



Electrocrow

If You've Been Thinking Of Giving Electric Flying A Try, Here's A Model That Has Plenty Of Performance, And It Is Just Right For Those On A Tight Budget.



By Michael Lenzme

Eight minutes into the last flight of the evening, it's nearly dark and about 20° in a light snow. I pull up into a roll heading downwind and about 30 feet high. The response is sluggish but I am inverted and committed to completing the roll. I apply full down elevator to regain valuable altitude as the roll continues. This is not looking good. The motor is well below peak power and the airspeed decays to dangerously low levels. I manage to roll to within 90° of right side up before the wing contacts my gravel drive. The end of Electrocrow number one has come. I pick up what is left and vow to rebuild a better, cleaner plane that incorporates all of the improvements I had thought about while flying prototype number one.

The second Electrocrow is born! I take the best and proven features of the old design and add a more streamlined fuselage and a practical equipment layout. Add to this a weight reduction and some full-scale features such as a canopy, spinner, and pilot, and you have one attractive, practical, and proven electric

NAME
ELECTROCROW

Designed by:

Michael Leasure

TYPE AIRCRAFT

Sport Electric

WINGSPAN

47-1/2 Inches

WING CHORD

7-1/4 Inches

TOTAL WING AREA

344 Sq. In.

WING LOCATION

Shoulder Wing

AIRFOIL

Flat Bottom

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

3/4 Inches

OVERALL FUSELAGE LENGTH

37 Inches

RADIO COMPARTMENT SIZE

(L) 11-1/2" (W) 1-7/8" (H) 2-1/4"

STABILIZER SPAN

18 Inches

STABILIZER CHORD (inc. elev.)

2-7/8 Inches (Avg.)

STABILIZER AREA

51-3/4 Sq. In.

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top Of Fuselage

VERTICAL FIN HEIGHT

3-15/16 Inches

VERTICAL FIN WIDTH (inc. rud.)

4 Inches (Avg.)

REC. MOTOR SIZE

05 Ferrite

BATTERY SIZE

6 Cell/1500 mA

LANDING GEAR

N/A

REC. NO. OF CHANNELS

3

CONTROL FUNCTIONS

Elev., Throt., Ail.

C.G. (from L.E.)

2-1/2 to 2-7/8 Inches

ELEVATOR THROWS

3/8" Up — 3/8" Down

AILERON THROWS

1/4" Up — 1/4" Down

RUDDER THROWS

N/A

SIDETHRUST

0 Degrees

DOWNTHRUST/UPTHRUST

2 Degrees Down

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa, Foam

Wing Balsa

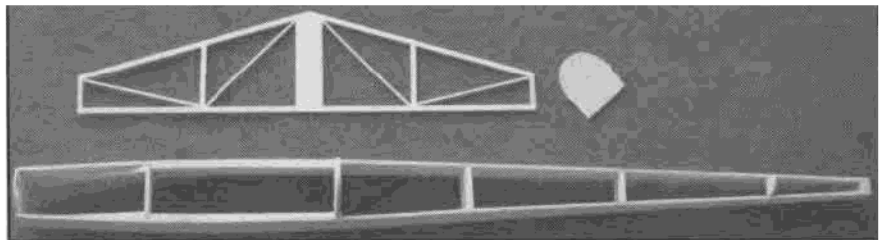
Empennage Balsa

Wt. Ready To Fly 35-1/2 Oz.

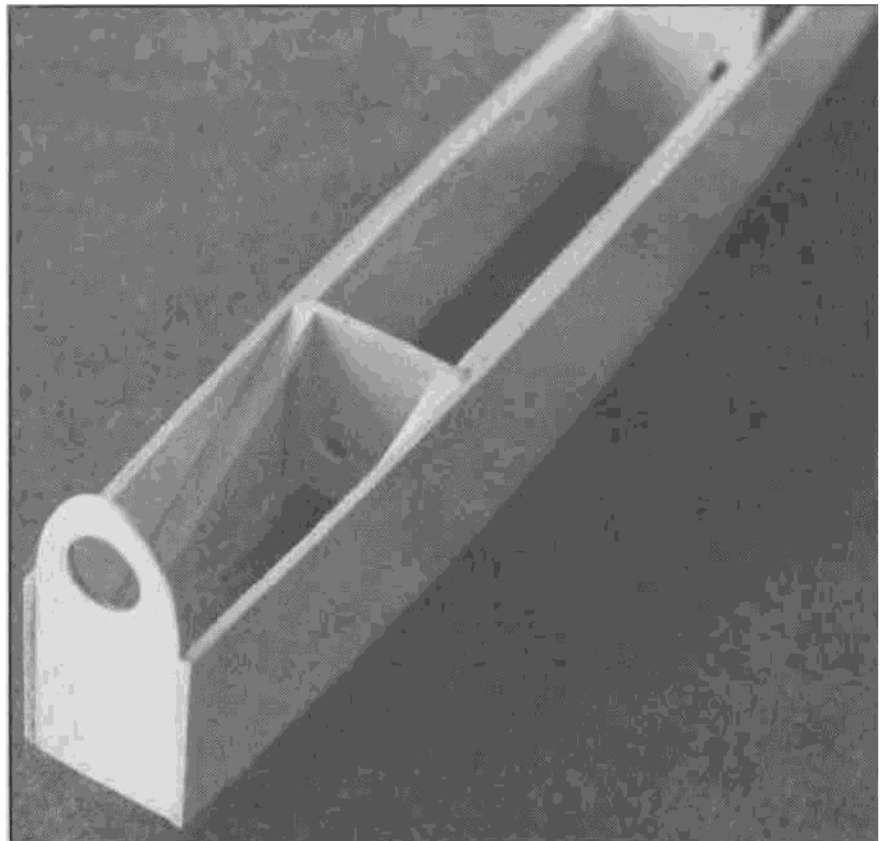
2 Lbs. 3-1/2 Oz.

Wing Loading 14.8 Oz./Sq. Ft.

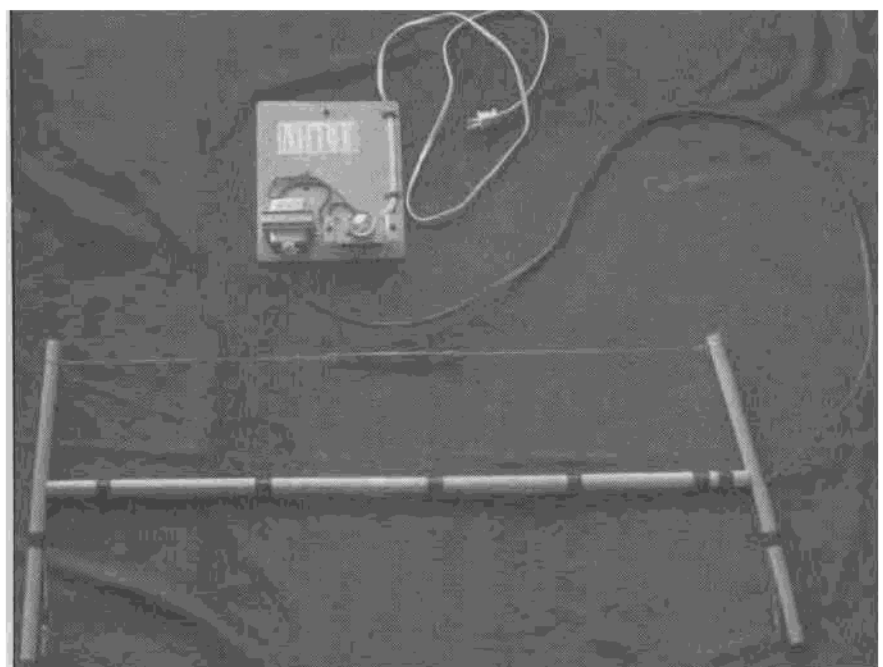
design. The Electrocrow will loop and roll from level flight during the first five minutes of the ten-minute motor run. The plane has no provisions for cooling, and using the equipment shown on the prototype, it doesn't need any. Electrics, like most things that fly, are a balance of compromises. If I wanted more vertical I would suffer a loss in run time, and of course if I wanted to make exceptionally long flights, I would suffer a loss of climb performance. The Electrocrow is set up for



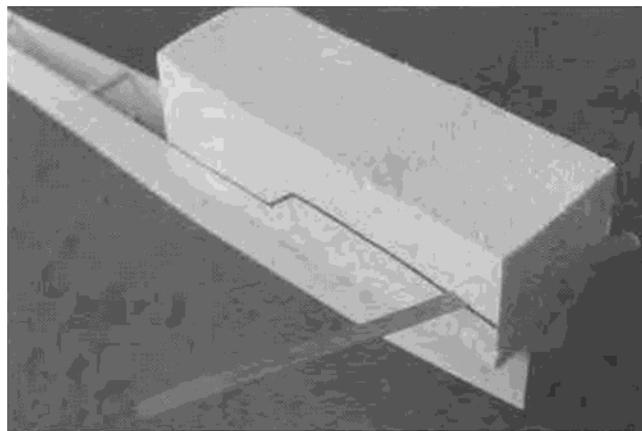
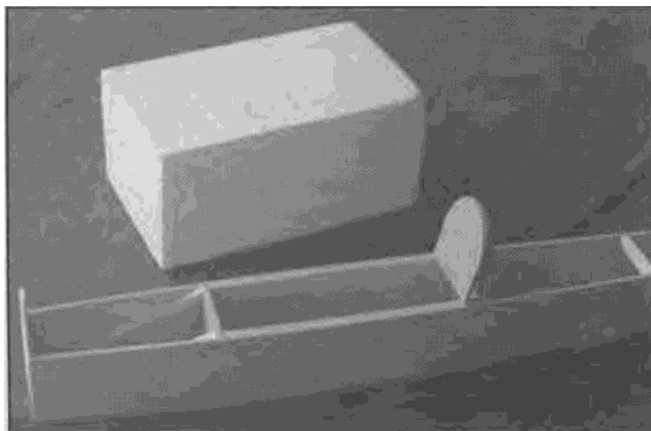
Lightweight yet strong structure is key to electric performance.



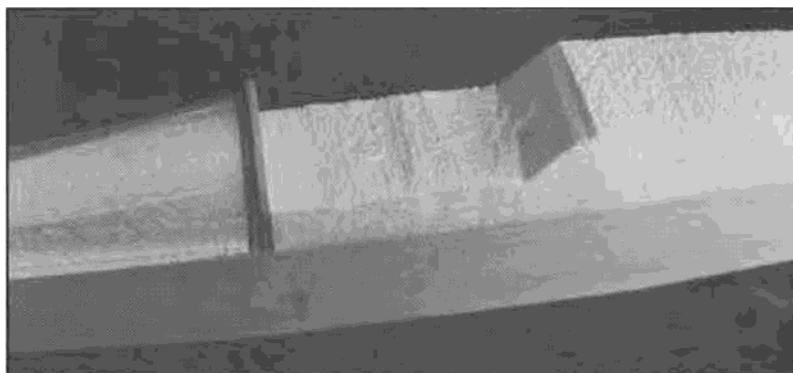
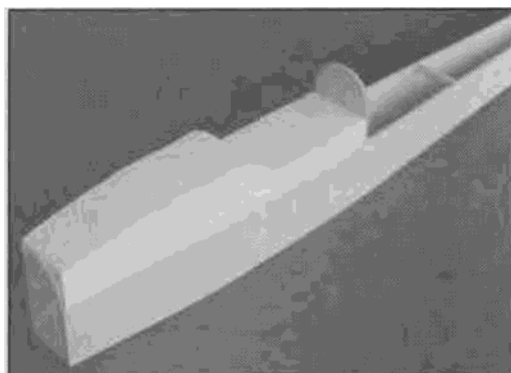
The forward fuselage and fire wall ready for motor tube and cowl blocks.



A simple hot wire saw using a doorbell transformer, dimmer switch, and dowel rods can be constructed for under \$20.00. Use .020 stainless steel aircraft safety wire.



LEFT: Foam is used in the fuselage construction for lightweight cores. Shape with a knife and sandpaper or hot wire. **RIGHT:** Rough shaping the fuselage foam with a hacksaw blade.



LEFT: The forward fuselage block ready for sanding. **RIGHT:** The foam turtledeck is glued in place and balsa stringers complete the contour.

good aerobic performance and a reasonably long duration. The plane is affordable. I have invested \$43.00 in the motor and battery system including all components. The "tank" is free to fill and the motor and battery have lasted through two years of trouble-free, all season flying. I am not an electric messiah sent to convert the blind, gas guzzling masses. I do, however, recognize and enjoy the benefits of flip-a-switch flying.

A P-47 Thunderbolt is best done in Quarter Scale with the biggest and loudest gas burner that will fit in the cowl, but this type of flying is not what the Electrocrow is all about. If you want to sip hot chocolate or a soda while your "tank" is filling and have a motor that starts first time, every time, then the Electrocrow may be for you.

CONSTRUCTION

Fuselage:

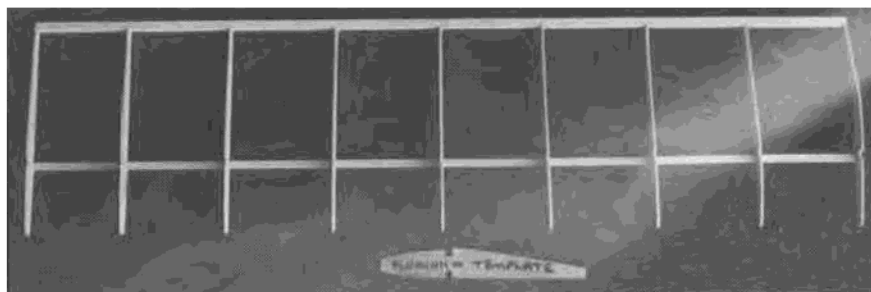
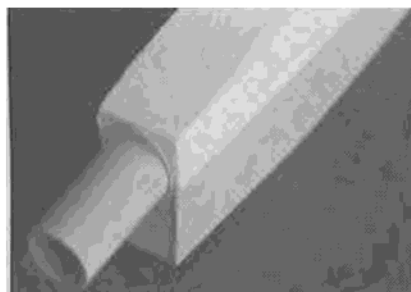
I won't even suggest that you cut out all of the parts first and make your own little kit. I haven't done this in 15 years of scratch-

building and I seem to have gotten by. We'll start with the fuselage sides and cut each bulkhead as we need them. The sides are cut to the plan shape and the bulkhead locations are marked on each side; this will avoid the "two left sides" problem. Cut the F1 bulkhead out of lite ply. Cut the F2 bulkhead from 1/8" balsa and glue the 1/32" plywood to one side using thick CA. The bulkheads are epoxied in place on the fuselage sides at this time. This sets the fuselage alignment. Fill in all other bulkheads and doublers per the plans. This includes the rear canopy former which is pinned in place but not glued. The bottom sheeting and battery hatch are constructed at this time. Now comes the foam shaping. This step can be speeded along with a hot wire (I used one) but good ole' sandpaper and carving will do fine. Set the rough foam blocks in place and secure the aft block with epoxy. The cowl block is glued in temporarily. Shape the foam per the plans, using the bulkheads as a guide. Go slowly towards the end as it is

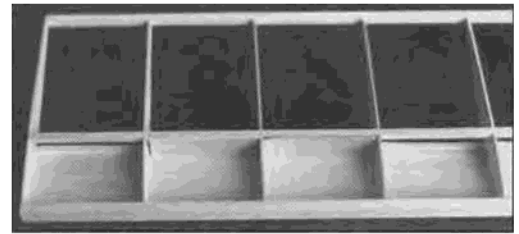
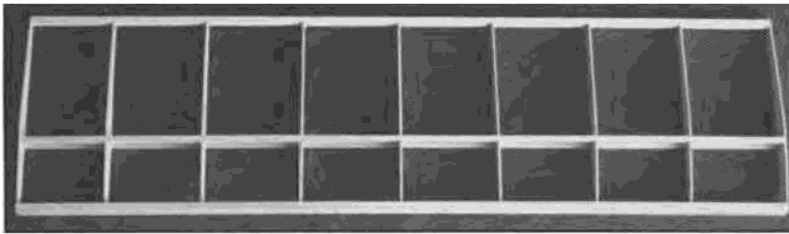
easy to take off too much material. The cowl is sheeted with 1/16" balsa and a light coating of epoxy. After shaping and sheeting, the cowl is popped loose and sanded to remove the temporary glue residue. The aft fuselage shape is completed by gluing the stringers to the outside of the shaped foam and adding the 1/8" balsa filler blocks between the stringers. The nose blocks and motor mount are added at this time. I rolled 1/16" balsa around my motor and then sanded the 2° of downthrust into one end. The balsa tube was glued to F1, and all balsa blocks were glued in place around this tube. Final sand the nose and fuselage. Remember, sanding cuts weight and drag so don't be shy.

Wing:

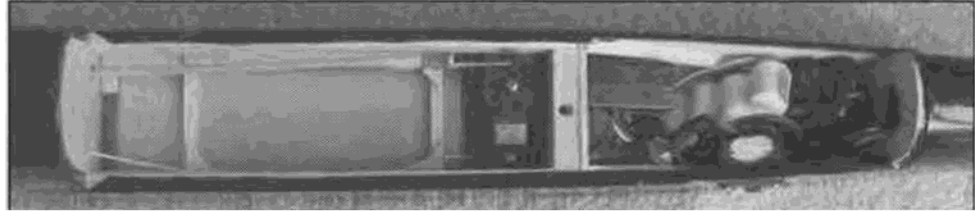
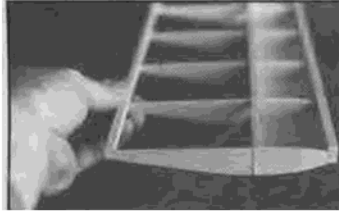
The plans show the bottom view of the wing, to give the most detail, but the wing is constructed in the conventional "ribs upright" manner. Begin by laying down the bottom spar and trailing edge. All ribs are cut out at this time and placed over the plans and glued in place. The middle two ribs are



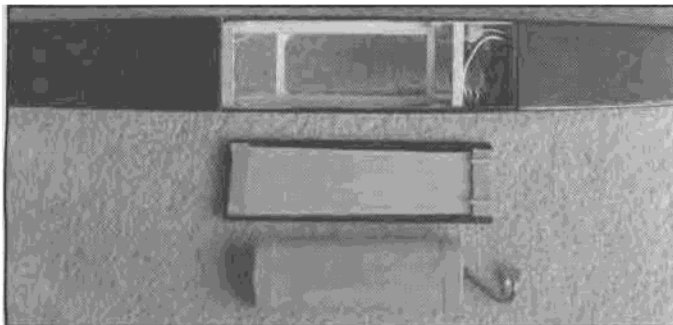
LEFT: The motor tube is fitted in place and balsa blocks will finish the nose contour. **RIGHT:** The start of the wing showing the bottom spar and trailing edge in place. I prefer an aluminum template for cutting out all the ribs.



LEFT: The leading edge and top spar are now in place. Lightweight construction throughout. **RIGHT:** Shear webs with vertical grain and leading edge sheeting add the strength needed for aerobatics.



LEFT: Wing root view showing spar locations and sticks prior to shaping. **RIGHT:** The fuselage showing approximate equipment location. Elevator servo and pushrod are positioned to clear aileron system.



LEFT: View of fuselage bottom shows easy access to battery compartment for charging. **RIGHT:** The battery is secured from sliding around by balsa sticks and the hatch cover.

angled away from each other to accommodate the dihedral when the two halves are joined. Now, glue in the top spar and the leading edge. Let all of this dry thoroughly (about 10 seconds these days) and wrap the leading edge sheeting around and attach. The wings are now lifted from the building board and the 1/16" shear webbing is added. You now have two wing panels that are identical except for the root rib angle. Sand the leading edge and attach the 3/32" tip balsa. The wings are now joined by cutting the first rib of each panel with a hacksaw blade and inseting the 1/32" plywood dihedral brace. Epoxy the root ribs and the brace with one panel flat on the building board and the other panel propped up the required 1-1/2". The aileron hardware is now bent to

shape per the plans, and the short lengths of trailing edge stock at the wing root are routed to accept the aileron wire and tubes. Glue the aileron hardware and T.E. stock to the wing trailing edge. Cut the two ailerons to length and set aside. The wing is completed by adding the 3/4" balsa blocks to the front of the root ribs and gluing the servo and covering braces along the bottom of the open area adjacent to the root ribs. The wing is now final sanded to shape including the wingtips and balsa wing blocks.

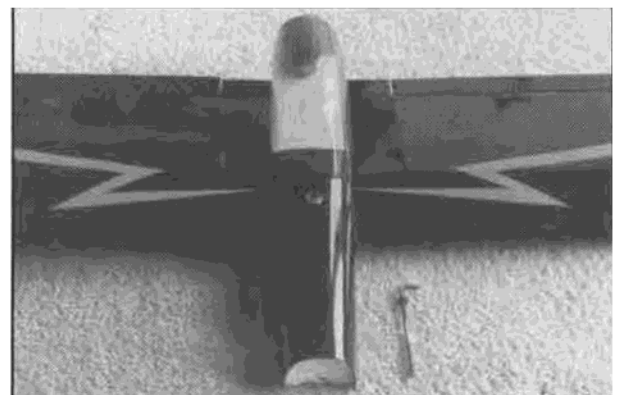
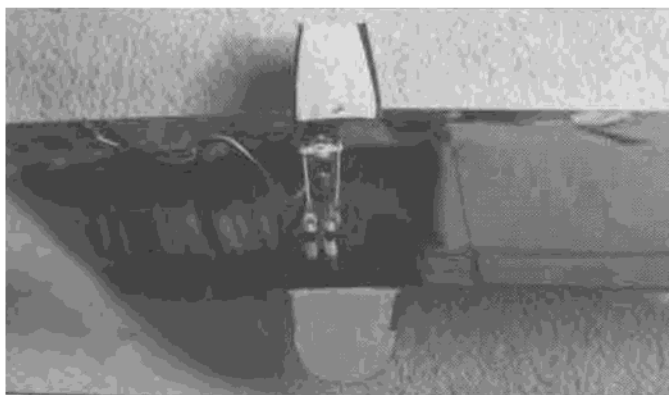
Tail Surfaces:

Cut the vertical fin from 1/8" balsa sheet. The horizontal stabilizer and elevator are built from 3/16" balsa, directly over the plans. Sand the leading edges to a rounded contour. Note that the grain runs vertical on

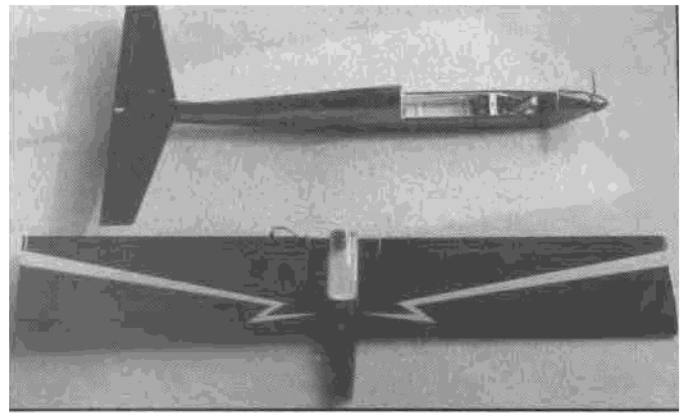
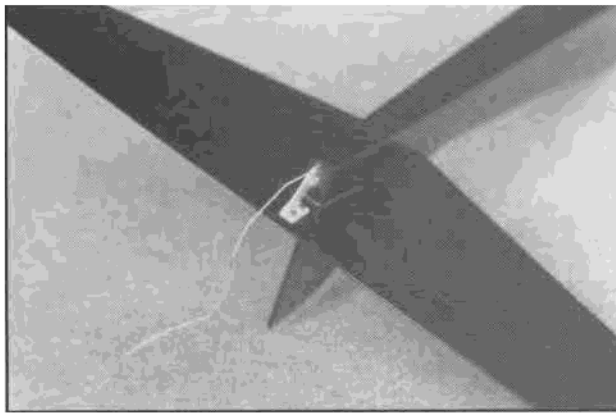
the vertical fin. The shapes are not critical; if you choose to improvise, please keep the overall areas and moments the same.

Covering:

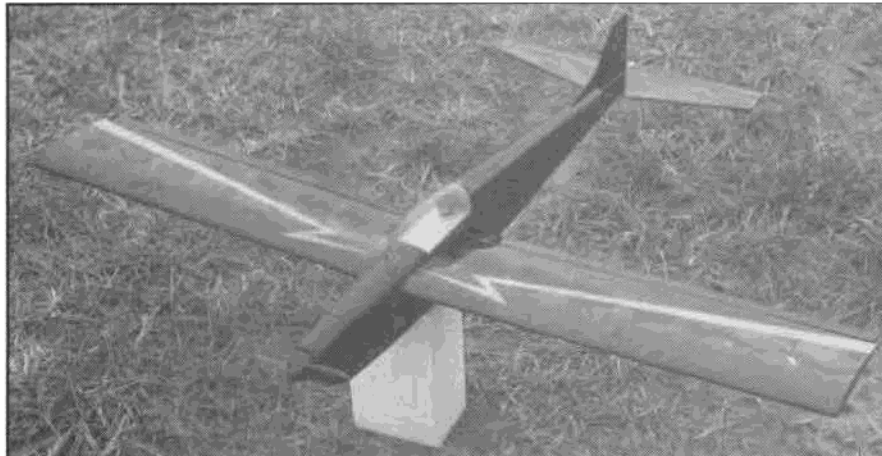
At this point you should have a sanded fuselage, wing, tail surfaces, and cowling that neatly fits the top of the fuselage. Cover all parts prior to assembly using your favorite method. I used MonoKote on this plane because it will stiffen the wings in torsion, it is easy to apply, and it's durable. The only thing to be careful of when using heat shrink coverings is the heat may melt the foam under the wood. Do not linger in one spot with a hot iron and keep the heat gun back from the surface. A low heat covering may be used but most do not provide adequate strength. The trim on Electrocrow is



LEFT: The aileron servo is offset to clear the root rib and the elevator servo. **RIGHT:** The wing is secured by a threaded rod passing through the forward, upper fuselage and into a block and blind nut in the lower fuselage.



LEFT: The elevator pushrod exits cleanly. The Electrocrow is very light and aerodynamically clean for excellent performance. **RIGHT:** Complete aircraft showing ample horizontal tail area and smooth lines.



LEFT: The Electrocrow at rest between flights. The Crow has such a flat glide that the lack of landing gear has not been a problem. **RIGHT:** Author's wife, Sharon, endures another photo session with a smile.

Solarfilm. Remember, trim and covering do not need to withstand the rigors of glow fuel, so almost any method will work. Light and strong are the words to live by here.

Assembly:

The cowl is first cut out to accept the wing. Use the wing rib template or the wingtip to draw a guideline on the side of the cowl with the wing in its proper location. Cut the 1/16" balsa and remove enough foam to slide the wing into place. Epoxy the cowl to the wing at each location where they make good contact with each other. Slide the

motor into its tube and epoxy the front edge of the motor in place. What? Yes, the motor is retained with a bit of epoxy. I have never swapped these inexpensive motors from plane to plane and the epoxy can be ground out if you must remove the motor for any reason. Besides, when you crash, the motor will be automatically removed for you! Epoxy the tail components in place, then hinge and install the controls. The wing attach equipment is next. Align the wing and drill a 1/8" hole through the cowl, the wing, and the balsa block in the fuselage. A blind

nut is installed at the bottom of this hole and glued in place. Now you must drill a 3/16" hole through the cowl. This hole only goes as deep as the balsa blocks in the wings, not through them. Insert a 3/16" metal tube, cut to be flush with the top of the cowl, and epoxy in place. This provides support for the 4-40 wing hold-down rod. Cut the 4-40 rod to length and bend a 90° handle on the end. A washer is soldered flush with the top of the cowl. The canopy is now cut to fit and either glued on with RC56 or retained with small screws as on the prototype. Install



LEFT: The designer, builder, and pilot "freezes" for a photo. **RIGHT:** The Crow after a high speed run, about to enter a roll

your favorite small radio with the servos in the locations called out on the plans. The motor battery may have to be shifted to obtain the proper Center of Gravity. The motor battery is secured in its final location with scrap balsa sticks and shims.

Comments And Flying:

The Center of Gravity shown on the plans is what I used on the prototype. I would recommend that you not place it any farther aft. As shown, Electrocrow is very maneuverable, controllable, and well behaved. I have a B.E.C. sitting on my bench but haven't had a chance to try it on this model. It should offer an even lighter weight airframe and improved performance. The motor system and propeller used on the prototype are capable of 16 oz. of thrust at 13,400 rpm. This provides a solid climb and little heat build-up. The control throws are shown on the plans and are set for aerobatics. The plane has little change in control authority from power to glide, so less throw could be used. Set it per the plans for test flights and modify to your taste. This plane can handle a fair amount of wind. I have flown it in 15-20 mph winds with no problems. This is due to a clean design and a wing loading of 14.8 oz. per sq. ft. I have been very satisfied with the performance of this design, both the aerobatics and the duration of the flights. This design utilizes inexpensive components to their best advantage. I keep the radio and motor battery on trickle charge constantly so the Electrocrow is ready in a moments notice. Build an Electrocrow and enjoy the ease and relaxation of electric flight!



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