

PHOTO: HAL DEBOLT

Bob Aberle, some 40 years ago (above left), poses with one of several deBolt *Live Wire Kittens* he had built since 1953. It had a 2-tube receiver and a McCoy



PHOTO: BOB ABERLE

.049 diesel. Now it's 1996, Bob is gray (above right), and his newest *Kitten* uses an electric motor, has a modern 4-channel receiver, and plastic covering!

# an electric replica of Hal DeBolt's **Live Wire Kitten**

By Bob Aberle

Once upon a time it was the R/C trainer of choice. The author gained his R/C wings with it and pays tribute to it with this remake. Takes an inexpensive Speed 400 motor.

If you are in your late fifties (or older) and have been in the model aviation hobby since school days, you will likely remember the little Hal DeBolt designed *Live Wire Kitten*. Hal kitted this plane under his company name of DeBolt Model Engineering Co., or DMeco as it was called, in 1953. The company back then was based in the town of Williamsville, N.Y., near the Niagara Falls area.

Just to back track a little: in the early fifties, the only form of R/C flying was done on the HAM radio bands. If you wanted to fly the primitive R/C systems of the day, you also had to study to obtain a HAM license. I'm going to guess, but around 1952, the FCC released a frequency of 27.255 MHz, which could be used, among other things, for the control of model aircraft (and boats as well). If my memory serves me correctly there was initially only one

channel assignment, although later some five or six channels were assigned in the 27 MHz band.

Although a permit was required from the FCC, no test was necessary. Almost overnight circuit designs began appearing in the magazines, authored by such famous people as Howard McEntee, Ed Lorenz, John Worth, and others. Several commercially manufactured R/C systems appeared at the same time, but for the most part it was buy the parts and build it yourself.

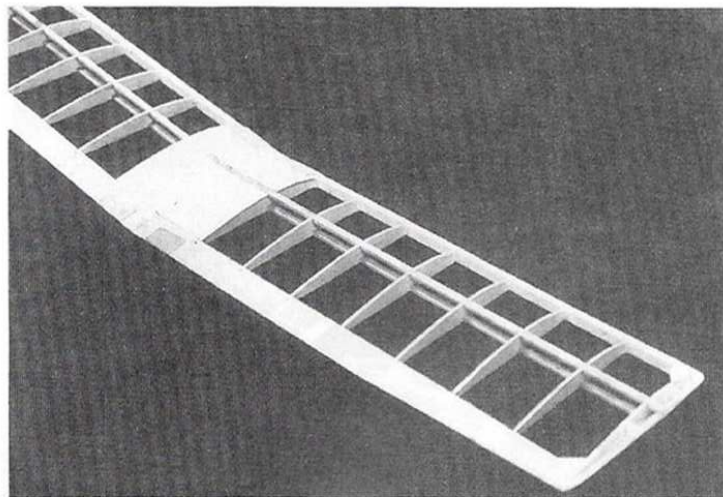
With the possibility of radio control systems now being in the hands of the average modeler, the next urgent need was for new aircraft designs that could explore the advantages of remote control by radio. In the 1952 and 1953 time period several popular designers of the day, who had been involved with freeflight and control line model designing, took up the R/C challenge. People

like Hal De Bolt, Lou Andrews, and Norm Rosenstock made it happen back in those days.

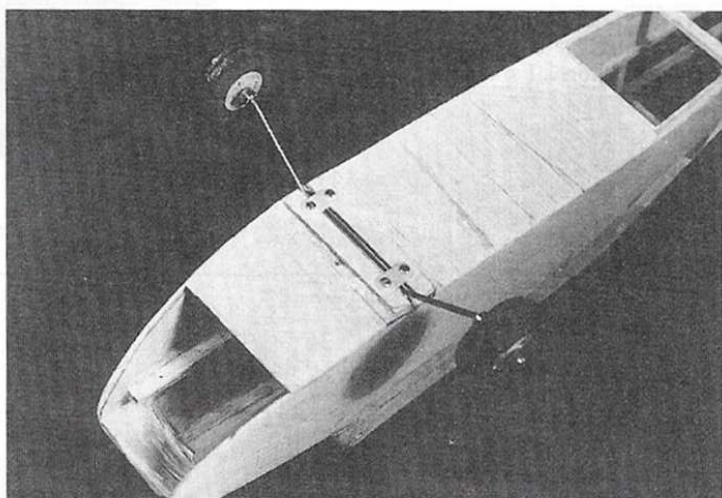
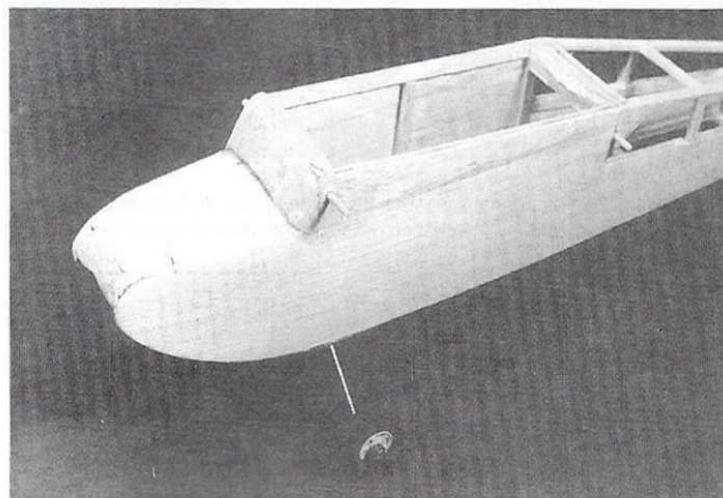
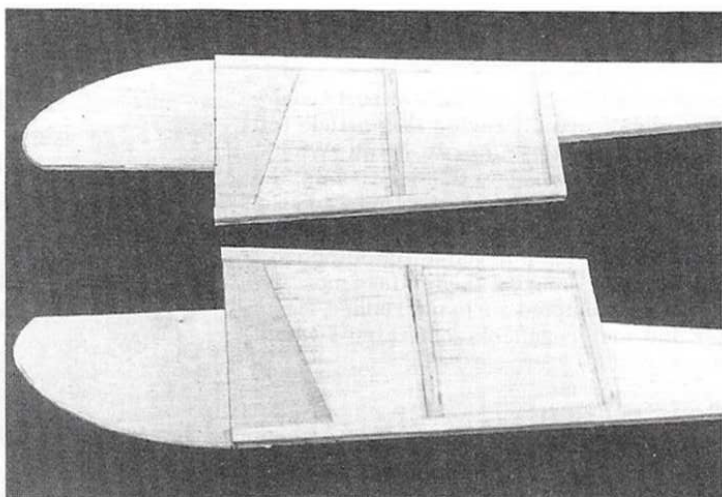
Probably the first successful R/C single-channel, rudder-only controlled model design to be mass produced in kit form was the Hal DeBolt designed *Live Wire Trainer*. I'd have to guess that thousands of these models were built and flown successfully. The typical radio receiver of the day consisted of a single hard or vacuum tube or a single gas tube. When the radio signal was "broadcast" from the transmitter, the plate current of the receiver tube circuit would change slightly (usually it would go down a few tenths of a milliampere). That change in current was just enough to cause a sensitive relay to open and close, thereby operating a small solenoid device, which was known as an escapement.

The escapement, in turn, was driven in a





Refined with newer materials and building techniques, Bob's *Kitten* (above left) uses top and bottom  $\frac{1}{8} \times \frac{1}{4}$  spruce spars in the wing. Doublers, made from  $\frac{1}{64}$  ply are used in the forward section (above right) of the fuselage. Very soft balsa blocks make up the front cowl and the windshield (below left). They can be hollowed out somewhat on the inside to save weight. Each of the gear legs plugs into a hardwood trunnion block (below right) and is secured with nylon brackets.



rotary motion by a twisted rubber band. Each signal from the transmitter, caused the escapement to rotate, providing rudder control in sequence, e.g., left, neutral, right, neutral, and so on. Radio system adjustments were critical, as were the relay contact adjustments. The batteries, which were not rechargeable, didn't last very long. And then you always had to worry about having enough turns in the rubber band to maintain rudder control for your landing. Despite all of these early problems, the DeBolt *Live Wire Trainer* with a small .09-.15 size glow engine was a very popular design.

By 1953 radio control technology of the day got a big lift from Mr. Ed Lorenz (who now resides in Ft. Myers Beach, Fla.). Ed developed a twin tube receiver that he published in the February 1953 *Model Airplane News* (I have Ed's autograph on my copy of that issue!). The twin tube concept allowed the second tube to be biased at essentially no current, without a signal coming in. When you keyed the transmitter, the first receiver tube's plate current changed slightly, but the second tube's current would jump up to 2 or 3 mA. That large increase in plate current made it possible to go to sub-miniature relays, without the need for any sensitive adjustments.

A full airborne system could then consist of a 1-ounce receiver, two 22½ volt hearing aid batteries in series for 45 volts for the plate or "B" supply. Two AA size pen cell batteries in parallel heated the tube filaments

and two more AA size pen cells, in series for 3 volts, operated the escapement. I'm going to guess, but the entire flying weight of that Lorenz airborne system was probably not more than 7 or 8 ounces.

With a very lightweight and reliable single channel R/C system now easily obtainable, the genius of Hal DeBolt went to work to produce the tiny (34-inch span, 220-square inch) *Live Wire Kitten*. My first R/C model in 1953 (age 15) was the Lou Andrews, Guillow *Trixter Beam*. By the end of 1953 I had my first (of many) Lorenz two-tube receivers built and installed in my first DeBolt *Live Wire Kitten*. The radio proved remarkably reliable for its day.

As a result, that first *Kitten* enjoyed several years of flying. It was powered, as were all of my *Kittens*, with a McCoy .049 diesel. Total weight, as I recall, was very close to that specified on the plans, namely 18 ounces. A typical flight lasted about five minutes. The motor would run about 4 minutes and if you had a little altitude, you generally got another minute or so gliding in for a landing. Despite the rudder only control, the *Kitten* could be spun down to gain speed, after which the application of opposite rudder would produce a couple of "high speed" loops. With rudder only, and non-proportional at that, you always had to anticipate your control application. Of course, you also had to keep in mind whether right or left was the next control in sequence. But we managed in those days and we also had fun.

### Modern day Kitten

Back around 1957 I built my last *Live Wire Kitten*. I was 19 at the time and already working in the defense industry, while attending college at night. During a lunch break a fellow worker took several color transparencies of me with my *Live Wire Kitten*. I've kept those color photos for close to 40 years, looking at them every once in a while, with the thought that it would be nice to revisit the *Kitten* some day.

Well, a little over a month ago I pulled out my copy of the original plans and began to construct another *Live Wire Kitten*. I might tell you that the plans and die-cutting tools for most of the DeBolt original kits are now owned by Don and Ron Wilson of Easy Built Models (PO Box 425, 210 Walnut St., Lockport, NY 14095). I spoke to Ron at the recent WRAM Show and he was thrilled with this revisit project. Ron did indicate that some day he might possibly produce kits once again for the *Kitten*. But in the mean time, he had no objection to anyone building a version to the updated plans contained in this article.

As you must all know by now, I have pretty much settled on electric power models exclusively. So it was only natural to make this new *Live Wire Kitten* electric powered. Who would have thought 40 years ago of this possibility and the fact that it could be so inexpensive and yet so practical.

The *Kitten*, as you see it portrayed in this article, is about as close to the original in size and structure as possible. I wanted to



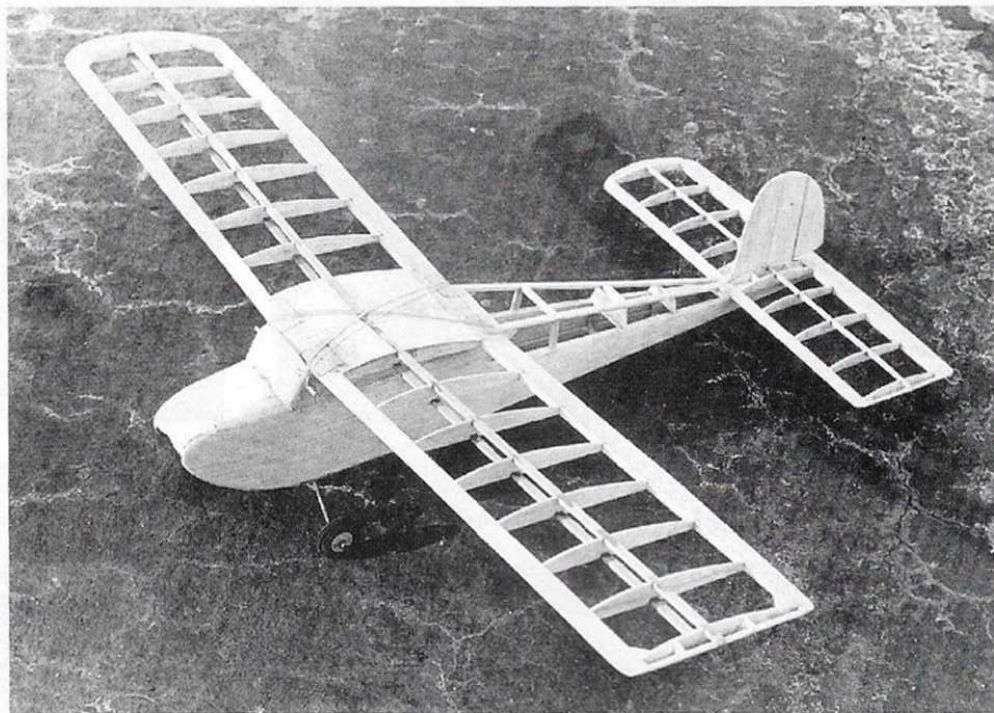
# Live Wire Kitten

preserve all the original lines as best I could. The photos accompanying this article tell the structure story in great detail. What I will try to do is explain the finer points, the details of the electric power system and the radio system and its installation in the "new" *Kitten*. Keep in mind that although I wanted to be a purist, the limits of most flying fields prompted me to use rudder, elevator and motor control (something I would have loved 40 years earlier!).

## Construction

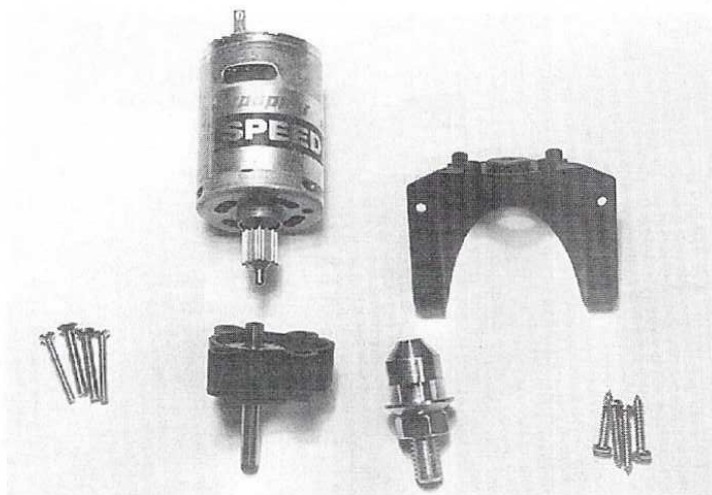
I felt it would pay to use a very thin  $\frac{1}{64}$  ply doubler on the inside nose area of the fuselage. The bottom fuselage sheeting ends by the trailing edge area of the wing. Aft of that point, out to the tail, is strictly the iron-on covering material. The stab is cemented in place. The elevator is one piece so that a joiner was not necessary. Both the rudder and elevator hinges are made from the covering material. To connect the servos and the control horns I simply used .025 inch diameter wire as a pushrod, supported by pieces of yellow inner Sullivan Gold N' Rod tubing. Just spot these small lengths of tubing with CyA cement to scrap balsa support pieces.

You will note that the single, lower wing

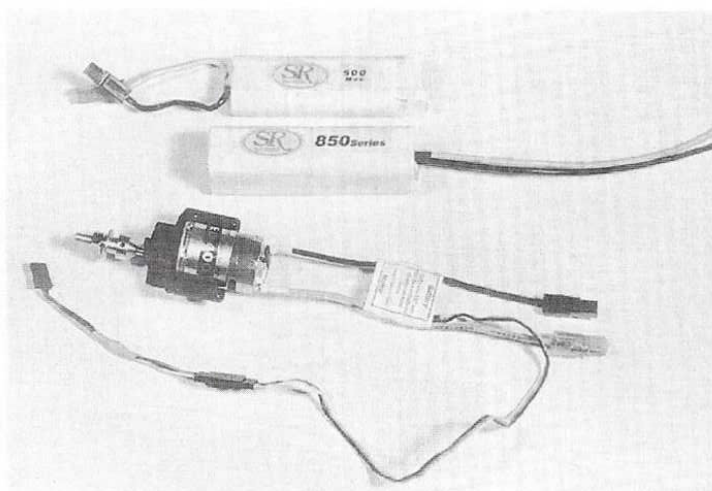


Despite materials and techniques, Bob's contemporary *Kitten* has the same basic structure as the original model designed by Hal deBolt back in 1953. The *Kitten*, back then, was the first mass-produced R/C kit.

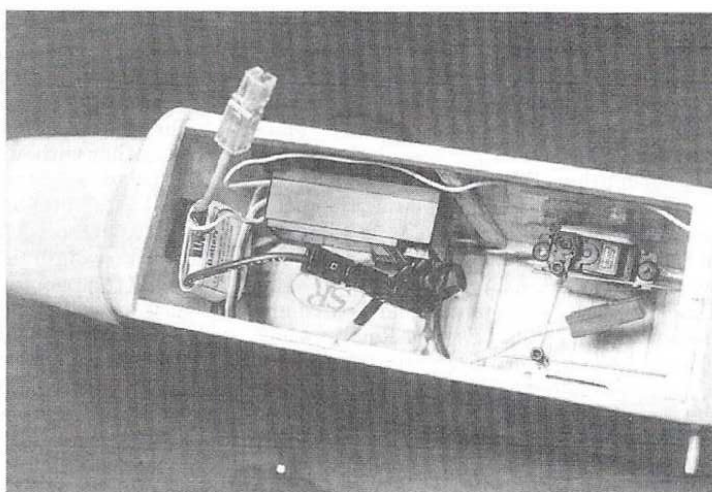
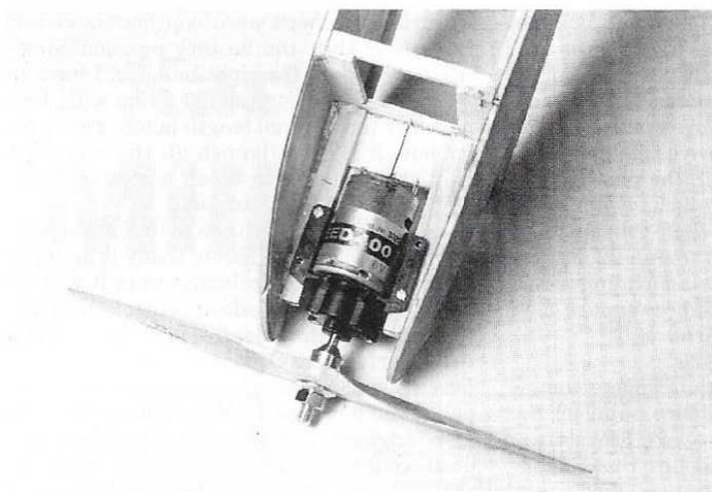




In the modern *Kitten*, the motor is a Speed 400 with a Graupner 1.8:1 gear box, shown unassembled (**above left**). Note the separately purchased prop adapter. At the top (**above right**) is the SR 7-cell 500 Max pack, and below it the SR 7-



cell 850 pack, along with Lofty Pursuits LPSC mini speed controller attached to the motor. Here (**below left**) the motor and gear box are attached to the ply tray. Hook and loop fasteners attach the receiver and speed control (**below right**).



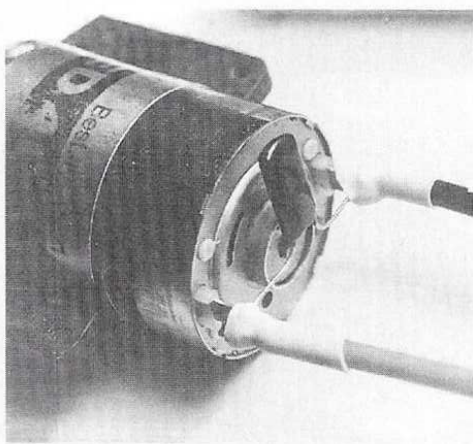
spar on the original has been replaced by a top and bottom spar, made from  $\frac{1}{8} \times \frac{1}{4}$  spruce. This turned out so strong that it wasn't even necessary to add shear webs between the spars. The very heavy leading and trailing edge stock of the original design was duplicated here. It provides for a very strong wing.

The original landing gear was a piece of flat aluminum, that was bent to shape. I remember how that used to flatten out during rough landings years ago. So for this application I employed two lengths of  $\frac{3}{32}$  inch wire, bent as indicated on the revised plans.

All of my original *Kittens* were silk covered and doped. This updated version took the easy approach. The wing and stab were covered in red transparent Solarfilm, while the fuselage and rudder were covered with regular opaque yellow Super MonoKote. The *Live Wire Kitten* decal on the wing was custom made for me by my friend, Clyde Geist, who operates as AMP Graphics Inc., 24A Nancy St., West Babylon, NY 11704; phone 516-253-2702. What Clyde was able to do was scan the logo directly off the original plan sheet. Then this data was fed to his computer where a two-color (yellow with silver trim) decal was produced. That's about as authentic as you can get. I'm sure Clyde has this particular decal stored in his computer so that additional orders can be filled.

## Electric system

We have been doing a lot of experimenting of late with the popular Graupner Speed 400 motors to power  $\frac{1}{2}$ A size models. Generally these would be models ranging in size from 200 to 300 square inches with total weights in the range of 20-25 ounces. For my new *Kitten* I ended up with a Speed 400 motor with the 6-volt winding and a Graupner 1.8:1 gear box. This gear box is designed



Any radio interference from motor brush noise will be suppressed by the Radio Shack .01 MFD capacitor installed across the motor terminals. The heat shrink tubing helps strengthen the connector joints.

expressly to fit the Speed 400 motor and at the same time provide a convenient set of beam mounting lugs. All it takes are four No. 2 sheet metal screws to anchor the motor in position. Motors and gear boxes can be obtained from both Hobby Lobby and from Kirk Massey at New Creation R/C, PO Box 496, Willis, TX 77378.

The choice for an electric motor speed controller was the tiny Lofty Pursuits LPSC-Mini that I reviewed in my April 1996 FLYING MODELS "Digest" article. The address for Doug Ingraham of Lofty Pursuits is 2274 Aster Ct. Rapid City, SD 57702. It is attached to the front fuselage former (F-1) with hook and loop fasteners. This little controller handles up to 10-12 amps of current and six to ten cells, has a BEC circuit that eliminates the need for a separate receiver battery pack and has a microprocessor that prevents accidental motor start-ups. All of this in a less than one-ounce package. Remember also that this speed controller will provide full proportional control of the electric motor or even stop it entirely.

Hook up for the speed controller is easy, but will require some soldering on your part. First, I like to place a small filtering type capacitor across the two motor terminals. A Radio Shack part No. 272-1065, which is a .01 mF capacitor of 50 WVDC rating, works just fine for most applica-



# Live Wire Kitten



Bob's new *Kitten* sports a bright yellow and red Solarfilm heat shrinkable covering (above left). Total weight of the model, with an SR 500 pack comes to 20

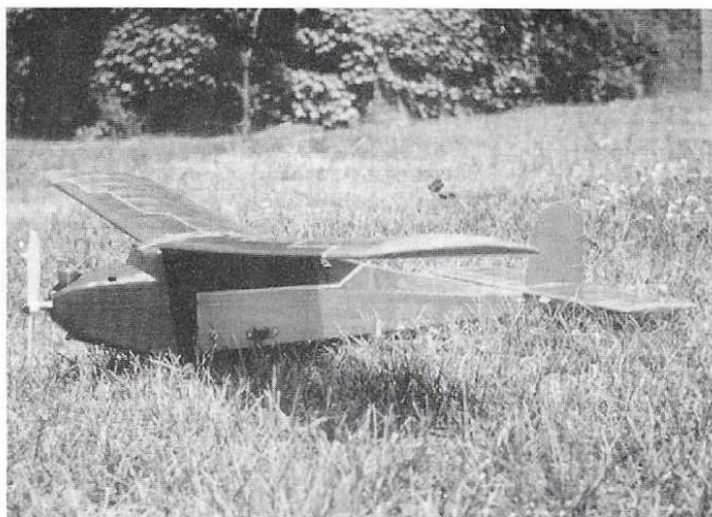


PHOTO: HAL DEBOLT

ounces. With the 850 pack, it's 22.5 ounces. In contrast Bob's *Kitten* of 40 years ago (above right) used a classic silk/dope finish.

tions. Solder the two wires coming from the speed controller, marked "Motor" to the motor terminals. Because you are using a gear box, the polarity must be reversed (red wire goes to the motor negative terminal, black wire goes to the positive terminal with the red dot marker). To the two wires (red and black) marked "Battery" you must attach a set of Sermos connectors. The mating half of these connectors must be on your battery.

Best prop for this motor/gear box combination turned out to be a 9-4 Rev-up which draws about 10 amps from an SR 7-cell 500 MAX battery pack. (SR Batteries address is PO Box 287, Bellport, NY 11713). That pack weighs exactly 4.9 ounces and will power the *Kitten* for about 3½ minutes at full throttle. I have also used an SR 7-cell 850 pack which only adds about 1.5 ounces weight to the model, but provides close to a 5-minute motor run, more if you are throttled back for part of the flight.

## Radio system and final weight

My choice for an R/C receiver was the Airtronics four-channel dual conversion micro (model No. 92745). Like the speed controller, it is attached with hook and loop fasteners, in this case to the inside of the fuselage, just forward of the c.g. Two different micro servos were used in this application. One was a Futaba S-133 and the other a Hitec HS-80. I removed their respective connectors and installed Airtronics connectors enabling them to be plugged into the receiver. Quite often I will mix and match R/C components to make do with what I have on hand. The servo lead coming from the LPSC-Mini controller plugs into the throttle port of the receiver.

You will notice that I didn't use a switch harness, charging jack or fuse in this installation. My normal start-up procedure is to first charge the batteries. I do this with the wing removed, since I don't feel it is worth the extra effort to construct a removable hatch cover to access the battery. I then turn on the transmitter first, with the throttle stick in the low or off position. Next the 7-cell battery pack connectors are mated inside the fuselage. At that instant the servos will both "chirp" slightly. Moving the rudder

and elevator control sticks should confirm that the radio is operating. Using three rubber bands on each side, attach the wing to the fuselage. You are now ready to launch.

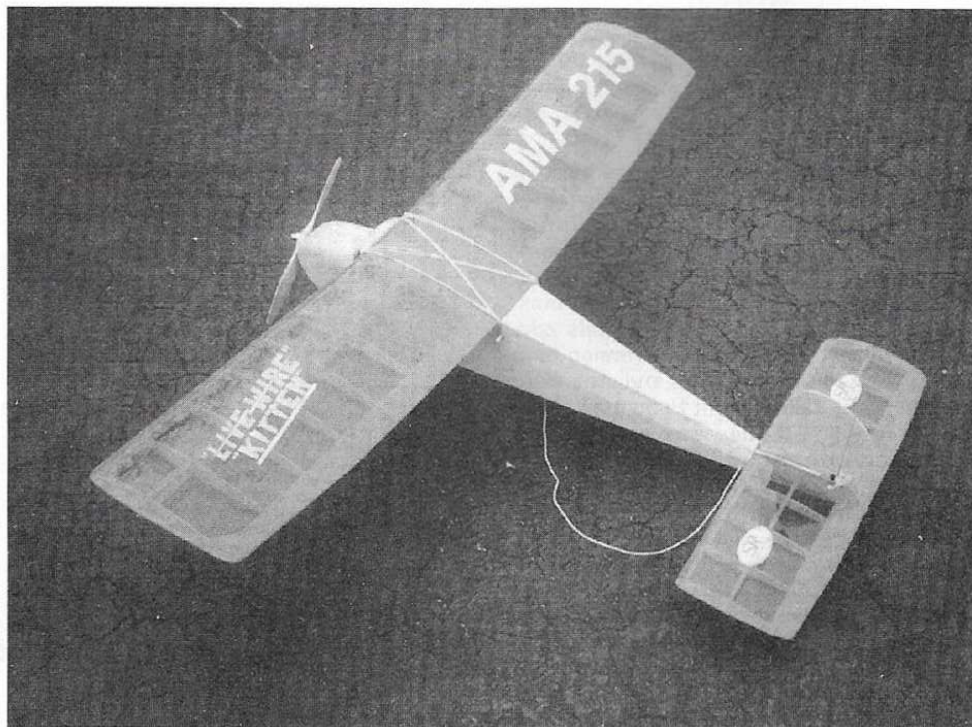
The final weight is an area most authors don't bother with and it drives me up a wall. The *Kitten*, as you see it in the photos, with the SR 7-cell 500 battery pack, weighs a total of 20.5 ounces. On the SR 7-cell 850 MAX pack the weight is just about 22 ounces even. At that weight the wing loading is still a very respectable 14.5 ounces/square foot.

## Flying hints/summary

Try to locate the battery in such a way as to achieve the proper balance point on the model (at the main wing spar). I used hook and loop fasteners to anchor the battery pack to the floor of the fuselage. Part of the battery actually projects through a clearance hole in the lower portion of former F-1.

By using the hook and loop fasteners you can easily shift the battery position somewhat to get just the right balance. I have to admit that the 9-4 prop I'm flying with does not clear the original length landing gear. So for now it is hand launch all the way. You may also on occasion break a prop on landing because of this situation.

An alternative might be to find a 9-4 folding prop. Flying the *Kitten* today is actually more fun and more relaxing than it was 40 years ago. With the added controls of elevator and motor throttle, this is a totally docile little performer. Of course, if you are not into electric power you could easily install one of the new Cox Hobbies Tee Dee R/C 05 glow engines, along with a throttle servo. That would certainly provide some very impressive performance. Either way I hope you enjoy your *Live Wire Kitten*, whether it be your first time or a revisit as in my case. ☺



If you're looking for a simple model to scratchbuilt, then the *Kitten* is an excellent choice. It took Bob just under a week to do his. Wing area, by the way, comes to 220 square inches.