

PHOTOGRAPHY: HAL REDNER

Frugal Phantom

This Semi-Scale profile is a real inflation *fighter*. Foam core wings and paper covering keep the price down. This one can be throttle equipped for demonstration flying./**Hal Redner**

There is something special about the F-4 Phantom. Whether it is the Blue Angels, Thunderbirds, U.S. Air Force or the Israeli paint scheme, the physical shape of the F-4 stands out. The old saying, "If it looks right it flies right" never had a better proof. But for the model builder with a limited budget, there just aren't any kits available, and the result is fewer and fewer juniors and seniors in the game. The Frugal Phantom was envisioned (I can't say designed) with the thought of having several of them available in a club or an area for flying demonstrations. Can you imagine a team of three? Of course the flyers would consist of a junior, a senior and an open.

The F-4 has several advantages for the U-Control builder. It is recognizably shaped and well known by the non-flying public. The low aspect ratio, delta shaped wing is distin-

guishing characteristics of the Phantom. The short, straight (but swept back) lifting surfaces allow the use of foam cores without any wooden spars, leading or trailing edges or balsa sheeting. A tri-cycle gear gives the pilot easy landings and sustained taxing for demonstrations. Since we are not going to loop or go inverted with three at a time just yet, let's get to the building phase.

Building the Wing

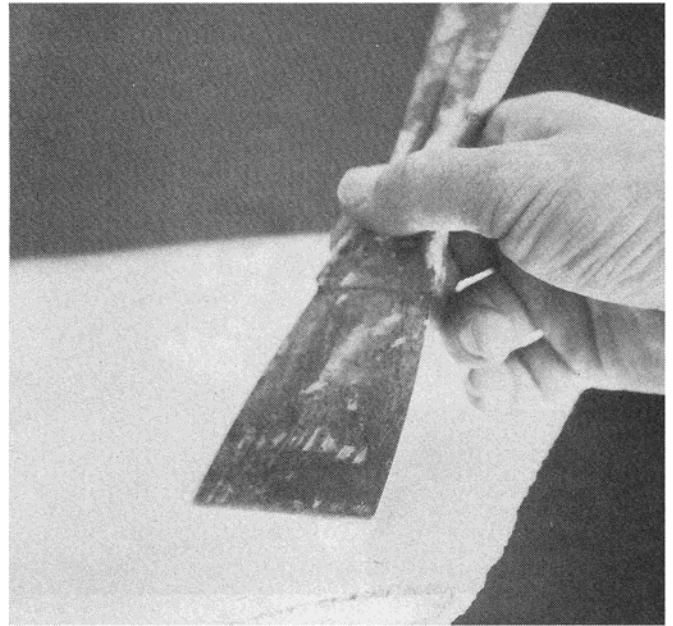
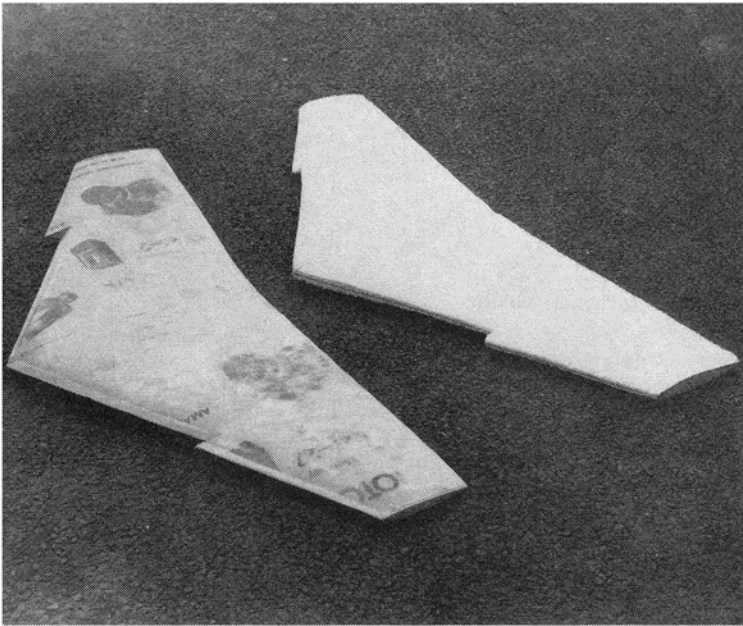
A one piece, foam wing is ideal for the Phantom, but two shorter sections will do the job just as well because most of the strength comes from the balsa or cardboard jacket built around the foam. This also accounts for 99 percent of the wing weight. The strength, though, has proven to be more than adequate. The low aspect ratio wing is not going to be snapped during right angle maneuvers.

Heavy loads will occur on landing with the power off, thus there is a need for a throttled engine and clunk tank.

Grab the hunk of foam and trace the wing planform with a felt tip pen. Next, with an ordinary household wood saw, cut out the basic wing shape. Mark off a centerline all around the 2" or 3" thick wing blank. This will serve as a guide to insure ending up with leading and trailing edges that are parallel.

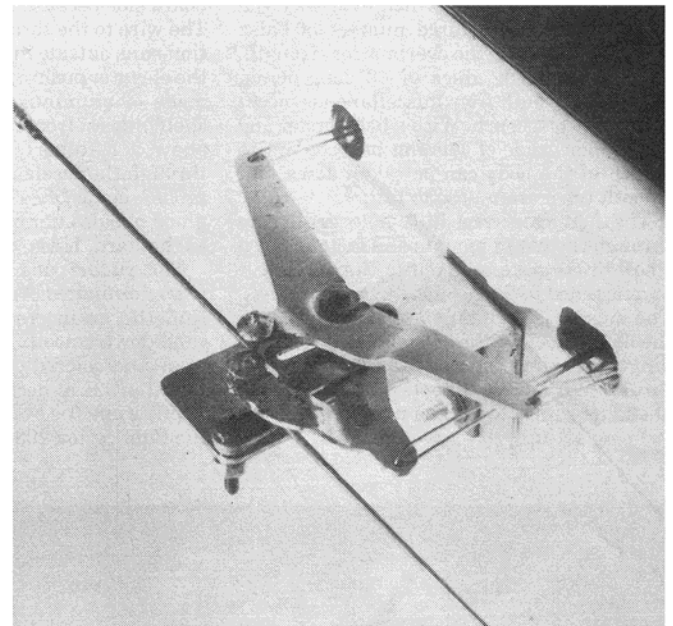
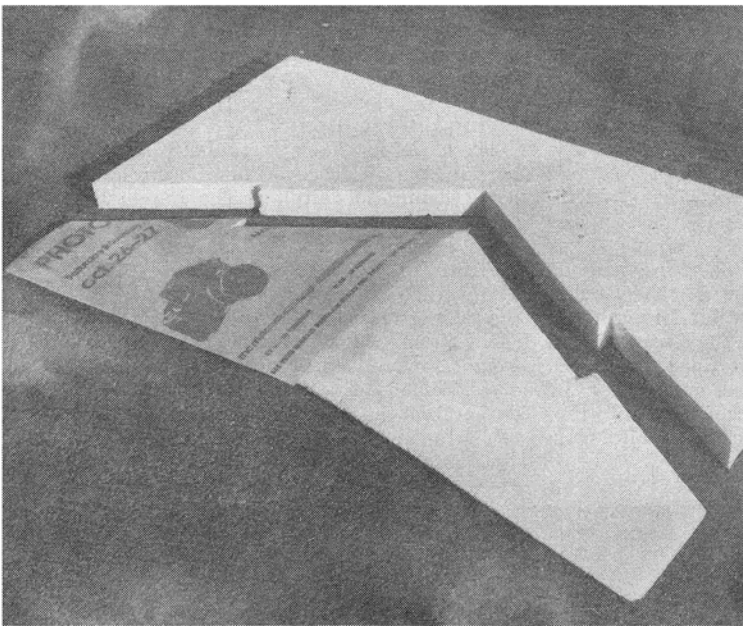
With the centerline brightly marked, pick up your handyman's putty knife and proceed to scrape off the excess Styrofoam. No hot wire is needed, just lots of careful scraping. With a little practice you will be soon scraping away with both left and right hand strokes. Don't scrape away the line you drew for the mean aerodynamic chord. That's needed for the next step.

Stop scraping, and with a block and some



The two wings above are shown before and after covering with poster board and contact cement. This wing is shown half covered (**below**). Note the block of foam that the wing was cut from. An ordinary wood saw and a putty knife are the tools required to do this job. A new technique.

This method of "sculpting" the airfoil is very economical. If you use a hot wire cutter, remember that the wing has a break point where the airfoil changes at section "C" and "D". The J Roberts throttle control is located on the outboard side of the fuselage (**below**). Easy installation.



rough sandpaper, sand the surface. When sanding, sight along the edges and get a fairly reasonable airfoil. *Don't breathe the dust.* Different foam types will require different amounts of sanding. All that we are after is a surface that will take the cardboard covering using contact cement.

My covering came from posters the local camera store had thrown out (Remember, the word is Frugal). The 1/16" thick, 20 pound cardboard didn't have a "hard" finish, and so soaked up a lot of resin. A better grade of cardboard with a harder finish on it would produce a ship that would perform very nicely with a .35 engine. Of course, if one used balsa . . . or a product called Oaktag, they would get better results.

For the bottom covering trace out the wing without overlap and scissor out the cardboard. Use two pieces for the bottom be-

cause of the two way curve and taper. Apply two coats of contact cement to the cardboard and two more to the foam. Sand the foam for a fair surface for adhering the cardboard. Masking tape the leading and trailing edges till the cement sets up tight. Exercise care taking the masking tape from the cardboard.

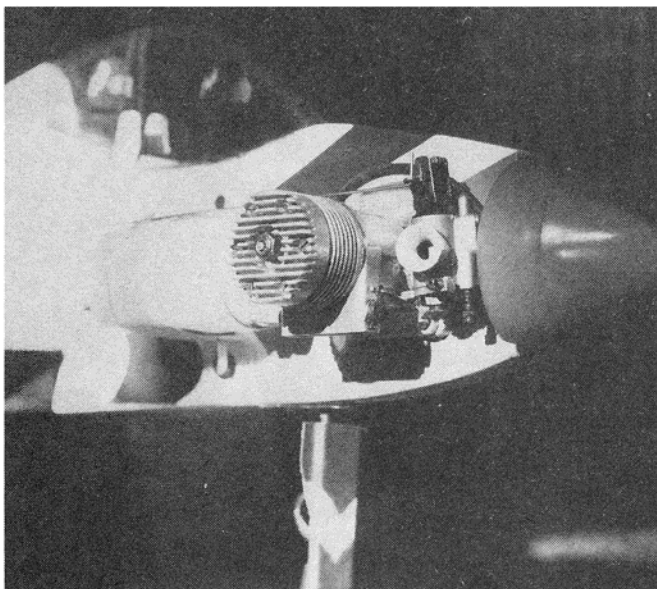
The same procedure goes for the top surface (almost). When cutting out the cardboard for the top surface give yourself 1/2" of overlap on the leading and trailing edges. Score the overlap (in a straight line) with a coin. Lapping serves as a strengthener for the wing. Overlapping, when we seal up the cardboard envelope around our foam will give essentially a "monocoque construction" unit that is remarkably strong. Insert the wingtips of 1/2" balsa and the 1/8" false rib at "C" (See plans.) Epoxy a one inch strip of fiberglass cloth at the midpoint and tie the

two pieces of cardboard together closing up the envelope. With the contact cement dry and the edges sealed tightly, the strength will really surprise you.

Prior to finishing, sand the cardboard to get rid of the blemishes. One light coat of Polyvinyl Resin should enhance the quality of the paperboard. A word of warning, have adequate ventilation for toxic materials, and when you lightly sand the resin, don't inhale the dust. Exercise care with the application of resin since it dissolves foam.

Building the fuselage

The profile body is constructed in the standard way. A 1/2" thick balsa plank is the main frame. The nose doubler on the outboard side is 1/8" thick while the inboard side is dictated by the depth required for your choice of engine. From the pictures it is obvious that a



The front end details include a plastic bottle fuel tank, nose wheel cover and a Fox .40 for power. The author says that level flight can be maintained on half throttle. Note the clear plastic canopy.



This photo is a multiple printing and shows what can be achieved by a team of flyers equipped with Frugal Phantoms. Throttles would be a must for such a project. This would be a good club project. Have fun!

solid doubler looks far superior to a cutout for the engine crankcase. Which ever way you go, plan for the required number of balsa sheets and stagger the overlaps for strength. Other than the 1/2" thick by 48" long plank, my ship was built from miscellaneous pieces from the work bench. With a belt sander and the proper grade of sanding belt the entire length of the body can be taken down to a smooth taper from nose to tail.

The nose gear sits in a hole drilled up through the motor mounts and fastened by a small brass plate soldered to the wire strut and fastened to the fuselage by wood screws. The holes in the brass plate afford pointing the nose wheel for the least amount of scrubbing on taxiing while still retaining out-thrust. With wing wheels set as straight ahead as possible, use the nose gear for the steering set-up.

I meant to place the bell crank on the out-board side because it looks better for photos. The wire to the throttle on a profile installation runs outside in a straight shot and thus the elevator pushrod too. The main bracket is made of aluminum and is supported by a shelf bracket from the hardware store. Plans show a J-Roberts set-up. Leadouts run through the fuselage and out to a "refueling probe" made of 1/8" plywood (for strength) glued to balsa (for bulk) and is wood screwed to the hard, balsa, inboard wingtip.

The rudder and stabilizer are made-up from laminated 3/16" and 1/4" sheet balsa. Run the grain crosswise for strength and sand down smooth. I use the routine sealer, clear and colored dope to finish the model. Use the U.S.A. decal sheet number L-11 by Topflite and the overall color scheme by Profile Publication 208/209 or "Boys' Life" mag-

azine August 1974. The wing colors are easy straight lines for the masking tape routine. Unless you get up real close the flags of the nations can be simulated by slot car decals satisfactorily.

Flying the Phantom

The model flies like an actual aircraft. No horseing the stick back for "up" like any over powered miniature airplane. The ship climbs with throttle and descends without it. The elevator merely establishes an attitude and the throttle will dictate touchdown speed. The average U-Contoller is exasperated with the lack of response to the elevator. He is spoiled from a ridiculous amount of "power to weight," oversize flaps and short moment arms. This model requires two hand coordination from the pilot. What a challenge. The idea is fun and sport. ☞

