

the Chez Coupe

By RON ROBERTI . . . Select a nice, straight pool cue and build yourself a couple of compact competitive coupes for the coming contests.

• After building and flying Unlimited Rubber for many years with good success, I was talked into trying Wakefield by a good Wakefield flyer and a good friend, Bob Loeffler. Well, to my own amazement, I loved it and managed to make it to the finals in my first year, 1976. After that, Bob talked me into building an 80 gram Coupe. I did, and the results astounded him, and me. I really didn't believe an airplane could fly so well on 10 grams of rubber. An excellent climbing and gliding Coupe for the contest flyer, you will really have a ball with it.

Let's get to work on Chez Coupe.
THE FUSELAGE

The fuselage is made by rolling a sheet of 1/32 med. hard straight grain balsa around a 1 inch form. To make the tube, wrap a piece of tissue one complete wrap around the form. Lay the sheet wood, that has been soaked in water, as close to the edge of the form as possible, making sure it lines up perfectly straight. Roll the wood around the form. Tape the tissue to the form so it does not unroll and bake in a low temperature oven for 30 minutes. When completed, remove the motor tube from the form and cement the seam. Make sure the seam is perfectly straight so that the tube doesn't bow. Use care here because any bend in the tube will render it useless. When this is dry, sand the excess glue from the seam and give it three coats of nitrate dope, sanding lightly between coats.

Now you can roll a piece of 1/16 x 1/2 around the same form used for the motor tube, to form a doubler for the nose section. See plans. Use the same procedure as used on the motor tube. Fit this piece inside the motor tube at the front end and cement in place. You'll have to trim it a little so it will fit snug inside. You can use Sig celastic for this also. I use it and find it easier and stronger than balsa. Your choice.

Now cut a disk of 1/4 inch hard balsa to fit inside the front end doubler so that it fits snug inside. This will be used on the prop assembly and as a nose block stop. Cut a small piece from the circle and cement to the nose section doubler. This is the nose block stop. The remaining piece will be used on the nose block and prop assembly later. Use epoxy here. When this is completed, sand the nose section face for 2° down thrust and 2° right thrust. Cut a 1/8 balsa disk for rear and cement as shown

on plans.

Tissue cover the motor tube by cutting 1/2 inch strips of tissue, spiral wrap around the motor tube, and dope. Repeat this procedure twice to get a double tissue covering that's very strong but not heavy. When this is completed, three coats of nitrate dope thinned to 50-50 should be enough. Set the motor tube aside for now and we'll build the tail boom.

The tail boom is bent the same way as the motor tube, except that the tail boom is tapered. Use very light 1/32 sheet and wrap it around a pool cue stick to form the taper. A good straight pool cue stick can be bought for about \$5 in better sporting goods stores. It's a good investment, as you will use it over and over when building other airplanes. Follow the exact procedures as for the motor tube, and you won't have any trouble. Cut one balsa circle of 3/32 scrap and insert in the rear. See plans.

Now insert the tail boom around the 1/8 balsa plug in the rear of the motor tube. Line up the two pieces so that the center of the motor tube lines up with the center of the rear of the tail boom, and cement in place. Hot Stuff this so that it can be handled without coming out of alignment. Use two coats of dope, sanding lightly between coats, and tissue cover the same as the motor tube, except a single wrapping is enough.

Make the stab platform mount from 1/4 inch soft balsa scrap, making sure you have zero incidence seating. Cement in place and add the stab platform as shown.

The rudder is made from 3/32 soft light sheet sanded to an airfoil shape for a right turn. Cover with tissue, then cut the trim tab out and reinstall as shown. Cement rudder on tail boom and add all hardware for D.T. lines as shown. The rubber holding peg is 3/16 ID brass tubing mounted as shown inside two circles cut from .032 aluminum and cemented with Hot Stuff at the location shown on the plans. This will give you the proper distance between hooks for six strands of 1/4 inch rubber.

The pylon seems kind of high, but it makes the model much more stable and conforms to the fuselage cross section rule.

Make the top and bottom pieces from the template shown and cover with 3/32 medium balsa. Drill a hole in the front and rear and insert a 1/8 birch

dowel for the wing mount rubber bands. To make the mount conform to the motor tube, wrap a piece of sandpaper, rough side out, around the motor tube form and sand the bottom of the mount until it is round and fits uniformly on the motor tube. When this is complete, cover with tissue and dope. Cement the pylon on the motor tube at the position shown on the plans. The location of the wing and C.G. position are important, so make sure you glue it at the right location. I have made many flights with the C.G. and wing in different positions, and this was the ultimate location for maximum altitude and glide. The Chez Coupe climbs and glides extremely well for such a heavy, small size airplane, so proper measuring here will pay off later.

The wing and stab are straight forward stick and tissue building. Cut the ribs from an .032 template so that they are all the same. For the wing tip ribs, cut them to the size of the taper, then mark the thickness of the trailing edge on the back of the ribs and cut a straight line from the lower portion of the rib. See template on plans. All spars are 1/16 by 1/8 hard. When wings are completed, set the butt ribs at the proper angles for dihedral and cement in place.

Do the tips first and then the center section ribs at the dihedral break are butt glued together. Add gussets as shown. Now give the wing two coats of dope and sand lightly. Cover with tissue and pre-shrink with water. When the tissue is almost dry, wash in the right center panel by pinning it on a flat surface and putting a 1/8 thick block under the leading edge at the top dihedral break. When the pre-shrinking is done, use 50-50 nitrate dope, about four coats. When doping is complete, pin the right wing panel down with the 1/8 thick shim under the leading edge and let it stay until a permanent warp has been set. All other panels are flat.

The stabilizer is built the same as the wing, on the plans as shown. Nothing really to explain here. When construction is completed, cover and dope same as the wing. Make sure there are no warps. Add the piece of 1/64 plywood for D.T. hook as shown and drill a hole for the D.T. string. See plans. I used a pretty pink Japanese tissue and trimmed in blue and black and it turned out real pretty. The model is almost complete now.

Last but not least, the most important part to go . . . the prop and prop assembly.

First make the nose block by laminating pieces of 1/8 sheet balsa in opposite grain directions as shown. Now glue the remaining piece of the 1/4 inch balsa

disk we cut for the nose block stop, and cement in the rear. Epoxy a 1/4 inch aluminum washer in front to act as a bushing. Drill a 3/32 hole through the center and insert a piece of 3/32 O.D. brass tubing and cut it off flush with the front and rear. Carve the block to shape as shown. Use 1/16 music wire and bend the shaft as shown in the diagram. Insert the shaft through the tubing in the nose block. Add the tension spring and thrust bearing and bend the proper angles for one blade. Now bend a separate piece of wire for the opposite blade as shown. Now cut two pieces of 1/16 wire and Hot Stuff them on each side of the blade shafts that we have just bent. Make sure all wire is at the proper angles as shown in the diagram. Now make the winding loop of the same size wire and Hot Stuff this in the center as shown. When all of this is aligned properly, bind with copper wire and solder. Be careful that everything is in alignment while soldering. This is very important so that the propeller pitch and diameter stay true. Remember, the more care you take with any part of the propeller assembly, the better the end result will be. The propeller is about 80% of the performance of the model, so take the time and do it right.

When the assembly is complete, set it down and balance the shaft by removing excess solder. Make sure that both blade shafts are in track. If one is the slightest bit longer than the other, melt the solder and align them properly. A 1/16 wire shaft assembly can be purchased from F.A.I. Model Supply. It comes with rubber hook already bent, bushing, spring and bearing. I use them and they work real well.

Now let's make the most important part . . . the blades. The blades are laminated with one layer of 1/64 plywood and two layers of 1/32 medium wood balsa. Cut out two pieces of 1/64 plywood and four pieces from 1/32 sheet balsa, using the blade template shown on the plans. Use the balsa sheet from the same piece of wood so that balancing will be easier later. Lay these aside and we'll proceed to carve the prop block that we will use for forming the blades.

Carve the form from a block of the same size shown on the plans. The prop will be 15 inch diameter by 19 inch pitch. Carving the block has been covered by many previous articles, so I won't go into that.

When the block is completed, let's start the blades. You will see that by using a block of this pitch and diameter that from the hub to about halfway out to the tip, the curve that the sheet wood has to make is extreme. To prevent bubbles in the wood from forming and to make sure you have a complete laminated bond, stay with the following procedure.

Take the two pieces of 1/64 plywood we had cut in the shape of the blades previously and draw a line down the center from butt to tip. Now start at the blade butt and drill a 1/32 hole every half inch for three inches, starting after the first half inch. Do this only on the plywood. This will relieve any air and excess glue and prevent the blades from bubbling. This procedure works very well if followed correctly. Now take one piece of the plywood and two pieces of the 1/32 sheet we had cut out before and, using 50-50 Titebond cement and water, brush the cement on the blades and laminate them together.

Now spray water on the bottom face of the plywood and top face of the top balsa sheet and lay this on the prop block. I use three feet of 3/4 inch elastic that you can buy in any fabric or sewing shop. Secure one end to the block, and start wrapping the blades on the block very tightly, keeping the sheets aligned together as you wrap. Make sure every portion is flat on the prop block. This is a very important part of the procedure, so take care here. When this is completed, bake the blade in a low heat oven for 30 minutes. Remove the blade and follow the same procedure for the second blade. When both blades are complete, sand the underside of the plywood to remove any excess glue. Now take both blades, lay one on top of the other and lay them both on the prop block. Bind again with the elastic and let them sit at least overnight, and longer, if you are not in a hurry. Sometimes there is still a little dampness between the layers, even after baking, so the longer you let them sit, the better they maintain their pitch angle.

Now take the prop block and drill a 1/8 diameter hole through the block as shown in the diagram, making sure that the hole is in the right position. You can double check this by making sure that the distance from the prop shaft to the tip of the blade is 7-1/2 inches. Insert a piece of 1/8 O.D. brass tubing. This will be the drilling guide for the blade folding points. Now cement a piece of 1/64 plywood on the top side of the blades at the hub. This is just a doubler for strength. See blade diagram. Now sand both blades to airfoil shape. Cut two pieces of 3/32 x 3/8 brass tubing and glue in place through the prop folding point holes we have already drilled. When this is complete, brush on two coats of fiberglass resin, sanding between each coat and making sure that both blades are the same weight. When completed, use rubbing compound to polish the blades. You will end up now with a beautiful set of blades.

Now install the blades on the prop shaft and nose block assembly, making sure that they swing on their hinges nice and free. Use .032 steel wire for blade stops. Install one, first making sure

that the center line of the blades lines up with the wire hub. Secure this assembly to a table and, using a wire gauge at one tip, install the other blade stop so that both blades are in track when they are both fully extended. When this is done, check the balance again. If one blade is heavier, use small pieces of masking tape to fine-balance the prop. When this is done, insert the prop assembly in the motor tube and rotate until the blades fold to both sides of the motor tube. At this point, install the prop stop screw as shown on the plans.

Now assemble the model completely with rubber and check the C.G. Add weight wherever needed to bring the C.G. up to the point shown on the plans. Make sure you have installed only a 10 gram rubber motor. The airplane should come pretty close to minimum weight.

If it's too light, add some weight to the C.G. to bring the model up to 70 grams less motor. Do not add weight with the motor in it. If the model comes too heavy, you did not select the wood properly. Remember, it's better to add weight to a light airplane than try to remove it from a heavy one. The Chez Coupe is now complete. Let's fly it.

FLYING

Use a short fuse for testing. Set the stab tilt at the same angle as the center wing panel dihedral for right glide. Test glide the model. It should glide flat with a slight right turn. If it stalls or dives, add shims 1/64 at a time to the leading or trailing edge of the stab as needed. When the glide is set, wind it up to about 50 turns of a 4 to 1 winder, light the fuse, and let it go. Under the initial power burst, it will climb real fast in a right circle with the nose high. You will be amazed at how high it will go. If the climb is not satisfactory for you, use shims in the nose block and very little rudder trim, if needed at all. Check the folding of the prop and the blades. If the blades, for some reason, won't stay folded, use a rubber band on the blades to keep them folded. I always do this for safety, and it works real well.

My airplane flew right off the plans, except that I had to move the C.G. to the position shown on the plans. This is all the trim it needed. Now that you have it trimmed, wind it up to 80 turns and you will see a very competitive Coupe performance. Build it, fly it, and I know you'll enjoy it. Good luck with the Chez Coupe and don't forget to light the fuse!

**MODEL
BUILDER**

#12769