

the

Ampeer

March	The EFO Officers	2006
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Ampeer subscriptions are \$10 a year US & Canada and \$17 a year worldwide	The Next Meeting: Date: Thursday, March 2 Time: 7:30 p.m. Place: Rick Sawicki's 5089 LedgeWood Ct. W., Commerce Twp	

What's In This Issue:
May E-meet Announcement - Adding a Balance Connector to a Li-Poly Battery Pack - Why Discharging Li-Poly Packs To 2.5 V/CELL May Not Be a Good Idea/Kopski - More On Early Li-Po "Death" - RaidenTech Long EZ - Small Magnet Source, B-17 Power Update & More - The February EFO Meeting - A Quick Note About the Aero Ace - Upcoming E-vents

May E-Meet at Midland RC
The Midland R/C Modelers Club
Presents our First Annual All Electric Fly
Saturday, May 20, 2006
MRCMC Field, 200 Patterson Rd.
Midland, MI

Midland, MI 48640
989-832-2785
or
Jerry Hanfeld, asst. CD
920 Scenic Dr.
Midland, MI 48642
989-631-1168
email: hahufeld@juno.com

Pilots' Meeting: 10 a.m.
AMA Members Only
No Landing FEE!
Paved & Grass runway
Free camping w/electric outlets
TX Impound
Friday Arrival Encouraged!
Lunch Available
Possible Events:
All Up/Last Down – Limit 1 minute motor run
Possible Zagi Combat, depends on turn out

Contact
John R. Hoovener, Sr. CD
1105 Ashman St.

Thanks from Ken

I want to thank all you who take the time to write up a little something for this newsletter. It is such a pleasure to be able to publish your thoughts and projects. Without you, the readers and contributors, this would be just another "club" newsletter. Thanks to all of you through all of these years for making this so very much more!

As I write this, it is the first of February 2006. The Electric Flying Organization (EFO) was started in February 1988, a long time before the "Electric Revolution". I would like to thank all of the EFO members, past, present and future for all of their contributions and future contributions and support of electric powered flight.

Adding a Balance Connector to a Li-Poly Battery Pack

By Jim Yuzwalk jjy@pop4.net

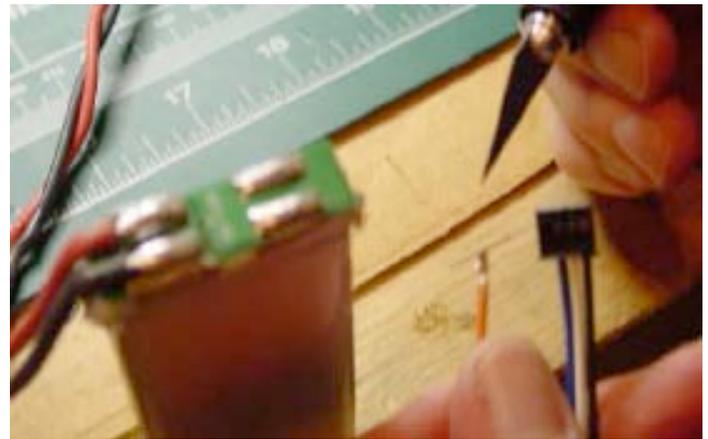
This information is being provided for those who feel that they have the necessary skills to do it properly and are willing to take the risk of damaging an expensive Li-Po pack. As in handling all battery packs, care should be taken to see that no cells are shorted, which could cause a fire or personal damage. The plastic bag that the cell is enclosed in is quite thin and easily punctured, extreme caution must be used with "sharp" and "hot" objects in close proximity to these cells! KM

First, a few words of caution. In all of the following steps, it is advisable to work with a Li-Poly battery that is in a state of discharge, cells discharged to 3.0 volts, to minimize mishaps. The greatest threat to personal safety is in regard to creating a short circuit while performing any of the following steps. **If you are not adept at soldering, you should not proceed.**

Thunder Power style balance connectors can be purchased at Todd's Models <http://www.toddsmodels.com/Lithium/thunderpower.htm>. They are relatively inexpensive. *(They are the type of balance connector used in this article. KM)*

Step 1 – Preparing the balance connector

If you are modifying a two-cell pack you will only need three of the balance connector's four leads. In this case, remove the orange lead from the connector by using an X-acto knife with #11 blade to lift the connector's plastic retainer tab to remove the orange wire's pin.



Step 2 – Preparing the pack

Again, ensure the pack is reasonably discharged before proceeding. Then carefully remove the outer shrink-wrap that surrounds the Li-Poly cells. **Be extremely careful to not puncture the Li-Poly cells while doing this.**



Step 3 – Soldering the balance connector to the pack's circuit board

Once the pack's circuit board is safely exposed, you can prepare the balance connector for soldering. Again it is extremely important to not create any cell-to-cell shorts while performing this step. As a precaution, do not strip the insulation off of more than one lead at a time – i.e., strip one lead, solder it to the pack's circuit board and then strip the next lead and solder it... In this way short circuits, by a stray bare wire, are minimized. Also be extremely careful while soldering. After all, solder is a great conductor, so pay particular attention to where your solder wire is at all times. You must also be careful to not create any solder bridges while soldering.

The balance connector's leads should be attached in the following order: (*For TP type connectors. KM*) black, white, blue, and orange. The black lead being the most negative lead, and the orange lead being the most positive lead with a three-cell pack. The blue lead will be the most positive lead with a two-cell pack.

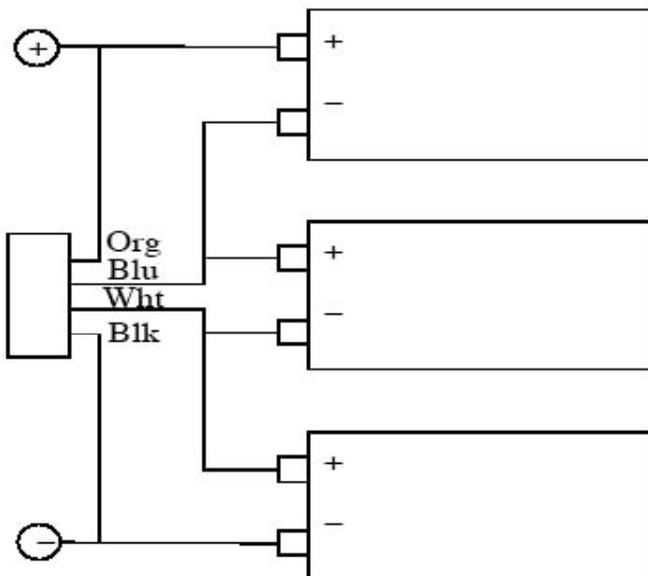
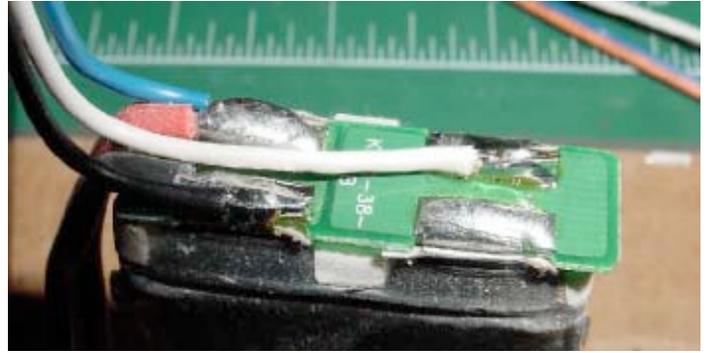


Figure 1 – Balance Connector Wiring Diagram

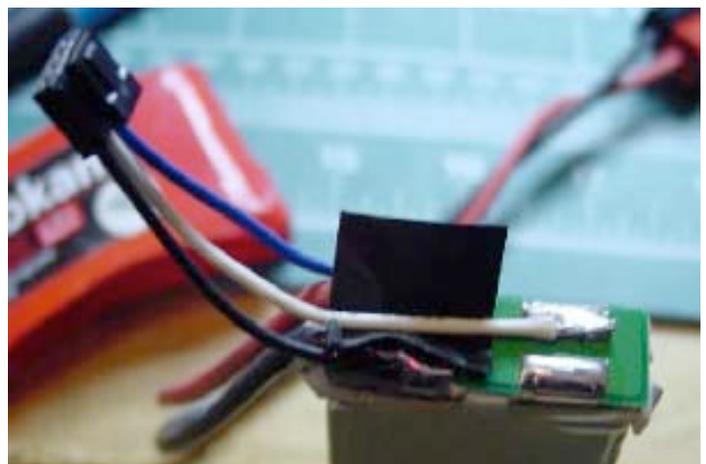
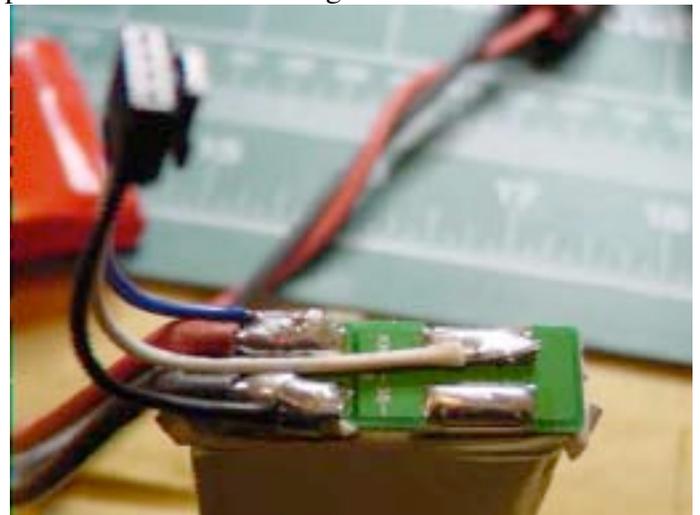
First prepare the black lead by cutting it to length (approximately three inches). Then strip off approximately 1/8 inch of insulation from its end.

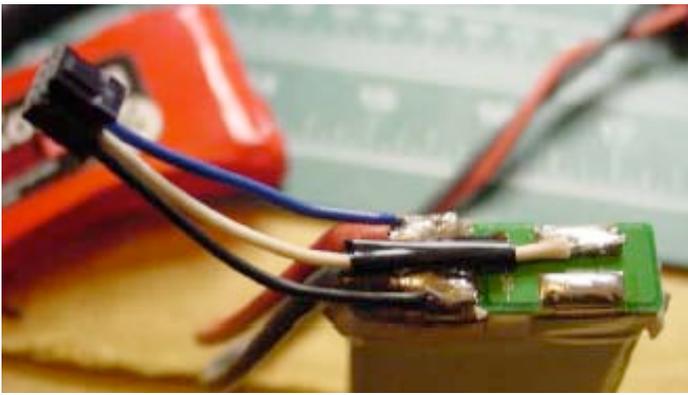
Attach the black lead to the pack's negative terminal (the one with the black lead already attached by the manufacturer).



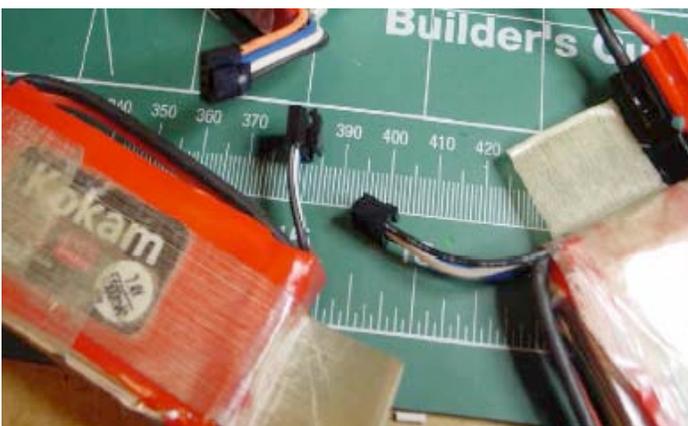
The next lead to prepare and solder is the white lead. It is attached on the circuit board where the most negative cell is connected to the next cell (see figure 1).

Proceed in like fashion with the rest of the leads. With a two-cell pack, the blue lead will be soldered to the circuit board where the pack's positive lead, typically red, is already connected; with a three-cell pack this will be the orange lead.





Here are some views of the finished packs. In the top photo, I included a Thunder Power pack for reference. I used fiberglass reinforced packing tape to re-wrap the packs in their original protective coverings. In the photo on the bottom, you can see fiberglass tape pull-tabs on the two cell packs. These tabs can make removing the packs from a model airplane much easier. Best of all, you don't have to pull on the wires to remove the pack, just pull on the tape.



Why Discharging Li-Poly Packs to 2.5 V/CELL May Not Be a Good Idea - and Related Thoughts

By Bob Kopski

25 W. End Dr.

Lansdale, PA 19446

In the February '06 *Ampeer* I described some costly and disappointing experiences I've had with some Li-Po packs. Specifically how my over \$500 "investment" in 3-cell 3.2 AH 20C and 2.0 AH 15C packs has been going down the drain. Not only were all six packs notably below their capacity description from the start, but also these packs appeared to be "dying on the shelf". Basically, they went from "not good" to "worse" in several months of relatively little use. At the same time or longer, other Li-Po brands did no such thing.

Following that discussion, I took particular interest in one 3.2Ah pack - the one that was labeled "C" in the referenced discussion. This pack displayed 2.55 AH when "new" and 2.49 Ah more recently. These were the results when tested at a menial one-hour rate using my CBA. (Incidentally, I have always conservatively set discharge limits to 3.0 V/cell with both my CBA and all my ESC's.) And - to my best recall - given how lousy this pack was from the start - it was never flown - a \$125 pack I did not want to use.

Since the February *Ampeer*, I decided to dig into this pack to learn more. I already knew these were assembled with a cell-interconnecting PC board on one end of the pack, so it was relatively safe and easy to access the individual 3 cell connections.



I had previously built and experimented with a balancer circuit and now applied it to this pack. One set of 3 curves shows the response of this pack -

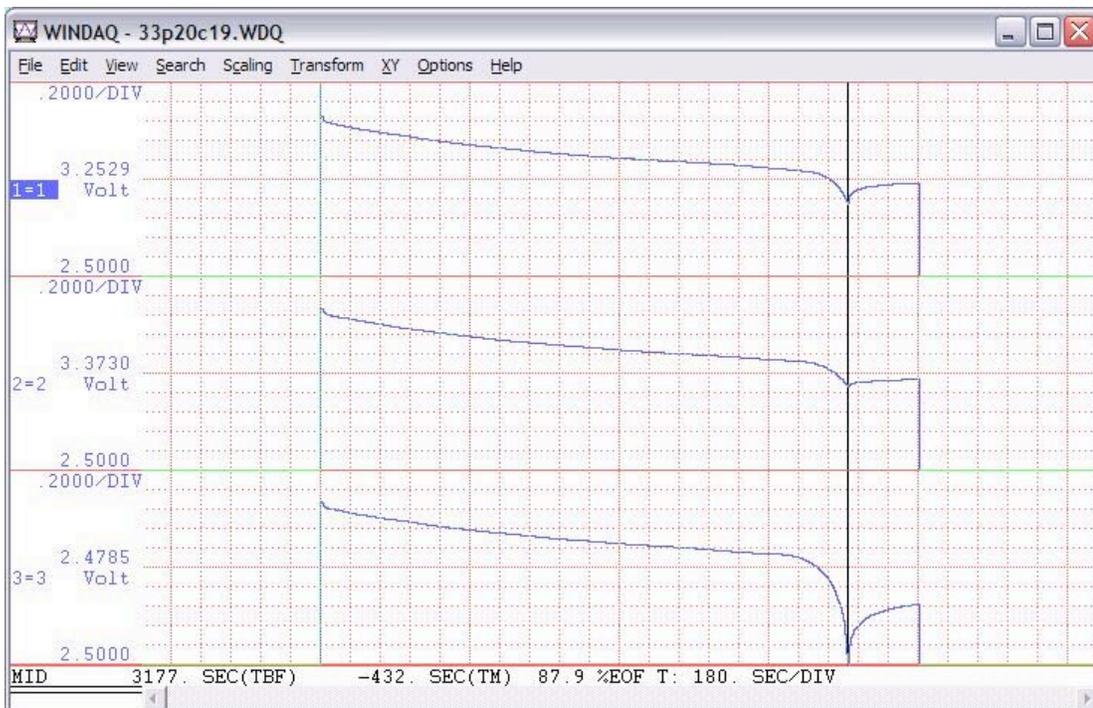


“before” (06), “balanced” (07), and after several more cycles (19). It is clear the balancing operation made a big difference in the displayed 1-hour capacity and that several cycles more made little additional improvement. (Graph at top of page)

HOWEVER, there is more to this as shown in the second set of curves. (Graph at bottom of page) While doing RUN 19 with my CBA I also connected a DATAQ data acquisition device to each of the three cells. The resulting chart therefore displays the individual cell behavior during the same CBA discharge. Notice that curve 3 (cell 3) clearly drops to 3 volts ahead of curves (cells) 1 and 2, and that at CBA cutoff of 9 volts total, cell 3 is already a bit below 2.5 volts. Now imagine where this cell may have gone had I discharged the pack using the “2.5 V/cell” (or 7.5 volts for the pack) standard industry

recommendation. Note that “2.5 volts per cell” is the oft-published minimum allowed voltage for Li-Po cells below which “bad things happen”. I don’t know from experience if this is true, but considering my investment loss to date I’m not anxious to test this. I just accept the 2.5 number as “gospel”.

Meanwhile, I also did some CBA testing for a friend who recently purchased some Falcon Batteries “Predator” 1550 3-cell packs. This appears to be a product that actually LASTS as I happily reported on last month. As usual, these also tested below label capacity (at a one hour rate). But otherwise they performed equally and very much like my original two and hopefully will also hold the promise of longevity as above. (Time will tell.) On this hope my friend and I collectively ordered even more of these for both of us - for what that’s worth.



Now I note with some pause the February 2006 issue of *Model Aviation*, page 10, item (5) under “Emergency Safety Alert: Lithium Battery Fires”, this:

“Use charging systems that monitor, control, and balance the charge state of each cell in the pack. Unbalanced cells can lead to disaster . . .”

This advisory sounds good to me, BUT now what to do with all those costly “normal” Li-Po packs

and chargers we all bought? AND - of course - any new balancing product (chargers and batteries) will no doubt be specialized by vendor and the connectors between brands will not match, right?

I've already decided that I DO NOT WANT a "captive" balancing charger, so I won't likely buy one from a battery vendor. Thus, I see here a golden opportunity for some third party balancing charger with adaptor (matching) cables for all future batteries. And I see here an opportunity for a future CBA that accesses individual cells, with matching adaptor cables of course. And I see here an opportunity for ESC makers to interface with individual Li-Po cells so as to retard throttle when the first cell goes low. BUT what I see most is the likelihood of batteries for our use built like those in some consumer products now (e.g. laptops) wherein the packs have built-in cell protection circuitry.

The latter will likely be quite a while in coming, but the balancing stuff is already emerging. I'm not rushing to buy much given my described experiences with lousy pack life. Besides, I continue to eagerly await Li-Po's that are TRUTHFULLY described with pack capacity MEASURED AT MEANINGFUL (FUNCTIONAL) CURRENT LOADS combined with an assurance (guarantee) of substantial CYCLE LIFE, like some-hundreds of useful (not abusive) cycles. I'm VERY, VERY tired of "investment" loss.

No more, please.

More On Early Li-Po "Death"

From Robert Peberdy rpeberdy@da.durr-usa.com

I was very interested to read the recent article in the *Ampeer* questioning the longevity of Li-Polys. I was beginning to think it was me!!!

I have a 2-cell 2100mAh Thunder Power Li-Poly that I started to use last spring. I have always recharged when I come back from the field at a rate of 0.6A with my Triton Charger. I now keep a log of the charge time, final voltage and mAh restored.

My 2-cell pack always used to recharge to 8.4V, then 8.39 and now it has just dropped to 8.31V. My voltage cut-off is set to 6V.

Prior to the drop to 8.31V I flew briefly on a cold but sunny day when it was 36F. The battery was fully charged before I went out, but it only flew for around 3 minutes before the ESC cut. I used to get close to 30 minutes! The notes that come with battery give a

lower discharge temp of around 32F and it was warmer than that.

Whether the batteries present condition is a cell balance issue I don't know, as this battery has no taps. I have a newer 3-cell from Thunder Power that does.

I have had other Thunder Power batteries that have "gone bad" and could no longer be used.

I'm now pretty much convinced that the only way forward is to buy the Li-Polys as single cells. Connect them in series to fly and then recharge them individually.

Do you know who makes 2100 mAh single cells? (*MaxAmps.com sells single 2100mAh cells. KM*)

In addition to my current 2-cell issue, early last year my TP 3-cell went bad and I sent it back. About three months later they sent me a replacement that included the balancer connections.

I think I will either have to consider Li-Polys as good for one season only or re-look at Ni-Cads.

Robert



RaidenTech Long EZ

From Tom Kempf Sebastian, Florida

Dear Ken:

I really appreciate your newsletter! Here's my most recent project... she's a ball to fly!

Electric Long EZ from RaidenTech (It comes with a cheap 400 motor which quickly found its way into the box labeled, "I'm keeping this but know I'll never use it.")

Wingspan: 55"

E-Flite Park 480 outrunner motor

APC 9x7.5E Propeller

Phoenix 35 ESC/BEC

Thunder Power 3S/2100 Li-Po, yellow stripe (10-12C)

Hitec Electron 6 Receiver

3- HS-81 Servos

RTF Weight: 38 ounces
Full throttle: 22 amps

It takes off from mowed grass, climbs strongly, cruises well at 2/3 throttle, will loop with a little dive help, will fly inverted, and has very gentle stall characteristics. With the power off it will glide very slowly and land gently. It could be powered with an AXI 2814/12 for a lot more zip if you want it, but you'd have to use the newer 20C series of Li-Po to handle the higher amp draw.

All the best... Tom Kempf

Small Magnet Source, B-17 Power Update & More From Bob Mugge eggumbob@chartertn.net

Ken:

Very interesting February *Ampeer*! You guys up north somehow find a way to work around the weather!

You mentioned that small magnets from Radio Shack could be used to hold things together. I had bought a couple pair of those for my B-17. Seemed as if \$2.00 for two wasn't so bad, but then I stumbled on an even better source. Our grandkids got one of those Magnetix kits for Christmas and are those ever a deal for small magnets! Got myself one of the smallest kits (\$5.00 at Walmart) and got 24 magnets. Had to use the Dremel tool to split the plastic housings apart to get the magnets out, but what a deal!

Speaking of the B-17, I finally decided on Li-Po batteries for the new AXI motor setup. It's really overkill, but the price was right. I'm using two MaxAmps 6300-3S3P packs, one on outboards and one on inboards. Had to saw off the bombardier's window to allow sliding the packs in from the front as they were too long to fit in the normal hatch. That's where I used the magnets, to hold the window/hatch on. Bench tests run full throttle for 9.5 minutes. Static current drain is 48A per pack, 24A per motor. This year it WILL fly, and power will NOT be the issue!

Thanks for a wonderful newsletter, and congratulations on a great 10 years with it!

Bob

Thanks Bob. Actually, the Ampeer has been published since February 1988. It was a paper only publication until 1996. The paper version reached almost 200 subscribers back then. Lots of folding, stapling and stamping! Glad those days are gone. Only about 40 paper subscribers today, but the Ampeer notification email is sent to almost 800 folks, and thanks to you all! ☺ Ken

The February EFO Meeting

Once again, the EFO met at Rick Sawicki's house, and again we thank him for his super hospitality!

It was a night of wonderful plane talking. The attendance was very good, and everyone there had a lot of fun.

Pres started out by sharing three more of his beautifully crafted rubber powered free flight models.



One of the German concepts that didn't make it off the drawing board.



Richard Utkan had the new Cox P-40, which he said flies very well and even faster than he expected! He also had a very nice Steven's Aero DiddleBug, which he also enjoys flying. He said the kit went together well. It is covered with tissue.



PMAC member, Hank Wildman attended the meeting. He had just come from the PMAC field and shared his Kyosho Corsair, GWS A-10, a C-47 with onboard video and a huge One Design. Hank has done a lot of work on all of the planes, upgrading the power systems, installing retractable landing gear and the like. Hank can be seen pointing out some of the features of the C-47 and Corsair. He noted that the C-47 is not one of the most pleasant planes to fly, while the One Design is EXCELLENT!





Ken Myers shared his completed Electro Flying Fusion. There will be a review of this great kit in an upcoming *Ampeer*. Ken noted that this is a craftsman type kit. While it does have some very nicely cut and perfectly fitting laser-cut parts, there still is a lot of carving, sanding and shaping to do. He said that it was a real joy to build! He highly recommends it to anyone looking for a "40" size plane.

After the extensive show and tell, we all adjourned to Rick's basement for some AirHog bipe flying! Ken, Rick and Richard each had their AirHogs. It was interesting trying to get all three in the air at the same time in the confined area. What a blast! Richard – check for a warp in your wings! Many folks took a turn at trying to see how many laps they could get around the support post! Just way to much fun. There is a short video of some of the action on the Web at:

<http://homepage.mac.com/kmyersefo/BasementKen.wmv>

We can thank Camille Goudeseune enough for providing us with our winter meeting entertainment!

There is a site dedicated to these little, inexpensive fun machines at: www.aeroacemods.com. You can also purchase them there.

What a great night!

A Quick Note About the Aero Ace

From Robert rcargen1@twcny.rr.com

Nice review in the December issue. I'll try the VCR tape and see if it helps the porpoising.

I bought one for my 5 year old. It's a great plane. I find it's me going out to fly it quite a lot. I can't seem to get enough of it. I can't find them for sale anywhere. I bought it last fall visiting some friends in New York City at Toys R Us. The single 10 second charge ones are garbage and cost about 10-15 bucks. So I said, how bad could it be? Bought the Aero Ace for around 30-35 bucks. Well worth the \$.

I've been experimenting with mine too, thinking about how much weight those stickers are adding and those little raised bumps from the mold must create a lot of drag maybe I'll try to sand them off or use a razor. I did have a little luck with the wheels I stole from my kid's matchbox car

Thanks,
Robert



**Upcoming E-events
2006**

May

4 – 7, Southeast Electric Flight Festival Hosted by the Fayette Flyers of Georgia, Andersonville, GA, info at www.hodgeshobbies.com

5-7 Silent Electric Flyers of San Diego Midwinter Electric Fly-in, info at <http://sefsd.org/>

21 Kishwaukee RC Flyers of DeKalb, Illinois 3rd Annual Electric Fly-in on May 21, 2006. Information at <http://www.kishwaukeercflyers.org/>
Spectators are always welcome at our event. Lunch will be available on-site, and is free for registered pilots. While at our website, check out the photo gallery and downloads section for coverage of last year's events at our field, as well as video and photos of events from around northern Illinois.

July

8-9 Mid-America Electric Flies, Midwest RC Society Flying Field on 5 Mile Rd. west of Ridge Rd., just west of

Plymouth, MI CD's Keith Shaw & Ken Myers

Please get event info to Ken Myers ASAP for the 2006 E-events



Ken's ElectroFlying.com Fusion
More inside
Ya Gotta have one of these!



The Ampeer/Ken Myers

5256 Wildcat

Crosswell, MI 48422

<http://members.aol.com/kmyersefo>

The Next Flying Meeting:

Date: Thursday, March 2 **Time:** 7:30 p.m.

Place: Rick Sawicki's house, 5089 Ledgewood Ct. W.,
Commerce Twp. MI 48382