

# R/C Sportflyer May, 2004

**Next Meeting at Stamm Field – Thursday, May 6 @ 7:00 p.m.**

## **Club Officers**

### **President**

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### **Secretary and Newsletter Editor**

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Send newsletter information and items for sale or wanted to the newsletter editor. He's almost always home after 9:00 PM or call his work number, 913-624-2570, it has a recorder, or send via Internet.

**Club Web Site:** [www.rcsportflyers.com](http://www.rcsportflyers.com)

The Radio Control Sport Flyers fly from Stamm Field, located near the south-east corner of Longview Park, operated by the Jackson County Parks Department. For information about the Parks department, visit their web site at: <http://www.jacksongov.org/rec.shtml> For the calendar of parks events: [http://www.jacksongov.org/rec\\_ce.shtml](http://www.jacksongov.org/rec_ce.shtml)

**Notice: We will be meeting at Stamm field in May.** We didn't discuss this at the previous meeting, so please pass the word to others when you see them. Thanks, Walt

## **Minutes of April 1, 2004 Meeting**

We had 20 members at the meeting.

The minutes of the last meeting were approved.

The treasurer's report was approved, with the change to the published report that \$116.09 should have come from the general fund for the mower, not 93.59 as was in the newsletter.

### **Old Business:**

**Helicopters:** There was discussion about flying helicopters at the field. They will be allowed. Rather than trying to capture the essence of the discussion, if there are questions, bring them to a club officer.

**Parks:** Bernie had received a letter from Joe Cygan giving the results of the last meeting with the Parks department. They will be replacing the trees at the field. An order has been placed with the contractor. GPS coordinates will not be put up at the field because of there being multiple methods of establishing GPS coordinates. The \$5 event fee has been waived for all special events such as our fun-fly. Gary Silva has also asked the clubs to have a static display at the June 26<sup>th</sup> Lake Fest. The Parks Department is also considering allowing quiet flight (gliders, electrics, etc.) from 7 to 9 am. This is in addition to the current hours.

**Mower:** George sold the old mower for \$150.00, after advertising it in the paper.

### **New Business:**

**Mower Fund:** A motion was made and passed to abolish the mower fund. This will make the Treasurer's job much easier.

**Training:** Dennis Tschirhart will be heading up this year. Training starts April 6<sup>th</sup>.

**Air Show Team:** Dennis Tschirhart reported that there was going to be tryouts for the team on April 25<sup>th</sup>. 2004 AMA membership is required. Although it's after the 25<sup>th</sup> when you get this, if you're interested, check with Dennis.

**Club Hats:** A motion was made and passed to spend up to \$200 for club hats. They'll be any color you want as long as it's that light gray, if I remember correctly.

**Delta Darts/Static Display:** The club will be doing this event at the church on November 10<sup>th</sup>. Hans talked with the church after the meeting and has the date firmed up.

**Raffle Prize:** Cliff Miller won the Great Planes Slot Machine. Dennis Tschirhart won it at a previous meeting and donated it back to the club.

**Show and Tell:** Claude had a DeHavilland Otter that he bought on E-Bay 2 years ago for \$30 in kit form. The entire fuselage is built up from 1/4" square sticks. The "kit" was just a bag of balsa with plans. He has a .91 4-cycle on it.

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Mike Krogh had a micro electric model with a 3-channel micro receiver and galvanometer servos. He considers it the opposite extreme of Over-Kill!

Joe Schield had a GSW Slow Stick. He added ailerons on a new wing he built from fan fold foam.

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### Treasurer's Report

<b>Beginning Balance</b>	<b>\$ 936.49</b>		
<b>Income</b>		<b>Expenses</b>	
Dues	\$ 50.00	Newsletter Postage	\$ 11.47
Raffle Prize	20.00	Church Magazine Subscript.	12.00
Lawn Mower Sale	150.00	Fertilizer for Field	76.01
		Wash Mower	1.50
		Lawn Mower Ad	5.25
<b>Total Income</b>	<b>\$ 220.00</b>	<b>Total Expenses</b>	<b>\$ 106.23</b>
			<b>Ending Balance \$ 1,050.26</b>

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### Calendar of Events – Models

<b>May 6</b>	RCSF Club Meeting – At Stamm field
<b>May 8</b>	RCSF Club Fun Fly
<b>May 22</b>	Big & Small Fly-in, Barnstormers
<b>Jun 3</b>	RCSF Club Meeting – At Stamm Field
<b>Jun 5</b>	RCSF Open Fun Fly
<b>Jun 19-20</b>	KCRC Annual Pattern Contest
<b>July 1</b>	RCSF Club Meeting – At Stamm field
<b>July 3</b>	RCSF Club Fun Fly
<b>Aug 5</b>	RCSF Club Meeting – At Stamm field
<b>Sept 10-12</b>	KCRC 50 <sup>th</sup> Anniversary Fly-in
<b>Sept 23-26</b>	US Scale Masters Championship – Gardner Airport
<b>Sept 25</b>	RCSF Club BBQ
<b>Oct 2</b>	Harvesters Fun-Fly Benefit
<b>Nov 10</b>	RCSF Static Display and Delta Darts at the church

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### Calendar of Events – Full Scale

<b>June 19-20</b>	WWI Replica Fighters Fly-in, Gardner Kansas
<b>June 25-26</b>	Vintage/Antique aircraft fly-in, Gardner, Kansas
<b>July 3-4</b>	Kansas City Aviation Expo, includes USAF Thunderbirds, Downtown airport
<b>July 27 - Aug 2</b>	EAA annual bash, Oshkosh
<b>Sept 4</b>	National antique aircraft fly-in, Blakesburg, Iowa

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**Club Shirts:** Dave Walter is coordinating the purchase of club T-shirts. If interested, call him at 816-350-1862. They cost \$10 and come in white or gray.

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The following is from the EZone web site (<http://www.ezonemag.com/>). If you haven't been there, check it out. It's one of the most reputable electric sites on the web. Because of the size of the article, I'm splitting it across two newsletters.– Walt.

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### A Controlling Interest - August 2003

By [Bernard Cawley](#)

August 21, 2003

Before I get started, I need to mention something I should have in the last installment (last December!). I wrote about MGM ComPro controllers and mentioned that I had some Kontronik stuff to feature in the future. Both of these product lines are available in the US from Northeast Sailplanes ([www.nesail.com](http://www.nesail.com)). Sorry about that, Sal.

This time I want to tie together this column and the last (and next) Recurring Charge, as the hot topic of conversation for some months now has been lithium-based batteries, in particular lithium-polymer cells. Lithium batteries have unique charging needs, which I talked about in the last Recurring Charge (and will talk more about in the next Recurring Charge).

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They also have some different needs when it comes to speed controls specifically where they are used to power our radio systems from the ESC. Both the low voltage cutoff (LVC) function and the battery eliminator circuit (BEC) function are affected by the differences between nickel-based and lithium-based battery characteristics.

First of all, lithium-based batteries are much less tolerant of being deeply discharged than nickel-cadmium or nickel-metal-hydride batteries. While the details seem to vary a bit from manufacturer to manufacturer, all say that lithium batteries should not be discharged below a certain set voltage. If they are, then permanent damage to the battery is said to occur. To take Kokam lithium-polymer cells as an example, the technical data as posted on the FMADirect web site (see [https://www.fmadirect.com/support\\_docs/item\\_1080.pdf](https://www.fmadirect.com/support_docs/item_1080.pdf)) cautions that they must never be discharged below 2.5V per cell measured under load, and they recommend that a low voltage cutoff be set to 3V per cell in order to be sure that the damage threshold is not crossed.

The practical result of this is that for a two-series-cell lithium-polymer battery (which is normally used to replace a 7 cell nickel-based battery), the LVC should kick in at 6V. This is higher than the LVC value of most ESCs on the market today. Granted, most (but NOT all) LVCs are set to something between 5V and 6V and so they should be safe for two-cell lithium-polymer packs as the voltage would theoretically never go below the 2.5V per cell under load limit. The operative word here is should. There are some choices that allow you to be sure which I'll get to in a minute.

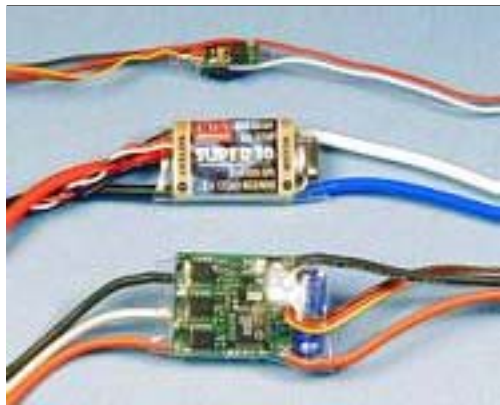
For a three-cell lithium battery, the cutoff would have to be set to about 9V in order to be conservative. For this sort of application all fixed-cutoff ESCs I know of will cut off at far too low a voltage. Even those that set the cutoff voltage as a function of the cell count (again, thinking nickel-based cells), such as the Jeti brushless units, usually set it at about 0.7V per cell. Since a freshly charged 3 series cell lithium battery has a little higher terminal voltage than a freshly charged 10 cell nickel battery, the resulting cutoff setting of around 7V will still be too low.



These 11.1 volt Lithium Polymer batteries should NEVER be discharged below 9V (unloaded) or 7.5V (loaded). Shown are a Thunderpower 3s4p 1950mAh (total 7800 mAh) and Kokam 3s 1200 mAh packs

At the moment there is only one line of controllers that I know of which is lithium-ready in the sense that the low-voltage cutoff can be programmed, and which has cutoff values that work well for two or three-cell lithium batteries. These are the programmable controllers from Castle Creations the Pixie-7P and -20P and the Pegasus-35P for brushed motors and the Phoenix series of controllers for brushless motors. These all have a choice of a 6.0V and 9.0V cutoff that can be selected by programming.

I know that FMA Direct is working on a line of ESCs with features tailored to the use of lithium-polymer batteries as well and I have a sample in hand of one for 30A or lower brushed motor applications, but as of yet haven't put power to it. It is supposed to self-set the LVC value depending on the type and cell count of the battery being used. I plan to report on that unit in the next column.



Three lithium-aware ESCs. From top to bottom, Castle Creations Pixie-7P, FMA-Direct SC-30 and Castle Creations Phoenix-25.

Recently I did some flying of a Wing-E on two lithium-polymer cells with a Castle Creations Pixie-7P set to cut off at 6V. Set that way, it seemed to cut off while there was still some life left in the battery. But these controllers also have the option to use a soft cutoff similar to that of the MGM ComPro controllers I discussed in the past two columns. The combination of 6.0V and the soft cutoff, which reduces power in order to maintain the selected voltage, looks ideal for two series lithium cells. Recently I've been flying my LiPoly-powered airplanes with Pixie-7Ps (and in one case a Phoenix-10) set to 6V and soft cutoff. This works very well indeed.

I have also been flying three-cell packs in my Mountain Models Dandy and Dandy Sport. At the moment both airplanes have Astro 010 brushless motors in them. I have set the cutoff of the Phoenix-10 to 9V and soft and find that this is quite reasonable for the batteries. Amazingly, the airplane still has enough power to loop and roll even when I can hear the cutoff engaging, but I know it's time to land and that I'm not drawing the batteries too low I like that.

The other area where lithiums present a challenge to currently available ESCs is in the voltage capability of BEC circuits. Two lithium cells in series have about the same voltage as seven nickel cells in series, so there is no problem there. But three lithium cells, as I noted above, are more like 10 1/2 nickel cells, and 10 cells is the rated upper limit for the BEC regulators in many (not all) small controllers. Some are only rated up to 8 cells. (For a refresher on why this is important, please take a look at the [October 1999 installment of A Controlling Interest](#).) Right now all I can suggest for using a BEC on three-lithium-cell power systems is to select an ESC that is rated for at least 10 cells, and then not to push the servo count. Also, make sure the linkages and hinges move freely. That said, I'm soon going to put a Phoenix-10 in a four-servo airplane, but the plane has generous provisions for cooling the ESC (the Mountain Models MiniFlash) so I hope it will be OK.

As I discussed in the [last Controlling Interest](#), one solution to having a BEC on a high cell-count or in a high-current application is the Kool Flight Systems UBEC, but at least for now, when most lithium-powered planes are pretty small, the UBEC is kind of big and bulky. I've suggested to Kool Flight that they think about making a smaller, perhaps more limited in capability version of the UBEC for three or four cell lithium-powered flyers, but I don't know what the status of that project is at the moment.

As lithium battery technology matures for our use, I am sure we will see more and more products, including electronic speed controls and add-on BEC units, which will be tailored to work with their characteristics.

#### **Featured Controllers: New brushless controllers from Jeti: the Advance series and the Jeti 04-3P**

As I alluded to at the end of the last Controlling Interest, Mr. Jelen and Mr. Tinka at Jeti have been busy expanding their line of brushless speed controllers. First, there is a new line called the Advance series that is in between the familiar gold-label series and the ones Jeti makes for Hacker (the Master series) in capability. This series currently has four members: 40A and 70A-rated units for 6-12 cells with BEC and for 6-16 cells with no BEC but an optocoupled signal. And, they have added a new tiny member to the gold-label series, the 4A rated Jeti 04-3P.

#### **Jeti Advance Series**

The Advance Series of controllers are a step up in features over the gold series, adding two timing choices and the option to have a soft motor cutoff once the low-voltage-cutoff threshold has been reached. Currently they are available in 40A- and 70A-rated versions, both in 6-12 cell BEC versions and 6-16 cell optocoupled versions.

Physically they are much the same as their gold-label counterparts the same size and weight, with the same leads and connectors supplied. The only visual difference English instruction sheet, at least as comes with units from Hobby Lobby, is a little easier to follow than some of Jeti's earlier information as well.



The first of the new features that I'd like to discuss is the soft motor cutoff for when the LVC threshold is reached. Those of you who have read my writeups of the MGM ComPro controllers in prior columns (or, for that matter, the little JMP-7 controller for very small planes) know I like that sort of cutoff for the planes I fly. In the Advance series, Jeti have implemented a soft cutoff that you can select indirectly. What they did is this: if you enable the prop brake, you get the hard cutoff (motor is cut when the LVC threshold is reached). If you DISable the brake, then you get the soft cutoff (power is reduced to maintain voltage above the LVC threshold value).

At first I was disappointed that it was tied to the brake this way, but after thinking about it a bit I have come to see the logic of what Mr. Jelen and Mr. Tinka did here. The place you don't really want a soft cutoff is in a plane that has a good chance of being in a thermal when you reach the cutoff point. In such a plane you may not be able to tell that the power is fading and run the risk of running the battery down too far. Coincidentally, you would normally want a folding prop on such a plane, which needs a brake to help the prop fold. So brake on hard cutoff; brake off soft cutoff. It makes sense after all.

The LVC threshold voltage is the same on the Advance series as with the red and gold Jetis 0.7V per cell or 5.4V. I admit that I didn't actually check the cutoff threshold in the unit I've been flying, but it doesn't seem to be cutting in too early.

The second new feature is a choice of two timing selections. One is sort of general purpose for motors like the Megas and Phasors and Aveoxes. It is the same setting as timing mode 2 in the Hacker Masters. The second timing setting (the same as timing mode 4 on the Hackers) is most suitable for high pole-count motors such as most external-rotor types. In particular it works well with the Model Motors AXI family of motors and gives a noticeable performance boost over the less aggressive timing setting.

Finally, the controller lets you know what mode it is in if you power it up but don't immediately run the motor up. If you wait for a few seconds after the arming tone(s) (one for brake on, two for brake off), then you'll get another series of tones a single beep indicating soft timing or a double beep indicating hard timing. I really appreciate not having to reprogram the controller just to be sure what mode has been selected. With this one it tells you the status of both selectable options when you power it up.

I've only static tested the Advance 40-3P a little bit it behaves just like the red-wrapped gold-labeled versions with the exception of the timing setting. Response is smooth and slightly damped, with loss of signal handled quickly and gracefully.

However, I have been flying an Advance 40-3P for several months behind a Model Motors AXI 2820/10 in my JK Aerotech Big-T. The controller has been performing just fine and as I mentioned above, with the timing in the hard setting there is a performance boost (at the cost of some duration) over the MGM ComPro controller I'd been using before. I've had quick starts the right direction without fail, and no nuisance shutdowns in flight. The soft low voltage cutoff works so smoothly that I can't tell it's working at all, which is exactly the way I like it.

Overall, the Jeti Advance controllers are a nice evolutionary improvement over the gold-label units for only a small increase in price. If you're looking for a sensorless controller in the 40-70A range, the Advances are well worth considering