THE FLIGHTLINE

RRCC 54 YEARS

RACINE R/C CLUB, INC. RACINE, WIS.

AMA CLUB 668 SINCE 1968
RACINE RADIO CONTROL CLUB INC SINCE 1968

RRCC August Issue
August 21, 2022 Newsletter

WE ARE ON THE WEB
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Editors note:

Since there was no July club meeting, there are no notes for this month.

Dennys Stuff:

More on the batteries we use on our radios, and/or electric model airplanes.

By now, most of the RRCC members are well aware of the balance cables on our Lithium type battery packs, and are aware that these batteries must be balance charged.

So, just what is balance charging anyhow? We never heard of balance charging with those old Nicad packs, or the more recent Nickel Hydride receiver packs. These two types of batteries have gone obsolete for just about any and all RC use. They just have to many drawbacks for use in our RC models.

First, fast charging a Nickel Hydride pack can lead to the charger shutting off before the pack is fully charged. (The charger is looking for around a 0.4% drop in voltage at full charge to halt the charging process.

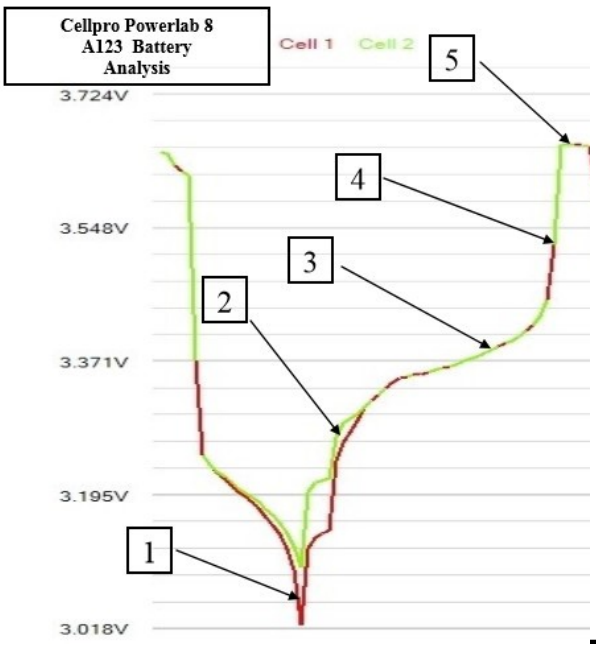
Second, they just can't handle the higher (much higher) currents pulled by the modern day servo's we have in use today.

So, we have the A123 cells along with the LiFe cells that are used for much of the larger models that the RRCC club is flying these days. Personal opinion, the A123 cells are more reliable than the plastic baggie covered LiFe cells. I'm aware of a half dozen LiFe receiver pack failures in our club in the past 5 years or so.

Now then. These A123, LiFe and the LiPo battery packs used in the electric model airplanes do all have balance plugs on them.

Back in the early days, the primitive chargers used at that time did not have balancing capabilities. And, unfortunately, LiPo fires were the common result. And, the internet shows that several modeler homes were burned to the ground from those LiPo fires.

FYI, A123 and LiFe packs do not have the fire risk of those LiPo battery packs. They can not go into thermal runaway and resulting fire like the LiPo packs.



Just what is involved in "Balance Charging" and why is it mandatory for the Lithium type battery packs?

That has to do with what happens to a battery pack when it is nearly fully charged when it is being charged with a battery charger.

Starting off, the individual cells in a Lithium battery pack are not exactly matched to each other. Even if they were exactly matched when new, that can and will change after they have been used for a while.

During the charging process, that means that some of the batteries cells will hit full charge first, with the remaining cells still accepting a charge. And, here is where the sh*t happens.

The graph below shows the Cellpro PL8 charger (Now no longer available) while it is charging a two cell A123 receiver pack.

The graph shows the voltage on two cells, shown in red for one cell, and shown in green for the second cell.

Starting at point #1, the charger kicks in with the two cells reading around 3 Volts DC each. The charger is charging the two cells at a ten ampere rate. Note that there is a voltage difference between the green and red lines showing the two cells are not balanced.

Point #2 shows the voltage quickly rising up to around 3.3 Volts per cell where it stays to point #3 and slightly beyond.

The graph area between points #2 and #3 shows the balancing charger is matching the voltage on the two cells.

The trouble begins at the “knee” just below point #4 up to the fully charged point #5. The cell voltage very quickly skyrockets to a much higher voltage. The cells are fully charged when their individual voltage hits 3.65 Volts DC.

BUT, YOU CAN NOT GO MUCH BEYOND 3.7 VOLTS DC (or 4.2 VDC for LiPo cells) OR YOU RISK DAMAGE TO THE CELLS!

A couple of notes here. These chargers are charging at a constant current value that the user presets on the charger before beginning the charge cycle.

Constant current charging indicates that the value of the charging current does not change while the voltage on the battery pack slowly rises.

And, the graph between points #4 and #5 shows that the battery pack voltage is very rapidly increasing, nearly straight up. And, if nothing stopped it, the battery voltage would quickly increase into the area where battery damage can and will occur.

Point #5 shows that the charger has changed, limiting the maximum voltage to 3.6 Volts DC in the case of the A123/ LiFe cells. (Or 4.20 VDC on the LiPos)

The problem shows up when there is a difference in how close to full charge each cell is in the battery pack.

If cell #1 is 95% charged, and cell #2 is 100% charged, that constant current charge cycle is going to push the voltage on cell #2 to 4 or 5 volts or higher very quickly.

With a LiFe or A123 battery pack, you will have damage to the battery pack as the cell gets very hot.

With a LiPo battery pack, that overcharging will heat up the cell(s) to unsafe levels. Once the cells internal temperature increases beyond perhaps 180 degrees F, the cell goes into what is called thermal runaway.

Thermal runaway is where the cell starts heating up, and because the cell is heating up, the internal heating action speeds up. Heating speeds up, gets hotter, heating speeds up, gets hotter, you get the idea.

The thermal runaway indicates that we have a never ending cycle of heating up. This will keep going, even if the charger is disconnected. The end result is a fire.

This risky charging business pretty much ended some 10 or 15 years ago with the use of these so called balancing chargers.

Just about all of the Lithium powered battery products such as gardening tools, saws and the like use balancing chargers.

Those that do not use balancing chargers have a balancing circuit board internal to the battery pack itself to protect against overvoltage on any one cell during the charging process.

We have been discussing the LiFe and A123 cells so far. And, when the individ-

ual cell voltage hits 3.6 Volts DC, the pack is fully charged. Simple as that.

And, with the A123's just charge them up after a flying day and they are ready to go next day, next week, next month, don't matter much. These cells hold 95% of their charge after a full year on the shelf. (Personal experience)

And, if a month or two goes by, you can always "Top them off" with a charger. A fully charged A123 or LiFe pack will be topped off in only a couple of minutes.

LiPo batteries have similar issues with the balancing process. As previously mentioned, exceeding the maximum voltage per cell on a LiPo battery is very dangerous, and can and will result in battery damage and/or a fire.

And, you CAN NOT store a LiPo battery pack at full charge.

Doing so for a day or three will cause permanent damage the LiPo battery pack, including puffing, lower power output, and loss of milliampere hour capacity.

These LiPo battery packs must be placed in a "Storage" mode where each cell reads around 3.70 Volts DC. That is around 40% or 50% charge.

Just fly out the pack to put it into "Storage mode". The modern LiPo chargers also have a "Storage Mode" function that will properly discharge a battery pack to a safe storage voltage. But, that can take hours on a larger LiPo battery pack.

There is a straight line of the LiPo battery percent of charge and the cell voltage. That makes it easy to determine the state of charge on a LiPo battery, or the Lithium Ion battery pack used in your battery powered power tools.

That is NOT true of the A123 and LiFe battery packs. A voltage measurement on these two type cells will not provide a useable readout of the state of charge on that battery pack.

And, any meter that does indicate state of charge on these A123/LiFe packs is providing misleading information.

Do not use those meters on these A123/LiFe cells. Their state of charge indication is worthless. **Period.**

So, how do you safely use those A123/LiFe receiver packs safely?

I've covered this subject many times in the RRCC newsletter over the past 15 years or so.

Basically, first, start off with a fully charged A123/LiFe battery pack. Go fly a couple of flights.

Then, field charge the receiver pack, and check how many MilliAmpere Hours were put back **INTO** the battery pack

These cells are quite efficient while charging. If you pull 1000 MilliAmpere hours **OUT** of the pack, it will take around 1050 Mah to recharge it.

Your editor uses a safety factor of two with these receiver packs. The type "A" A123's have around 2300 Mah capacity,

or 2500 Mah capacity for type “B” cells less than 5 years old.

With a safety factor of two, do not pull more than 1200 Mah out of the receiver battery pack during a days flying.

Now, if you put 3 flights on the receiver pack, and it took 760 Mah to recharge it, your model airplane is taking 760/3 or 253 Mah PER FLIGHT.

That means you can safely fly 1200/253 or around 5 flights on a charge.

If you check around the pit area, you will find that most RRCC members are using two A123 receiver packs in their 30cc and 50cc gassers. Each pack has its own on-off switch and each plugs into a port on the receiver. (Dual redundancy)

This indicates that one can fly a full day of 10 flights without worrying about running out of receiver battery power.

And again, when you get home, simply recharge the receiver A123/LiFe battery packs, and they are ready to go next time you go flying.

Note that these numbers are an example. Run your own numbers, since the battery demand for a two meter sail plane is much different than a 50 cc gasser model with huge ailerons flying 3D.

Now, for reliability of these cells, especially those used for receiver power. The A123 cells last a very long time if not abused. Ten years is realistic.

Abuse includes leaving the receiver switch on, and running them completely flat. They can be “Jump started” but they will loose a bit of capacity in the process.

And, abuse includes dents in the A123 cell case. The internals of these A123 cells are pressed into its aluminum jacket.

Any notable dent in the case will affect the internal stuff. The result is the cell won’t hold a charge indefinitely, but may go flat in a month or so. (I’ve seen this twice with cells that have big dents in them)

As for the LiFe and the two cell LiPos for receiver power, failure mode includes a cell with severely reduced milliampere hour capacity. The only way to find this sort of failure is to run a milliampere hour discharge test on them.

I can provide a **free** Mah receiver battery test for any RRCC members that use LiFe or LiPo batteries for receiver power. All I ask is you put your name on the battery pack(s).

I have a Western Mountain CBAIV battery analyzer for this purpose. It gets a lot of use. All I have to do, is plug in your battery pack into the CBAIV analyzer, hit “GO” on my computer, and come back when it is done.

Some of the RRCC members have seen my 3D printed cases for the two cell A123 receiver batteries. Unfortunately, one of the RRCC members conducted a test on two of those 3D cases by a bad crash.

Interesting, the two 3D cases were completely unaffected by the crash. In fact,

the case mounting screws pulled out of the airplane as a result of the crash!

Denny Vollrath

RRCC Editor

JIM'S CORNER

It's been an interesting summer. For a lot of people, it been great weather for festivals, family events, etc.

For RC flying, it seems that we have had more wind than normal. Lots of days at the field, there is no flying; just guys sitting around talking. We can't complain too much. We could have heavy rains like Kentucky or high heat and dry like the southwest. We just have to make the best of it.

A lot of new planes are showing up at the field, especially on Sundays. It's fun to watch these new planes. Unfortunately we have also had a few crashes. Some have been repaired and flying again.

No discussion have taken place as to having an invitational event this summer. Possibly discuss this at our upcoming club meeting on the 21st. It would probably would be held in September if we have one.

Our finances are good, the field is in good shape, all our equipment is in running order, and no issues with the Village of Mt. Pleasant. All good things. At this point I am not aware of any impending issues.

The AMA has not come out with any information about registering our flying site with the FAA as an exempt site so that we do not need transponders on our planes. We were supposed to start the process in July, but it appears that the typical governmental process is slow.

We'll stay on top of it.

Hope to see many of you at our next meeting at the field on Sunday, August 21st at 1 PM.

Fly Safe & Have Fun
Jim Litwin
President

Jasons model, it's HUGE!

RACINE RC CLUB 2022 CALENDAR

August 21	Sunday	1:00 PM	Club Meeting - Flying Field
August 28	Sunday	9:00 AM	RC Club "Open House"
Sept 18	Sunday	1:00 PM	Club Meeting - Flying Field Get proposed rule changes submitted
October 1	Saturday	Noon	Deadline for submission of Proposed Field Rule & By-Law Changes
October 1	Saturday	8:00 AM	Shelter setup
October 16	Sunday	1:00 PM	Club Meeting - Flying Field
Nov13	Sunday	1:00 PM	Club Annual Meeting - Election of Officers; Vote on proposed Field Rule & By-Law changes
Dec 7	Wednesday	12 – 6 PM	Last day Club Compost Duty
Dec 18	Sunday	1:00 PM	Club Meeting - Flying Field – Establish-Membership Dues schedule for next year
Jan 1, 2022	Sunday	9:00 AM	New Year's Day, "First in the Air" Event & Noon lunch (Electric Sunrise - Gas/Glow 9:00 AM)

Hoss wondering where the manual is

The following RRCC members have volunteered to be a substitute for compost duty. Contact them to work out the details

Steve Knackert 262-497-2824 Justin Francisco 414-484-4574

Date+K20I29A1:KA1:K39	Time	Name(1)	Name(2)	Sub		Date	Time	Name(1)	Name(2)	Sub
04/06/22	12-2	Darrel (Hoss) Hossalla	Gerald Bublavy			08/10/22	12-2	Bob Johnson		
04/06/22	2-4	Darrel (Hoss) Hossalla	Gerald Bublavy			08/10/22	2-4	Trygve Smalley	Gary Bokowy	
04/06/22	4-6	Justin Francisco	Gerald Bublavy			08/10/22	4-6	Roman Kirykowicz	Helmut Schmidtke	
04/13/22	12-2	Roger Nickolaus	James Martinich			08/17/22	12-2	Raymond Redlin Sr		
04/13/22	2-4	Roger Nickolaus	James Martinich			08/17/22	2-4	Jim Smith		
04/13/22	4-6	Justin Francisco	James Martinich			08/17/22	4-6	Roman Kirykowicz	Jeff Lee	
04/20/22	12-2	Roger Nickolaus				08/24/22	12-2	Raymond Redlin Sr	Matthew Holl	
04/20/22	2-4	Darrel (Hoss) Hossalla	John Boticki			08/24/22	2-4	Dennis Vollrath	Matthew Holl	
04/20/22	4-6	Justin Francisco				08/24/22	4-6	Wayne Greisen	Matthew Holl	
04/27/22	12-2	Charles Roberts				08/31/22	12-2	Terry Peterson	Bruce Napierkowski	
04/27/22	2-4	Rich Smentek				08/31/22	2-4	Dennis Vollrath		
04/27/22	4-6	Dan Pozel				08/31/22	4-6	Wayne Greisen	Gary Bokowy	
05/04/22	12-2	Steve Knackert	Bill Flannery			09/07/22	12-2	Terry Peterson	Ronald Schroeder	
05/04/22	2-4	Rich Smentek	Bill Flannery			09/07/22	2-4	Dennis Vollrath	Ronald Schroeder	
05/04/22	4-6	Dan Pozel				09/07/22	4-6	Roman Kirykowicz	Ronald Schroeder	
05/11/22	12-2	Charles Roberts	Paul Willems			09/14/22	12-2	J Fisher		Steve K
05/11/22	2-4	Rich Smentek				09/14/22	2-4	James Houtsinger		
05/11/22	4-6	Charles Roberts				09/14/22	4-6	Eric Armantrout	Ron Dixon	
05/18/22	12-2	Steve Knackert	Dennis Krzyzanek			09/21/22	12-2	Buzz Paricka	William Wampler	
05/18/22	2-4	William Bylsma	Dennis Krzyzanek			09/21/22	2-4	Buzz Paricka	William Wampler	
05/18/22	4-6	Trygve Smalley				09/21/22	4-6	Bill Flannery	Jeff Lee	
05/25/22	12-2	Michael Stein	Douglas Karge			09/28/22	12-2	Buzz Paricka	William Wampler	
05/25/22	2-4	Michael Stein	Douglas Karge			09/28/22	2-4	James Houtsinger		
05/25/22	4-6	Michael Stein	Douglas Karge			09/28/22	4-6	Arland Matson	Jeff Lee	
06/01/22	12-2	Jerry Rose				10/05/22	12-2	Charles Brzezicki	Kenneth Dalton	
06/01/22	2-4	Jerry Rose				10/05/22	2-4	Charles Brzezicki	Kenneth Dalton	
06/01/22	4-6	Trygve Smalley	Manuel Gonzalez			10/05/22	4-6	Charles Brzezicki	Kenneth Dalton	
06/08/22	12-2	Chris Stein	Paul Willems			10/12/22	12-2	Helmut Schmidtke	Bruce Napierkowski	
06/08/22	2-4	Chris Stein				10/12/22	2-4	Helmut Schmidtke	Roger E Olsen	
06/08/22	4-6	Chris Stein				10/12/22	4-6	Helmut Schmidtke		
06/15/22	12-2	Jerry Rose	Dennis Krzyzanek			10/19/22	12-2	Donald Parkinson	Calvin Thomas	Helmut S
06/15/22	2-4	Ray Fisher				10/19/22	2-4	Donald Parkinson	Calvin Thomas	
06/15/22	4-6	Ray Fisher				10/19/22	4-6	Donald Parkinson		
06/22/22	12-2	Steve Knackert	Arland Matson			10/26/22	12-2	Carl Bergquist	Tim Brehm	
06/22/22	2-4	William Bylsma				10/26/22	2-4	James Houtsinger	Tim Brehm	
06/22/22	4-6	Bob Johnson				10/26/22	4-6	J Fisher	Tim Brehm	Steve K
06/29/22	12-2	Pete Luks		Steve K		11/02/22	12-2	Jim Litwin		
06/29/22	2-4	William Bylsma				11/02/22	2-4	Jim Litwin		
06/29/22	4-6	Wayne Greisen	Helmut Schmidtke			11/02/22	4-6	Jim Litwin		
07/06/22	12-2	Pete Luks	Roger E Olsen	Steve K		11/09/22	12-2	Carl Bergquist	Bruce Napierkowski	
07/06/22	2-4	Jim Smith				11/09/22	2-4	John Boticki	Calvin Thomas	
07/06/22	4-6	Bob Johnson	Manuel Gonzalez			11/09/22	4-6	James Strelitzer		
07/13/22	12-2	Raymond Redlin Sr	Paul Willems			11/16/22	12-2	J Fisher		Steve K
07/13/22	2-4	Jim Smith				11/16/22	2-4	John Boticki		
07/13/22	4-6	Dan Pozel	Helmut Schmidtke			11/16/22	4-6	James Strelitzer		
07/20/22	12-2	Pete Luks		Steve K		11/23/22	12-2	Carl Bergquist	Roger E Olsen	
07/20/22	2-4	Eric Armantrout	Ron Dixon			11/23/22	2-4	Arland Matson		
07/20/22	4-6	Eric Armantrout	Ron Dixon			11/23/22	4-6	James Strelitzer		
07/27/22	12-2	Richard Stapleton	Peter Redel			11/30/22	12-2	Ronald Hayes		
07/27/22	2-4	Richard Stapleton	Peter Redel			11/30/22	2-4	Ronald Hayes		
07/27/22	4-6	Richard Stapleton	Peter Redel			11/30/22	4-6	Ronald Hayes		
08/03/22	12-2	Raymond Redlin Sr				12/07/22	12-2	Steven Navone		
08/03/22	2-4	Ray Fisher	Gary Bokowy			12/07/22	2-4	Steven Navone		
08/03/22	4-6	Bob Johnson	Manuel Gonzalez			12/07/22	4-6	Steven Navone		