P. O. Box 1303
Monticello, MN 55362

The Wright Flyer

WEBSITE: WWW.JOELD.NET/WFRC

VOLUME 20 ISSUE 3 | AMA# 4143 | MARCH 2006

NEWSLETTER OF THE WRIGHT FLYERS R/C CLUB

Meeting Highlights

On Tuesday February 14th, the Wright Flyers held the monthly membership meeting at the Monticello Middle School. This was the fifth monthly meeting of the winter season at the school.

The business meeting was called to order at 7:15 PM by President Scott Leiferman. There were 11 members present including four club officers. The secretary read the minutes of the January meeting and they were accepted as read.

A treasurer's report was given with the current treasury balance as of the start of the meeting of $4424.42, after cutting a check to the AMA for $150 to cover the 2006 club charter and flying site insurance certificates.

Joel Dirnberger brought in two items that were obtained from the Café Press web site with our club logo on them. One was a coffee mug, the other was a clock. Joel offered them as door prizes at the meeting. Jeff Munsterteiger also brought in a $5 gift certificate from Hobby Warehouse to use as a door prize. The members at the meeting voted to give the mug to Wayne VanDenBoom who missed the meeting because he just returned home from the hospital after surgery that will put him out of commission for a month or more. The clock was drawn by Ron Bredeken (see photo) and the Hobby Warehouse gift certificate was drawn by Garth Landefeld.

Joel Dirnberger gave an update on the club web site (www.joeld.net/wfrc/) that he had volunteered to put together and maintain. Scott Leiferman contributed a CD of photos to put in a page of the site. Leo Davids also contributed some photos and an updated members' radio frequency use chart along with the current bylaws for posting on the web site.

The next meeting is scheduled for **7:00 PM** on Tuesday, March 14th, 2006. It will be held in room 30 of the Monticello Middle School.

Garth Landefeld announced that the president of the Maple Lake EAA chapter would like to attend a club meeting in the future to become familiar with our organization and present some of the things their EAA chapter does for aviation related functions. There might be some activities that could be fostered by a cooperative effort of both organizations. Garth was authorized to extend an invitation to the EAA chapter president to one of our meetings.

Leo Davids presented some information about the Xcel Nuclear Power Plant that our field is adjacent to. The plant is currently trying to get a permit for a spent nuclear fuel storage facility on their site. They are holding public hearings, one of which was held in Monticello. This kind of facility shouldn't effect our flying site, especially if their preferred location between the plant and Highway 75 is approved. They do have an alternate location beside the weather tower which is about 1200 feet west of our field.

Leo Davids asked if anyone has solicited a quote from Carefree Lawn Service to mow the field this season. A quote was mailed to the club from the

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owner of Carefree with a proposal to do a complete mowing as needed on 72 hour notice for $135 per time (no minimum number of mowings required). None of the officers of the club had invited a quote. There will be no response to the quote since Garth Landefeld has agreed to continue mowing for the same price he charged last year.

The meeting was adjourned at 8:15 PM

Show and Tell

Scott Leiferman brought his latest project, a Great Planes Ultra Sport 40 which he had built from a kit. He is powering it with an OS 70 four-stroke. Scott also has mechanical retracts on the main gear.

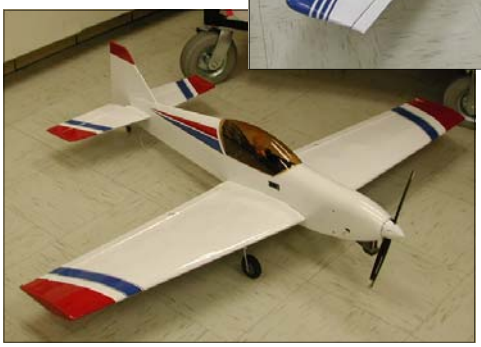
Jeff Pederson brought in a Byrons Sukhoi that he had rebuilt after a crash. It has fiberglass fuselage and foam core sheeted wings. Jeff is interested in selling the plane without radio or engine.

Rich Johnson brought in his newly acquired helicopter, a JR with a 33 Webra engine. He has put radio gear in from his Futaba 7CAP radio along with a Futaba GY-401 gyro. Rich also had a aluminum carrying case he got at Wal-Mart to use as a 2-transmitter carrying case.

John Kossieck brought in his miniature electric shock flier which he powered with one of his custom built outrunner brushless motors. The plane flies nicely on a 2-cell Li-Poly and is a rocket on a 3-cell pack. John has also built a double stator version of the little outrunner on his mini-shock flyer. That one is hoped to make a really hot propulsion system for a flying wing that John would like to get to the century mark in air speed.

Joel Dirnberger brought in one of the most anticipated pieces of R/C hardware that has come out this past year. He just purchased one of the Horizon Spektrum DX6 radio systems. Their main claim to fame is that you don't need to have any concern for frequency conflict with other R/C pilots whether they fly with this radio or the current 72 MHz types. This first generation of a spread spectrum technology radio is in the 2.4 GHz band and automatically finds open frequencies among 80 channels in that band. Typical RFI noise and interference that troubles the 72 MHz band is not a problem either. These initial radios only have 100 milliwatt output which makes them suitable for park flyer aircraft performance and range. The radio has 6 control channels and helicopter modes. Virtually all of Joel's fleet is the park flyer variety so he expects to be able to put the new radio to lots of use.

Jeff Pederson's Sukhoi



Scott Leiferman's Great Planes Ultra Sport 40

Below: Rich Johnson's helicopter

Basics of Electric Flight

I really enjoy getting together with clubs and speaking to the group about the basics of electric power. However, because there is so much information that needs to be passed along, it would be difficult, if not impossible, for those attending to remember much of the pertinent information. For that reason, it's better to write up the basic guidelines so that those who are interested in getting into electrics would have the information available for reference at a later date.

Here goes. I'll keep the numbers as simple as possible to avoid unnecessary confusion.

OK, here's how it all shakes out. The basic power required to fly an electric model is as follows:

Direct Drive Systems	60 watts/lb
Gear Drive Systems	50 watts/lb
Mild aerobatic performance	70-80 watts/lb
For all-out aerobatics	100-110 watts/lb
3-D performance	150 watts/lb or more

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The above numbers are based on models with wing loadings from 8-16 oz/square foot. As with gas models, higher wing loadings require more power since they must fly faster to support the added weight. By the same token, a lightly-loaded model with a wing loading in the 3-5 oz/square foot range will fly very well at 25 -30 watts/pound.

What's a 'watt'; and where can I get some? Wattage is the term used in electric flight to relate the level of power that an electric drive system will produce. To relate it to terms we're familiar with, 746 watts = 1 horsepower. To calculate the wattage delivered by a given system looks like this: amps x volts = watts. So where do these numbers come from and how do I know how many volts and amps are needed to fly a given model?

Okay, let's say you want a mildly aerobatic sport model with a 14 oz/square foot wing loading that will weigh in at 2 pounds. We already know that the power requirement for a model like this is about 70 watts/pound, so we're going to need to generate about 140 watts. Let's assume that you are going to use an eight-cell Ni-Cd battery. At 1.2 volts per cell, eight cells will deliver 9.6 volts. To arrive at the necessary current draw to achieve 140 watts, simply divide 140 (watts) by 9.6 (volts) and you arrive at 14.58 amps.

Now, let's assume that you have a three-cell Li-Poly battery for the model, which is rated at 11.1 volts. The formula is the same; 140 (watts) divided by 11.1 (volts) = 12.6 amps. As you can see, as the available voltage increases, the lower the current draw needs to be to deliver the necessary wattage.

Now here's something to consider when selecting your system: the higher the current draw, the shorter the flight duration on any given battery. Therefore, the ideal setup would be to use a higher-voltage battery with lower current draw for maximum duration. On the downside, when using Ni-Cd and NiMH batteries, as the cell count goes up, the weight will increase significantly as well. It works that way with Lithium too, but Lithium batteries are dramatically lighter then the old "round" cells.

Okay, let's say we're going to use an 11.1 volt Li-Poly battery. All we need to do now is select a motor that will swing enough propeller at 12.6 amps to fly the model at a top speed of around 40-45 mph and we're in business. Now that you know the parameters, visit your local hobby shop and select a motor that fits that description.

Gear Drive vs. Direct Drive: Why is one better then the other?

Well, it all depends on the kind of performance you're looking for. If you're looking to go fast, go with direct drive. Going fast requires a high-pitch propeller turning high rpm. The formula to calculate propeller pitch speed is an easy one; it looks like this:

rpm x pitch (in inches)/1056 = mph

Let's say that you are turning a 7-6 propeller at 14,000 rpm. 14,000 x 6 = 84,000/1056 = 79.55 mph

Now, let's assume you are setting up a slow, relaxing park flyer with about a 5 oz/square foot wing loading. If we swing a 9-7 propeller at about 3,500 rpm, we'd be looking at a top speed of roughly 23 mph. To swing that much propeller with a small, light drive system, we would use a gear drive unit at a very low current draw and a small, light battery.

Again, to make a known comparison, we can relate all this to riding a 10-speed bicycle. A gear drive swinging a big propeller is like riding your bike in low gear. You pedal like mad with little effort, you don't go very fast, but you can climb steep hills with ease. The direct drive system could be compared to riding the bike in high gear. It'll really go fast, and even though you're pedaling slower, it requires considerably more effort.

What all this boils down to is "propeller disc loading." We all know what wing loading is: it's the amount of the model's weight that each square foot of wing must carry. Prop disc-loading works the same way. A large propeller will be more lightly loaded, thus delivering more torque then a smaller propeller turning high rpm. The tradeoff, of course, will be speed.

One more thing to cover and we'll give you a rest. Batteries are rated in "voltage" and "amperage." Voltage dictates the amount of power the battery will deliver. The amperage rating dictates for how long the battery will deliver that power. To relate that to glow fuel, consider the voltage as nitro content. High voltage (nitro) means more power. The amperage is related to the quantity of fuel, or simply the "size of the tank."

To figure the size of battery needed, let's go back

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to our 140-watt sport airplane. If we're pulling 14 amps from a 1400 mAh (1.4 amp hour) battery, we will have full power duration of five to six minutes. In the real world, with proper throttle management, you'll see flight times of approximately eight minutes. These are common flight times, even with liquid-fueled models.

To arrive at that number, divide the battery amp rating by the current draw: 1.4 (amp hours)/14 (amps) = 0.1. Then take 60 (minutes per amp hour) x 0.1 = 6 minutes. Now, to double the duration, you must either cut the current draw in half (to 7 amps), or double the battery size (to 2800 mAh or 2.8 amp hours)—again we see tradeoffs. To reduce the current draw, we can use a larger, higher-pitch propeller turning slower with very little weight penalty. If we double the size of the battery capacity, the weight penalty is quite high unless we go over to the new Lithium batteries in which we will discover we have benefited from a tremendous weight reduction, but at a higher price then conventional batteries.

Okay, I promise I'll quit before we all end up in "system overload." Once again, there's a tremendous amount of information here for a newcomer to electrics to digest, so let's do this: if you have specific questions about setting up an electric model, please feel free to drop me a line and I'll do what I can to steer you in the right direction. For now, I'll offer up one last piece of advice. To get started, work with a known good design, and use the recommended equipment that has been proven to work. Talk to the people who are successful and copy what they're doing. The one thing I do know about modelers is that they are always willing to share their knowledge with those interested in what they are doing.

From the Albuquerque Radio Control Club,
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