



JCRC Flight Line

2019 Volume VI, June 2019

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President's Message

Our new Vice President, by popular acclamation, is Tim Cox. Congratulations, Tim...Now get to work!!

Chilling and Grilling has started!! Make time to come out and fly and be sure to join us for the Tuesday evening Chill and Grills, come rain or shine, just not when the lightning flies.

Dan Jackson

Quotable Quotes

When once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return.

— Leonardo Da Vinci

If God had really intended men to fly, he'd make it easier to get to the airport.

— George Winters

We in America do not have government by the majority. We have government by the majority who participate.

— Thomas Jefferson

"It takes time to persuade men to do even what is for their own good."

-Thomas Jefferson

Editor

Please send your input, questions or suggestions either by e-mail (rossgtenn@gmail.com) or post to Glenn Ross, 134 Chock Creek Road, Johnson City, TN 37601-3639 by the 19th of the month you would like it included. Electronic input should be .jpgs and word documents (.doc or .docx).

THANKS!

Glenn Ross

Next Meeting

Tuesday, 24 June 2019, 6:45 PM at Odom – Fennell Field, Tri Cities Model Airport

New Member Information –

From Harold Hughes –

“Ever since I was a small child I have loved anything to do with flying. I started out building model airplanes and from there to a career flying in the army.

My talking about flying so much to my wife led her to conspiring with my daughter to buy me my first RC model plane for my birthday. I immediately got on the internet to find out about all the resources that were available. In addition to knowing about the club here I found all the information I needed to join.

The club has already checked me out releasing me to fly on my own. I enjoy the comradeship of the members and look forward to learning so much more from them.”



FYI

We held the 2019 Inaugural Chill and Grill on May 7th. Quite a few folks showed up for Hot Dogs, Kase Kuchen, Flying, and Fellowship. Even Dave Peterson dropped by, looking good and moving under his own steam. Here are a few pictures:



On the 14th of May, we had an even larger crowd show up to enjoy Hamburgers and Potato Salad. There were strong winds followed by sudden periods of dead calm and a furious rush to get up and down between gusts. No wrecks, but Tim seemed to stop his landing roll outs with his spinner in the dirt....



Upcoming Activities

Chill and Grill

6 PM till Dusk, every Tuesday evening, Rain or Shine starting 7 May and running through 27 August at Odom-Fennell Field.

Join us for Burgers or Hot Dogs with flying and fellowship – unless there's

 lightening  !!

National Model Aviation Day and Club Pic Nic

17 August,
rain date 24 August
at Odom-Fennell Field.

Tips and Techs

This is part one of a two part article which shares “Rules of Thumb” as presented by Stephan Vorkoetter*. Part two will be presented in the June issue of Flight Line. Again, if any of you readers have tips or information to share, please submit your article to the editor (me).

Electric Flight Rules of Thumb

*for QuietFlyer Magazine by Stefan Vorkoetter**

I've been writing this column since late 1999, and over the years, have mentioned many rules of thumb. A reader recently asked if these were all written down in one place, so I thought this would be a good opportunity to do exactly that, revise some of the older ones, and see how they work together. None of these rules, used by themselves, will guarantee a good performing airplane, but taken together, they almost ensure it.

Power Systems

Probably the most used rule in the history of electric flight is one originated by well-known electric flight guru Keith Shaw. The rule states that for reasonable sport performance, a plane's power system should draw at least 40 to 50 Watts per pound (W/lb) of airplane. For good aerobatics capabilities, 70 Watts per pound is more suitable. These figures are in terms of motor input power ($\text{Watts} = \text{Volts} \times \text{Amps}$), and assume a motor efficiency of about 75%, which was typical of a good cobalt motor when this rule was suggested. With a modern brushless motor operating at 85% or better, this can be changed to 35 to 45 W/lb for sport performance, and 60 W/lb for aerobatics.

Rules of Thumb

It is a well-established, yet incorrect, belief that the term "rule of thumb" comes from 15th or 16th century English common law. Supposedly, the law allowed a man to beat his wife with a stick no larger in diameter than his thumb. I did some research (mostly by looking at other peoples' research) and found that this was simply untrue, although there are apparently one or two 19th and early 20th century American cases where this alleged rule was applied.

The term was apparently used longer ago than even the 15th century to refer to tradesmen who knew their craft so well, that they would often dispense with measuring devices such as rulers, and just use their thumbs to make accurate measurements (thankfully, they didn't have power saws in those days). Hence, they used a "rule of thumb" instead of a "rule of wood".

This origin of the phrase also makes more sense, since a rule of thumb is not a strict dictum, but just an approximation or suggestion.

I propose that we collectively start a legend that the term comes from the radio control hobby, where many of us fly our rule-of-thumb-designed models with our thumbs.

Another early electric flight rule is that the power system (propeller, gearbox, motor, speed control, and battery) should account for about 50% of the total ready-to-fly weight of the aircraft. This rule, based on the technology of the 1980s and early 1990s was intended to help ensure

adequate power and duration. Modern nickel metal hydride (NiMH) cells have about twice the capacity for the same weight as the cells available then, and lithium polymer (LiPoly) cells are much lighter yet. Similarly, most brushless motors are lighter than a brushed motor of the same power output. This means that the same performance can be achieved with a power system that represents 25% to 40% of the ready-to-fly weight.

Batteries

A number of years back, former Demystifying Electrics columnist Matthew Orme proposed a simple rule for sport model battery packs: there should be approximately one nickel cadmium (NiCd) cell for each 50 square inches of wing area. This rule was intended for models powered by Sub-C sized cells, and if I remember correctly, either the 1900SCRC or RC2000 were the state-of-the-art at that time. Having chosen the battery pack, one could then apply the other rules to choose the motor, gearbox, and propeller.

A suggestion for full-throttle current draw was that models powered by Sub-C sized cells should draw about 25 Amps, and those powered by AE or AA cells should draw about 10 Amps. The 25 Amp limit was to ensure adequate flight duration, whereas the 10 Amp limit was to prevent cell damage. Modern 3300mAh NiMH Sub-C cells can provide the same durations at 40 Amps, although the smaller cells are still best kept at 10 Amps. LiPoly cells have specific current limits suggested by the manufacturer.

Propellers and Gearboxes

Choosing the right battery and motor will not guarantee a plane that performs well (or even flies at all). Having determined the required power level, an appropriate propeller and possibly a gearbox must be selected to turn that motor output power into something that can move the plane.

The first rule in this area concerns pitch speed, which is the speed that the propeller would move through the air if the air were a solid material. It is approximately the speed that the air leaves the back of the spinning propeller. The rule states that the pitch speed should be about 2.5 to 3 times the aircraft's stalling speed (the speed below which it cannot fly – more on this later). Pitch speed in miles per hour is equal to $\text{rpm} \times \text{pitch} \times 0.000947$, where pitch is measured in inches. If the pitch speed is too low (i.e. much less than 2.5 times the stalling speed), then the propeller becomes inefficient at high speeds. If it is too high, the propeller is inefficient at low speeds.

The rule needs to be modified somewhat for non-sport models: electric sailplanes should have a pitch speed of 2 to 2.5 times the stall speed, and 3D models about 1.5 to 2 times the stall speed.

Another factor is static thrust. This is the amount of pull that the power system provides when the plane is stationary. In general, a model should have static thrust of 1/4 to 1/2 of the plane's weight. Sailplanes that are to make rapid high-angle climbs benefit from higher thrusts, as do 3D models (which require thrust greater than weight in order to be able to hover).

Keep in mind that what really matters is the thrust provided when the plane is moving, but this is hard to measure. Thus, any rules regarding static thrust should be used in conjunction with the pitch speed rule appropriate for the model.

Often, with a given motor and battery, it is not possible to produce the desired combination of thrust and pitch speed, in which case adding a gearbox can help matters by allowing the use of a larger, more efficient, propeller. Of course, there is a rule of thumb that can be used to select the right propeller for a given gear ratio. First, choose the direct-drive propeller that gives an appropriate pitch speed. For example, for a particular high-revving motor, this might be an 8×3. Multiply the diameter by the square root of the gear ratio, and multiply the pitch by the gear ratio. For example, if using a 3:1 gearbox, the 8×3 propeller would become a 14×9. This will

allow the motor (not the propeller) to turn at the same rpm, produce the same pitch speed, and far more static (and in-flight) thrust.

A final rule regarding propellers for sport models is that the diameter to pitch ratio should be somewhere between 2:1 and 1:1 (for example, 8×4, 8×5, 8×6, 8×7, and 8×8 fall into this range). Somewhere in the middle is usually best. Used in conjunction with the previous rule, it lets you choose an appropriate gear ratio.

** Giving credit where it's due, Mr. Vorkoetter is also the author of the two part article series presented in March and April. I told you I'd give credit if I could find his name.*



AMA Updates

The last few weeks have been busy for the FAA as it begins to transition to assuming its newly mandated level of control over use of the nation's airspace to meet its commercial, recreational and security requirements. On the 23th of April, AMA led the first Stakeholders' meeting for the development and promulgation of new administrative regulations for recreational UAS with the FAA. Participants included the Toy Association, the University of California, Fresh Air Educators, Flite Test, MultiGP, UASidekick, the Drone User Group (DUG), the Association for Unmanned Vehicle Systems International (AUVSI), Horizon Hobby, the Experimental Aircraft Association (EAA), Civil Air Patrol (CAP), the Alliance for Drone Innovation (ADI) and the Organization of Black Aerospace Professionals (OBAP).

Then, on May 14th, 2019, the AMA sent the following e-mail to its members:

Dear members,

Some of you may be aware of a recent FAA Memorandum that addressed altitude and flying restrictions in controlled airspace. This memorandum was intended as FAA guidance to educate air traffic control facilities (ATC) on best methods to respond to recreational flyers seeking authorization, not as guidance to recreational operators.

Recent legislation under Section 349 (c) states operators in controlled airspace will be required to seek authorization from towered airports, unless flying from a chartered flying site. We successfully championed that if you are flying at an AMA flying field or sanctioned event, you can continue flying by following AMA's safety program and within the existing agreements your club or contest director has with nearby airports.

AMA has been in contact with the FAA regarding this memorandum, and we have been assured that our flying sites' current agreements with air traffic control facilities (ATC) will be honored and our members can continue flying within AMA's safety program, as usual. This memorandum was not intended for public distribution, and out of context can read as problematic or contradictory to previous messaging to protect our operations. The FAA clarified this memorandum is just one of many steps in the Section 349 implementation process.

Future steps in the implementation process will require letters of agreements (LOA) between AMA flying sites in controlled airspace and nearby ATC. Updates and guidance on how clubs should proceed with LOAs will be provided to our members in the coming days. Please monitor social media and www.modelaircraft.org/amagov for the latest information. You can reach our offices at 765-287-1256 or amagov@modelaircraft.org.

Sincerely,

AMA Government Affairs Team

Clearly, our flying site at Tri-Cities Model Airport is in Class G airspace and not within 5 Miles of an ATC controlled airfield. However, if you are flying at some other location that is within the 5 mile radius, you should be aware of the requirements to notify the administrator of that airfield/controlled airspace.

The 14 May Mail-Note was followed on May 17th by this e-mail from AMA:

Dear members,

Earlier today, the FAA issued a notice that provides temporary guidance for recreational fliers. AMA is already working with the FAA to make accommodations for our members, and we wanted to let you know what to expect.

First, we'll share a bit of background. Throughout the past few years, thousands of new recreational drone users and more than 400,000 new commercial drone operators have entered the airspace. Late last year, Congress passed and President Donald Trump signed into law the FAA Reauthorization Act of 2018. This law gives the FAA more authority to address the surge of new users and changing airspace. Part of the law includes Section 349, which outlines eight statutory requirements for the recreational operation of all unmanned aircraft, including all drone and model aircraft hobbyists. The FAA is tasked with creating new rules in accordance with this law.

The guidance the FAA issued today is one step in a long process to create and implement the new rules for recreational fliers. It's important to note that at this stage in the process, the guidance does not constitute official rules and it's not legally binding.

Here's what you can expect: AMA is working with the FAA to accommodate our diverse, safe, and responsible community with future regulations. Together, we are working to ease the burden of compliance with the guidance issued today and, eventually, with the new rules. We regularly engage the FAA, including multiple meetings yesterday, to discuss the details of these solutions.

As a next step, we will begin working with AMA members and clubs located near airports to establish letters of agreement. These letters of agreement will formalize the special accommodations for our community and allow AMA members to continue flying at these fixed flying sites without interruption.

AMA members have flown safely in our nation's skies for decades, and the FAA recognizes that; however, we are entering a new era of unmanned aviation and with that come changes. We are doing everything we can to ensure that this transition is smooth, and our hobby is protected.

We will keep you updated on the FAA's process of creating and implementing new rules, as well as our work to find solutions for AMA members. If you have questions, please do not hesitate to reach out.

Thank you,

AMA Government Affairs

The new temporary guidance is located here - <https://www.federalregister.gov/documents/2019/05/17/2019-10169/exception-for-limited-recreational-operations-of-unmanned-aircraft>.

If you haven't already done so, please take a few minutes to go to the link study them. Although they are not yet legally binding, you should be aware of their direction.

Also, even though we are outside the 5 Mile radius, we were visited at our field by three members of the FAA. Dan and Vic gave them a tour and invited them to "*learn to fly*" with our club. Clearly, the FAA personnel who visited the club believe it is their responsibility to generate a Letter of Agreement (LOA) with our club even though we are outside the 5 Mile radius requirement detailed in Section 349. Our having an LOA, whether we are inside the radius or not, may not be a bad thing. It would also be beneficial for us to cultivate a good working relationship with our local FAA personnel, and better, to add them as members to our club.

JCRC Sponsors

Hobby Town USA

Located at 3515 Bristol Highway in Johnson City, Hobby Town offers a full range of hobby needs, from model rail roading, to automotive modeling and aviation modeling. A strong sponsor of JCRC, they offer JCRC club members a 10% discount. Phone: (423) 610-1010.



Benedict's Ace Hardware Store



Due to the sale of *Great Planes model parts and accessories*, Benedict's Ace Hardware is discontinuing their aircraft parts sales. Once the current inventory, shown in the picture below, is gone, they will be out of this product line with no plans to restock. Get stuff while you can. They are at 3607 North Roan Street in Johnson City; (423) 282-1950.

