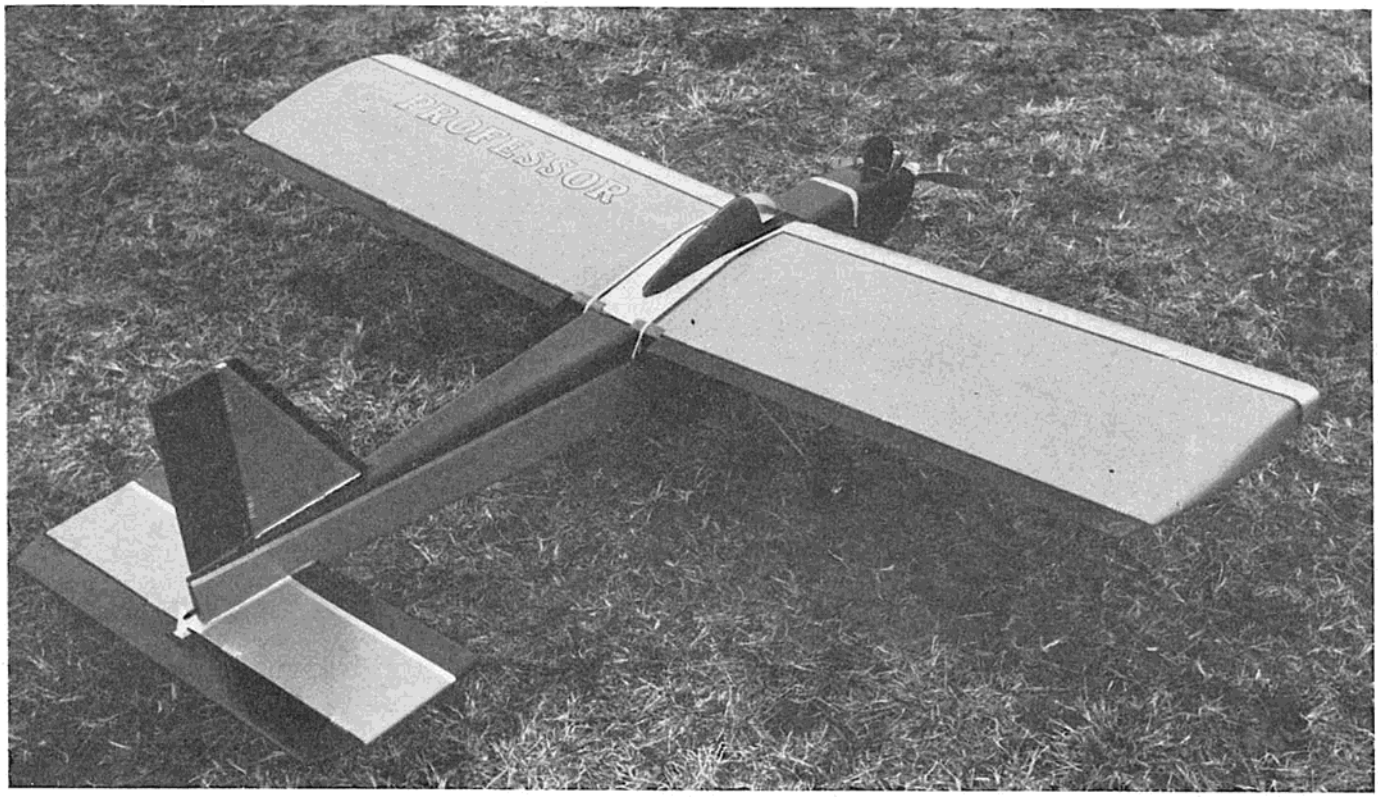


# THE PROFESSOR

## Shop & Field presents part II of Chuck Cunningham's .45 - .60 Multi Trainer.

THE Professor has been designed to satisfy the need of the newcomer to R/C who wishes to start with a large engine and a large model aircraft. This ship will take engines in the .45 to .61 range, and has been flown with a Ueda .45, a Fox .59, an Enya .60 and a Webra .61. It is docile at almost any power range. It has been flown both on proportional and 10 channel reed gear and has much the same flying characteristics with either type control. It is not the greatest airplane in the world — it wasn't designed to be — nor is it the best possible pattern ship. It is a strong, smooth flying, rugged aircraft to get the beginner into the air and down again without making toothpicks out of wing spars. It will hold its own in a Sport Flying contest and will fly a pretty good pattern, and land either fast or slow. The wing is of a convenient span to fit into most automobile trunks and yet due to the low aspect ratio (the relation between the wing span and the wing chord is "aspect ratio") packs a lot of wing area into a small span.

Those of you who have been following RCM for several years will recognize the direct connection between the Instructor from the RCM Annual of 1966, the Lil Swinger from RCM, October '67, and the Professor. This has been intentional since each of these ships was designed to do the same thing, only do it with differing engine sizes and radio equipment. If you have built one of the earlier ships and liked it, then I know you will like the Professor. If this is to be your first entry into radio flying, then again I know that you will like the Professor. You needn't worry about skimping on the finish to save weight, although you are better off with a lighter aircraft. If you want to beef it up even more than the plans show, go ahead, the extra wood and glue won't hurt it. The idea is that this is one ship that you can build and not really worry about all of the time.

The original Professor has foam wings with balsa sheet covering. The plans show conventional balsa construction since this is the way that the majority of builders construct wings. Either method will be fine. I like to build foam wings since they are so much faster than built up ones, and if you cover with some of the new skin materials such as Marvelite, sheet plastic, or my favorite, cardboard, you can complete a wing in a remarkably short time.

Next month we will go into the problem of flying your first (or perhaps your third, fourth, or even fifth) R/C ship and will pay special attention to taking off, making simple turns, and landing. This month will give you time to get your Professor ready for the air.

**Construction:**

It seems most natural to start construction by building the wing. (If you want a foam wing, and do not cut your own, one of the commercial wing cutters will be happy to furnish you with this type wing.) Cut out all of the wing ribs from either 1/16" or 3/32" sheet balsa. I normally use the 1/16" since this is strong enough and yet much less expensive. Make a template from either cardboard or hard balsa from the master rib shown on the plan, trace around this template with a ball point pen on the sheet balsa, and then cut these ribs out with an X-Acto knife. After all of the ribs are cut out, stack them together, line them up carefully from leading edge to trailing edge, and pin all of the ribs into one neat bundle. Sand this bundle to exact rib outline with medium fine sandpaper. This will insure that all of the ribs are the same airfoil, and that your wing will not have high and low spots.

Next, pin the trailing edge lower sheeting in place over the plans and glue the 1/4" square trailing edge to this. Cut the spars from hard sheet balsa and notch this spar to accept the ribs. Slide the ribs into the slot in the spars, but do not glue them as yet. Lay a glue bead on the bottom of each rib as wide as the trailing edge sheet and up the back side of the rib, then pin the ribs and spars to the trailing edge sheeting. Pin the 3/8" leading edge in place and then block up this leading edge with the special blocks shown on the plans. Pin everything securely in place. The best glue to use in building the wing is a good grade white glue or Titebond glue. Take a small dime store paint brush, dip it into the glue and paint

the adhesive all over each joint between the ribs, the spars, and the leading edge. Don't slop it on, but make sure that you have a good glue joint at each intersection. If you have a large enough building board make both halves at the same time. If you cannot do this, allow the first half to dry at least twenty-four hours prior to removing it from the pinned position. Hurrying this portion of building may induce a warp.

Once you have all of the ribs and spars glued you can apply the top trailing edge sheeting, the top leading edge sheeting and the cap strips and then set the whole thing aside to dry. When unpinning a portion of the wing structure to add sheeting, just unpin that portion of the wing to be sheeted, then pin it back again after the sheet has been placed. Glue all of the sheeting in place with white glue. If you like, you can use contact cement for installing the sheeting. When one half is dry (24 hours) remove it from the building board and either build the other half, or prepare both halves for the dihedral brace. Do not glue on the bottom leading edge sheeting yet. Make the dihedral braces of hard straight grained balsa. Cut away the ribs where the braces go. Do not cut the brace. Put a liberal amount of white glue on the braces and pin the two wing halves to the braces. Make sure that each half is lined up with the other, and be sure that one wing half does not slant up while the other slants down when viewed along the chord line. It is very important to maintain good alignment at this point since a mistake here will definitely show up when you are flying! When the glue has dried remove all of the pins and install the bottom leading edge sheeting and the wing tip blocks. Rough saw the tip block to shape prior to gluing them onto the wing.

Wrap a 6" wide piece of fiberglass tape or a piece of linen (a piece of material cut from an old bed sheet will do) around the center section and glue in place. If you are using fiberglass use fiberglass resin. Boat resin will be fine. You may buy both the resin and the tape from Montgomery Ward's or Sears at a very nominal price if it is not available at your local hobby shop. If you use a 6" wide band of linen be sure and dope the balsa wood at the center section at least three times before gluing the linen down with white glue. After this is dry, sand lightly and set aside for covering.

The fuselage is very easy to construct, and if you follow the directions closely you will have a very straight structure. Cut each side from good hard 3/32" balsa and the doubler from 1/32" plywood. Make sure that you have one right and one left side, and mark them as such so that when you are applying glue you will not get them mixed up. Use a good grade of contact adhesive and cement the doublers to the sides.

Next, take a straight edge and mark a long, straight line down the center of your building board. Make this line longer than the fuselage side. Cut out the fuselage formers A, B, and C, and mark the center line on both sides of each one. Lay out the location of each former at the correct place on the straight line by measuring from the plan, or you can build the fuselage on top of the plans. Pin each former in place on the plans, or on the straight line by putting the top of the former on the line. We are building this fuselage upside down. **Be sure that the firewall is offset to the LEFT when building upside down** (the reverse as shown on the plans) so that when the finished fuselage is rotated to the upright position the aircraft will have right thrust. Use Titebond glue on the sides of formers B and C only and pin the fuselage sides to this. Pin this very securely and add blocks of balsa wood to help hold this in place.

Now, glue in the tail block, made from a piece of trailing edge stock, and bring the rear of the fuselage sides together. Make sure that they join exactly on the line. If they do not, loosen and reglue. Hold them together with clothes pins. Use epoxy glue along the sides of former A (Sig Epoxy glue is the best that I have tried yet) and bring the nose of the ship in place at former A. Pin carefully and then add the extra braces and doublers around the firewall with epoxy glue. Check the sides with a drafting triangle to make sure that everything is straight. Check the alignment one more time. You should be able to look down at eyeball level from the firewall toward the tail and see that the center lines on each former line up with the long line down the middle and with the tail. If not, correct it before it dries. If you take care in this part of construction you will always have a good straight fuselage.

While the fuselage is drying in the inverted position you may go ahead and add all of the bottom sheeting and the plywood at the landing gear location and at the nose. It is a good idea to drill all of the holes in the firewall for the nose gear blocks and the radial mounts. You can use a normal radial mount back plate, or a Tatone mount for an engine support. I like the Tatone mount far better than any other form for installing a radial mounted engine since it eliminates a great amount of vibration.

When all of the fuselage structure is dry, remove it from the board and glue on the

top 1/4" sheet rear cover and the front hatch. (Only tack glue on the hatch for sanding to shape.) Sand both of these to shape and then mark a center line along the top rear portion, and make a 1/4" wide cutout to accept the vertical stabilizer.

The vertical stab is made from 1/4" sheet balsa as is the rudder. The horizontal stab is built from 1/16" sheet and 3/16" x 3/32" ribs. The elevator is made from 1/4" balsa. To build the stab, lay out the frame work on the plans, pin in place, and glue. Use contact cement to glue on the top sheeting, remove from the plans, and glue on the bottom sheeting with contact cement. Set these pieces aside for finishing.

Covering and finishing is something that has consumed at least a million words in the model press, and yet, no two builders ever do it quite alike. Since this is primarily to be an aircraft for the less than expert flier I suggest that you forego the super finish and stick with something simple. You may use either silk, silkspan, MonoKote or Shrink-Tite on the wings, or on the whole ship, for that matter. Whatever method you choose, be sure and seal the area around the nose as much as possible to keep the wood from becoming fuel soaked. If you decide to use silkspan for covering, double cover the wing. Finish doping all surfaces and check all surfaces for warps. Glue the vertical stab and the horizontal stab to the fuselage with epoxy glue. Remove the covering on the stabs where they are joined to the fuselage so that your glue bond is between wood to wood, not wood to a covered and doped surface. Check to see that the alignment of the stab to the fuselage is perfect and that neither is tilted in any way.

Install the radio gear as we indicated last month and make sure that the pushrods are not binding against the fuselage sides. Make sure that there are no metal to metal contacts. Even though many of today's proportional rigs are reasonably immune to noise it is much safer if you eliminate any potential trouble spots.

Build the main gear from music wire, or you can purchase a commercial main gear. If you have trouble in soldering this heavy wire with a soldering gun or iron, the job can be done with a gas kitchen stove (don't let your wife see you) or the gas lighter in the fireplace. Get the joint just hot enough to flow on the solder, but not too hot to make the wire brittle.

With the Professor completed be certain to check the balance point of the finished model (with the tank empty) with the C.G. shown on the plans. If in doubt, balance a little nose heavy rather than a little tail heavy. When flying, make sure that you have plenty of rubber bands to hold down the wing, at least eight large ones on each side. With a wing of this much area it is easy for the wing to lift if not held down tightly enough, and when it does you will have the wildest gyration that you have ever seen! This is common with a shoulder or high wing since the force of a pull out tends to pull the wing away from the body. The reverse is true of a low wing aircraft.

If you have taken care in your construction, and done a reasonably neat paint job, you will have an aircraft ready to fly that will treat you kindly. Next month we'll take up the question of flying and how to do it.