The Transmitter

Suburban RC Barnstormers - P.O. Box 524, Bloomingdale, IL 60108

AMA CHAPTER 640 IMAA CHAPTER 194 July 2012

http://www.suburbanrcbarnstormers.com

Coming in July and August

July 9th, Club Meeting, Bloomingdale Public Library, 7:00pm
July 15th, Fun Fly #3, Pratt's Wayne Woods, 9:00am Trim Flights, 10:00am First pilot off

August 13th, Club Meeting, Bloomingdale Public Library, 7:00pm
August 19th, Fun Fly #4, Pratt's Wayne Woods, 9:00am Trim Flights, 10:00am First pilot off

July Entertainment

By Dave West

3D Printing Demo

3D Printing is the process of creating real-world objects from computer drawings. Until recently, the cost of the equipment made it affordable only to serious design and engineering firms. But that's changing. Kits are now available that fit the hobbyist budget. Most of these low-cost 3D printers print parts by extruding a thin filament of ABS plastic (the stuff Lego's are made of) and building parts layer by layer.

Very cool! But is 3D printing useful for R/C modeling? Maybe. It provides a new way of making lots of model parts -- everything from ornamental details for scale models, to servo mounting brackets, to pushrod guides, to replacements for broken ARF parts. Motor mounts, spinners, gears, and even prop designs have been published (although the strength of the plastic likely limits this to smaller planes). Of course, it can also be used to create pilot figures. And not just any pilot, but a 3-dimensional likeness of the modeler!

At the July meeting we will see a live demonstration of a low-cost 3-D printer in action. You will get a good look at the machine and see a number of objects that it printed. Don't miss it!

Roll-Over Raffle

The Uproar 40 ARF was not won at the May or June meeting so it has rolled over to July. The matrix is mighty full, so it is likely it will go this month. This 48 inch span balsa and ply plane is designed for a .32 to .45 glow engine or electric equivalent.

Notes of the Suburban RC Barnstormers Membership Meeting

June 11, 2012

ATTENDANCE

There were 32 regular members present. Bob Vance was visiting.

OFFICER REPORTS

President: Mike Maciejewski presided over the meeting.

Mike reminded everyone about the upcoming interclub Fun Fly between our club and the Prop Masters. Please take the time to practice and join us at the event. We need all the flyers we can muster. Rules for the event can be found in last month's newsletter.

Mike said if you interested in historic planes, he recommends joining the Air Force Museum Foundation in Dayton. They have a great magazine and you will be helping preserver these great aircraft.

Mike also reminded everyone this is an election year and we will have some officer positions available. Please start encouraging those potential officers to run. Better yet, volunteer to run yourself!

Vice President: Dave West said door prizes for the evening were a bottle of glow fuel and a 2oz bottle of foam safe CA. The UpRoar is still in our inventory, so it will once again serve as our Rollover prize.

Dave said **Steve Thill** would be giving a presentation on parallel charging of Lithium batteries. This greatly charging of multiple packs, but there are cautions that Steve will share with us.

Dave reminded the members that we have tee shirts and hats for sale. They are $10 and $13 respectively.

Treasurer: Bob Elsner said the field permits have been paid for. He is not sure what will happen for events that are cancelled due to Presidential TFRs.

He also checked with the Library for meetings from July through December. There were two conflicts. One on September 10th and the other on October 8th. For the September meeting we will occupy only the Room B portion of the lower level. There will be another organization in Room A. For the October meeting, we have shifted our meeting date from the 8th to the 15th (the third Monday). The Christmas meeting appears to be on target for the regularly scheduled date for now.

Secretary: Scott Taylor reported the news that there would be another Presidential TFR this weekend, meaning our club Fun Fly would be cancelled. Please remember this in November!

Scott said don't forget about the Father's Day Pancake breakfast at Schaumburg airport. Our field will be closed so it is a great aviation alternative! Get eggs, pancakes, sausage and beverages for $7 for adults and $4 for 12 years and under. The breakfast runs from 8am until Noon. There is a flight simulator for kids. Scott donated a breakfast ticket for a door prize.

COMMITTEE REPORTS

Fun Flys – Scott Stampfli said we need all the help we can get for the interclub Fun Fly. He was hoping we could practice on Father's Day, but that isn't going to happen now. Please practice on your own if you get a chance. We are hosting the event this year and will be providing the food and drinks.

Flight Instruction – John Howe said he is currently training two students. Please contact John if you are looking for an instructor (contact information in the newsletter).

OTHER BUSINESS

Field Relocation – Mike Maciejewski said he had recently spoken to our Ranger, Mark. He had commented there were some updated drawings but he did not know when they intended to break ground.

In some related news, Mike said the Forest Preserve intends to require all flyers to be full members of the AMA to ensure they have insurance. The Park Flyer AMA membership will not be sufficient because of the lower insurance limits provided. They will no longer accept Home Owners as proof of coverage.

ENTERTAINMENT

Steve Thill gave a great presentation on the parallel charging of batteries. This can greatly reduce the time need to get back in the air or reduce the number of battery packs you need for a days flying. Steve uses an EP Buddy Charge. He said to make sure you have a large enough power source to charge the number of packs you have. Small capacity power supplies can be easily overwhelmed and small capacity batteries can be easily drained. Steve suggested the following procedure.

1. Plug the parallel charger to the power source first followed by the balancer connector.
2. As you plug in batteries, plug the battery power wires in first, then the battery balance wires.
3. All batteries should be in roughly the same state of charge to avoid the low charge batteries from draining the higher charged ones.

PLANES AND THINGS

Ron Hilger brought in an Ultra Stick 120 that he calls a Trash Can Survivor. His "phoenix" Ultra Stick is powered by a 60-size electric motor and is about one pound lighter than the box claims.

Tom Lyons showed the members a Stryker 180 Micro. It has the same look as the popular Stryker just much smaller. It is powered by a 200ma 2 cell battery and is very fast.

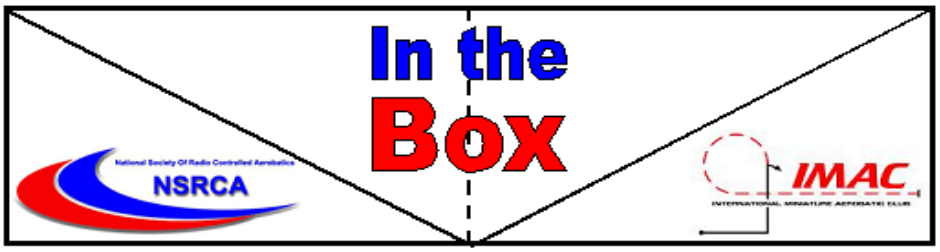
Stan Warden brought in a Vampire MK 6 foam ARF. It incorporates retracts and a ducted fan. He says it flies great once you figure out the CG needs to be moved forward of the plans location.

RAFFLES

Glen LaRocco was the winner of the free Father's Day breakfast, Leno DiDonna took the bottle of fuel, Mike Cannata grabbed the CA an Scott Stampfli went home with turkey rights. There was no winner in the rollover raffle.

Pictures from the 2012 Interclub Fun Fly

A threatening early shower in the morning quickly disappeared as skies were replaced by a light overcast and warm temperatures. The Barnstormers and the Prop Masters were closely matched with about 12 pilots from each club. The object was to climb, make as many loops as possible and spot land without power. Unfortunately, the Prop Masters edged us out by a few points. But the pizza was great the Fun Fly was FUN!



Pattern Flying - Precision Aerobatics

Taking your passion for flying RC airplanes to the next level!

By: Bob Sarley

Control is what it's all about. Control of the aerobatic aircraft by a competent pilot will result in an impressive display of precision aerobatic maneuver execution, which is a beautiful thing. Given an airframe of reasonable design, competent construction and inherent aerodynamic capabilities – control boils down to three major factors: 1) the talent, experience and capability of the pilot executing commands (stirring the sticks) at his/her transmitter, 2) the ability of the transmitter and on-board receiver to accurately relay those commands to the servo control circuitry and 3) the ability of the servo to accurately and effectively enforce execution of those commands at the aircraft's control surfaces.

We cannot expect the airplane, for example, to track a perfect large inside loop if the air pressure exerted on the elevator during the downward high speed portion of the loop exceeds the servo's position holding capability and essentially pushes the elevator back from the intended throw angle (blow back - resulting in an egg shaped loop).

The system as a whole must be up to the task of providing:

- Adequate torque for deflection and position holding of the control surfaces
- Full range of motion of the servo control arm (rotation CW and CCW from center)
- Reasonable deflection speed of the control surface throughout the range of motion required
- Accurate re-centering of the control surfaces when a control surface deflection command is neutralized
- Maximum number of servo control arm incremental steps (resolution)

All for the purpose of executing precise control of the attitude and flight path of the airplane.

Some servo basics:

We all know that servos come in many different sizes and specifications. Besides size and weight, the most common specs we are interested in are: 1) torque output at the control arm, measured in oz./in. or kg./cm., 2) speed, which is typically measured as the time (in seconds) it takes the control arm to traverse 60 degrees of rotation from a standstill at center and 3) the operating input voltage at which these specifications are attainable. Input voltage is typically 4.8 volts DC (4 cell NiCad, 4 cell NiMH or BEC output) but many high performance servos can be operated at 6 volts DC (5 cell NiCad or NiMH) and some at 7.4 volts DC and higher (to accommodate direct attachment to LiPo or LiFe power systems). Servos that are capable of operating at the higher voltage inputs will be able to produce more torque at a higher speed (for a given gear set) than those restricted to the 4.8 volt input. If the servo can reliably function at the 6 volt level (or higher), the manufacturer will include torque and speed specifications for those voltages. Be mindful of the maximum operating voltage specified by the manufacturer and do not exceed it. Also, make sure your installed receiver can operate at those elevated voltages. If not, you will need to add a DC to DC voltage regulator to drop down the voltage from the battery pack to within the operating range of the receiver.

Another variable is the gear set material. Nowadays you can buy servos with gears made of (from cheapest and least robust to the most expensive and resilient) nylon, Karbonite (reinforced plastic composite material with almost five times the strength of nylon gears), metal (typically brass or mild steel) and titanium (super strong and very light).

As with engines, motors and propellers; it is always advisable to match the equipment to the airframe and application. Overkill will cost you unnecessary expense but undercutting may cost you an airplane. Leisurely flying with a trainer or sport low wing will not place a high demand on servo performance. You will be fine with standard servos and nylon gears or Karbonite (if you want to pay a little more). Larger planes, precision aerobatics or high alpha flying will require servos with higher speed and torque ratings which in turn will demand harder gear sets.

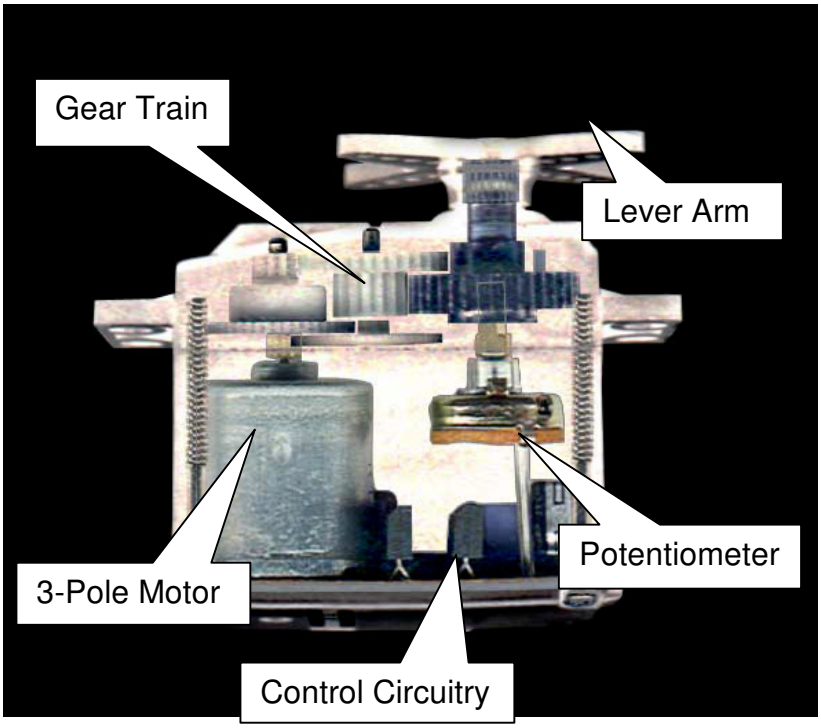
Playing with the numbers:

When comparing servos you may encounter two servos that are identical in weight and size (and probably in price) that list different torque and speed specifications. As an example, you may find that one servo is rated and 40 oz/in of torque with a speed of 0.12 seconds to 60 degrees and the other servo is rated at 55 oz/in of torque with a speed of 0.21 seconds. This is a result of different gear reduction ratios. For a given motor, the servo with the higher gear ratio (more rotations of the motor drive gear to the rotation of the final servo lever driven gear) will produce more torque at the expense of lower final driven gear speed. Lowering the total driveline gear ratio will produce less torque at the servo lever arm but provide faster rotation (thank you, Archimedes). If you are more interested in control surface deflection accuracy and repeatability than in deflection speed (such as is desirable in most precision aerobatic flying), you would select the higher torque over the higher speed servo. In addition to increased torque, the higher gear ratio provides smaller incremental steps in response to transmitter stick (command) inputs. Our rotary wing friends, on the other hand, would require the maximum available speed for tail rotor applications, for instance.

The servo performance required of high alpha (3D) flying and most helicopter controls demands a trio of high torque, fast servo arm movement and maximum control surface deflection. So once again the application will influence the type and cost of your servo selection.

The Servo – Exposed:

The picture to the right is an X-ray view of the servo internals. This view illustrates the typical location of the motor, drive gears, potentiometer and motor control circuitry (pulse width comparator, positional feedback circuitry and motor drive circuitry). Most servos conform to this layout.



My Pulse Quickens:

The motion of the servo lever arm that is connected to the control surface of the airplane is in response to the servo control circuitry interpreting the width of a repeating string of pulses being sent to it by the receiver (which is relaying it from the transmitter) at the rate of approximately 20 times per second (a pulse every 50 milliseconds or .05 seconds).

Each pulse tells the servo what to do by virtue of its width (or “on” time). This is where the term “pulse width modulation” is derived in the context of RC servo control. Let’s examine how it works.

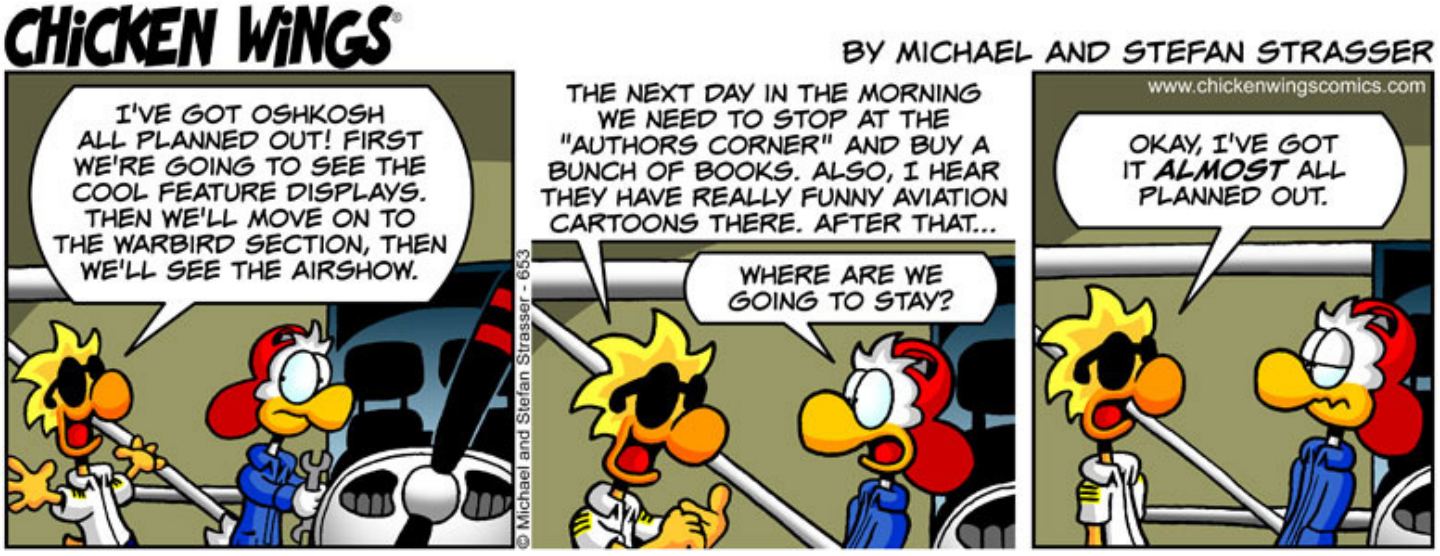
Each pulse begins by going from 0 volts to +4.8 volts (provided by your onboard battery or BEC). The servo control logic expects the pulse to remain “on” for at least 1 millisecond and watches this pulse to see what to do next. The amount of time that the pulse remains “on” after the 1 millisecond synchronization time is what the servo uses to determine how far and in which direction to drive the motor/lever arm. The total width of the pulse sent by the transmitter and relayed to the servo control logic by the receiver will vary from a minimum of 1 millisecond to a maximum of 2 milliseconds depending on the position of the transmitter control stick at that instant. For example; If the rudder stick is moved to the full left position the pulse will be no wider than the 1 millisecond sync time. This will be interpreted by the servo as “move the lever all the way to the left”. If the stick is in the center or neutral position, the pulse will be 1.5 milliseconds wide and the servo will interpret the command as “remain centered” or “move the lever to the center position” if it is not already there. Moving the rudder stick to the full right position will produce a 2 millisecond pulse which will be interpreted as “move the

lever all the way to the right". The transmitter, receiver and servo control circuitry will actually respond to many stick positions in between the extreme left and extreme right (or up and down) positions, adjusting the position of the lever arm accordingly, thus the term "proportional" control.

Let it be resolved:

Like in building a component stereo system; you may have a CD player and power amplifier that can reproduce a 20 to 15K cycle per second audio passage. But if you have it connected to $19.95 Radio Shack speakers, you will never hear all of the original recorded content. The same is true of airborne servo systems. Your transmitter and receiver may be able to resolve 1024 discrete "steps" representing your stick movement, but if you have a cheap servo that is not up to the task, you will never see that number of steps in the movement of the servo control arm. The effectiveness of the motor, the servo motor drive circuitry and factors such as control linkage binding and other parasitic control surface inefficiencies also come into play.

This leads us into a discussion of analog versus digital servos and the pros and cons of each – for next time.



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We reserve the right to edit all information forwarded to us. Permission is hereby given to reprint any article that we publish as long as proper credit is given.

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Articles must be received by the 4th Saturday of the month to be included in the following month's newsletter.

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