

ADRENALIN



Have you ever started daydreaming while doing a very low slow-roll? Did you recover in time? I didn't. Does your present sportship glide like a gut-shot duck? Is it so ugly that you hide it when other modelers are present? Does it climb like you used molten lead for all the glue joints? Is it so battered-up that it looks like a teenager with a terminal case of acne? Well, I've had my share of such planes.

Through the past several years, I've read about every model magazine article I could find about designing your own airplanes. In my opinion, Chuck Cunningham of RCM has had the best articles on designing. Since I usually scratch build, to save money, I decided to build my own designs when I couldn't find anything that I like in the

magazines. As a result, I have designed and built several planes through the years. All of them, thanks to good old boy Chuck Cunningham's formulas, flew very well. But none were loaded with charisma. Most of the planes were ugly as an old flea-bitten hound dog or nearly took a second mortgage to build. But that was my fault, not good old boy Chuck's.

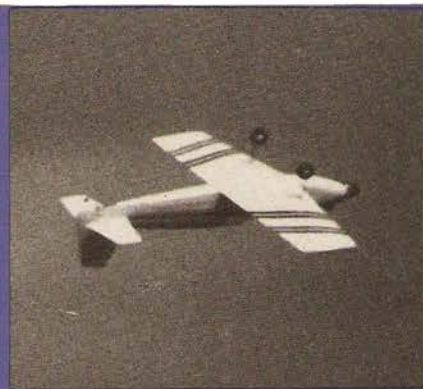
But slowly I've learned a little. My wife,



**By
Charles
Mullins**

**Photos
By
Wesley
Taylor**

This .40 powered low wing has the lines of a 1930's racer. It's a real livewire in performance and also easy on the pocketbook to build.



Frankie Ann, will even agree to the above statement. She has taught me several things during our marriage — like how to mop the floors, run the vacuum cleaner and even how to make up beds. (Psst . . . she still hasn't taught me how to wash dishes yet . . . hee, hee, hee.)

* **I now know how to wash dishes** . . . Damn it all, she read this.

Now back to the plane. About three years ago, after the incident of the slow-roll, I decided, out of necessity, to design a new plane with a little extra looks and, hopefully, excellent flying characteristics. I wanted a lightweight plane to get a fast climb and to have a good glide. It had to be strong in order to withhold my abuse. Obviously, clean lines and a strong engine are a great help to accomplish all of this. In addition, I didn't want to anger the spouse by stealing all of the grocery money for the next two months. Besides, I stay in enough trouble as it is.

After building my latest brainstorm, I was pleasantly pleased with its looks. To me it has a 1930's racer look. That was what I had in mind when it was designed. Really --- it was!

The flight characteristics were indeed a surprise. It climbed like crazy, was faster than expected and would glide as good as any plane I've ever owned except for a glider. I'm not saying that it is the ultimate; but I am saying that overall it has the best combination of flying characteristics of any plane that I have flown.

During the last three years, my good friend and flying buddy, Larry Erwin, and myself have flown the prototype many hours. Larry was more impressed than I was with the way it flew. With this plane, we have been quite successful in fun-fly competition. After a long time, Larry finally managed to con me out of my airplane. And then a few months later he was showing off one day and crashed my plane.

Everyone repeat three times . . . Larry is a turkey! Thank you.

Larry claimed that he was showing another modeler how slow it would come in for a landing. He came in the last time a little too low over the power lines and then, Thud -- Flip -- Wham! Luckily, I had some simple plans drawn and other Adrenalin + under construction.

Since I have had several modelers say that they would like to build one of these planes, I thought that I may as well share it with everyone. So I decided to send it in to RCM to see if Old Dad Dewey would like to publish it.

I would like to thank all the magazine columnists for the great help that they have given me through their columns. And a special thanks to good old boy Chuck Cunningham for his past articles through the many years. Feeling old, Chuck?

CONSTRUCTION

Wing:

I would recommend starting with the wing. I don't like to build wings and when the wing is finished the rest seems to go faster.



First, trace the wing root and tip templates on a piece of paper and glue to a piece of 1/8" plywood. Cut carefully outside the template line, then sand to the line being careful not to alter the airfoil outline. Next, divide the center line on each template into eight equal divisions. Make identical marks on the opposite side of each template.

You are now ready to cut a foam wing. If you aren't familiar with coring wings, then enlist the aid of a foam cutting flying friend. At the same time, learn how it is done. I don't believe it costs any more and it is a lot faster than cutting out all those ribs. The only disadvantage is that foam wings are slightly heavier. It only weighs about three ounces more for a wing of this size. Important --- don't forget to wash out the wing tips as noted on the plans! (*Ed. Note: Cores of you who cannot cut your own, cores available for \$10.95 from Wing Mfg., Box 33, Crystal Lake, IL 60014.*)

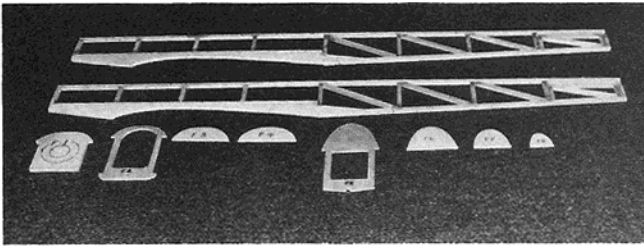
After the cores are cut, prepare the cores by sanding lightly with 240 or 320 grit sandpaper. Sand until all fuzz is removed and the cores are uniformly dull. Next, vacuum the cores well to remove all dust. Be careful not to alter the airfoil while

sanding.

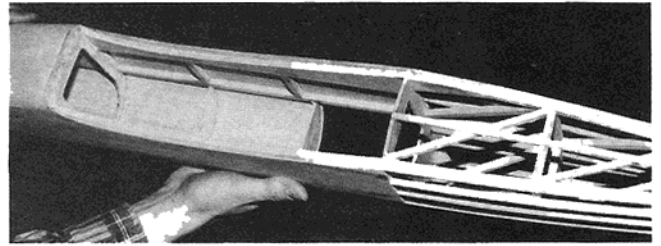
Join sufficient sheets of 1/16" balsa to make four wing skins. Sand the skins and then vacuum. I prefer and recommend Southern Sorghum cement for bonding wing skins to the foam cores. Coat the top half of each wing core and two wing skins with Southern Sorghum cement and allow to dry. Place the wing cores in the bottom of the foam buck that the core was cut from. Align the wing skin with the core and press lightly in place. Check to see if the core is covered on its entire surface, then press firmly in place.

Coat the bottom of the wing cores and the other two wing skins with cement. Place each wing half in the top buck. Make sure it is on a flat surface. When the bottom sheet is in place, any warps will be nearly impossible to remove. When everything is alright, sheet the bottom halves. Trim the leading edge and trailing edges and sand the skins flush with the foam. Trim and sand the wing roots and tips. Using Titebond glue, add the 1/4" x 1/2" leading and trailing edges. When dry, shape and sand the edges using the plans as a reference.

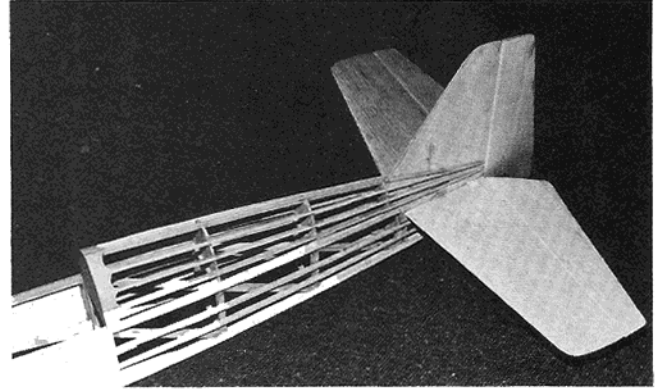
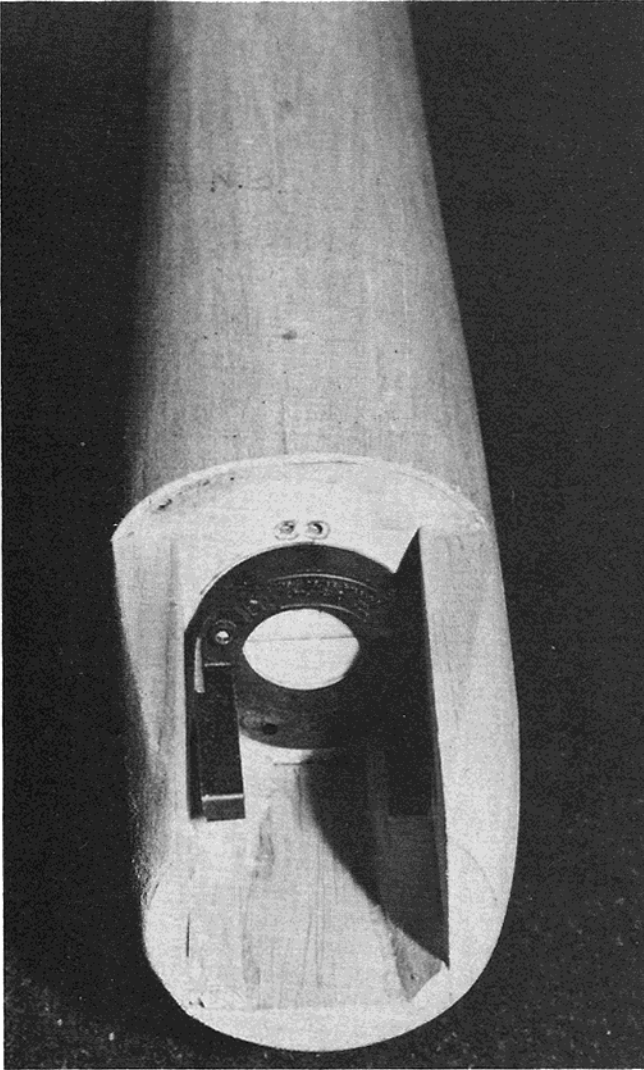
Next, cut and notch two 4" sections of



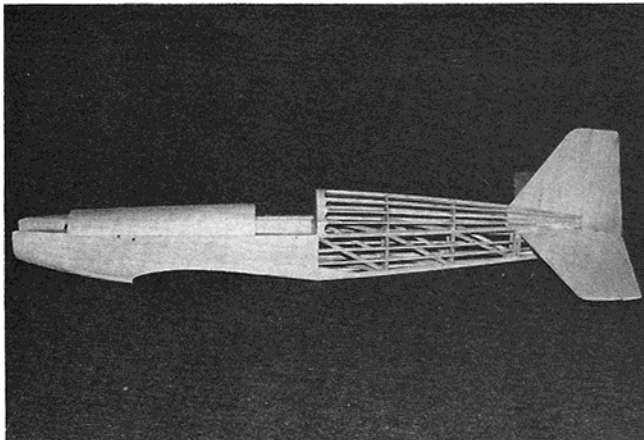
Basic fuselage sides and formers shown. Note: Formers are not numbered correctly.



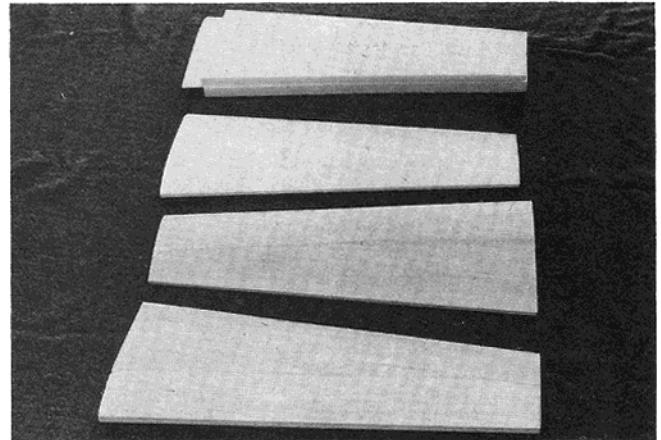
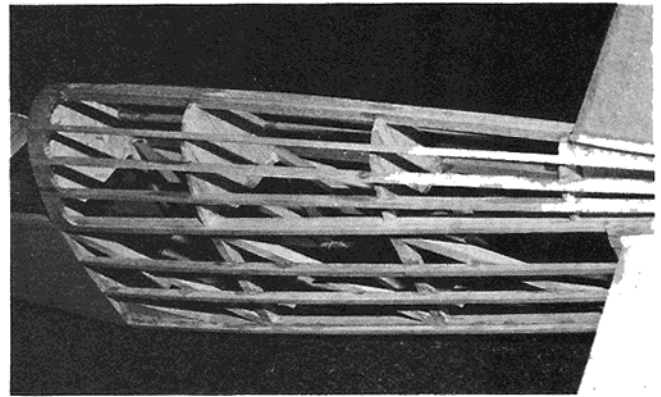
Inside view of fuselage showing the aft fuselage braces and side detail.



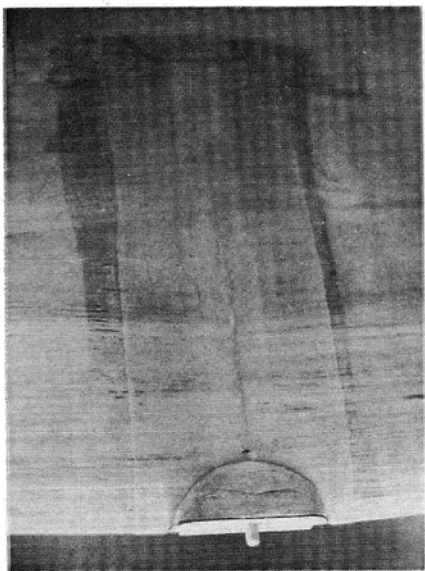
LEFT: Close-up of engine compartment with KM-40 mount installed. ABOVE: View of fin and stab with stringers trimmed to fair in around the fin. BELOW: Aft fuselage stringer detail. Note how forward sheeting has been contoured at bottom.



All that's missing is canopy floor and the final sanding before covering.



A pair of wing cores before and after wing sheeting.



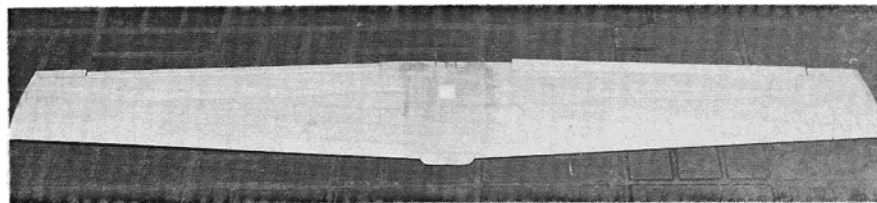
Bottom of wing center section showing F2A and dowel with the leading edge fairing.

trailing edge stock as noted on the plans. Install your choice of strip aileron linkage and glue to the center trailing edge leaving about 1/4" overhang at each root. At this time, I usually cut the dihedral joints. I block up each wing half 1 1/2" at the tip on a radial arm saw and trim just enough to get a flat surface across the entire root. One pass on each wing half and you have a perfect wing joint. If a radial arm saw cannot be borrowed, then the trusty old sanding block will do. Epoxy the halves together using five minute type epoxy. Be very careful of wing alignment. Accuracy isn't just nice, but vital for a good flying plane.

Wrap the center section with a 4" wide band of fiberglass cloth and epoxy well with slow cure epoxy. Don't put on so much that it drips, but just enough to saturate the fiberglass. When the center section is cured, glue on a 3" section of trailing edge stock at the tips. Again be careful of alignment. Notice that the bottom rear section of the airfoil is flat. Use this for alignment. Use the remainder of the trailing edge stock to make your ailerons. Just cut to length and bevel the front to a neat Vee shape. Glue on some 1/4" sheet for the tips. Cut a hole for mounting a servo, and epoxy on plywood strips for servo mounts. Next, measure for the location of the landing gear blocks. Cut a nice snug fitting hole and epoxy in your landing gear blocks. Sand the wing until nice and smooth. The rest will be finished later.

Fuselage:

In this day of slab sided fuselages this may look hard but, using Hot Stuff or Jet, it is quite light, strong and reasonably fast. In addition the cost is low for this size fuselage. As far as weight is concerned, my fuselage weighed only 14 ounces with the KM-40 mount. Start by cutting out all the fuselage parts as shown on the plans. Build the side over the plans but, to keep from having a big mess, use some plastic wrap between the plans and the sides. By all



Completed wing lacking only final sanding and covering.

means, use Hot Stuff or Jet. It is so much faster. If you goof, as I do occasionally, and cut a brace slightly too short, don't despair. Just simply place some baking soda in the gap and Zap, or Hot Stuff or Jet it. It works fantastic! However, do try to get the parts to fit as well as possible. When both sides are built, sand them to match each other. The only areas to be careful of at this point is the stab slot, wing saddle, and the firewall end should be square with the top longeron. Fill the area immediately behind the firewall with 1/4" sheet balsa. Glue on the 3/16" sheet sides as per the plans. Make sure that you have one left and one right side.

Using a square, epoxy F1, F2 and F6 on one side. Make sure they line up, as shown on the plans, and that they are square with the side. Then epoxy on the other side to the formers. Check to make sure that the sides are parallel. Bevel the inside of the tailpost and pull together. I made vertical marks down the center of each former on the backside. Then when the tail is pulled together, use the mating surface of the tail and the lines marked on the formers for alignment. When all is in alignment, glue the tail together.

Cut to fit and glue in 1/4" square balsa between the rear fuselage sides as shown on the plans. Also cut and glue in a few diagonal braces to keep the fuselage straight. Formers F3 and F4 may now be glued in place.

Wet one side of a piece of 3/32" balsa sheet and trim to fit over the top of F1 rearward to F4. Also note that the sheeting extends back to F6. This extension forms the base of the canopy. If you prefer, the sheeting may be put on in two pieces. After gluing and trimming, a piece of sheeting should be glued between F4 and F6. This forms the canopy floor.

At this time, glue on the side stringers. Also glue pieces of 1/4" square balsa above and below the stab slot. Now use a sanding block to sand the stringers flush with the fuselage sides and to taper them at the rear of the fuselage. Sand the stringers at the rear of the fuselage starting at the front of the stab slot and tapering smoothly to the tailpost.

The stab and fin should now be glued in place. Note that the fin is shaped to go down to the stab leading edge and on top of the top longerons. Be careful to make sure that the stab and fin are square to each other and in alignment with the fuselage center line.

Glue on formers F7, F8, and F9. Notice that the front of the turtleback stringers are notched to fit over the top edge of F6. Cut the stringer a littler longer than necessary.

Glue each stringer in place after trimming to fit flush against the fin. Sand the stringers to a nice smooth termination at the rear of the fin. This construction method gives a beautiful clean fillet between the fin and stab when covered. Install the plywood

ADRENALIN + Designed By: Charles Mullins

TYPE AIRCRAFT

Sport/Aerobatic

WINGSPAN

55 1/2 Inches

WING CHORD

10 3/8" (Avg)

TOTAL WING AREA

576 Sq. In.

WING LOCATION

Low Wing

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Double Taper

DIHEDRAL EACH TIP

1 1/2 Inches

O.A. FUSELAGE LENGTH

41 Inches

RADIO COMPARTMENT AREA

(L) 12" x (W) 2 3/4" x (H) 2 1/2"

STABILIZER SPAN

20 3/4 Inches

STABILIZER CHORD (incl. elev.)

5 1/2" (Avg.)

STABILIZER AREA

111 Sq. In.

STAB. AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

6 1/4 Inches

VERTICAL FIN WIDTH (incl. rud.)

6" (Avg.)

REC. ENGINE SIZE

40 cu. in.

FUEL TANK SIZE

8 Oz.

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Foam and Balsa
Empennage	Balsa
Wt. Ready To Fly	70 Oz.
Wing Loading	17.5 Oz./Sq. Ft.

tailwheel mount.

Bolt on the engine mount and the engine. Cut a 3/4" balsa block to shape and epoxy in place. Next cut the 3/4" side blocks to shape and epoxy. Trim the nose blocks to length to suit your engine. Install a 2 3/4" spinner on the engine and draw around the outside of the spinner on the nose blocks. Remove the engine and shape the nose to the spinner line and flow the shape to terminate smoothly at the bottom of F2.

Sand the fuselage sides to form a slight arch from the top to match the cowl sheeting and down to flow smoothly to the shape of the bottom nose block.

Trim the front of the wing center to fit around F2A. Place F2A in position against the bottom of F2. Drill the hole in F2A and F2 to 1/4" diameter. Then slip the wing around F2A while still against F2. Epoxy the wing to F2A. Be careful not to epoxy the wing to the fuselage! Remove the wing with F2A and install a 4" long dowel. Next, reinstall the wing. Make sure that the wing is centered and drill for the wing mount bolts into the 1/4" plywood wing bolt block.

Finish any minor details, then sand the whole plane with 400 grit sandpaper.

I used MonoKote to cover my plane. It is very light, easy to maintain and clean. Cover your airplane and trim to your tastes. When covered, you can install F5. Use Hot Stuff to glue the canopy to the fuselage after covering.

Fuel proof the engine compartment with epoxy. Now mount your radio and engine.

Shift the radio battery pack to get the plane to balance as shown on the plans. I would not balance it farther back than shown until it has been test flown. Thereafter, you may shift it back at your own risk. As we say in the Tennessee Valley area, "You pays yer money and takes yer chances."

Flying:

Range check your radio and double check the C.G. Make sure your left aileron goes up when you push left aileron on the transmitter. Many a plane has been instantly rekitted by that oversight. I haven't done it — yet — but I've seen it done a few times. Set all control surfaces to neutral and set the main gear wheels for about one to two degrees of toe-in. Make sure your engine runs and idles reliably. Try to get a slow reliable idle. If your Adrenalin + comes out as light as mine, you will have trouble landing with a fast idle.

If you don't have much experience flying pattern type aircraft, I would recommend that you seek the assistance of a more experienced flyer. Don't let pride get in the way of logic. I have seen it happen, and it has also happened to me.

This plane has no vices that I am aware of if it is built as shown. If you are using a strong engine like my O.S. .40 FSR, you're in for a surprise. It's fast! It will give most Quickie 500 planes quite a race and will be the winner quite often. It will climb straight

up with a good grade of fuel; yet, it will slow down for a very slow landing without fear of a snap roll. Stalls are gentle and straight ahead if built true, but will spin and snap roll readily using both rudder and ailerons. A conventional geared plane will handle on the ground as good as a trike geared plane, except with a strong crosswind. The primary secret is in the wheel alignment. Make sure the main wheels are as shown on the plans.

I have flown tail-draggers for several years and the following method has worked well for me.

For the first two or three seconds of take-off roll, hold full up elevator. At first, apply only one fourth throttle and, as speed builds, slowly advance throttle to full. When you reach nearly half throttle, you should have released the up elevator and the tail should be flying level. Use the rudder to steer the plane and keep it centered in the runway. All that remains now is to feed in a slight amount of up elevator and it will lift off. Keep the wings level and climb for some altitude. Slowly turn it around and gain more altitude. When it is high enough you may trim the plane out. On my plane the only trim needed was a little up elevator trim. Fly her around and get the feel of the control response. If everything is alright, climb to high altitude, for safety, and idle back and check how she feels in a landing attitude. Also check a stall. Notice that it will not snap, but will stall straight ahead slowly and gently. Notice also that the ailerons are effective even down to stall speed.

If you fly off of grass fields, I would recommend using larger wheels and bend the main gear struts 1" to 1 1/2" forward of the location shown on the plans.

In summary, there is the whole ball of wax. This is a darn good airplane in spite of the fact that I designed it.

Oh, yes! If you use an engine like the magnificent O.S. .40 FSR, you will notice that it is hard to balance the plane as shown. If this occurs, as it has to me, simply install enough lead in the tail to get it to balance. Epoxy it in place and cover it up with MonoKote or whatever you are using.

I hope you will build this plane. If you do, I believe you will be very pleased with the end results.

If you have any questions about Adrenalin +, write me at Route 3, Box 5A, Ardmore, Tennessee 38449. □

**Editing By Hisat.
RCModeler
Oct. 1980.**