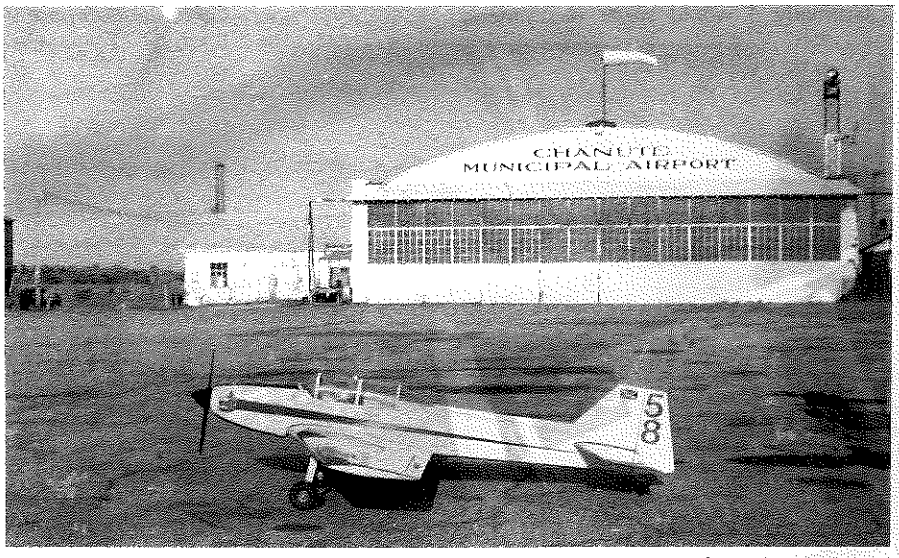
THE CHOCTAW WARRIOR

By JOHNNY LITCHENBURG. . .Designed for slow aerobatics, the Warrior is a natural for easy-going maneuvers. Power is a .60 or larger, and the weight should be kept to seven and a half pounds for best results.

• Out of the mists the warrior appears, ready for battle! Sound like Louis L'Amour? Hardly. In this case the "warrior" is special, wanting only to battle the pattern competition. Of course, CHOCTAW WARRIOR is the name of this new, slow-aerobatic job. With all the controversy over "turn around" boiling around us, I elected to classify this design as "slow pattern," and boy is it terrific! To start, the design is based on all of the parameters developed for hot pattern, but this design flies on aerodynamics, not ballistics. Admittedly the airfoil is symmetrical and "non-lifting" but the airframe set up converts it to full lifting surfaces right-side-up or upside-down. With all this sweep-back, you can point the Choctaw where you want it to go and it'll stay that way.



Kansas born and bred, the Choctaw Warrior is a slow pattern design that is keen on easy aerobatic maneuvers.

In designing any new, or different version of model aircraft the basic reason must be addressed, that is, why? Choctaw gives us many different aerodynamic variations from the norm, but relies mostly on the simplest reasoning: light. That's all, simply light. With a .60+ engine the total airframe weight is only 7lb., 14oz. and if your version comes out heavier, look over your building methods real hard, 'cause you're overbuilding somewhere.

I haven't used light materials, but being careful of grain and quality is very important. A lot of strength is gained by the covering and that will be covered completely later in the article. If you are a beginning builder now is the time to get an experienced modeler to help you with this model; it is not a project to learn on.

Let's get into the building now and cover more of the technical details later.

Start with cutting out all of the parts. I agree with the idea of making a kit to

work from, building just seems to go smoother with every thing cut and ready to fit.

WINGS

Starting with the wings, cutting the spars and leading edge material to the proper taper will require a simple jig to make them accurate, and easy to cut. Take a look at Figures 1 & 2. For this type of set up to work you will need to use a regular plane, as the razor planes normally used in model construction for balsa won't work too well. Be very sure when cutting the guides for the jig to make them as straight as possible! Wedge the spar blank in place very well, so no movement of any kind will occur. Be sure, in setting up the spar blanks, that the two blanks are "mirror" duplicates; in other words, the grain direction and density must be identical but opposite. One of the deviations from the plans is the spacing between ribs W-2. If you use one aileron servo and it does not fit the space shown, you will have to reduce the ribs slightly and move them outboard a little. Of course the biggest deviation from the plans will be the use of foam cores for the wing construction. add wash-out to the wing tips, it will negate the control symmetry!

Another variation deals with unusual flight attitudes and how to keep the aircraft in those attitudes without gyros or mega-athlete coordination. The Choctaw Warrior is designed to look like many other aerobatic aircraft, so to add that necessary "automated" stability I have experimented with lateral area control. Note the big leading edge wing fences. One maneuver we are all fascinated with is knife-edge flight. Most knife-edge maneuvers consist of nothing more than point the nose up, roll it on its side, then recover before it hits the ground. Pure ballistic trajectory, nothing more. To achieve simple flight requires lift, either from a plain flat plate flying at a slight angle of attack or a good lifting airfoil. That is all. The more complex wing barriers are on the Choctaw Warrior. They merely add area to the right spot on the airframe when in the vertical position.

THE TAIL

The tail assembly is a simple built-up sandwich consisting of a planform sheet base with ribs and spars added to each Warrior II is built this way and it is actually a little lighter than the built-up version.

Install the servo lead paper tube in rib numbers 2 through 6 before aligning them for final assembly.

W-16 can be built-up from three pieces of 1/4-inch spruce. The drawing shows how I machined it out of a solid piece of 3/4-inch using a 1/2-inch rotary file in the drill press.

Start the wing by positioning the top main spars over the plans with 1/16-inch scrap spacers evenly spaced between the plans and the spars. Then with the rear spar building spacer in place, build the entire wing frame upside down in one piece.

Notice the airfoil patterns: the leading edge from W-8 to W-12 has a sharp entry. This, of course, is to allow the outboard airfoil to trip, or stall easier. With the extreme sweepback this design has, the sharper the airfoil on the tips, the quicker the reaction to rolls and turns. Be careful flying this design set up; it snap rolls easily on takeoff and landings, so you will have to experiment for the best set up for your flying expertise. By the way, don't side. This method is fantastically accurate with little added weight. The main spar material should be selected carefully, and "mirror" matched. Note: in abrupt maneuvers the horizontal stabilizer is switched through pretty violent turbulence, consequently it is prone to instant flutter. This design will reduce the potential of such an occurrence, and with careful selection of firm, stiff materials, plus meticulous building methods, you can insure a perfect structure. To help reduce weight the center section can be sheeted with 1/16 inch balsa or carved from a solid block and hollowed. Do not cut lightening holes in the base sheet!

FUSELAGE

When you cut out the parts to make up your kit, I hope you selected the wood very carefully for the fuselage sides, as they should be very firm and matched perfectly. Even then, I suggest you cut the top and bottom of the fuselage from the plans to keep the shape of the aft part of the fuselage straight with a definite bend at sta.27.250. Don't depend on just bending the sides, then fitting the top and bottom to the shape that develops.

Start by gluing the 3/8-inch triangle stock in place, then add the 1/16-inch ply doubler all the way from the firewall to sta.27.250., then add the wing saddle. I cut my wing saddle from 1/8-inch light ply but 3/16-inch balsa would be better. Add all the bulkheads to one side of the fuselage making sure they are square, let them dry thoroughly, then add the other side. Next glue the top of the fuselage in place around the front of the box, then pull the tail posts together to fit. This procedure should give you a good straight structure without any hassle. Now set the block of foam on the top of the fuselage and carve it to shape. I use an old kitchen butcher knife perfectly sharpened to shape foam blocks such as this instead of the hot wire method. It works very well for me. Cover the fore and aft decks with 1/16 inch balsa or 1/32 inch ply. Finish the interior installations such as the wing tie-down plate, tank floor, and tail wheel mount.

Now is the best time to fit and adjust the motor, motor mount, and fuel tank arrangement. As you can see, the tank slips in from the wing opening and can be a bit of a problem getting the fuel lines fitted properly, but to keep from adding hatch covers all over the plane this is the best way. When every thing is fitted and functional, disassemble all the hardware and thoroughly coat the entire interior with resin or epoxy. Now you can cover the bottom of the front part of the fuselage. With the engine back in place-fit the blocks of balsa and carve the nose shape to suit your set up. Allow lots of cooling exit area vents, 'cause the engines on these slow jobs are going to work just a little harder with the bigger low-pitch props.

That's about it for the construction phase. So let's get to the joining and aligning the tail and wings. The horizontal stabilizer should fit into the slot cut in the sides perfectly and be perfectly aligned with the top of the fuselage box line, this assures the wing and stabilizer alignment to be 0 degrees—0 degrees. With the horizontal stab in position I cut the top deck to fit the outline of the fin rather than use the side blocks as shown on the plans. Either way works perfectly and is plenty strong enough. Fit the wings square and true and ya' got yourself a flyin' beauty!

During the construction phase we left off the bottom aft of the fuselage to facilitate the installation of the push rods and bracing blocks, so now get the rudder and elevator controls in place then fit and install the servo mounts. Now you can cover the bottom of the fuselage and carve the corners to your heart's content.

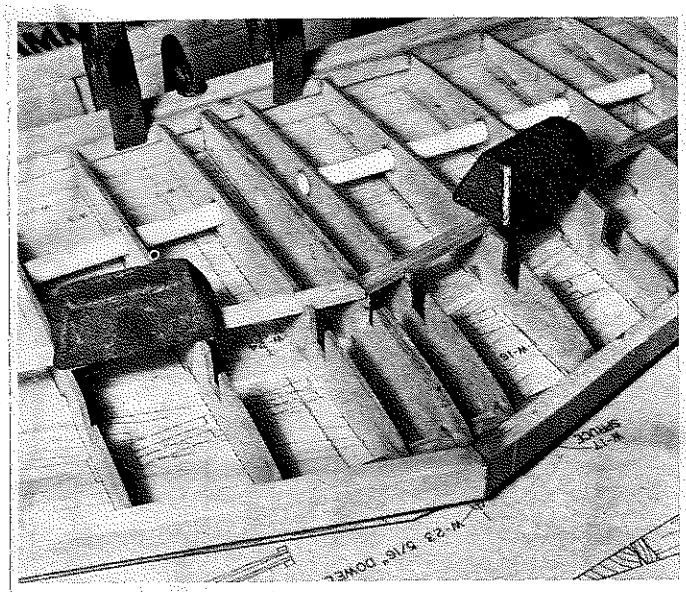
COVERING AND FINISHING

At the beginning of the article, I mentioned the importance of the covering, and I must emphasize that strength requirement now. All of the covering films have their individual advantages but now is the time to choose and use the best quality and toughest film you can afford; don't pinch pennies at this stage. I still use silk and dope like free flight days and for the life of me cannot understand the comment "It's too hard to patch." The fabric and dope method I use now is a lot simpler than the "old days."

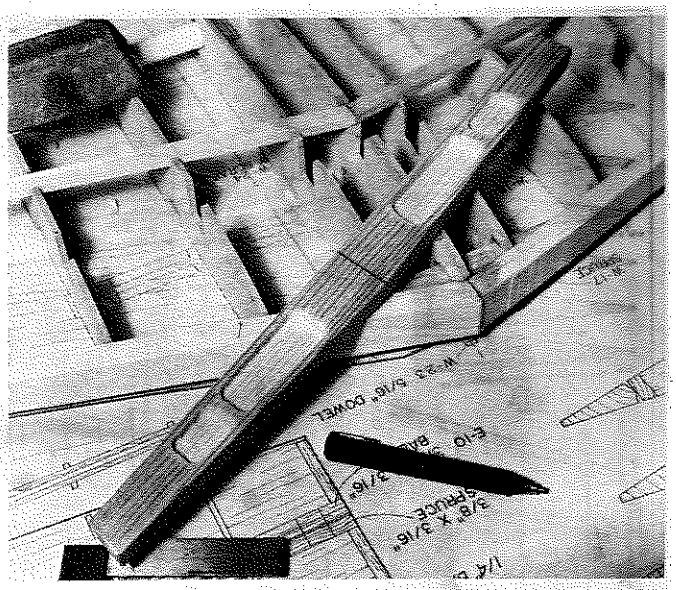
First, you can use almost any of the very light synthetics available in the market today. Go to the biggest and best fabric store and find the cutest clerk there, tell her what you want the fabric for and I'll guarantee you'll get the weirdest look, then the most help possible. Probably because she thinks, "Aw this poor old man must be in his second childhood and needs lots of help," regardless of you being 15 or 55. Anyway, test your fabric for any eccentricities it may have. Then, start by coating the frame of you aircraft with Balsa-rite. Yep good ol' Balsa-rite. Then iron on your new fabric discovery just like it was any of the miracle films, then heat shrink it. Next use clear butyrate dope and coat everything with a thinned coat. Approximately two parts of dope to one part thinner should be about right. I spread my dope on with foam brushes and this cuts down on bleed-through, so I hardly ever need more than two coats to tighten up the fabric real hard and seal everything. Now you will only need one coat of color over this to completely decorate the whole frame. Any additional painting you do will be for your own satisfaction.

FLYING

Now let's get down to the fun part of building a miniature aircraft, flying it. This airframe setup has two distinctive control modes which allows unusual and smoother manuevers to occur naturally. For instance, if you feed in rudder by itself, the yaw will push one wing forward and cause the lift to increase dramatically on that side, resulting in a neat open roll.



To obtain proper dihedral, build the Warrior's wing upside-down.



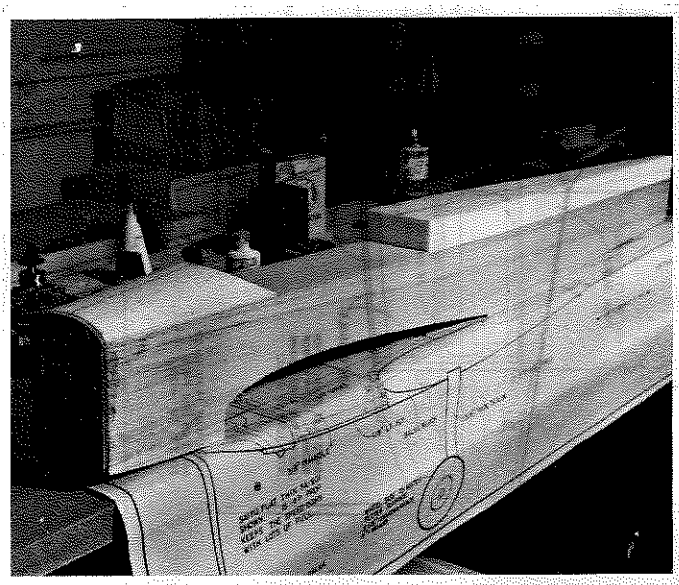
The massive main beam, number W-16, can be machined, or built-up.

Other than having more rudder parameters than average, the rest of the flying characteristics of the Warrior are perfectly normal. This airplane is a precision machine and should be set up accordingly, so plan your in-flight trimming very carefully. Start with the normal taildragger take-off procedure but, use a very light touch on the rudder after she gets up to takeoff speed. Make a looong straight climb out and roll into the traffic pattern, and start your down wind elevator trim on this pass and the following upwind pass. Now do the same with the ailerons. Next go into the upwind leg and set up for a vertical stall turn, and trim your rudder out of this maneuver. The aileron and rudder trims will have to be cross-coordinated a number of times to get everything on the nose. Other than the above-abbreviated procedure, other flight maneuvers fit the normal "around centerline" airframe designs. Now that you are satisfied with the basic flying setup, let's try the fun stuff the Warrior will do. Set the throttle to high idle on the trim, enter the maneuver straight and level, and go into a 60-degree climb, chop the throttle slap full rudder and full aileron. Looks real good and you can do it over and over again instead of accidentally. That's a coordinated flip. A similar maneuver can be achieved with cross-controlled rudder and afleron input. The Warrior can be spun but it takes a very light touch on the ailerons to keep it from developing to a spiral dive. By feeding cross aileron to keep the wings level the rudder can then do its thing normally.

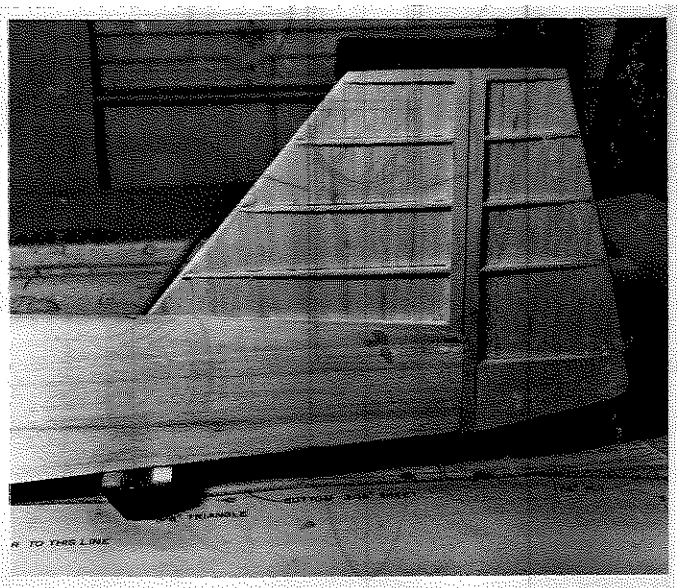
WING FENCE DETAILS

An interesting experiment I have been testing over the mild winter months consist of more rudder-activated controls, and one of the benefits was the development of side lift and vertical rotation points. I found the addition of area ahead of the center of lateral area emphasied the sensitivity of the rudder, that fact added to the extreme sweepback wing on the Warrior adds up to some really dramatic control reactions. I am not the best R/C pilot in the world (that's a real understatement) and consequently I am not able to utilize the full potential of the fences. However, I am convinced the theory is sound and a good pilot can develop some really outstanding moves with them.

That's it. Just charge up the batteries and let's go flying! •



Form the front and rear decks from foam as shown. Keep it light!



Sheet outline of tail assembly is easy to build.