the Ampeer

October The EFO Officers 2010

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Mailed Ampeer Subscriptions are no Longer Available

The Next Meeting:
Saturday, October 2, 10:30 a.m.
Place: Midwest RC Society 7 Mile Rd. Flying Field

What's In This Issue:

Mid-Am Thanks to ALL of our GREAT VOLUNTEERS!

I am sharing the following so that all of the folks who made the 2010 Mid-Am a huge success know that all of their hard work was very much appreciated. Guys and Gals, this is for you. Keith and I can never truly express our gratitude to you. Without your volunteering, this meet could never be. We appreciate your efforts more than you can ever know!

I received a thank you card in the mail, a very thoughtful and appreciated gesture, from Tom and Barbara Motsinger of Bowling Green, OH.

Hi Ken,

Tom and I want to thank you for setting us under your tent at the Mid-Am last Saturday.

I had surgery for a broken wrist and really appreciated not being in the sun. It was a really nice event and turnout.

Thank you,
Tom and Barbara Motsinger

To Beagle and all those others who couldn't make it to Mid-Am this year...you missed the best one in quite a while. Perfect weather, beautiful models, great pilots, and great company. Many thanks to Ken, Keith, and everyone else who make this great event possible. It's always the highlight of my RC season. Can't wait till next year.

Mark Wolf

Good times, great weather, new friends, old friends.

Thanks again to Ken and Keith. Maybe we should do it again this weekend?

Denny Sumner

Ahhhhhhhh... Maybe not, then again? KM

The Flying Fosses had fun, thanks Ken, Keith, CJ, etc..... for a great meet.

Pete, Carolynn and Sam

Again folks, thanks so very, very much for making this a great Mid-Am! KM

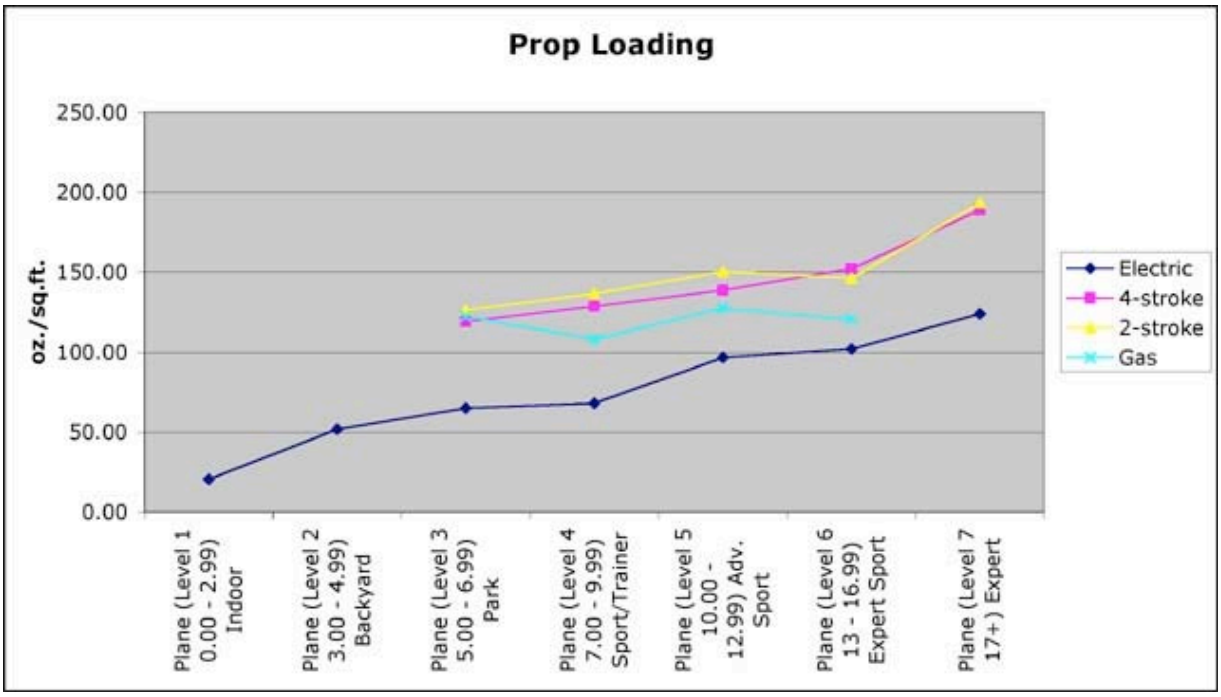
Electric Flyer Magazine Reminder
From Henry Holcomb Publisher/Editor

At http://www.electricflyermagazine.com/ you'll find our online Electric Flyer Magazine. If you would kindly call this to the attention of your members we would be sincerely appreciative.

Part 2: How Electric Power Systems 'Create' Usable Power Compared to Glow and Gas Engines
By Ken Myers

The first part of this article appeared in the August 2010 *Ampeer* and was titled "Comparing Glow Engines to Electric Power - Again".

All of the data points in the graphs are **AVERAGES** for each of the wing cube loading (aka cubic wing loading/CWL) Levels. Keep in mind when viewing the graphs that the "outlying" levels have fewer data points, so the numbers in Levels 1, 2, 6 & 7 may or may not be accurately represented. A spreadsheet with all of the data that I've collected is available at
http://homepage.mac.com/kmyersefo/M1-outrunners/metricnewtheory.xls



The higher the prop loading the smaller the diameter of the prop will be for a given weight. Prop diameter is a major determinate of thrust. Other factors like RPM and pitch do play noteworthy roles in determining thrust, but diameter dominates. **The perceived performance of a model is based on two factors: its pitch speed to stall speed ratio and its thrust to weight ratio.**

Here is an example of prop diameters for a given plane based on the **AVERAGE** prop loading for the four types of power that can be used in this example of a Level 4 plane. While using various power systems in the example plane brings about a change in the planes final weight, I've kept the weight the same for this example as it demonstrates the differences in suggested diameter based on the type of power system and the prop loading for the power system chosen.

Cermark 25% Yak 54 ARF *Fly RC* Sept. '09 at a weight of 152 oz.; gas **16**", 4-stroke **15**", 2-stroke **14**" and Electric **20**" (gas engine with 17x10 prop used in review)

The math for those interested in how I derived the prop diameters noted above:
Prop diameter = square root (((RTF weight/prop loading)*144)/Pi)*2

The example below uses the disk loading of 107.86, which is the average prop loading for Level 4 gas powered planes.

SQRT(((152/107.86)*144)/Pi)*2
SQRT(((1.4092342)*144)/Pi)*2
SQRT((202.92972)/Pi)*2
SQRT(64.594537)*2
8.0370727*2=16.074145 or 16 inches

For those who like to play with math, the other average prop loading numbers for CWL Level 4 are; 4-stroke 128.68 oz./sq.ft., 2-stroke 136.66 oz./sq.ft. and electric 68.05 oz./sq.ft.

Another review of the Cermark 25% Yak 54 ARF is at *RC Universe* May '09 (http://www.rcuniverse.com/magazine/article_display.cfm?article_id=1095) at 163 oz.; gas 17", 4-stroke 15", 2-stroke 15", and Electric 21" (gas engine with 17x6 prop used in review)

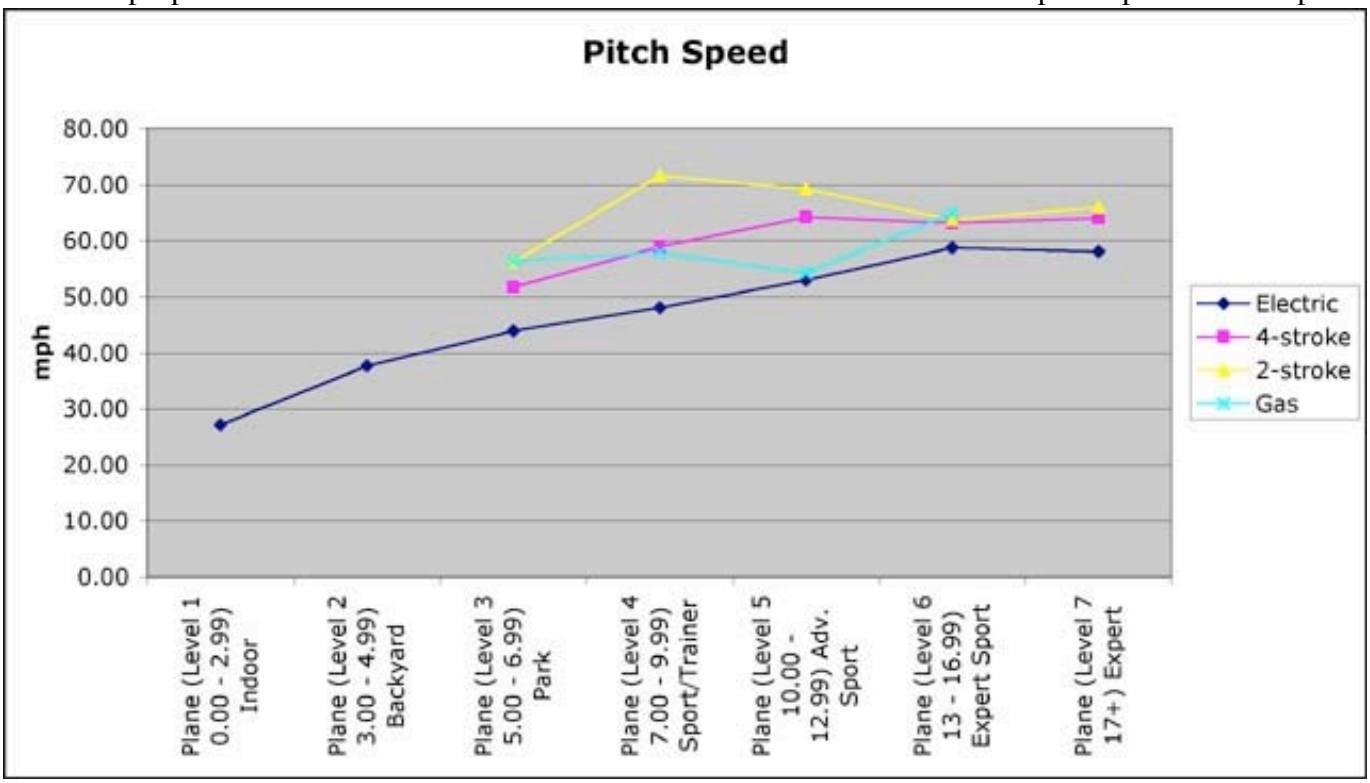
The reviewed engine is a Cermark MLD-28S gasoline 2-cycle. The supplier recommends wood props **16**x8 through 19x6 for this engine. The supplier also recommends a 2-stroke "120". O.S. recommends **14**x10 through 15x6 props for their 1.20AX 2-stroke glow engine. Cermark does not recommend a 4-stroke, but using the 1.5 rule of thumb, it would be about a "180" 4-stroke glow engine. Saito has a 180 4-stroke and its recommended props are **15**x8 through 18x6. An AXI 5330/F3A GOLD LINE outrunner motor would have an input power of about 1870 watts in (equivalent to a 4-stroke "180") using an APC **20**x10E prop.

Electric power and 4-stroke glow power demonstrate that as the wing cube loading (CWL) increases the pitch speed increases. The gasoline engine powered planes have an interesting dip at level 5. The gas planes of Level 5 use props that have very low diameter to pitch ratios. The effect is to drop the pitch speed down for that engine group at Level 5. Examples of the gas props I have on record include; 16x6, 18x6, 18x8, 20x8, 22x10, 23x8, and 27x10. The average pitch speed for glow 2-stroke engines plateaus at Level 4, decreases to Level 6 and then stays fairly constant at about 65 mph for Levels 6 and 7.

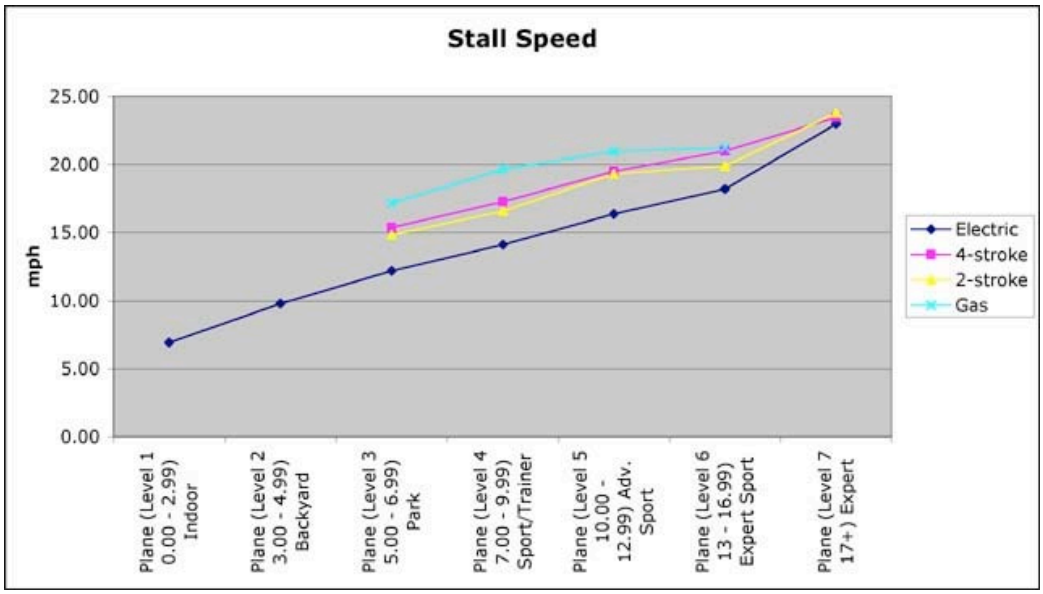
The general increase in speed is used to offset the higher stall speeds of the upper CWL Level models. (see graphs 2, 3 & 4)

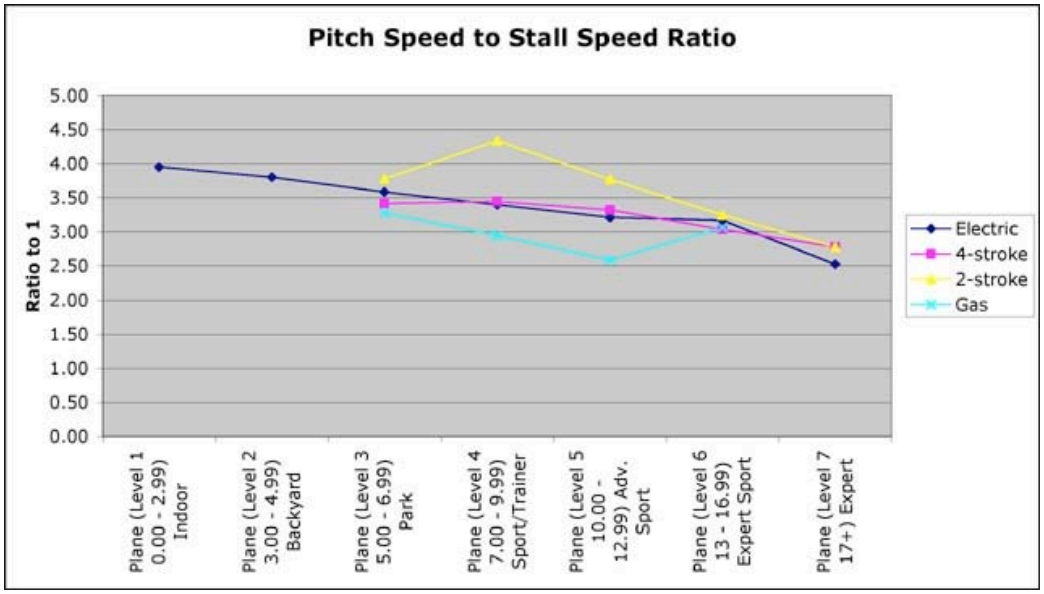
Overall the 2-stroke glow engine has a higher pitch speed to stall speed ratio at each Level. Electric motor power systems and 4-stroke glow systems are quite similar in their pitch speed to stall speed ratios. Once again there is an interesting "dip" at Level 5 for gasoline-powered systems.

As I noted earlier, I have created a performance factor that uses the pitch speed to stall speed ratio,



which has been weighted, and then combined with the approximate thrust to weight ratio to create a relative performance factor. The Performance Factor decreases as the wing cube loading/CWL goes up and the power to weight ratio falls. (graph 5)


Stall Speed
mph
25.00
20.00
15.00
10.00
5.00
0.00
Plane (Level 1 0.00 - 2.99) Indoor
Plane (Level 2 3.00 - 4.99) Backyard
Plane (Level 3 5.00 - 6.99) Park
Plane (Level 4 7.00 - 9.99) Sport/Trainer
Plane (Level 5 10.00 - 12.99) Adv. Sport
Plane (Level 6 13 - 16.99) Expert Sport
Plane (Level 7 17+) Expert
Electric
4-stroke
2-stroke
Gas


Pitch Speed to Stall Speed Ratio
Ratio to 1
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Plane (Level 1 0.00 - 2.99) Indoor
Plane (Level 2 3.00 - 4.99) Backyard
Plane (Level 3 5.00 - 6.99) Park
Plane (Level 4 7.00 - 9.99) Sport/Trainer
Plane (Level 5 10.00 - 12.99) Adv. Sport
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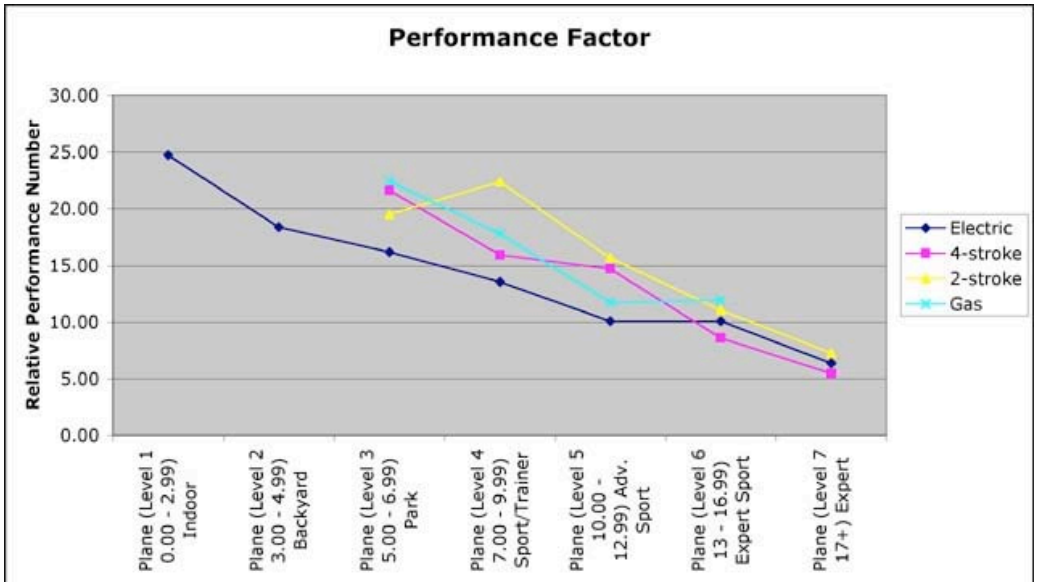
4-stroke
2-stroke
Gas


Performance Factor
Relative Performance Number
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Plane (Level 1 0.00 - 2.99) Indoor
Plane (Level 2 3.00 - 4.99) Backyard
Plane (Level 3 5.00 - 6.99) Park
Plane (Level 4 7.00 - 9.99) Sport/Trainer
Plane (Level 5 10.00 - 12.99) Adv. Sport
Plane (Level 6 13 - 16.99) Expert Sport
Plane (Level 7 17+) Expert
Electric
4-stroke
2-stroke
Gas

Comments on Hitec 2.4GHz & Wiring Twin BEC

From Gary Gullikson
ggullikson@socal.rr.com

I just got my Hitec 2.4GHz module and first Optima 6 receiver for use with my Eclipse 7 transmitter. Haven't bound and tried it yet. I cannot believe that the Hitec USA team did not proofread and make the instructions more understandable. I wonder if the Asian language versions are any better. Maybe the factory folks don't deign to talk to the US folks who must explain their terrible instruction sheets.

Actually the Hitec Optima 6 receiver is smaller than I thought and the Boda antenna is too. The Optima 6 has end type servo connections which is better than standard on top plug-ins. My fuselages never look "too pretty to cover".

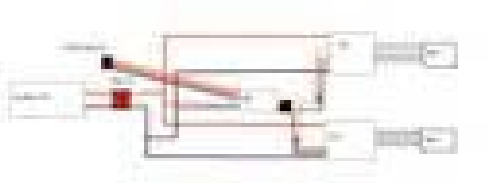
Pat's design (SR-10) looks a little bloated versus the 1:1 Reliant but it should fly scale-like. Your bipe conversion is looking great. Enjoy, but watch the other guy.

Simultaneous twin brushless motor LVC

I have been flying a GWS ME-262 with two 2028 3900K brushless motors. If I fly too long or have to go around another time before landing, one motor may shut down before the other due to one speed control's LVC circuit acting before the other. When this happens the other speed control sees sufficient voltage and keeps running full tilt. This can result in a crash due to asymmetric thrust if I don't chop throttle fast enough and regain control for a dead stick landing.

I found out that Dimension Engineering's "Smart BEC" has it's own LVC circuit that will over-ride the two speed control's LVC circuits if they are both speed controls are set for NiMH cutoff.

I haven't had a chance to try this yet but attached is my crude diagram based on advice from Dimension Engineering and Castle Creations and the guru's on RCGroups. If this works it would also apply to twin motor twin speed control propeller models such as B-25's, etc. Probably could be expanded to 4 motors, etc. Maybe Keith Shaw or others might have some thoughts about this.



I am a true believer in using switching-type BECs when using amp hungry 2.4GHz receivers and more than 3 servos I think that the hobby industry has been reticent and slow in informing users about the need for using switching type BECs.

Keep up the good work on *Ampeer*.

Gary Gullikson, "E-Challenged"

More Mid-Am Thanks & Other Related Topics

Ken,

I had a great time again at the Mid-America and the weather was fantastic. I flew my foamies; 2 birds and a wing. The real birds were chasing them all the time, so they may look like birds after all. I mentioned this in a post at the dirty birdy thread, (http://www.rcgroups.com/forums/showthread.php?t=1020550&page=11) together with some photos.

Thanks for your terrific work running the event. You did a great job, as usual even persuading the gods of the air to bring us great weather.
Phil Alvirez, Windsor, Ont., Canada

Thanks Ken. It's sad the Mid-Am only comes once a year!
Take care,
Don Belfort

Ken,

Bob Livin and I had a great time at the Mid-Am. We did no damage to our models, which for a couple of old geezers is not bad.

This photo of Bob Livin's Nomad was taken at the Mid-Am.

Here is a little about the Thermaleer that you used as the Mid-Am teaser photo in the August *Ampeer*.

W.S.: 76"
Wing area: 720 sq. in.
Designer: Daniel Veronica
Published 5/40 Air Trails
Kit: None
Builder: Robert Livin
Battery: 5 A 123 cells (DeWalt Cells)
Motor: Aveox Sport 40 direct drive
Fuselage: Planked construction. The only straight line is the centerline :-)

All of the old timers have too much dihedral so Bob took a bunch out and it turned out the plane was difficult to control. So he bit the bullet and took the turtle deck over the wing apart and increased the dihedral. It now flies fine. The covering is a Polycarbonate Coated Ripstop Polyester. It is sold by Hang em'High.
http://ecom.citystar.com/hang-em-high/ushop/index.cgi

I already sent you a photo of Bob's latest, the Nomad, which was designed by the late Chuck Hollinger.

He also designed the rubber powered Cruiser. From an AMA history document submitted to the AMA in 1997 by Hank Cole.

He kitted a rubber cabin model called the Cruiser, which was recently built by some modelers in Iowa. He built a beautiful, pod and boom, C-gas model called the Nomad, which he flew at the Nats and plans were published in Air Trails in the early 1940s. The design is currently being flown in Radio Control electric.

The "some modelers" in must have referred to Paul McIlrath and me. I saw Paul's model fly and had to have one. As the plans were in Air Trails (about 1946) it was easy to get a copy.

Plenny Bates

A Strange "A123" 2300mAh Occurrence

By Ken Myers

I took the Super Stearman and the Flite 40 (http://www.rcgroups.com/forums/showthread.php?t=735972) to the flying field on the evening of August 12. I "normally" charge my "A123" 2300mAh batteries before leaving the field after a flying session, so they are stored charged. To double check that I follow my normal procedure with a pack, I put them on charge on my CellPro 10S at the field before flying and take a peek at the numbers. The CellPro 10S reported a cell count error on the Flite 40's 6S "A123" 2300 pack. It would not charge the pack. I kept trying to get the pack to charge so that I could see the numbers. I thought that the 'hacked' 7-pin balance plug was not working correctly. The 88-deg+ heat and sun caused me great frustration with repeated tries.

Paul let me borrow his AstroFlight 109 with the "A123" mod in it. It reported that it was trying to charge a 7-cell pack. I stopped the charge and we used Paul's voltmeter and measured over 26 volts with no load. What? No way! A fully charged 6S "A123" 2300mAh pack should only be about 22 volts.

I ran the pack for a couple of 20 second bursts on the ground and then flew it for its normal six-minute flight. When I landed, I put it on charge on the CellPro 10S and it took a normal charge. Later I flew the plane once again for a 'normal' flight.

For its entire life, the pack has only been charged with the CellPro 10S. The plane with the pack in it had not been flown since some time in June and had been sitting in my 67-deg F basement since its last charge in June.

I really have no reasonable explanation for what happened and why the pack was "over-volted". The only thing that I can think of was that the 20-deg F temperature difference might have had something to do with it, but that doesn't make sense to me.

The other possibility was that I somehow managed to charge the pack as a Li-Poly before storing it. I really doubt that I could have done that as the CellPro 10S would not have worked on the Li-Poly setting, as the cell count would have been

wrong for the voltage and number of cells. I really doubt that I did that as I have my CellPro 10S set up to do "A123" 2300mAh cells at either 2.4 amps or 10 amps and for my "storage" charge I use the A123 10 amp setup to do it as quickly as possible before leaving the flying field.

If any of you readers have any other ideas of what might have caused this unusual happening, I'd be interested in hearing from you.

Bob Kopski's BDM & Some "A123" Info
From Richard Golding rngolding@aol.com

Hi Ken,

Came across your excellent *Ampeer* Magazine on the net and was intrigued by Bob Kopski's article describing his Battery Discharge Monitor and would like to build one (I'm a retired Electronics Engineer). Could you please arrange to have build details emailed to me as offered in the text - I couldn't find Bob's email address. I have been tinkering with a similar project and have been using a Hall Effect current sensor.

Oops, sorry about that! Bob can be reached at kopskib@gmail.com

I'm also a fan of A123 batteries and have several planes powered by them - some of the packs have been in use for 3 years and are still going strong.

I have attached pictures of my latest plane. It's supplied as a kit (balsa sheet etc) by SLEC here in the UK - it used to be a Precedent Fun Fly (Wingspan is 52") before SLEC kitted it. The plane was intended for IC, but we don't want to do that do we? The A123 battery pack fits nicely in the fuel tank compartment.

The motor is a Turnigy SK4250-650, powered by a 6S1P A123 pack, which produces 575 Watts @ WOT with a 12 x 6 EMP prop. (9660 rpm @ 17.63V and 32.6A). It gives me about 5>6 minutes of 'spirited' flying.

Incidentally, using the drill press method, the measured Kv of the SK4250-650 was 603 rpm/V, not 650 as claimed on the data sheet.

Keep up the good work,

Best wishes,
Richard Golding
G3VZG

A Problem with FMAdirect Adapter Boards Discovered
Ken Myers

Joe Hass of the Skymasters' RC club contacted me about a problem that he had had with an FMAdirect Adapter Board for the CellPro 10S. His charger had stopped working, so he sent it in to FMAdirect for repair. They contacted him and asked how/why the traces on the PCB adapter board became charred. He had not noticed it and had no idea.

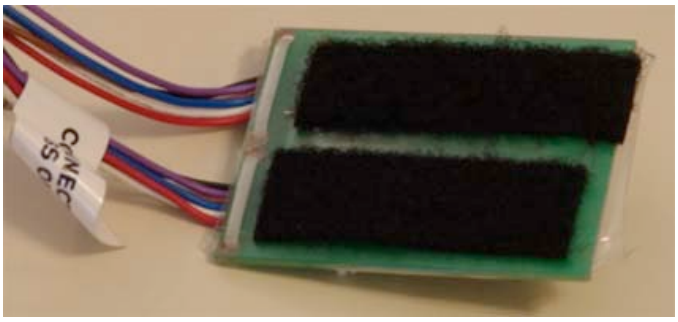
Looking closely at the PCB of the adapter we can see that the connector pins, that go through the

PCB and allow the connectors to be soldered to the traces, have sharp points, created by the solder, on them that can pierce the heat shrink covering if the adapter becomes compressed somehow. If the pins have penetrated the heat shrink and contact something metal, say a part on an automobile body when charging in an open car engine compartment, they can short.

Regarding the piercing, Joe said, "I think that the piercing can take place just from heat and use."

On one of the boards that I own, one pin of one connector has penetrated the heat shrink. To the best of my knowledge, the adapter has never been compressed. I do all of my charging in my planes, as I use "A123" 2300mAh packs in all of the planes that I fly on a regular basis, and my adapters are generally "hanging" in midair when I'm charging with my CellPro 10S.

The way to avoid the pins shorting is to place some kind of sticky-backed padded tape on the back of the adapter over the heat shrink. I used some Velcro that I had more of than its mate. There was no particular reason to use the Velcro except that is what I had on hand.



I am not familiar with other companies' similar boards, but I would suspect that they have a similar problem as they are all made, most likely, in a similar fashion.

Joe let me know that he had received word from Howard Matos of FMAdirect technical support that they had contacted their manufacturer in Singapore and they are now flush cutting the pins on the adapters. Howard noted that this would prevent them from poking through the shrink.

Howard also noted that the diodes were blown due to a short circuit on the charger and that the diodes blow to prevent major damage from happening to the charger.

Joe believes that the short circuit that Howard spoke of was cause by the balance board design, not an end user problem.

The bottom line was that Joe was out a charger for a very active month (July/Aug) of RC flying and was charged for a repair that was not really caused by him. He is not pleased with how FMAdirect handled the whole situation.

Horizon Hobby is Possibly Selling 72MHz Transmitters that are NOT in Compliance with USA FCC Regulations

By Ken Myers

At the PMAC electric fly-in I had an unfortunate incident with my parkzone ZX10 5-Chan FM 72MHz transmitter for my parkzone T-28. I dropped it on its face while loading it into the car and broke the throttle/rudder stick clean off. Rather than trying to get it fixed, I ordered a new transmitter of the same type on August 8 from Horizon Hobby. I ordered it on Ch 54 to match the receiver I'm using in the T-28. I already had one of the parkzone ZX10 5-Chan FM 72MHz transmitters on Ch 17 that I use as the buddy box (with the crystal and antenna removed) for my student pilot training using the T-28 and on another trainer, the Fledgling, with a Spektrum DX-5e.

The new transmitter arrived on Monday, August 16. To my surprise, it was on Ch 17 although my invoice clearly showed that I had ordered Ch 54.

I called Horizon Support the same day I received the transmitter and spoke with a lady who told me that that unit only comes on Ch 17 and that I would have to order the crystal set for Ch 54.

That presented a problem to me, as I was aware that the user is not allowed, by FCC regulations, to just swap a crystal in a transmitter to change its transmission frequency. The following link points to the regulation:
http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITLE=47&PART=95&SECTION=645&YEAR=2000&TYPE=TEXT

I have reprinted part (b) of Sec. 95.645 below and used a bold font to point out the section that specifically excludes crystal swapping by the end user.

TITLE 47--TELECOMMUNICATION
COMMISSION (CONTINUED)

PART 95--PERSONAL RADIO SERVICES--Table of Contents
Subpart E--Technical Regulations

Sec. 95.645 Control accessibility.

(b) An R/C transmitter which incorporates plug-in frequency determining modules which are changed by the user must be certificated with the modules. Each module must contain all of the frequency determining circuitry including the oscillator. **Plug-in crystals are not considered modules and must not be accessible to the user.**

Obviously the ZX-10 transmitter is in violation of part (b).

The crystal, even though it is accessible to the end user is considered and an internal part. The following section regulates RC transmitter internal parts. I've only reproduced part (a) as that applies.

http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITLE=47&PART=95&SECTION=223&YEAR=2000&TYPE=TEXT

TITLE 47—TELECOMMUNICATION COMMISSION (CONTINUED)
PART 95--PERSONAL RADIO SERVICES--Table of Contents
Subpart C--Radio Control (R/C) Radio Service
Sec. 95.222 (R/C Rule 22) May I make any changes to my R/C station transmitter?

(a) **You must not make or have anyone else make an internal modification to your R/C transmitter.**

I did not receive an instruction manual with either of the two transmitters that I'd purchased separately from the T-28.

I have copied part of the FCC regulation section concerning an instruction manual here and have used bold print for emphasis.

http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITLE=47&PART=95&SECTION=653&YEAR=2000&TYPE=TEXT

TITLE 47--TELECOMMUNICATION COMMISSION (CONTINUED)
PART 95--PERSONAL RADIO SERVICES--Table of Contents
Subpart E--Technical Regulations

Sec. 95.653 Instructions and warnings.

(a) A **user's instruction manual must be supplied with each transmitter marketed**, and one copy (a draft or preliminary copy is acceptable provided a final copy is provided when completed) must be forwarded to the FCC with each request for certification.

(b) The instruction manual must contain all information necessary for the proper installation and operation of the transmitter including:

(1) Instructions concerning all controls, adjustments and switches that may be operated or adjusted without resulting in a violation of the rules.

(2) omitted for brevity

(3) **Warnings concerning the replacement of any transmitter component (crystal**, semiconductor, etc.) that could result in a violation of the rules.

(4) omitted for brevity

All of my other 72MHz transmitters have an FCC ID number on them. The parkzone transmitters do not. With no FCC ID number and no instruction manual I believe that these transmitters may not be type certified by the FCC. **I have NOT verified this by contacting the FCC to check the certification.** It is a guess on my part.

http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITLE=47&PART=95&SECTION=603&YEAR=2000&TYPE=TEXT

TITLE 47—TELECOMMUNICATION COMMISSION (CONTINUED)
PART 95--PERSONAL RADIO SERVICES--Table of Contents
Subpart E--Technical Regulations

Sec. 95.603 Certification required.

(b) Each R/C transmitter (a transmitter that operates or is intended to operate at a station authorized in the R/C) must be certificated, except one that transmits only in the 26-27 MHz frequency band and is crystal controlled (where the transmitted frequency is established by a crystal (a quartz piezo-electric element)).

(Continued on page 10)

Upcoming E-vents

October 2 EFO flying meeting, 10:30 a.m., Midwest RC Society 7 Mile Rd. Flying field. All electric fliers welcome with current AMA membership card to fly. Everyone welcome to come.

NOT in Compliance with USA FCC Regulations (cont. from page 10)

I was going to quote what can happen if the FCC rules for RC are violated but you can look them up at:
http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITLE=47&PART=95&SECTION=218&YEAR=2000&TYPE=TEXT

During my discussion with the lady at Horizon Hobby support, I briefly pointed out that it appeared to me that the transmitter being handled this way was not in compliance with the FCC regulations. She sent me a prepaid RMA for the return of the transmitter.

I decided not to return the unit and took it to Peter Waters, a licensed RC radio technician, at Kraft Midwest. Peter noted that just swapping the crystal did not present a problem to adjacent channels, but that the power was down a bit. Using his scope and other equipment, he put it solidly on the frequency and tweaked it to return the power to the correct level.

I now have my T-28 back into the teaching rotation and feel good about doing it the "right way."

The Ampeer/Ken Myers
1911 Bradshaw Ct.
Commerce Twp., MI 48390

http://homepage.mac.com/kmyersefo

The Next Monthly Meeting:
Date: October 2, 2010 **Time:** 10:30 a.m.
Place: Midwest RC Society 7 Mile Rd. Field