder of the process is really very easy, although it is time consuming. This process may be used for making a mold for any design you may choose. The only special products required are Hobby-poxy formula II, fiberglass or polypropylene cloth and U.S. Gypsum Epoxical Release Compound.

First inspect the plug halves for defects. Remember, the better the finish on the plug, the better finish you'll get on your female mold. Now spray on three or four coats of release, buffing all but the last coat.

Mix up about two ounces of formula II and spread a light coat on each plug half and on a one inch border around the halves on the mounting platform. Allow glue to become tacky. Repeat with another coat of freshly mixed epoxy. Next drape a layer of fiberglass cloth on each plug half. For the first layer use a very light, fine grade of fiberglass cloth. Push cloth around corners so that it is in complete contact with the plug. Trim excess cloth away but leave a one-inch border of cloth around each half. Apply another coat of formula II and a heavy grade of cloth. This layer will give the mold strength and keep it from distorting with age. Cure molds for 48 hrs.

Remove the molds from the plugs by gently lifting from the edges. If the mold does not release easily, gently tap the surface with a mallet. Once the molds have been removed, you are ready to mount them permanently. Use the same material that you used for mounting the plug halves. Since the molds will have to be mounted in the platform, you will have to remove two oversize fuselage profiles from the mount. This will allow the molds to protrude through the mount and be secured to it by the one inch border or flange. Secure the molds in place with formula II at the flange. A frame of $\frac{3}{4}$ x 3" pine should now be nailed on the bottom of the platform. This will make the mold more stable during molding.

You are finally ready to mold your fuselage. Inspect the molds for defects. Use Hobby-poxy formula I or II to correct defects and allow to cure. Now spray on two or three coats of release, buffing all but the last coat. Mix about 2 ozs. of formula II and pour 1 oz. in each mold. Spread the glue over the entire surface of each mold including the mounting flange. Lay a full length, full width piece of light-weight fiberglass cloth in each mold and then gently work the cloth until it is in complete contact with the mold. On tight curves and corners, you may have to cut and overlap the cloth. This will not present problems as long as there is at least one layer of cloth in all areas. Next trim off excess cloth but leave at least $\frac{1}{4}$ " border on the mold flange. Now lay on a second layer of cloth extending from the rear edge of the wing saddle all the way forward. Any excess glue laying in the tail of the mold can be moved forward to saturate the cloth. Lay on a third layer extending from the front of the wing saddle forward. Work into place in the same manner as before.

Each of these layers of glass should be saturated with glue but any excess glue should be removed. If it is not, you will end up with a brittle fuse. Cure 48 hours.

Remove fuselage halves from the molds. A few taps with a light mallet should free

them easily. You are now ready to install the firewall and join the fuselage halves. The $\frac{1}{4}$ " plywood firewall, as per outline on plans, should be cut out oversize and trimmed to fit the fuse halves. Glue the firewall in one of the fuselage halves in the position shown on the plans. Now cut out the wing saddle opening and crank shaft opening, leaving about a $\frac{3}{8}$ " border around each. Next cut some one-inch strips of fiberglass cloth, one about four feet long and two about a foot long. Saturate these strips with formula II and attach them to one side of the fuse allowing one half of the width to overhang. Use the four-foot length from the firewall down the top of the fuse and double it back along the bottom to the wing saddle. The shorter strips are for the bottom, forward of the wing saddle and for the top and bottom of the engine compartment. When strips are in place, join, align and clamp the halves together by the flanges. Inspect the strips to make sure they are in contact with both halves. When the epoxy has cured, cut away the flange and file the joint smooth. Any holes should be filled with epoxy.

The engine opening can now be cut out. Make a small opening at first and then enlarge it gradually until the engine clears. Also, mark off and cut the rudder and stab slots, then insert tail assembly and epoxy.

The rest of the building process is pretty much standard and everyone has their own methods for gear installation, finishing, etc. There is ample room in the fuselage for any of the new digital systems. I used a Kraft 6-channel with four standard sized Kraft servos. With this gear, the Mite weighs just under four pounds and has plenty of zip with a Super Tigre 23 and a 9-4 or 9-5 prop. There is also ample room for a larger displacement engine, for those of you who are so inclined. The balance point should be located between 30% to 40% back from the leading edge at the center section. Even at 40% the airplane is quite stable, but will perform snapping maneuvers easily when they are called for. The long moments make the airplane easy to fly smoothly. This is very important in small designs, since they have a tendency to be jerky if they are short coupled. The Mite is quite predictable in entering and recovering from spins and snap rolls. The inverted flight characteristics are excellent.

To sum it up, the airplane is as flyable as any larger multi I have ever flown and in many respects more so. With slight modifications, I believe that almost any of our popular contest designs can be reduced 25% in size without sacrificing performance.

If you are a little bored with that 60-powered brute, maybe it's time you tried a mini multi. You'll find the Mite to be a real solid airplane, that's a lot of fun to fly.