THE ELECTRIC BEAVER

By STEVE GRAY. . . This electric flyer began as an enlargement of Walt Mooney's own Bostonian Beaver, as it appeared in the September, 1983 Model Builder. It makes a pleasing, easy-to-fly R/C electric project.

• There has been a recent trend that I've noticed to revive some of the rubber-powered and gas-powered old timer designs and install in them an electric power system and radio gear. These planes make for good Sunday fun flying. Their lightweight stick structures and ample wing areas with lifting airfoil sections make them perfect candidates for electric R/C. There are lots of potential R/C electric designs which could come from the ranks of these old time models but what about the new time rubber models? Bostonian and peanut scale models have the right structures and proportions which, when enlarged, make excellent electric R/C models. The choices of subjects are as endless as the Walt Mooney articles in *Model Builder* magazine.

One of these designs of Walt Mooney's was the basis for my Electric Beaver. It is a semi-scale design for a Bostonian Rubber powered model featured in the September 1983 issue of *Model Builder* magazine. I had built the actual "Bostonian Beaver" during the winter and only after I had finished it I began to wonder about enlarging it for electric R/C. Enlarging the Bostonian plans three times and extending the wing a bit gave me what I thought would be the correct size model. The Leisure gear drive (2.5:1) 05 system with a six-cell 1200 mah Sanyo pack was chosen as I wanted a no-fuss installation and a low investment. This was to be only my second electric model and I just wanted to take advantage of a proven flight system which I had seen in use in many of the models I had read about.

The author's Beaver, eagerly heading for the cameraman, comes in at 48 ounces. Power is from a Leisure gear drive 05 system, with a six-cell 1200 mah Sanyo battery pack.

I was also spurred on in the project by the fact that almost no one in our club had tried electric power and in fact, several members refused to believe that an electric model could have any kind of performance or be at all interesting to fly. I couldn't wait to prove them wrong so I got busy drawing the plans. I was also smart enough from previous experience to know that you're beat before you start unless you have lightweight radio gear.

I obtained a three-channel World Engines Mini Flight Pack with three S-22 servos to control the model. I found this flight pack to be excellent for my purpose and it performs flawlessly.

Now, if I have interested you enough to read on then clear off your work bench and I will try to describe to you my construction notes on the model. Remember

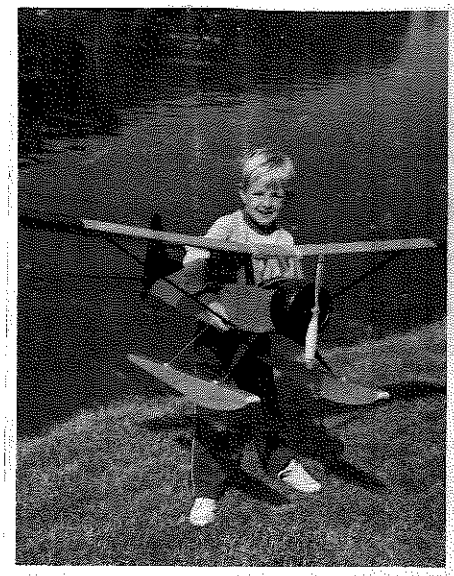
one thing as you go. Build light and resist the urge to improve upon the design with extra structure. It isn't necessary. Cyanoacrylate glue is used throughout.

FUSELAGE CONSTRUCTION

The fuselage is constructed by building two sides using 1/4-inch square medium hard balsa and spruce where called for. Pick light but stiff wood for this. You can use softer wood for the uprights but be sure the longerons are stiff. Cut out all the formers and glue the tail together. Crack the butt joints at the fuselage sides just behind the wing position (top and bottom) to allow the sides to angle back to the tail. Glue in F-3 and the fuselage cross members at the rear of the wing position (top and bottom). Be sure everything is square. Install the remaining cross members in the cabin area and tail. Use light wood for the cross members. Now crack the joints in the longerons at F-3 to bring the nose together and install F2A and F2C. Add the F2Bs and the instrument panel. Sheet the nose with 1/32-inch balsa. Install the 1/8th L.G. wire and the plywood tailwheel mount. Now build the battery door and associated structure if you want the added convenience of a drop-out battery pack. Otherwise, just reinforce the floor for the batteries. Install the wire strut mount and wing dowels. Sand the entire structure and prepare it for covering.

COWLING AND MOTOR MOUNT

If you use the Leisure system you can follow my directions for mounting the motor and gearbox. With other systems, such as the Astro Cobalt gear drive for instance, the mounting can be done similarly but the holes in the front of the cowl (C1) will have to be adjusted. Cut out C1 and C2 from 1/8th plywood and join them with 1/8 X 1/4 balsa pieces to form an internal cowl structure. The cowl itself is formed by vacuum forming a piece of 1/16th styrene sheet over a balsa plug. My plug was made by turning a balsa block on a lathe. The procedure for vacuum forming could be the subject of another article so I won't go into it. The cowl could also be easily built up from balsa or made of fiberglass as you prefer. The internal cowl structure / motor mount is then glued into the cowl. The motor and gearbox are separated and bolted back together on either side of C1. The nine cooling holes cut into



Scott Gray holds on to his dad's Electric Beaver on floats.

C1 are necessary to cool the flight systems and also simulate nine cylinders of a radial engine. The cowl is glued to the fuselage only after painting and covering both items.

TAIL CONSTRUCTION

The tail is constructed of 1/4-square balsa and is quite easy to build. Build it light and directly over the plan. Use a hard piece of 1/4-square balsa for the stab trailing edge to provide strength. The elevator horn is made from 1/32 brass sheet soldered to the elevator control wire and will be concealed within the fuselage when the tail is installed. I prefer to cover the tail and hinge it before installing it on the fuselage. I show no hinges as I used the Monokote method of hinging as per their video tape. You may use small plastic hinges if you prefer.

WING CONSTRUCTION

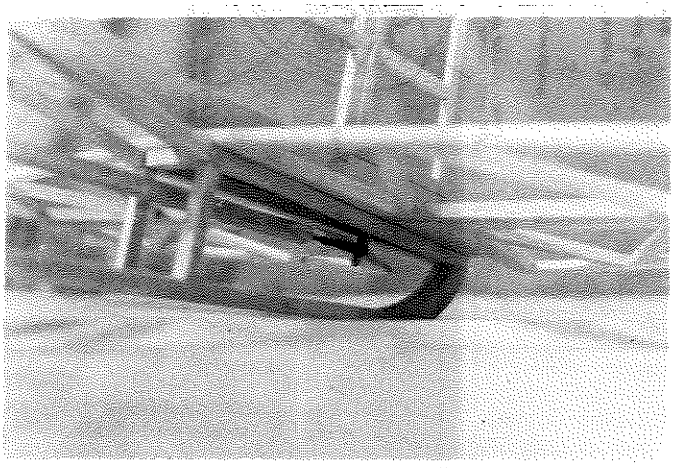
The wing is constructed conveniently. Use light wood (of course) and build it directly over the plan on a flat building board. Install the plywood dihedral brace after joining the wings with epoxy. Sheet the center section (top only) and add the tips and top spars after joining. Glue in the strut attachment wires and reinforce them with balsa blocks. Make the struts by streamlining 1/4 X 1/2 spruce and adding wire hooks to the ends. The struts attach with small bits of fuel line.

FINISHING

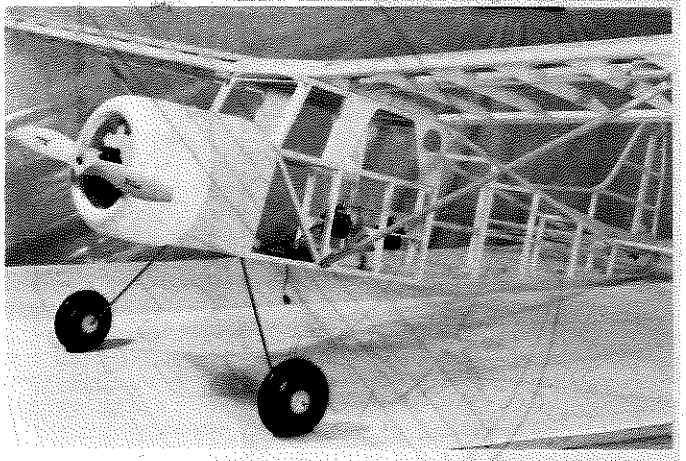
The model I built is covered with Solarfilm. It combines light weight with easy application and gives the structure the necessary rigidity. Other coverings can be used but remember the weight factor. The cowl was painted to match the Solarfilm and the registration numbers were cut out of black Solarfilm and ironed on. The windows were cut out of clear acetate and glued in place with R/C 56 glue. Thin trim lines were added to mark the ailerons, flaps and doors, etc. with Sig striping tape. Install the radio and flight system. A micro switch (also available from Leisure) was used with a servo on the third channel for motor control. You could use a good speed control or an Astro electronic on/off control if you have them but the micro switch system works well.

FLYING

My model weighs 48 oz. ready to go. If yours weighs much more than this, I recommend you use an 800 mah battery pack for the motor and a 100 mah flight pack battery to save weight. If you are still on the heavy side you had better consider a small gas engine. The Beaver flies well with a .20 cu. in. glow engine or similar. If you are close to my weight or less, then congratulations and let's go flying. My first flights were made with six 1200 mah Sanyo cells and a Rev-up stock 11 X 6 prop. This is adequate to fly the plane but once I went to a seven-cell pack I had the performance I wanted. I have also tried other props to see how things could be even further imrpoved. My best performance with a stock prop has been with a 12 X 6 Top Flite prop but by thinning blades and by taking some meat off prop hubs I have achieved even better performance. My plane will loop and roll and will do the prettiest touch and go's. It will R.O.G. from grass and has been very successfully flown off the water. The model is super stable and I would recommend it for anyone's first electric project. I hope you enjoy your Electric Beaver and I look forward to hearing thousands of little Electric Beavers whirring through the skies showing all those unbelievers that electric power is fun and practical. •



Tail up-close shows elevator control horn detail. Horn is made from 1/32 brass sheet soldered to the control wire.



Completely framed and with radio and motor installed, the Electric Beaver is a pleasing-looking little model.