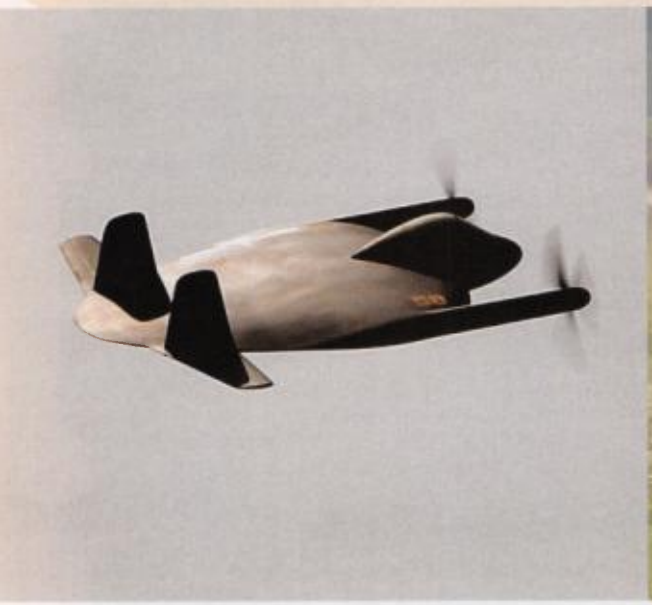
Vought XF5U-1



by Ken Stuhr

INTRODUCTION

The real XF5U airplane was one of the many tragic stories I seem drawn to. It was built and taxi tested right up to the high-speed taxis, but destroyed by government edict before it could be flown.

As conceived, the XF5U was to be a carrier point-defense fighter, one that I like to think would have been used primarily against the Japanese kamikaze threat. Its chief attributes included a great climb rate and great maneuverability, a very low landing speed, and a small overall size for efficient carrier "packing." Believe it or not, the real thing was powered by two P&W R-2000 radials! Estimates of its top speed range from 380 to more than 500 mph.

BACKGROUND

Several years ago, in the May 1999 issue of *S&E Modeler* (the magazine that is now *Quiet Flyer*), my column featured this airplane as a possible power scale soarer (PSS) subject. I built a slope version, but owing to a lack of wind at my hill of choice, it has not yet flown. In the interim, I got a wild hair to electrify the thing. Naturally, it had to be a few percent smaller than the PSS version to match the motors I wanted to use at the time, which gave the 1 ft = 1 in. scale of this model. After scaling the big one down, construction took little time. I went to a thicker symmetrical airfoil, which was closer to scale, but retained the same sheet-balsa structure. I planned to test fly this using Speed-280 motors and the 4.7-in. Tipsy folding prop combination, with an all-up weight of less than 20 oz. Instead of the full tubular shaft housings of the real thing, the test model had plywood keels sticking out front on which these motors were mounted. Well, it worked. Granted, I was running these motors on three Lithium Polymer (Li-Poly) cells, but the thing flew pretty well—I even got a roll out of it.

It has two modes of flight—low angle of attack, in which it goes fast and controls just like an aerobatic airplane, and high angle, during which the elevons lose most all roll authority. In this case, at least the elevons work to pitch the model down to fly out of the mush mode.

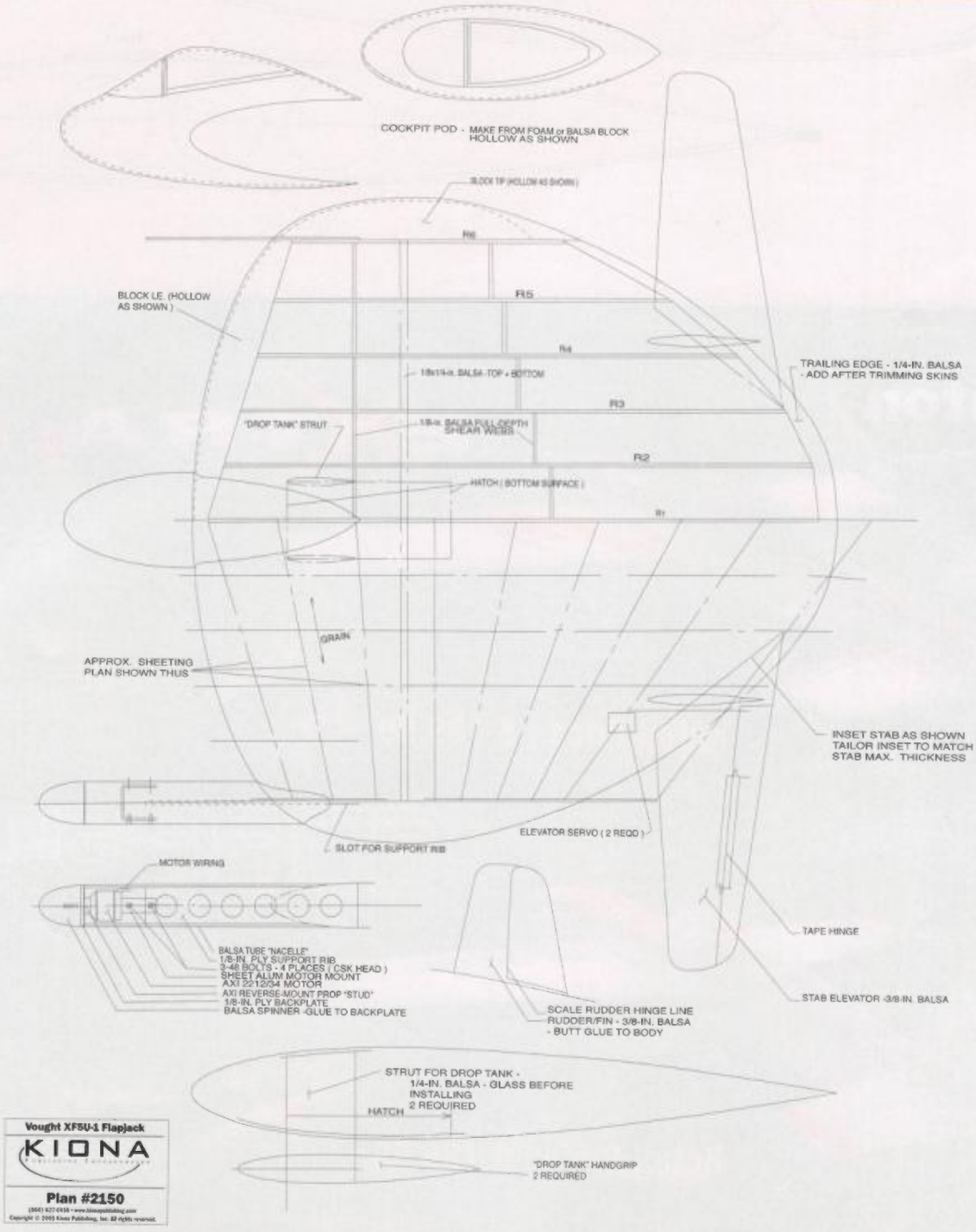
Feeling successful after this, I finished the model by adding the shaft housings, filling the surfaces, and priming, leaving the model ready for paint. I thought to do another test flight at this point, as about 4 oz had been added. What followed was a very long, powered test glide; the model no longer had quite enough thrust to climb. Evidently, the 1-3/8-in.-diameter shaft housings covered up just enough of the 5-in.-diameter propellers to compromise the thrust.

At this point, two weeks before the fun fly I hoped to make, I decided to fit two AXi 2212/34 motors in place of the 280s. With some quick telephoning and quicker work, the motors were fitted a week later. I ended up using clunky 3-blade opposite rotation propellers from the gas world. That very day, I got word of new props from Windsor Propeller: 3-blade models available in both rotations. These were in hand about three days later and fitted for a test flight. The propellers produced a nice thrust level, allowing a near-hover on a 3s Li-Poly pack. The first test fight ended quickly due to way too much aileron throw, but repairs and dialing down the throw took only two more days and gave a perfect test flight.

This thing is very exciting to fly! It looks like nothing else and definitely sounds like nothing else. The AXi motors emit a whine that sounds

The bottom view shows the access hatch between the permanently-mounted drop tank skids. Batteries end up under aft edge of hatch to give proper balance.

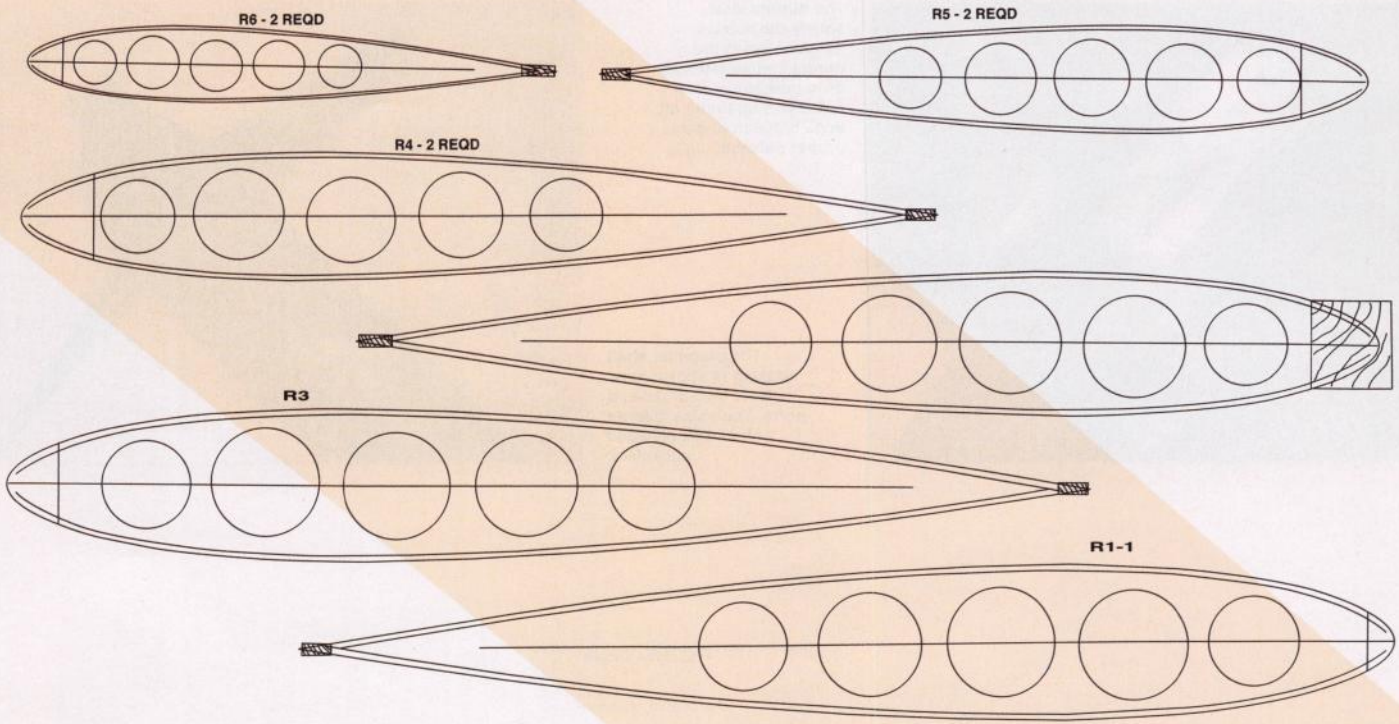
The propeller shaft housing is shown here. Note the air exhaust ports. The balsa spinner glues to a plywood backplate.



Vought XF5U-1 Flapjack

KIONA

Plan #2150


R6 - 2 REQD
R5 - 2 REQD
R4 - 2 REQD
R3
R1-1

for all the world like a turboprop airplane. That, coupled, with its looks got me going! I took the model to the Fern Prairie Club's Celebration of Silent Flight, put in almost two perfect flights, and won best multi-engined model to boot!

CONSTRUCTION

This model is comprised of two wingtips joined end to end with no wing in the middle. As such, it is all compound curves, so I'm thinking that only more experienced builders will want to build it. Therefore I apologize if I skip over some steps.

The "wing" is symmetrical and built on a series of shadows as shown under each rib on the plan. These are glued to your flat table as a jig. For all the following, use only contest balsa and Sigment glue. I put a couple of the bottom pieces of sheeting on the shadows, and then pinned down the ribs. One of these bottom pieces near the mid chord should be glued to the ribs to keep the structure rigid after all the top sheeting has been added. Use the sheeting plan to cut approximate shapes for each piece of top planking, working from the center to each edge. Also, observe the grain direction called out, and try to make the planking pieces located near the center of the chord be full-span. The others can be butt-joined along the center rib.

When dry, remove the frame from the jig, invert it, and add the rest of the bottom planks. Trim all the edges flush, add the trailing edge stock and the leading edge stock, and sand all to profile. The tip blocks should be tack glued on, shaped, and removed for hollowing, then reattached. Note the 1/8-in. slots that must be cut onto the tip blocks to receive the shaft housing keels. Sand overall with 220-grit or finer sandpaper to reduce the seams between planks. I chose to use nitrate dope and Silkspan applied wet to seal and strengthen the surface.

The radio hatch is shown on the drawing. Just cut out the shape and add some 1/64-in. plywood flanges inside. Use your favorite latch technique. Also, add the two struts that hold the "launch tanks" to either side of the hatch opening, and shape the hatch edges to allow it to fit nicely in between. The tanks can be carved from block balsa. I just sealed them with dope and talc, and epoxied them to the struts. That way, they break away if the landing is too hard.

Shape the horizontal tails from 1/4-in. contest grade balsa and cover with Silkspan and dope. Use a simple symmetrical airfoil as on the vertical fins. Cut insets into the areas shown for their mounting. Glue them in place with Sigment. Use Red Devil lightweight spackle to fair these into the wing.

The verticals are made from 1/4-in. sheet, shaped and Silkspanned, and simply butt-glued onto the wing.

The shaft housings are made from 3/32-in. contest balsa, moistened and wrapped around a piece of PVC pipe to dry. The balsa is cut to just the right circumference and butt-joined using Sigment while still on the mandrel, but you can wait for the water to evaporate. It is sanded smooth and glassed with three wraps of 1.4-oz fiberglass cloth and epoxy resin, all still on the pipe. After curing, it can be removed. Repeat this procedure for the other housing.

Cut 1/8-in.-thick, 5-ply birch plywood to the size shown on the plan for the nacelle keels. Cut the lightening holes, and glue the keels into slots at each tip. The balsa tubes need to slide nicely over these. The ends of each tube can be shaped to fit onto the wing surface through lots of trial and error. Once this pinnacle is reached, trim the propeller end to the correct length as indicated on the drawing.

Add internal fiberglass to the front end of each housing tube—about the first 3 in. Again, use the 1.4-oz cloth and add the equivalent of three layers. There's no need to be continuous here—these can be multiple segments inserted with a little edge overlap. Trim the front edge of the glass flush with the tube end.

The housings can be glued to the wing and the keels with Sigment. Thread the motor leads through first, and through into the center of the wing. Watch the right-left alignment, as the housings should point straight ahead and have no up or down thrust. Use Red Devil lightweight spackle to fair the housings nicely to the wing. After all shaping and fairing was completed, I used two layers of 1-oz glass cloth and epoxy over this area for extra strength.

The motor mounts are made from 0.025 aluminum sheet, bent as shown. Add the motor, shaft adapter, and propeller to each mount, and slide each mount into its housing to mark the locations for the two screws on each side that will hold the mounts. The propeller shaft should be dead center in the housing. Use flat-head screws here, and countersink the heads into the housing so they are not visible. Add pieces of basswood or birch plywood to the inner sides of the mounts to give more purchase to the threads.

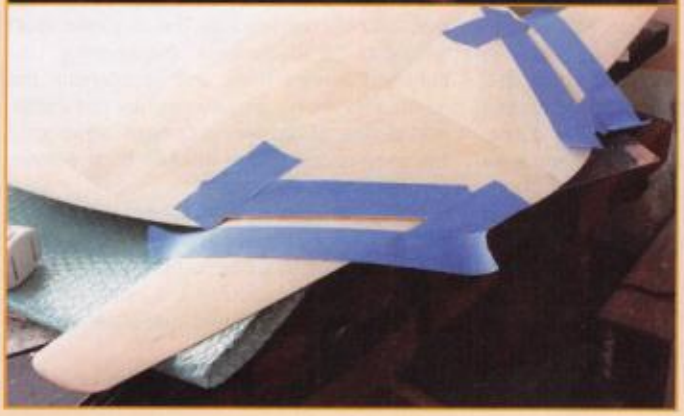
Cut 1/8-in. plywood discs to fit inside the very front of the housings to keep them circular. These must be a tight fit and must also be perfectly circular! Cut holes in them just larger than the propeller shaft adapter to

Top planking started. Note the two pieces of bottom planking in place to hold the structure true. There are spacer tabs at the rib ends. Use 1-piece skin planks as much as possible.

Installing shear webs. These will be cut flush with the ribs next. Note that these lightening holes were a bit too big.

Finishing bottom planking. Note the change from 1- to 2-piece strips of balsa.

Stabs glued in place. The planking is notched in far enough to allow the stabs to slide between. Be sure to align the stabs before gluing.



This image shows the stabs and body masked ready to accept filler to fair one to the other. Use Red Devil lightweight spackle. Spackle, use light glass over the whole area after shaping. Body can be dope and silkspan covered right over the glass.

allow it to pass through. Tack glue these parts in place.

The spinners can be turned from 2-in. square balsa block. You could turn them a bit undersize and vacuum-form plastic spinners, but I just used the balsa, hollowed out and with the surface filled with auto primer. They are vulnerable to damage, but quick to make. I used a 1/8-in. plywood back plate behind the propeller on to which I glued these spinners.

The pilot's nacelle is made from solid block that has been shaped on the outside, split, and hollowed. The airfoil shape can be cut in the block before shaping using a nice big band saw. At some point, I may cut the canopy off and make a clear one so the cockpit can be detailed, but the weight needs to be considered. Other details would include the air inlets located midway to the prop shafts, and some panel detail if you really wanted to do it up.

FINISHING

The model was painted with a couple coats of clear nitrate dope with talcum powder added as a filler. A light overall sanding was followed by several coats of auto lacquer primer, then another light sanding. I airbrushed on Testor's® Model Master enamel for plastic models in the dark sea blue color. I used their Royal Air Force (RAF) "sky" color for the canopy effect. The decals were stolen from a Flying Styro Corsair foam kit.

FLYING

Balance the model as shown. Be aware that a model with an aft center of gravity (CG) will be harder to control, so having it slightly forward is better. Adjust elevon throws as per the drawing.

With 3-cell lithium battery packs, the thrust pulls the model right out of your hands. It departs at an alarming angle and just keeps going. Response to elevator control is soft and response to aileron is very sharp, so plan way ahead until you get used to it. I have no warnings to give about flight behavior, as the model seems to be well-behaved. For landing, throttle back to an idle and approach at this setting. Don't come in deadstick, as a funny rocking sets up and you might be tempted to correct for it. That would be a mistake. Under low power, just flare as the tail end gets near the ground and cut the throttle as the airplane flops down. That's the technique I have been using, and I haven't yet broken a propeller.

This thing is fast enough for me, but if you wanted vertical capability, using the AXi 2212/26 would do it! They are exactly the same size as the 2212/34s, so there will be no problem fitting them in the model. I can only imagine the performance. You would probably have to increase the total weight to get some 1500-mAh Lithium Polymer (Li-Poly) batteries on board for a decent duration. Good luck with this option.

Importantly, have fun! QF