Spirit of SAM Electric Models

by Dave Harding

Most models we see in SAM RC assist competitions are Antique and Old Timer IC powered models, but recently the advent of lightweight affordable RC gear and electric propulsion has opened the field to models that were originally rubber powered. There are now three such events; Spirit of SAM, Electric Wakefield and Electric Unlimited Rubber. All of them are rapidly gaining popularity with SoS leading the way.

The author's Electric Wakefield, left and Spirit of SAM, right, versions of Jack North's 1939 Wakefield depicted in the book "Flying North" by Martin Dilly. Those darned fragile bamboo landing gear have been removed for this picture.

Spirit of SAM is for any pre 1943 rubber model powered by any electric motor with a NiCad battery weighing no more than 45 grams. It is flown as a Texaco event where you may run the motor at any power level at any time; starting and stopping is allowed. And that is it; the rest is up to you; model size, motor/gearbox/prop, radio gear and the specific battery design; number and type of cells.

The model must be capable of ROG but Eut Tileston, the event's sponsor, usually flies it as a mass launch where hand launch is allowed, but you may be asked to prove it is capable of ROG.

Spirit of SAM competitors at the 2006 SAM Champs in Las Vegas.

As with any Texaco event, you are trying to fly your model as high as possible in the powered flight so you have the longest glide time. With electric

propulsion this may be accomplished by a series of climbs and glides so the model will stay in sight. You may choose to “punch and coast” at full throttle or just cruise-climb to altitude; your choice.

So, with a fixed battery weight your first challenge is to find the NiCad cells with the highest energy density; milliamp hours per gram, but then you need to configure a 45 gram pack from them. The battery of choice seems to have stabilized on four Sanyo (or Harbor Freight) AAA 350 mah cells. If you are careful in the packaging and use very short leads, these will come in under weight.

The next decision is the model size and wing loading. All other things being equal the lightest model will climb to the highest altitude and the lowest wing loading will allow for the lowest rate of descent. Of course there are other factors! But the weight factor is real and competitive models come in at about 4.5 ounces. At the last four SAM Champs the competitive models are all about 150 square inches in area although at two of these competitions these models had difficulty staying up-wind. So, like with all competition models, you must decide what weather conditions you are aiming for and use the 150 square inches as a baseline.

You may build your model much as you would for a rubber model, same wood and covering etc. The differences are in provisions for a motor mounting and battery installation. Of course you will need to make an operable rudder and elevator too. I will discuss these later.

Next you need a motor/gearbox and propeller to power this model with the four cell pack. Several competitors use the GWS indoor motors; I use the GWS 4.8V LPS RLC Light Power System (GW/LPS-RLC-CS). This one is a C with the 6.2:1 gearing. Basically, you can trade gear ratio and prop sizes, just like number of strands of rubber. Some like big props and others small ones there is not much difference in this range and I use a GWS 7 x 6 prop.

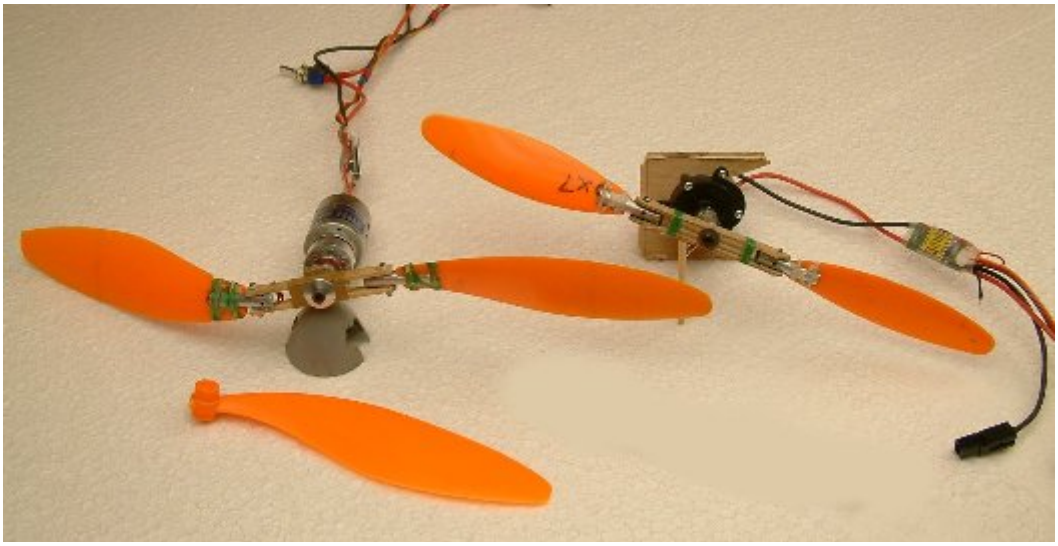
The SoS GWS motor of choice. Note you must use the 4.8 volt motor with the four-cell battery.

Following back from the motor you will need a speed controller, known as an ESC. It must be capable of handling the motor current and the operating voltage. The ESC will allow for radio system power to be drawn from the power battery and will shut down the motor when the battery voltage has dropped to a low level, allowing for continued control in the glide.

The GWS 100 E controller will handle five amps and operate down to 3.6 volts, it weighs five grams. It also has a brake so you will get clean folding if you choose to make a folding prop for

superior glide. I have made them for my Electric Wakefield where the event is for a limited high-powered motor run with a prolonged glide.

Unlimited Rubber power system on the left and a Wakefield on the right. Both feature folding props using GWS blades.

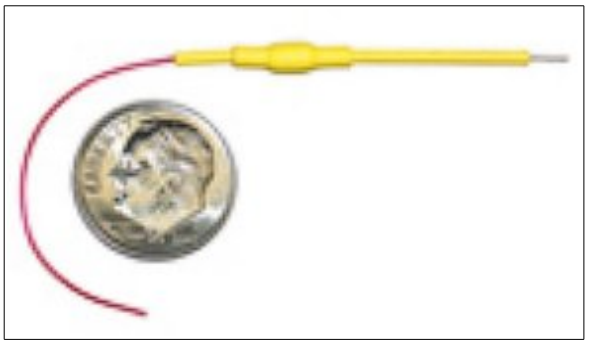


Now the radio gear; receiver and servos need to be really light, and fortunately there are many excellent inexpensive choices. For receivers you could use the ubiquitous GWS Pico but they are prone to interference in mass launch situations, although some people use them. My preference is the Berg Microstamp 4, now being made by Castle Creations. It weights under five grams and operates well in noisy environments.

The Berg Microstamp 4 sub five gram radio receiver

Most of our equipment operates on the 72 MHz band so the antennae tend to be 39 inch trailing wires, however, Azzar, at E-Cubed makes some superb small lightweight loaded antennae small and light enough to be completely contained within the fuselage; recommended!

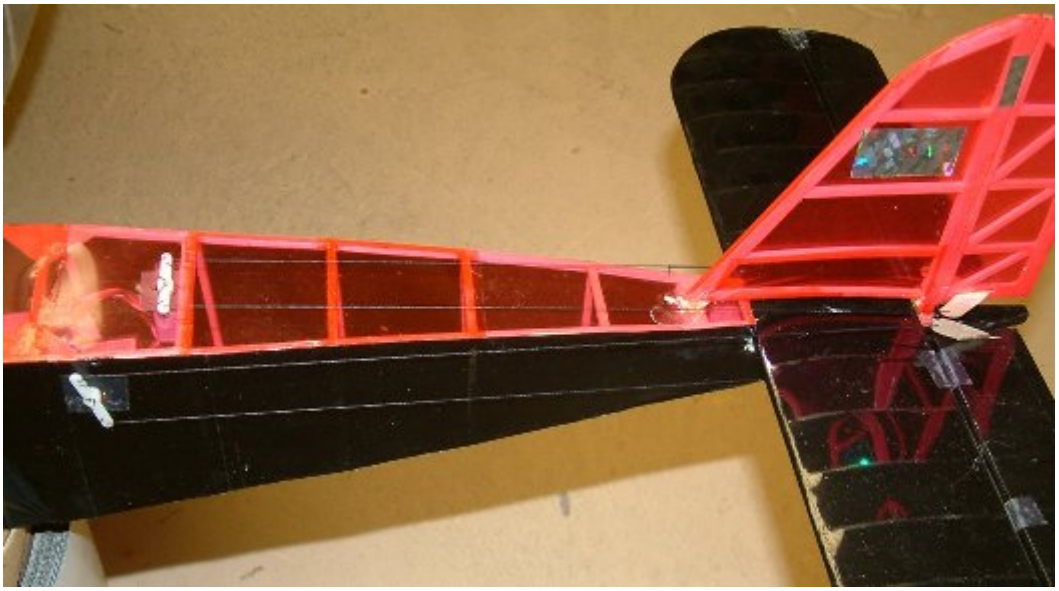
Azzar's minature antenna



Many people now make inexpensive sub five gram servos, some under four grams. Make your own choice; you will need two; rudder and elevator.

I like to make my models with a hatch under the belly through which I can access the battery and receiver. I mount the receiver and servos on 1/16 inch sheet strips glued within the fuselage framework. The Receiver is held in place with a small patch of Velcro.

I prefer pull-pull controls for these models because it is the lightest way to drive the surfaces. The servos are mounted by gluing them to the 1/16 strips such that the control horns protrude through the covering; just like the WWI airplanes.

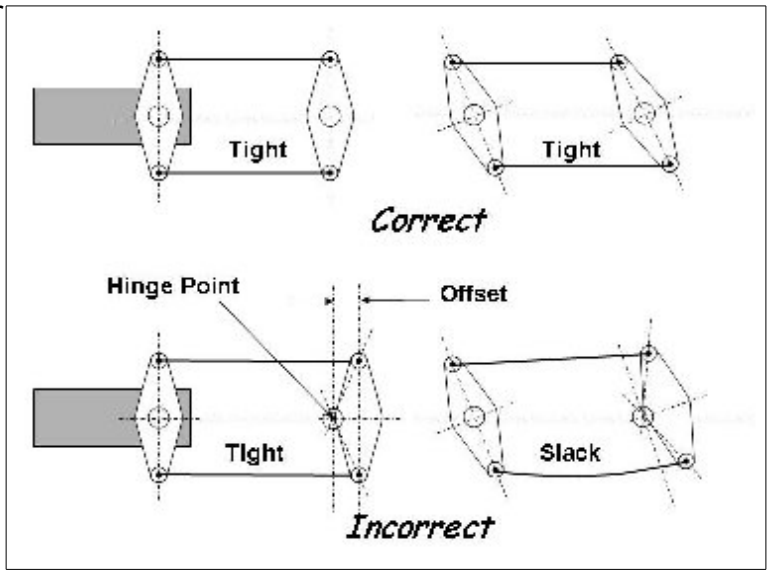


Pull-Pull control of rudder and elevator.

By the way, I have found that a half elevator, operating on just one side, to be entirely satisfactory and it solves several problems with rudder-elevator interference and elevator half joints etc. The picture shows the controls for my Wakefield. I use 1/64 ply horns and carpet thread for the control materials. Please note that with pull-pull controls you should make the attachment points in line with the hinge, otherwise the threads will go slack or tighten at control extremes.

I mount the battery with Velcro onto a lower fuselage platform. You must ensure that the heavy battery landing loads get distributed into your airframe structure, and don't overly reinforce just one area because you will make a stress raising failure point.

The GWS motors mount either to a round dowel or screwed to a bulkhead. Either way you need to accommodate them into the nose structure, of course with the usual down and right thrust.



So there you have it, a simple rubber model with Park Flyer hardware for fun competition. Why not build one this weekend? Or maybe you have a real rubber model you want to convert.

Here the author launches for the 2004 SAM Champs mass launch in Muncie. This ended ten seconds later with disorientation and disaster! However, the model was repaired and has taken second place at Eloy AZ and the 2005 and 2006 Champs.

Dave Harding

An excellent source for all of the motor and radio gear mentioned in this article is BP Hobbies Piscataway , NJ , 732-287-3933

Source for light compact antennae; Azzar's E-Cubed; http://www.azarr.com/ 937.849.0418

The Sanyo batteries may be obtained from Batteries America; 800-308-4805 The cells you need are; KR-350AAAEC make sure you get the AAA cells.