



FlightLines

Newsletter of the North Vancouver RC Flying Club

2023: Year in Review

“There is nothing permanent except change” - Heraclitus

Oh, what a year!

First we lost our right to fly outside. Then we regained it. Then we lost our right to fly freely, so we got licenses, registered our planes and we learned a whole new set of rules.

Our balsa and foam model aircraft became Remotely Piloted Aircraft Systems (RPAS). Suddenly we RC modelers were lumped under the same set of regulatory constraints that govern our full-scale pilot brethren. We all mourned the loss of our MAAC Exemption. We all anticipated Exemption 2.0.

Then we had a near-miss crash into Field 8, resulting in new flight area boundaries and a renewed focus on field safety. We seemed to be increasingly hemmed in - from all directions.

On a positive note, we celebrated the end of summer with a successful BBQ. Organized by Fraser, the event had a strong turnout and we enjoyed enthusiastic competition. This was crowned with an anonymous donation of \$1000 to the club!

The District of North Vancouver announced their intention to upgrade field 4, 5 & 6 facilities. A new washroom building and a covered gathering area are being proposed.

In our November AGM the 2023 executive was re-elected for 2024. We accepted two new members in December so now we have 75. We trust everyone will renew!

MAAC elected a new president, and we forgave our governing association for their transgressions. We came to realize that the RC landscape has changed permanently. There may someday be another Exemption, but it will not be anything like the original.

We discovered that our initial fear of the regulated environment was unfounded. For the most part, it is business as usual at the club and we have adapted to living in a regulated RC world.

And now here we are at the end of 2023, still going strong and hoping for a much smoother year ahead!

We are looking forward to a new team to drive the newsletter forward in 2024. Thanks to Paul Conway, Jack Selvage, Paul Cox and Norman Steinberg (and Chat GPT too) for their great contributions to this issue. As always, contributions are welcome from all members!

We hope you are having happy holidays and look forward seeing you at the field. 😊

Your Executive Team

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Message from the Prez

Dear Members

Just a quick note to wrap up a most interesting year. Between MAAC machinations, the "incident" and a generous donation, we've "had it coming and going!" as they say where I come from (Staffordshire, England).

While some of the new regulations might seem unfounded, our recent emphasis on club safety is not. We had a bit of "scare" not too long ago and must prevent a repeat. Let's make 2024 a year of safe flying for all. With this in mind, here are the top five field rules that are worth refreshing ourselves with, as we enter the new year:

Top 5 Field Rules List



1. **Put out the cones when flying.** Even if flying alone – it's a MAAC regulation. The first row of cones (Pilot Stations) should be at the first base line of the south baseball diamond (not in front of Pit Area). The flight line is then 10 paces out (west) from there. The reason for this is to protect pilots from being hit by aircraft taking off and landing. This has happened in the past and there were serious consequences. Always take off upwind from other pilots on the stations line.
2. **Keep your plane inside the flight area boundary** and always avoid flying over pedestrians walking outside the fence. DO NOT fly over Fields 7 & 8 to our north!
3. **Field must be clear** of ALL public and DNV employees before flying.
4. **Register and mark your models** with the required Transport Canada identification. See Requirements here <https://tc.canada.ca/en/aviation/drone-safety/registering-your-drone-overview>
5. **No Guests are allowed to fly at the field**, as per DNV legal requirement. If you know someone who would like to try out at the field, please refer them to the Executive and an instructor can be arranged.

Note: The complete club rules and field diagram are posted on the website <https://www.nvrcfc.com/Rules/> and also on the lid of the blue box at the field. Contact the Executive if you are unsure of anything.

To help kick off the new year we have developed a new logo. Comments are welcome!

You will be seeing more graphical change in the revamped website to be rolled out in January.

Thank you for renewing your membership.

Take care,

Paul Cox, President
North Vancouver Radio Control Flying Club
Cell: 604 802 2726



Baba and the Jet

by Mike Poser



Recently, I drove down to Seattle to take long-awaited ownership of my first 80 mm EDF (Electric Ducted Fan) jet, the Avanti S V2.

I arrive at the Marymoor RC field in

Sammamish, about 20 miles east of Seattle, on Sunday afternoon. It is a fine day and the field is well-attended considering it is mid-December. I walk around and notice a few EDF jets, including two other Avantis, already on the flight line.

I start to prep for take-off, and I am suddenly surrounded by three of the other EDF jet pilots, all under age fifteen. I imagine they are concerned about this old dude setting up to fly a jet. They very kindly offer to assist, even carrying the plane out to the end of the runway for me.

Then comes the discussion. Flaps or no flaps on take-off? Two of the three say none needed. I am new to jets, so I go with democracy and set flaps to neutral. Before I hit the throttle, the jet crew, now joined by a very bright and knowledgeable young teen named Baba, quizzes me on how long I have been flying. I am embarrassed to admit fifty years, so I cut it down to thirty. This meets with an odd silence. To this crowd, even thirty years is eternity and does not compute. I am cleared for take-off, nonetheless.

The Avanti, huffing and puffing, accelerates down the grass runway but does not lift off. My jet crew yells out "Abort!". I immediately cut throttle. The jet flips over into the tall grass at the end of the strip. The nose gear doors shear off but otherwise there is no damage.

Round two. After my unsuccessful take-off attempt Baba takes charge. He thoroughly checks the plane over and scowls.

"You need 3 seconds to drop the flaps otherwise the plane won't transition properly from high-speed flight," he says. Should I have known that, I wonder?

Baba asks for my transmitter and deftly navigates to the Flap Systems set-up screen. A software glitch prevents him from inputting the desired 3 second servo delay. He hands me back the transmitter,

advising me to always do the manufacturer recommended software upgrades. Strike two!

"You can fly it as is, but just be careful deploying flaps at speed for now," he allows. "And make sure to add half flap for take-off. That'll make all the difference."

I taxi to the end of the runway and take a deep breath. The sun is low on the horizon and reflects off the jet's canopy. The Avanti looks new and pretty.

I struggle to maintain a confident look, but Baba sees through it. He offers to maiden the Avanti for me. He has been flying *four* years, he tells me, so I can trust him. Intuition tells me the smart move would be to hand him the sticks, but my pride takes over and I politely decline.

"Flaps down?" Baba asks.

"Check!"

I push the throttle hard; the Avanti lurches, rolls forward and up she goes! Just like Baba said she would.

"Flaps Up. Gear Up!" Baba prompts me.

His reminder is well-timed because I am now so focussed on avoiding the sun's glare that I had forgotten that the plane had either flaps or retracts.

After a few circuits to trim out, my "co-pilot" advises me it is time to practice some approaches.

"Don't outfly the battery".

I descend into the landing circuit and with Baba's guidance get the approach altitude just right. Gear down and half flaps on his signal. All good. The jet settles on to final glide path.

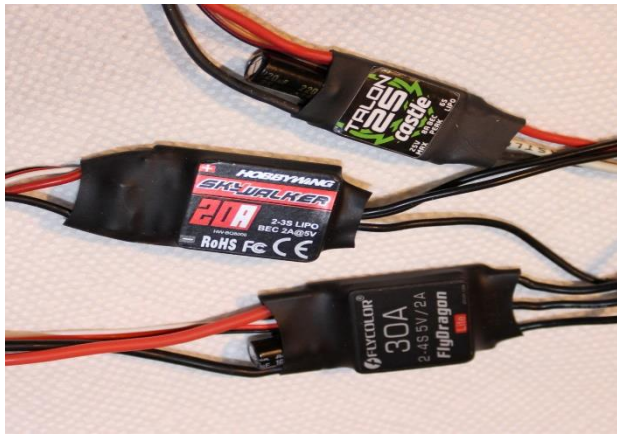
"Flare!" Baba calls out. But I am a touch late, so the jet hits nose wheel first and bounces on touchdown, knocking off the magnetic nose cone. The Avanti is otherwise safe and sound. Mission accomplished!

Baba smiles and I thank him heartily. Another jet newbie launched. It dawns on me that this young man and his companions are the future face of RC.

The Marymoor RC Club has about 500 members and fly out of King County's Marymoor Park. The club has an impressive program to attract and mentor their junior pilots. It works!

Photos by Paul Cox





BEC Ratings By Paul Conway

What follows applies only to electric models, but all models require an uninterrupted supply of electrical current to the receiver. A bad connection or poor switch contact can instantly disable any model. However, one weak spot that is unique to electrics and which may cause sudden and total radio failure is the BEC.

The BEC or Battery Eliminator Circuit is usually contained in the ESC and is responsible for supplying power to the receiver and servos. It eliminates the need for a separate radio battery (like nitro models require) and hence the name. The BEC supplies a stable and fixed voltage, irrespective of the battery voltage or number of cells. To do this it employs a voltage regulator circuit to reduce the greater and variable input voltage to a steady 5 or 6 Volts. The label on the ESC specifies the number of cells that can be used and the maximum current that the BEC can supply under ideal conditions.

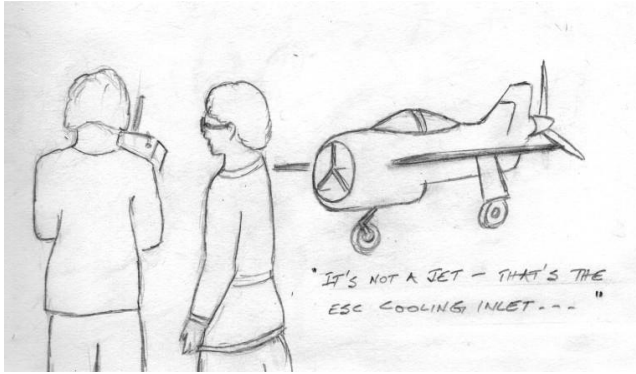
There are two basic types of voltage regulators in use in BEC's - linear and switching. Linear regulators simply "lose" the unwanted extra voltage by using it to generate heat. If you have a 12-Volt LiPo, the BEC will "burn off" 7 Volts in order to supply 5 Volts at the output. If your receiver and servos are drawing 1 Amp the BEC will be generating $7\text{ V} \times 1\text{ A} = 7\text{ watts}$ of heat.

This is certainly a lot of heat and would easily burn out the regulator if applied for very long. Small electronic components generally have power dissipation ratings in the milliwatt range.

Switching voltage regulators are different - they adjust the output voltage by rapidly switching the power on and off at a rate that matches the demand. These regulators don't generate as much waste heat and are therefore more efficient and run a lot cooler. BEC's with switching regulators are usually called SBEC's. There is one possible disadvantage to an SBEC - it may have the ability to cause radio interference if poorly designed or installed too near to the receiver or antenna.

Electronic circuitry is sensitive to excess heat and ESC's are no exception. If your BEC is getting too hot it will either fail or shut down due to thermal overload and the radio will stop working. Confoundingly, by the time you have gathered up the pieces and got them onto the bench for a test, the BEC will have cooled down and may have started to work again. Or perhaps not.

Determining if a linear BEC is adequately rated for a given installation is not as simple as reading the rating on the label. The fact that a linear BEC is rated at 2 Amps does not mean that it can continuously supply that amount of current without over-heating. For a start, the current rating is based on the assumption that the input voltage is close to the output, so that the power dissipation (heat generated) is low. The output from a 2S (8.4 V) pack will only need to be reduced by 3 Volts but a 3S (12.6 V) needs to "lose" 7 Volts and a 4S (16.8 V), 11 Volts. If the radio is drawing 1 Amp in each case, the 2S installation will generate 3 Watts of heat, the 3S, 7 Watts and the 4S, 11 Watts. Depending on the current load, your 3-amp linear BEC might only be good for 0.75 Amps on 4 cells without over-heating. Obviously, adequate cooling airflow over the ESC will be a much bigger concern with a higher cell count, even though the size and number of servos might be the same.



It's difficult to determine what current rating is actually needed but a useful, if very rough, rule of thumb that I have devised is to allow 8 mA of current for every 1 oz-in of servo torque and to downgrade the BEC current rating by 50% on three cells and 75% on four to allow for the increased heat generated in reducing the higher voltages. Use only SBEC's on five cells or more.

For example, consider a model with two HS 81 servos on the ailerons and two HS 225's on elevator and rudder. The total torque is $36 + 36 + 54 + 54 = 180$ oz-in at 5 Volts and the current is therefore estimated to be $8 \text{ mA/oz-in} \times 180 \text{ oz-in} = 1,440 \text{ mA}$. In addition, allow 100 mA for the receiver, so the total current requirement is 1.54 Amps. If you use a 2S battery a 2 Amp BEC will be okay, but a 3S will need a 3 Amp BEC (downgrade by 50%) to allow for the increased heat generated and 4S will need a 6 Amp BEC (downgrade by 75%). If you use a switch-mode BEC, a 2 Amp rating will be OK in all cases. Even the smallest SBEC's will usually deliver more than 2 Amps anyway.

This is admittedly a rough estimate and I have rounded off the numbers, but it is conservative, and it seems to work for me. If you fly very aggressively you might want to consider these to be absolute minimum acceptable ratings. You still need to allow adequate airflow around the ESC. (Remember that styrofoam is a great insulator and an ESC tucked into a pocket in a foam fuselage is at a big cooling disadvantage.)

Finally, the ESC also contains the motor control unit which controls the motor speed by regulating the

current supply. With motor currents of many Amps, there is bound to be some heat generated but the circuit works more like a switching regulator, turning the current on and off very rapidly. The process is not 100% efficient, so there is still some heat to dissipate. This will contribute to warming the ESC and an ESC operating close to its maximum rating may get quite hot. A good rule-of-thumb is to use an ESC that is rated for 50% more current than the motor will ever draw. In the small confines of the ESC package, heat generated by the motor control circuit will contribute additional heat to warming the BEC. Most ESC's have a thermal cut-out which stops or slows the motor when the motor control unit reaches a pre-set temperature. The BEC can get quite a bit hotter.

The motor will not necessarily stop under these conditions and it is possible for the BEC to over-heat to the point of failure before it does so. In short, you can't rely on the motor control thermal cut-out to protect the BEC but when the BEC does fail you will lose all control, not just the motor, suddenly and without warning.

Next time you fly, feel the ESC as soon as possible after landing. If it's too hot to touch, find out why and correct it before risking another flight.



Dang!
Shoulda right-sized the ESC!!



How Do I?

by Jack Selvage

The RC flying hobby has certainly changed over the years. Having recently re-discovered the hobby after many years away from it, I discovered the learning curve is pretty steep. (Foam airplanes, Electric motors, ESC's, BEC's, 2.4Ghz, gyros, SAFE, etc.) One of the best sources of information are fellow members of the Club. It is hard to beat the benefit of heading to the field with a coffee in hand and talking to/sharing information with fellow Club members. So, come on out to the field!

Another great source of information is, of course, the internet. The trick is knowing where to find the information you require. To that end, the attached is a listing of various sources of information I found to be useful as I took up the hobby again. I am sure each of you has a favourite resource you use that may not be included here - sharing your favourites would be welcome! We are planning to summarize all of the information in one place on the soon-to-be updated website. Stay tuned.

Articles

MAAC Magazine- March/April 2022 - RC Electric Section pg. 52

"Managing Batteries Between Flying Sessions" by Nigel Chippendale

Includes a very useful reference chart for optimizing battery usage in order to prolong the life of your battery investment.

Websites

Canadian Air Regulations Part IX

<https://lois-laws.justice.gc.ca/eng/regulations/SOR-96-433/FullText.html#s-900.01>

Transport Canada Licensing Requirements

<https://tc.canada.ca/en/aviation/drone-safety/learn-rules-you-fly-your-drone/flying-your-drone-safely-legally>

Transport Canada RPAS License Study Materials

<https://tc.canada.ca/en/aviation/drone-safety/drone-pilot-licensing/drone-pilot-study-resources>

Transport Canada Drone Registration Portal

<https://tc.canada.ca/en/aviation/drone-safety/registering-your-drone-overview>

AMA Flight School

<https://www.amaflightschool.org/how-do-i>

MAAC Magazine Articles

<https://www.maac.ca/en>

Model Airplane News-Tech and Tips

<https://www.modelairplanenews.com/category/fixed-wing-flight-school>

The RC Geek-Blog-lots of topics including Tutorial on SAFE Select

<https://www.thercgeek.com/2018/07/from-the-bench-horizon-hobbies-safe-select-technology-tutorial>

Understanding Lipo Batteries

<https://www.mrpositive.co.nz/buying/knowledge-base/understanding-lipo-batteries>

Forums

Hobby Squawk-Forum-Hundreds of Topics

<https://www.hobbysquawk.com/forum>

RC Canada-Forum-Hundreds of Topics

<https://www.rccanada.ca/rccforum>

RC Groups-Forum-Hundreds of Topics

<https://www.rcgroups.com/forums/index.php>

YouTube Channels

<u>BD Tennessee-Playlist-Spektrum NX/IX Tutorials</u>	Playlists of short videos that explain various Spektrum radio features and how to use them.
<u>Brian Phillips RC</u>	Detailed build and radio setups for hundreds of popular models.
<u>FatGuyFliesRC Video-“Protecting Your Investment for the Long-Term”</u>	Good detailed video on periodic maintenance of foam airplanes to ensure they are safe to fly for the long-term.
<u>FliteTest</u>	Playlist-Beginner series covers lots of basic knowledge when starting out.
<u>ModelAv8R</u>	Various reviews of popular models including radio parameters along with detailed overview of flight characteristics of each model.
<u>SpektrumRC</u>	Various videos to discuss features of various Spektrum equipment including tutorials on forward programming.
<u>Tim McKay</u>	Short videos available explaining RC Basics including CG, Flaperons, Telemetry, TurboCAD
<u>https://www.youtube.com/@user-cp8xe7kz8s/videos</u>	Videos including step by step instructions of Beg/Int/Adv aerobatics.

Book

Stick and Rudder-An Explanation of the Art of Flying

By Wolfgang Langewiesche

Provides an overview of flight basics including an explanation of angle of attack, the role of lift and the purpose of each flight surface written in an easy-to-read format from the perspective of full-scale flight. Available on Amazon or at your local library

Tips and Tricks

A single lifetime of aeromodeling is not long enough to figure it all out on your own! In this new section of the newsletter, we are aiming to build a library of helpful tips for building, repairing, maintaining and flying. Here are a few to get us started. Please send in yours for future issues!

Building

1. Dollar store plastic paint palette for (accurately) mixing epoxy.
2. Twirl a cotton bud (à la cotton candy) to collect weblike hot glue residue.
3. Glue sandpaper to (free) paint stir sticks.

Submitted by Paul Cox



ii) Small zip ties can be used to bundle/organize the wiring inside the plane. If you leave a small length to the end of the zip tie when you cut it, it can be poked into the side of the fuse and with a little CA on the end it will become a semi-permanent wire hanger. *Submitted by Jack Salvage*



iii) When you've got a short bit of dowel or tubing left over, don't throw it away. Glue a piece of sandpaper around it to make a sanding cylinder. These are useful in a variety of sizes to sand the inside curvature on gussets and lightening holes. When the sandpaper wears out, just glue another layer on top of it. *Submitted by Paul Conway*

Foam Repair

i) Hot water from a boiling kettle poured directly on the crushed area of a foam aircraft will expand the foam to the point of removing most if not all of the damage. Take care to pour the water only on the actual damaged area as the hot water expands the grain in the foam and will be especially noticeable if the foam is painted. *Submitted by Jack Salvage*



ii) Here is a tip to repair cracked, but not fully broken, foam wings, parts, etc. Cut off the sharp tip of a hypodermic needle. Remove plunger, squirt some Clear Gorilla Glue into the syringe and replace plunger. Inject the glue into the crack. Use painter's low tack masking tape to hold parts in place while the glue sets.

Injection gets the glue deep into the crack and makes the part like new again. Clear Gorilla glue does not expand like the white or yellow versions do, so it won't bubble out of the joint. *Clean-up Tip:* Before the glue sets, clean the inside of the needle by poking it through with a thin piece of music wire. *Submitted by Mike Poser*

Charging

Does your LiPo charger require a DC input power supply? If so, consider using a desktop PC power supply. They are relatively inexpensive, reliable and come in different current ratings. (*Editors Note: PC power supplies are generally rated at 200-1500W output. Be sure to right-size the power supply to your output charging requirements*). Preferably get one with a mechanical on/off switch or plug it into a switched power bar. Also, there are lots of used ones (for free) in abandoned computers but ensure that the fan is working without mechanical noise. Either cut off the disk drive connectors and splice the wires to your charger's input cable, or buy mating connectors for the charger inputs.

Submitted by Norman Steinberg

The Back Page

Remember the MAAC flight ban from January of this year? To commemorate this "infamous moment" of our hobby, we asked Chat GPT to write us a song. It is called "Fly, Fly into the Canadian Sky" written in the style and tune of the Don McLean classic "Bye, Bye Miss American Pie".

The song tells the story of a happy club of multicultural model airplane enthusiasts who love to fly their models in the beautiful foothills of North Vancouver.... Until their government (called MAC) bans them from flying outside. So hum along with the lyric below and let the joy of flying never die...

Fly, Fly into the Canadian Sky

by Chat GPT

Verse 1:

*A happy club of flyers, in North Vancouver's hills
Their models in the sky, brought them many thrills,
Old and young, from many lands,
A multicultural group with planes in their hands.*

Chorus:

*Fly, fly into the Canadian sky,
The joy they felt, you cannot deny,
With each plane that soared up high,
The love they had, you could not buy.
The love they had, you could not buy...*

Verse 2:

*One day, their government, who they called MAC,
Banned them from their field, it was an attack,
"We made a mistake," said MAC, with regret,
"You cannot fly, it's not safe, please don't forget."*

(Chorus)

Verse 3:

*Loyal to MAC, the flyers obeyed,
But as time passed, they became dismayed,
Many cursed, some lost respect for MAC,
Their beloved field was now under attack.*

(Chorus)

Verse 4:

*At long last, MAC fixed their mistake,
And lifted the ban, it was no fake,
The flyers were free to fly again,
And the rejoicing was heard, from mountain to plain.*

(Chorus)

Outro:

*So let us remember, the flyers and their planes,
And the love they had, that will always remain,
Fly, fly into the Canadian sky,
And let the joy of flying never die.
And let the joy of flying never die.*