ACADEMY OF MODEL AERONAUTICS CHARTERED CLUB #1255

SERVO CHATTER

A PUBLICATION OF:

ANOKA COUNTY RADIO CONTROL CLUB, INC.

APRIL 2015

THE MEETING WILL BE THURSDAY, APRIL 16, AT RIVERWIND!!

PRESIDENT'S CHATTER

This is a short note to remind everyone that the first event of the year, a Fun Fly, is this month on the 18th. Trim flights are at 9:00 AM and the fun begins at 10:00 AM. Let's get them out of the hanger and tuned up.

SEE YA THERE

Virgil Okeson

ACRC MINUTES

Members present - 22

New members - Gary Bona

Treasurer - All is good. Get your memberships in!

Membership - 75 about the same as last year, says Grandpa.

Events - April fun fly; Saturday after the meeting. 10:00 AM start time.

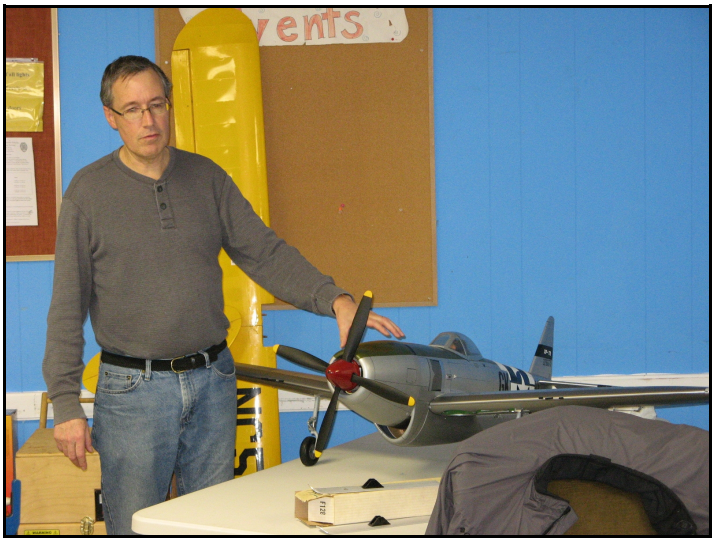
Training - no students or instruction inquiries.

Safety - looking at FPV rules. Brett to get info for FPV rules for membership knowledge and newsletter info.

Old business - indoor flying season has ended.

New business - the president expressed that more field work is needed in the way of replacing some of the wood on the benches and performing some run up stand upkeep. FPV was brought up again as the new hot topic. Brett to dig deep for info on the does and don'ts and on the must haves and have-nots.

Show and tell -



- Bob Proulx brought in a modified Hangar 9 P-47 turned in to a XP-72. Powered by a Axi 41-20 motor and a 6s power pack, weight at about 10.5 lbs, covered with different colors of silver to simulate metal work in different areas of the aircraft. He had to find a new wing for the project the original was well used and in need of extensive repair, he found a donor and reinstalled his Robert retracts. What a fantastic piece of artwork. I look forward to seeing it at the field.

Virgil Okeson and Tom Larose brought in their computers to play on the simulator. Phoenix simulators have the ability to let you fly over the web with your buddies or other users. The simulator runs about $130.00.

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Raffle winners -

8" belt and disc sander	Bob Barton
3 pack parts containers	Tim Karash
Prop reamer	Marc Tellevik
Kwik switch mount	Jeff Voelz
Kwik switch mount	Tom Janos
Hangar 9 fuel pump	Stan Zdon
Volt watch meter	Tom Janos
Maxx products switch	Virgil Okeson
Digital tach	Bob Barton
Chicken stick	Jeff Voelz
Plane ID cards	Marc Tellevik

Andy Thunstrom

MEMBERSHIP NEWS

I hope you will take time to read the flying site rules and refresh your memory now that the flying season is close at hand. This is especially important because a few years ago some changes were made to rule 10 and high-speed passes are now allowed over the runway in certain instances. The rules will be attached to the email you get with this newsletter. You should print a copy and keep it handy. If someone mentions to you that you are violating one of the safety rules please do whatever it takes to correct what you are doing. It is considered bad form to give them a hard time and then continue doing what you are doing. If it means that you have to stop flying and make repairs or go home to get something that you need, that is what the club expects you to do. The AMA insurance for you and the landowner provides coverage only if you are following the rules. It would be a shame to lose our field because of the ignorance and arrogance of a few fliers.

Part of Rule #2 states that members are to put their membership card on the frequency board and guests are supposed to use their AMA card. The reason for this is so that we can be sure that the fliers are either current ACRC members or guests with a current AMA. Fliers are not to use last year's cards, driver's licenses or business cards. If you lose your 2015 ACRC card and need a new one let me know. I will mail you a new card - FREE.

Don't forget that the first Fun Fly of 2014 is on Saturday, April 18.

The next meeting will be at Riverwind on April 16 at 7:00 PM. This is the last indoor meeting until September. The summer meetings will be AT THE FIELD.

Stan Zdon

ACRC TRAINING

Flying season is finally here. I have seen a few planes up when driving by the field (bummer it is not me flying), anyways if you are new to flying or rusty from the winter and need some training we will be starting the training on Wednesday nights, like last year. However, so far we have not had any potential students contact me for training.

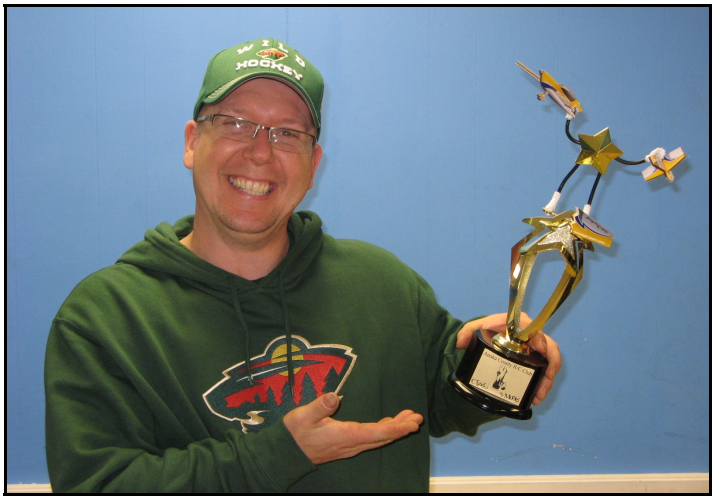
I am also still looking for instructors for assisting the new pilots on their "Rapid Vertical Deceleration Prevention Training" for this summer.

Please contact me if you would like to volunteer again this year or need instruction.

651-329-8449

designerfirewood@gmail.com (Please put ACRC Training in the remarks so I don't delete you as spam).

Tom Janos



2015's First Crasher of the Month
Winner - Andy Thunstrom
January 1, 2015

ACRC SAFETY

If you want to get into FPV flying, it would be easy enough to go out and buy a complete setup. Starting at two hundred dollars or less for a basic set up it is relatively cheap and easy to get a basic system. Of course that system would have its limitations and probably would not suit the needs of the more serious modeler. For example; Horizon hobbies is selling a complete FPV package designed for use on park-flyer sized airplanes. For about $250 you get a camera with transmitter and a set of video goggles with a built in receiver.

On the other end of the equipment spectrum is the high end aircraft like that coming out of DJI that have a price tag of $3000 but can do seemingly just about everything. And of course you could spend a lot more than that.

Since I don't have a lot more to spend, I am looking at building a system that is cheap but versatile and it also needs to be expandable. I could start with the Horizon Hobby FPV package but it has some limitations so I will need to plan a little to design my own system. For FPV flying I will need to have six basic components:

Camera
Transmitter
Receiver
Antennas
Video display
Aircraft capable of carrying the camera and transmitter

Ultimately I would like to have a quad copter to fly FPV but for right now I have enough fixed wing aircraft that I can modify an existing airplane to use for FPV flying. This will save money and will ease the transition to flying with this new style of equipment.

The first consideration is transmitter frequency. There are several different frequencies including 900 MHz, 1.2-1.3GHz, 2.4 GHz, and 5.8 GHz (sometimes abbreviated as 2G4, 5G8) each has its pros and cons. The lower frequencies can perform more solidly in dense terrain, but they also require longer heavier antenna. The higher the frequencies do not readily penetrate walls and trees and it does not transmit as far as lower frequencies for the same power but it does benefit from a smaller antenna, and, at least in the 5.8GHz, there is very little external interference. Although the 2G4 system would seem a balance of distance, general interference, and smaller antenna, it also poses a greater potential of conflict with the 2.4GHz spread spectrum radios commonly used in RC today. Taking into consideration that current guideline require that all FPV flights are performed with a spotter on a buddy box who can visually see and take over control of the airplane, the potential signal loss from flying behind obstacles and out of sight with the 5.8GHz should not be an issue under normal flying conditions. As it turns out, not only is 5.8GHz widely supported by the bigger name brands making equipment easily obtained at the local hobby shop, most of the cool stuff coming out is 5.8GHz ready.

The FPV package sold by Horizon Hobby, for example, is a 5.8GHz system that includes a one-piece camera and low power transmitter. The low power transmitter was selected to avoid the FCC requirement of having a ham radio operator license in order to make a FPV system that anyone could operate. While this is perfect for flying with micro airplanes, I might be out of range of the transmitter before I have left the end of the runway if I was flying anything larger than a park flyer. To get better range, I will be looking for a transmitter in that is as low as 25mw but more likely something in the 200mw to 1W range. Keep in mind that the higher power does not necessarily mean that you will get more range. The higher power will also require obtaining a FCC technician class license, but this does not appear to be difficult or expensive to achieve.

This complete package also includes a pair of Fat Shark FPV goggles. Although they appear to be fine goggles, they are a very basic goggle. And while they may be useful as a second pair of goggles they have a built in receiver that only works within one band of channels within the

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5.8GHz spectrum. While this might work for a vast majority of FPV pilots, they will not work with all possible setups with other branded transmitters locking you into a limited, but excellent, choice in transmitters. But for the price, it is still a very good receiver/video display option.

As much as I would like to start with a good set of goggles, I think a better option to get started cheaply is to go with a ground station with a video monitor. For under $75.00 it is possible to purchase a multi-band receiver that would be capable of tuning in all of the channels within the 5.8GHz spectrum used for video transmission. This could then be patched into a video monitor (an old flat screen TV that no longer works with the new broadcast signal). This setup is perfectly fine for getting started and has the bonus of allowing for sharing of the video feed from the aircraft. As this side of the hobby is growing so rapidly, I can see the possibility of the video goggles getting better and cheaper within the next year making the ground station option a very practical way to start.

A quick word on cameras and antennas. Cameras are pretty much the same across the board. I am sure that there are arguments for and against certain types, but they can be broken up into different classes and different price points. Some of the variables include: lines of resolution, low light levels, color, and even on screen setup, with the better quality and features meaning more cost. For the most part you do not need higher resolution, especially if your display is not capable of showing all the lines of resolution. Spending more for something you are not going to notice is a waste of money, especially on a plane or quad that could crash and break.

As far as antennas are concerned, there are a few different types. Whips or rubber duckies, CP (circular polarized) and patch are some of the most common used in FPV. Whips, which usually are included with the transmitter or receiver, are inefficient and prone to signal loss, especially when turning and banking with an aircraft. Patch antennas are great for long distance signal reception on a ground station but they need to be pointed directly at the transmitter in order to work. CP antennas, which look a little like a mushroom when they have a plastic cap, are very effective compromise. They also work great with a pitching airplane, and eliminate reflection interference making for a clearer image.

Next month I will be putting together a basic video system based on what I have talked about here. Also, I will try to answer some of the questions posed concerning FCC, FAA, and AMA rules and recommendations. I say “try” because, as I have found out so far, there is no simple answer.

Brett Ohnstad

SOLDERING ADVISORIES

Someone suggested that the use of a soldering gun was safer than other types because it would not roll off the workbench and burn you. It should also be mentioned over and over that soldering guns have a very strong alternating current magnetic field around the tip. When brought in proximity to electric motors and servos, this magnetic field de-gausses (demagnetizes) the magnets inside the motors and servos and causes permanent damage.

I have seen several people come to the flying field with a new electric-powered airplane that does not have enough power for flight. When asked if they soldered the wires to the motor with a soldering gun, the answer is usually “yes.”

Also you should never stick the tip of a soldering gun into the airplane’s radio compartment while soldering pushrods and etc. as it will presently damage the motors inside the servos.

If you must use a soldering gun, you should stay well away from electric motors and servos, meaning at least 24 inches just to be safe

—From the Rogue Eagles RC Club, Medford, Oregon

ACRC Forum - http://anoka-rc.com/forum

COOLING YOUR ENGINE

If your engine is running hotter than you would like, how can you cool it down? Most people make the mistake of thinking more is better when it comes to the air inlet at the front of the cowl. This is a common error and, while it seems logical, the reverse is actually true. To properly cool your engine, you need more outlet area, not more inlet area. You want at least 2:1 - preferably 3:1 - air out to air in ratio. Otherwise, it makes a dam and the air cannot come into the cowl because it has nowhere to go out of the cowl. If you engine is not cooling properly, try blocking off the other air inlet or opening the belly of the cowl further.

ACRC Forum - http://anoka-rc.com/forum

PROPELLER SAFETY CONCERNS

By Fred Burgdorf of Landing Products (makers of APC Props)
From R/C Report – October 1994

All propellers are inherently dangerous. Model airplane propellers are especially dangerous. Model airplane propellers used in high performance racing are extremely dangerous. Model airplane engines designed and modified to achieve maximum operating capabilities create unpredictable and potentially severe loads, leading to various forms of potential propeller failure. Ignoring reasonable safeguards may be catastrophic. This concern is the motivation for the following discussion.

Warnings included with propellers are intended to protect consumers. They also protect manufacturers against claims resulting from misuse of the product. Most products with potential for causing injury contain ample warnings about misuse. Some advertisements for products now contain warnings even before the product is sold! There is a strong proliferation of warnings in most products having potential for creating injury or damage. This inundation of warnings may cause consumers to become inured to product warnings.

The warnings about propeller use must be taken seriously, especially for racing applications. It is very risky to assume that a racing propeller blade will not fail, especially when used with state-of-the-art racing engines. Nevertheless, occasionally model aircraft operators are observed standing in the plane of propeller rotation of high performance racing engines running at full power. This is very frightening. The following information reinforces the assertion that dangers of misuse are very real.

Ideally, a product can be designed with credible knowledge of the environment (loads acting on the product) and capabilities of the product to withstand that environment (not fail). There is nothing ideal about designing a model airplane propeller for stress because some major components of propeller loads are very uncertain. The principal load components acting on a propeller are:

- Centrifugal (from circular motion causing a radial load)
- Thrust/drag (from lift and drag acting on blade sections)
- Torsional acceleration (from engine combustion and/or pre-ignition)
- Vibration (from resonant frequencies or forced excitation)

Centrifugal loads are very predictable**,** given the rotational speed and the mass density distribution of blade. Their contribution to total stress is relatively small.

Thrust/drag loads are somewhat uncertain due to complexities of aerodynamic environments. The relative axial speed of the prop (at any radial station) is aircraft speed plus the amount the air in front of the blade is accelerated by the mechanics

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creating thrust. The latter may be approximated using first order classical theory. Much empirical lift/drag data (from wind tunnel tests) exists to quantify lift/drag loads, once relative velocity and angle of attack distributions are established. These loads are nominally the major source of stress when torsional and vibration effects are benign.

Torsional acceleration loads are generally not reasonably quantified. Analytical techniques used by Landing Products to estimate torsional acceleration loads suggest that they can become strongly dominant when pre-ignition or detonation occurs. These analytical observations are supported by test experience with very high performance engines running at elevated temperatures. The latter causes a high torsional load (about the engine shaft) that creates high bending stresses, adding to those from centrifugal force and lift/drag effects. These torsional acceleration loads depend on unique conditions for specific engines. Engines "hopped up" for racing appear to be especially prone to create high torsional loads when lean mixtures lead to high cylinder temperatures and pre-ignition/detonation.

Vibration causes additional loads from cyclic motions. These motions occur when resonant frequencies are excited or when cyclic load variations exist on the blade. The magnitude of these variations depends on how close the driving frequency is to the resonant frequency and the level of damping in the propeller material. Engine combustion frequency is an obvious excitation. Obstructions in front of or behind the blade can cause cyclic variations in thrust load. Once a blade starts to flutter, those motions further alter the flow, causing additional variations, in loading. High performance engines have caused propeller tips to break, presumably due to fatigue failure from vibration.

Efficient propeller design practice utilizes analytical/empirical computer models to predict propeller performance and stresses. However, the uncertainty in impressed and inertial loading from complex phenomena requires substantial testing to assure safe performance. Unfortunately, it is not possible to assure testing that convincingly replicates worst case conditions. The large combinations of engines, fuels, temperature, humidity, propeller selection, aircraft performance and pilot practices create an endless variety of conditions. If the origins of severe loads were well understood, quantified, and measurable then structured testing that focuses on a worst-case stack up of adverse conditions might be feasible. However, since the origins of severe loads are really not well understood, it is essential to provide sufficient margins in material properties and design to assure safe performance. Propellers that are used in fairly routine and widespread applications (sport and pattern) lend themselves reasonably well to test procedures that provide reasonable confidence. In time, a sufficient data base develops that can be used to empirically quantify performance and "anchor" or "tune" assumptions used in analytical models.

However, propellers that are used for increasingly extreme performance applications do not benefit from the large empirical data base sport and pattern propellers enjoy. Assumptions and design practices developed for current generations of engines may not be valid for emerging engines whose technologies continue to push engine performance to greater extremes. Consequently, propellers that are used in applications where performance is already relatively high (and expanding) must be used with great caution.

In summary, please abide by the safety practices recommended by propeller manufacturers. This is especially important for high performance propellers. Assume that propellers can fail at any time, especially during full power adjustments on the ground.

NEVER STAND IN, OR EXPOSE OTHERS TO, THE PLANE OF THE PROPELLER ARC.

Using a Timer Can Improve Battery Life

One of the failure modes in Ni-Cd cells is shorting. While many things can contribute to shorting one of the significant contributors is cadmium migration through the separator where it forms a conductive bridge, ultimately shorting the cell. Cadmium migration is a function of the time the charge current is flowing through the battery and less a function of the level of current. Therefore we have found that high pulses of charge current to maintain the charge state are better than a steady low rate (trickle) current. This is very difficult to quantify as their are many other factors contributing to the life equation but improvements in battery life of 10 to 20 percent by pulse charging vs. trickle are not unrealistic.

Therefore we have found the sustaining a pack at the fully charged state by way of pulsing the charge is better than a continuous trickle charge. Some chargers employ this technique. You can do the essentially the same thing rather simply and at a very low cost. Simply connect your regular wall module charger that came with your system to an appliance timer. Intermatic makes a good unit for around $5.00. Set the trigger pins on the timer so that it is on for 1 hour a day. When you return from a flying session turn the timer wheel so that the off triggers come up in 14 to 16 hours. Then turn the timer knob to on. This will give your pack a full charge and then a sustaining charge for 1 hour a day. The battery can be left in this manner for a long time between flights and still be maintained at a fully charged state with minimal overcharge. If you only fly a couple of flights, you can just set the timer so that you get 6 or 8 hrs before you go into the 1 hr/day mode. If we assume a normal 2 hr flight time for a system and you only fly 20 minutes then the charge you need to return is 20/120 times 16 hours, or about 3 hours.

It is good to know what your system consumes in the way of energy per minute of flight. This can be determined by first charging a pack and then discharging it on a cycler to determine how much capacity it has fully charged. Then recharge and go fly. Record your system-on time and immediately discharge the pack when you return home. This will tell you how much capacity you have left. Let's say you fly for 40 minutes and when you discharge the pack you get 390 mAh. From your initial discharge from a fully charge pack you got 585 mAh. This would mean that you discharged 195 mAh in the 40 minutes you flew or about 5 mAh/min. From this you would know that your pack is good for 116 minutes of flight time. The system usage will vary, depending on your flying style, size of the plane and number of servos used.

C. L. "Red" Scholefield

R/C AIRPLANE DEFINITIONS

DINNER: The meal that is always cold when you get back from flying.

DOWNWIND TURN: Sensitive item that when posted on rec.models.rc.air, will generate threads of 100 entries and up.

ELEVATOR: A device to prevent level flight.

ENGINE: A device designed to make noise. It will suddenly stop making noise when just beyond glide in distance. A device that doesn't start when you want it to, and won't shut off when you want it to.

EPOXY: A compound designed to replace balsa and add weight throughout your plane after the flying season.

FAIL SAFE: An option on computer radios that allows a pilot to choose whether to crash near him or a long ways away.

FIREWALL: A removable part of the fuselage. Generally on landing.

FLARE: What someone has when they are good enough to show off. Beginners luck.

FLYING FIELD: Take off area. Landings occur elsewhere.

Submitted by Stan Zdon

SERVO CHATTER

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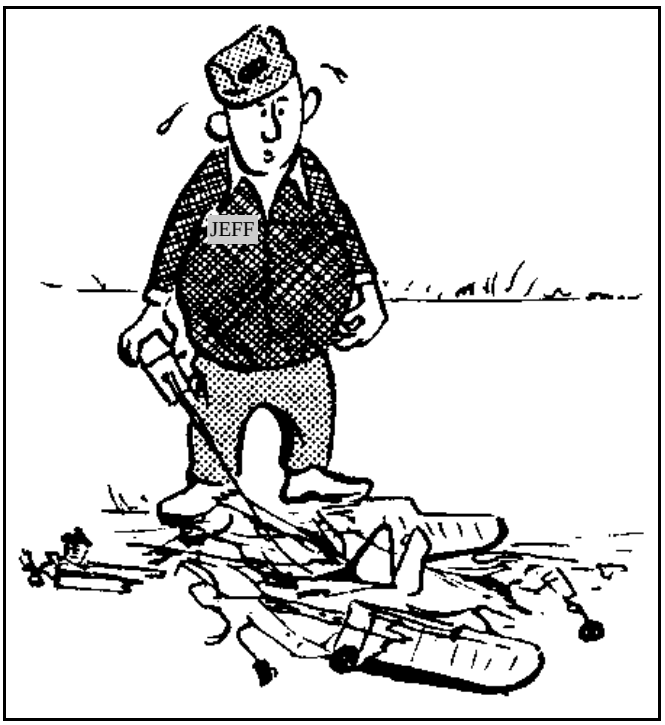

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Deadline for the next newsletter is: May 1, 2015

CALENDAR OF UPCOMING EVENTS

Thursday – April 16
- ACRC Meeting

Saturday – April 18
- ACRC Fun Fly #1

Thursday – May 21
- ACRC Meeting

Saturday – May 23
- ACRC Fun Fly #2