THE SLOW ROLL

CHARTERED #921
Since DEC. 1974

President—Frank Moskowitz
Vice President—Tony Quist
Treasurer—Gene Peterson
Secretary—Rusty Fried

Editor—Bob Purdy
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AUGUST 2009

The Slow Roll is published by the Sun Valley Fliers
By and for its membership to all others interested in the
building and flying of radio control aircraft

Inside this issue: **Cover Photo by Jerry Wright, story inside … Prez report…Minutes.. August B'Days & Treasurer Report & IMAC…++SVF Members photos…Servo's...Retracts..NOISE!...Scale Master…New Storage….OEAF Flyer...Warbirds Over the Rockies Flyer & MORE...*ENJOY*!**

THE PRESIDENTS CHANNEL

FRANK MOSKOWITZ

AUGUST 2009 SLOW ROLL PRESIDENTS LETTER

Welcome to the August Slow Roll.

Now I know why it's called the lazy days of summer. No one is at the field flying! On a Saturday morning its looks like a ghost town. For those lucky enough to arrive at the crack of dawn, the temperature and wind conditions are excellent. Others who arrive later than 10 a.m. must deal with 100 plus temperatures, high humidity and really high dew points. We have until September 30th for the official end to the Arizona Monsoon season. Until then arrive early and enjoy the great weather.

You might have noticed that two of our tables under the Ramada have a new green covering. **Charlie Beverson** installed the new material. We will try this out for a month to see how it weathers the sun and spills from fuel. That's if for this month. Enjoy the heat.

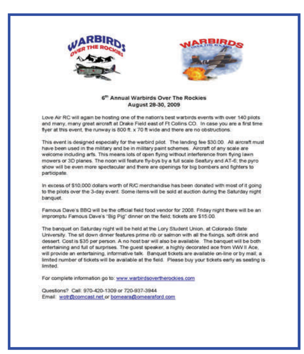
Remember our next meeting is **Wednesday August 5th at 7:30 pm.** If you want to eat I suggest you arrive no later than 6:30 pm. **Location is Deer Valley Airport Restaurant. (7th avenue and Deer Valley Road). Lots of great food and a smoke free environment.** The Club meetings get better every month. We will always have more than one raffle prize and the 50/50 could make you very happy $$$. You never know what might happen, and you don't want to miss it.

Have fun out there!

Frank Moskowitz

President

John Geyer presents Lariana Forsythe Lesniak of the Boys and Girls Clubs of Phoenix with the proceeds from our 2008 Electric Fly-In. The Boys and Girls Clubs will again be the recipients of the proceeds of our next Electric Fly-In – the Ninth Annual Electric Turkey Fun Fly scheduled for November 7th 2009. This event was originated by Gene Kidwell and has always had the dual purpose of bringing electric fliers together for a relaxed day of flying and sharing information while giving back to our community by providing support to a local charitable organization. Our relationship with the Boys and Girls Clubs goes back to 2007 and we plan to increase our involvement with them this year through on-site learning events as well as continuing to contribute what we make from our Electric Fly-Ins.



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August 28-30, 2009

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For complete information go to: www.warbirdsovertherockies.com

Questions? Call: 970-420-1309 or 720-937-3944
Email: wotr@comcast.net or bomeara@omearaford.com

ONE EIGHTH AIR FORCE
SCALE MODEL FLY-IN
OCTOBER 24 AND 25 2009
SUPERSTITION AIR PARK MESA, AZ
ON MERIDIAN RD JUST NORTH OF BROWN
A GOOD TIME FOR EVERYONE
FRIDAY EVENING HOSPITALITY HOUR WITH PIZZA & WINGS
SATURDAY NIGHT DINNER AT THE FIELD
OEAF'S UNIQUE AWARDS FOR MANY FLIGHT CATEGORIES
REGISTRATION STARTS AT 7:30 AM SATURDAY
AMA REQUIRED AMA SANCTION 09-
$10.00 ENTRY PER PILOT 100 DB SOUND LIMIT
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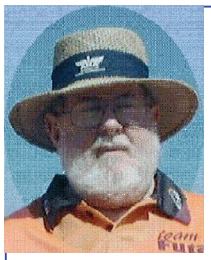
PARKING $6.00 PER DAY NO OVERNIGHTCAMPING
3D FLYING NOT ALLOWED
INFO CD: Howard Kennedy 602-361-8475 bushpilot1443@yahoo.com
COMMANDER: Jerry Wright 480-205-6821 jwright@bcaphoenix.com
www.oneeighthairforce.org



Sun Valley Fliers Club Meeting Minutes
Date, July 1, 2009

The meeting was called to order at 7:30 pm by President Frank Moskowitz.

Officers Attending:
Frank Moskowitz, President, Tony Quist, Vice-President, Gene Peterson, Treasurer

Board Members Attending:
Charlie Beverson, Ron Thomas,Bruce Bretschneider, John Geyer, Howard Kennedy
Dan Jacobson

Guests: None.

New Members: No new members in attendance.

New Solo Pilot: No new solo pilots to recognize.

Secretary's Report: The June SVF club meeting minutes were accepted as published in the *Slow Roll.*

Treasurer's Report: **Gene Peterson** – The club's regular account has a balance of $———, the field improvement account has $206 in it, and the reserve account has about $———. There are currently 293 members in good standing in the club.

Safety Officer Report: **Joe Balabon** – Club members are reminded that safety is everyone's concern, and members were further asked to be sure to stand behind the pilot barrier fencing while flying, not on the blacktop starting area. There have been several incidences where models out of control have gone into those blacktop starting areas.

Old Business:

A. Our new 13 KW generator is in place in the new shed thanks to our generous donor and
B. Jarel & Dustin Young, Ron Long, Joe Balabon, Mark Doan, Wayne Layne, Dan Jacobson, & Frank Moskowitz who all helped to accomplish the move and installation. Wiring work will be accomplished in the near future.
B. The purchase and installation of new carpeting for the work tables still has to be accomplished.

New Business:

50/50 Raffle – This month's lucky raffled winner was **Jerry Wright** who took home **$31.00** in cash.

Door Prize Winners:

T-Shirt & Large patch - Val Roqueni, Bruce Bretschneider, Mike Schmidt, John Olejinczak Dave Linne, Tony Quist (given to Ed Klein), Jay Steward, Jerry Wright, Phil Mahoney
Gallon of fuel - Howard Kennedy, Paul DeLawder, John Deacon

Show & Tell:

Dave Linne discussed how we should fasten servo mounting blocks to servo hatches with a screw as well as adhesive on the ARF's we build, as these blocks can otherwise loosen up over time if they are not additionally screwed in place to the hatch. It can become a safety issue and cause you to lose an airplane. Additionally, it was suggested to strengthen the cabanes on bi-plane ARF's to ensure that the top wing does not suddenly depart the aircraft in flight.

Bernie Frank of Frank's Hobby House showed a BH Models T-28 in .60 engine size. The T-28 is made in Vietnam and sells for $150 at Frank's.

The meeting was adjourned at 8:15 pm.

Respectfully submitted,
Bruce Bretschneider
for Rusty Fried, Secretary

$ TREASURERS REPORT $ with *Gene Peterson*

TREASURERS REPORT August 2009

One of the things the Board is considering right now is for SVF to become a Chapter (Chartered Club) in IMAA. IMAA is basically a membership organization of people interested in Large Scale airplanes. Size wise they must be larger than 80" or 60" for a biplane. We may already have the required number of members in our club but I'm not sure. As a member (which costs $25.00 a year) you do get a magazine quarterly and you can fly in any events that are IMAA. They are "Fly Ins", and not contests. Sorta like the 1/8 AF, which is for People interested in Scale and Warbirds, and they have their Fly Ins twice a year. We could sponsor an event also if the club wanted to. This process is just getting started, so I would appreciate if you would let me know if your interested in joining IMAA, and/or would like SVF to Join IMAA, whether or not your already a member, and any other thoughts you may have. EMAIL me at **az49er@cox.net** if you got a moment. We'll talk about this at the next couple General Membership Meetings.

Below is some of the guidelines for IMAA membership.

Have a nice month and fly safe.

Regards, *Gene Peterson, Treasurer*

AUGUST SVF BirthDay Boys

First name	Last name	Member type	Dob
John	Boccia	Regular	08/01/1963
Steve	Tillson	Regular	08/01/1946
Edward	Andres	Senior	08/04/1928
Tony	Guyer	Regular	08/04/1956
Alfredo	Valenzuela	Regular	08/04/1974
Frank	***Moskowitz***	***Regular***	***08/05/1954***
Paul	DeLawder	Regular	08/07/1958
Chuck	Arquette	Senior	08/08/1932
Jackson	Furedy	Regular	08/13/1952
Bill	Pearse	Senior	08/14/1941
Scott	Sibson	Regular	08/15/1962
Gary	Hedges	Regular	08/16/1943
Dustin	Young	Regular	08/16/1981
Jim	Stabile	Regular	08/17/1968
Haim	Lichaa	Regular	08/17/1972
Richard	Hartman	Senior	08/19/1940
Ray	Fulks	Regular	08/20/1947
Robert	Dunn	Senior	08/21/1936
James	Musser	Senior	08/21/1937
Ronald	Thomas	Regular	08/21/1949
Bob	Corley	Regular	08/23/1950
Chuck	Graves	Regular	08/23/1963
Darrin	Jeffries	Regular	08/24/1969
Frank	Seminera	Senior	08/25/1941
Jonathan	Colner	Regular	08/27/1949
Ash	Zeller	Junior	08/28/1991
Greg	Evans	Regular	08/28/1956
Curtis	Westra	Senior	08/31/1933
Rory	McCrave	Regular	08/31/1973

IMAA MEMBERSHIP

1. One of the finest magazines being published today. Not just advertising.
2. IMAA Members can Fly at any IMAA fly-in.
3. Club gets to hold IMAA sanctioned events without paying for an AMA sanction, the IMAA pays the sanction for the club. After the second event, the charter has been paid for.
4. One time club chartering fee of $25.
5. IMAA sanctioned events are advertised in High Flight free of charge. You also get an ad in Model Aviation when the sanction is sent in by the IMAA.
6. The events coverage for your event will be a full color spread in High Flight.
7. These are fly-ins not contests. They are however class 3 restricted events. Flyers must be IMAA members and must have the correct size aircraft.
8. The club only needs 5 members to get a club charter. There are three of us from AMA that are members, so you only need two more.
9. I would like to see more clubs around the valley join so that we could have a whole series of giant scale events in the area.
10. IMAA membership for individuals is $25 a year. There are 4 issues of High Flight sent out a year. These are included in the membership fee.
11. Aircraft must be 80" for a monoplane. 60" for a biplane and a jet has to have a combined measurement of 140" for wingspan and fuselage length. Turbine waivers are still required.
12. At our last event we had 53 registered pilots which included some pilots from Lake Havasau.
13. The IMAA will provide an address list to help send flyers to existing members.

U.S. Scale Masters Championships

Scale Flight Training Seminar

Sunday, August 16, 2009
7:00 to 11:00 am

Hosted by the 1/8th Air Force and Sun Valley Fliers
Cave Butte Park, Phoenix AZ

Cave Creek Road to Jomax, Turn West at Traffic Light

If you think you'd like to try Scale Competition, or just want to make your sport flying more scale-like and disciplined, join us for a review of Scale Flight Judging Maneuver requirements and criteria as well as the techniques for flying them properly.

For More Information:
John Geyer – 602-810-1767 or jegeyer@cox.net
Howard Kennedy – 602-361-8475 or bushpilot1443@yahoo.com
Mike Peck – 623-853-7630 or peckster1@msn.com

SVF

ONE 8

On Sunday August 16th, the One Eighth Air Force is joining with the SVF to present a Scale Flight Seminar for anyone who thinks they might be interested in scale competition, or who just wants to add to their general flight skills. The seminar will provide a general overview of the flying components of Scale competition – the mandatory and optional maneuvers, what the judges are looking for, how the flights are scored, etc., as well as demonstrations by experienced scale competitors flying contest routines and discussing why the specific maneuvers were chosen and what the pilot is trying to achieve with each maneuver and with the overall flight. There will also be a chance to fly in front of experienced flight judges and receive suggestions on how to improve your flying.

If you've ever thought you'd like to fly Scale this is a great opportunity to try it in a friendly, no pressure environment and you'll find that all it takes is a little discipline and practice. And, even if you're not interested in competition, that same discipline and practice is a great way to improve your sport flying. You'll find that trying to fly a consistent routine will improve your flying skills while providing a fun alternative to just "boring holes in the sky". The seminar will run from 7:00 to 11:00 am but, if you're not interested in participating, there will be no interruption to normal Sunday flying.

SVF MEMBERS PAGE

Photos by SVF Members.

Friday breakfast get together, then go flying, great!

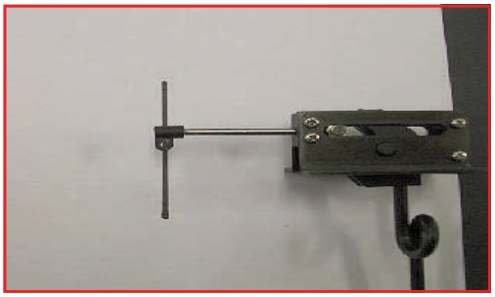
MECHANICAL RETRACTS

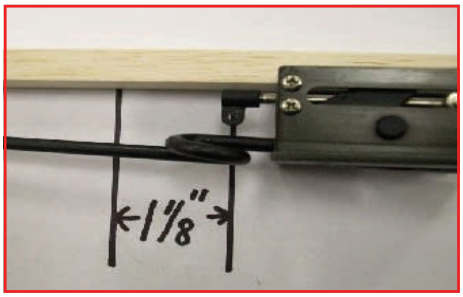
by Rick Powers

can be one of the easiest and most reliable ways to pull the gear up. If you have never done retracts or your retracts are giving you problems, this may help to clear up some. The problem with the instructions in the airplane is, they don't give any details on how it works, they just tell you where things go. When you understand how it works then it easier to set up and becomes extremely reliable.

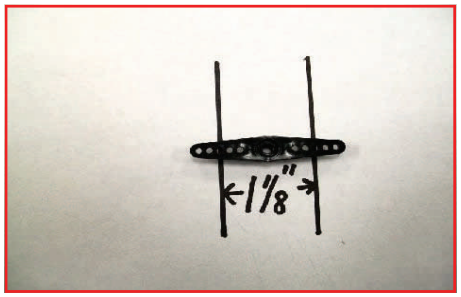
Most airplane kits and ARFs will call for a RETRACT SERVO. A retract servo is deferent than all other servos,

(1) It moves 180 degrees, with out stopping.
Can not do END POINT ADJUST or SUB TRIM
(2) Must be very strong, most are 90 to 250 ounce inches of torque
Std servo 40 to 45 ounce inches, moves only 60 degrees
(3) Metal gears in the servo are preferred but, may not be necessary.
Most airplane kits and ARFs will call for a RETRACT SERVO. A retract servo is deferent than all other servos,
(4) Some come as a low profile, about half the hight.
Now we have to understand the retract:
First we must measure the full up and full down requirements of the particular retract.

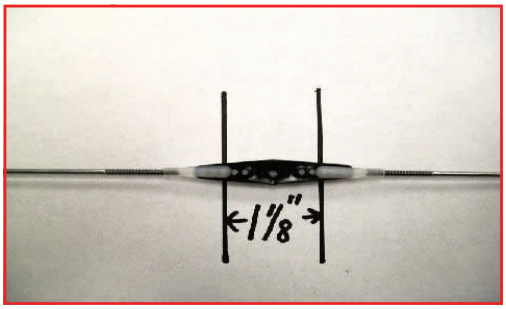




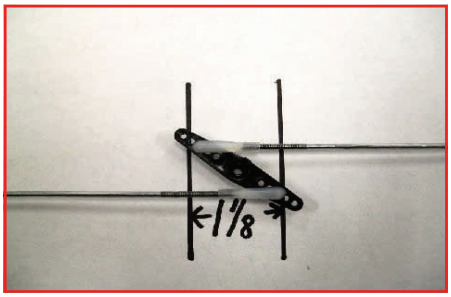
This is the retract in the full up position. When you measure the position of the retract actuation rod from full down to full up it moves
<----1-1/8"---->

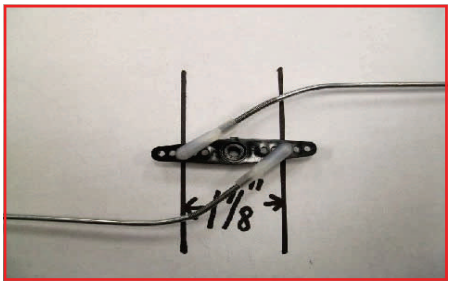


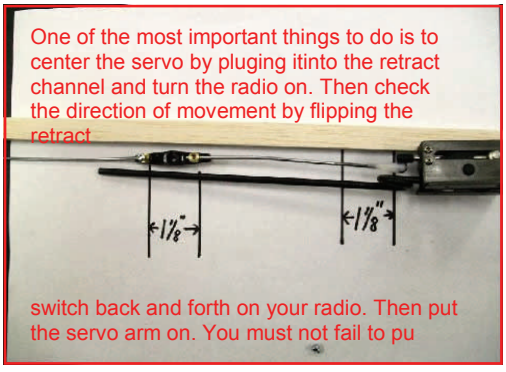
The retract servo arm must move the exact same amount. When the servo arm moves all the way around to the other side, that must be the same as the movement of the retract.

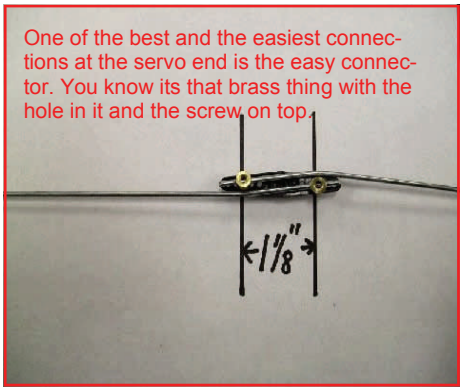


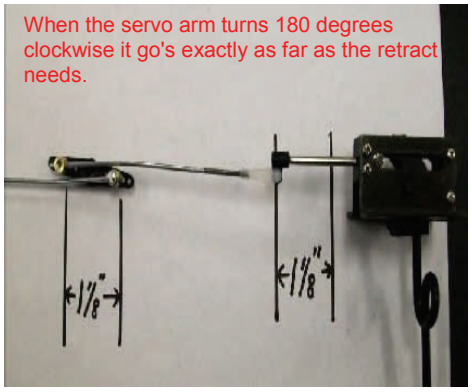
Shown here with the push rods connected. If you use a clevis, they will bind before the servo completes its movement you can solve this with a slight bend in the rods. It will still work even with the bend.











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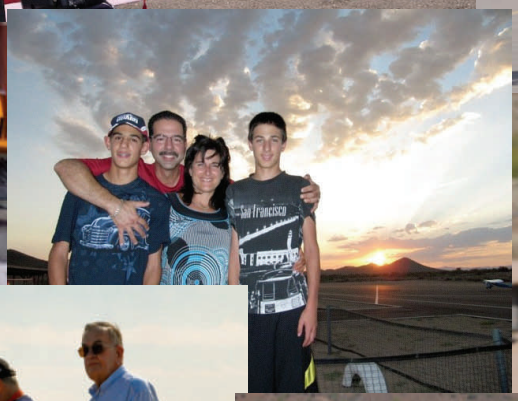
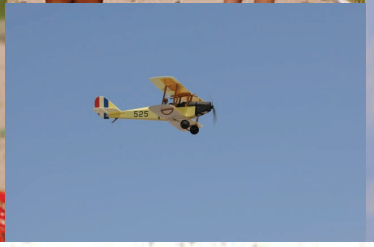




How do RC Servos Work?

From RC MODEL REVIEWS

THE BASICS OF RC SERVO OPERATION

RC servos come in an amazing range of sizes, speeds, strengths, weights, shapes colours and varieties but they all work on the same basic principles.

The job of an RC servo is to position its output arm to a position that exactly corresponds with the movement of the corresponding stick, switch or slider on the transmitter. What's more, it should do this as quickly as possible and provide a high level of accuracy regardless of the effects of aerodynamic loads or other factors.

Most servos, regardless of brand or type, consist of several main parts:

The mechanics. These are the gears and the case.

The motor. This provides the motive force to drive the output arm

The feedback pot. This allows the servo to measure the actual position of the output arm

The amplifier. This is the electronics that hook all those other bits together to make it work

Now let's take a look at those bits in more detail...

The Mechanics

Most RC servos have a plastic case, the top section of which contains a set of gears that can be either plastic or metal. The strength and rigidity of these mechanics play a significant role in determining the robustness and weight of the servo, with metal gears usually being significantly stronger (and heavier) than plastic.

The choice of gear material depends very much on the type and size of model in which the servo will be used. Generally speaking, plastic gears are only suited to models up to 5-6 lbs in weight.

Bearings

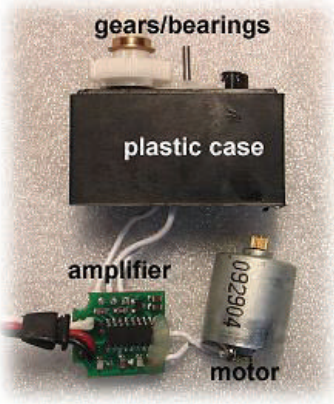
The output shaft and gear of a servo experiences significant side-loading during its operation and this means it needs some kind of support to stop it from moving out of mesh with the rest of the gears.

Cheap servos tend to simply rely on the plastic shaft rubbing against the plastic of the case and for small/slow models this isn't too much of a problem. These servos are often caleed 'bushed" and, because there has to be some clearance between the shaft and the case, usually demonstrate some side-to-side slop in the output shaft, which can appear as a degree of rocking up and down of the output arm.

However, precision and hi-torque servos really do benefit from the addition of a ball-bearing or two on the output shaft. This significantly reduces the friction, virtually eliminates wear and means there should be no slop at all in the output shaft.

Good servos have a single bearing (usually in the top of the case) while even better servos have two bearings -- one in the case and one at the bottom of the output shaft.

The Motor



There are basically three different types of motors used in model servos, the most common of which is a brushed motor with three or five-pole armature. The benefit of these motors is their low cost and robustness. The downside is that, because of their heavy iron armature, they tend to respond more slowly.

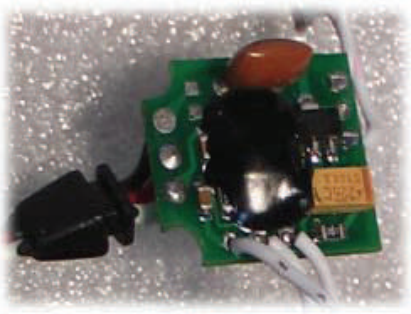
The second most common type is the coreless motor which, as the name suggests, does not have an iron-cored armature but instead has a lightweight plastic armature on which the field windings are formed. This has the advantage of being able to start and stop far more quickly (due to its low mass) and also produce more torque -- since the diameter of the windings is much greater than with a cored motor.

Because they cost more to manufacture, coreless motors are usually only found in expensive servos designed for very fast transit times (such as used on heli tailrotors).

The final motor type is the brushless variety being offered in just a few servo models from big-names like Futaba. The brushless motor can be designed to provide very high levels of torque and has no brushes to wear out. Servos with brushless motors are few and far-between right now though because of the costs involved.

continued

Pots and Amplifiers



Inside every servo is a tiny circuit board that contains a bunch of components. It is the job of this circuit (which is called an amplifier) to convert the signal from the receiver into a signal that drives the servo's motor to position the output arm to the requested position.
Way-back, when proportional RC gear was first developed, there was only one kind of servo amplifier: the analog amp, but today we also have digital versions.

Standard/analog Servo Amplifiers

Modern receivers send a series of pulses to each servo. Those pulses vary in width from about 1 thousanth of a second (1mS) to two thousandths of a second (2mS) -- with the center-point being around 1.5mS.
These pulses are sent at a rate of about 50 per second and every time a pulse arrives in a standard/analog servo, the amplifier checks to see if the servo's output arm needs to be moved one way or the other.
If the amplifier decides that the servo arm does need moving because the transmitter stick has been moved then it sends a short burst of power to the motor in order to rotate the gears and (ultimately) the output.
For most applications, this works just fine but since the servo motor isn't being driven continuously (only for a moment every time a new pulse is sent from the receiver), the full torque potential and speed of the servo isn't fully realized.
Another issue with standard servos is that the torque tends to drop off quite dramatically as the difference between the requested position and actual position of the output arm gets smaller. In fact, when this diference is very small, the torque of the servo be insufficient to move the arm against a slightly binding linkage and the result will be a buzzing noise.

Digital Servo Amplifiers

Since the standard/analog servo amp was designed, electronics have moved on significantly and now manufacturers can put tiny computer chips called microcontrollers in servos.
These little computers can provide significantly improved speed, torque and accuracy.
They do this by allowing the servo's motor to be driven far more frequently than was the case before.
Instead of only driving the motor each time a pulse arrives from the receiver (a mere 50 times per second), they effectively remember the length of the pulse and then drive the motor almost continuously (or at a much higher frequency).
The result is that the motor produces more torque and can accelerate/stop more quickly.
Digital servos are often easily identified when running because of the different sound they make as a result of this increased motor-drive. Hitec digitals will "sing" at a high frequency and some others like Futaba and JR will "growl".
Which is best?
Clearly, because of their greater torque, accuracy and speed, digital servos are usually superior to standard servos but in many cases, such as sport models, that extra performance might not be worth the extra price.

Feedback Pots

So how does a servo know exactly where its output arm is so that it can command the motor to move it to the position commanded by the transmiter stick?
Well that's the job of the feedback potentiometer ("pot" for short).
The pot is just a tiny version of the volume control knob on older-type radios and TV sets. It's a variable resistor which can be used to create a voltage that changes as the servo's output arm moves.
That voltage can then be used by the servo amp to work out the exact position of the arm and decide whether it needs moving and if so, which way to drive the motor.
Good servos use high quality pots, cheap servos tend to use inferior ones and the quality of the feedback pot is very important to the accuracy and reliablity of a servo. When a pot becomes worn or dirty, the servo can jitter and become erratic in movement. Cheap pots may also be adversely affected by high-vibration environments.

continued

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Brand Wars

So who makes the best servos?

Well there's no easy answer to that question and asking it is likely to result in as many people as there are opinions offered.

The reality is that most of the big-name manufacturers produce perfectly good servos that, providing they're matched to the model properly, will provide long and useful service.

When it comes to the no-name servos, most of which originate from China then all bets are off.

Some time ago I began a very comprehensive review of every servo brand/model I could get my hands on and that will be online soon.

Choosing The Right Servo

More important than choosing the right brand of servo is actually choosing the right servo for your model and flying style.

With modern servos spanning the range from featherweight 3g units with only a tiny amount of torque to mammoth heavyweights that can exert over a thousand ounce-inches of power there's really no excuse for using a servo that's not matched properly to your model.

For small models (foamies ane the like) small, cheap 5-9g servos do the job just fine. Servos like the HXT900 are incredible value for money and are so cheap you can throw them away when/if they break.

Small heli-fliers can use these budget servos too but unless you're into just hovering around, there are some real benefits to be had from using digital servos instead. A number of companies make fast, strong digital servos that are well suited to small helis -- but you'll pay extra for that improved performance.

A sport/trainer model up to 5-6 lbs in weight will be ideal for the so-called "standard" servos such as the Futaba 3001/3003, Hitec 425 and a raft of others. While a ball-bearing servo will outlast a non-BB one, many people fly very low-cost (under $10) servos in these applications with no problems at all.

If you're into aerobatics or 3D flying then digital servos may offer you some benefits in terms of precision, speed and torque. It's also worth considering the use of metal-gears once models get above the 6lb mark as this will reduce the chance of stripping.

Larger helis are also a good candidate for stronger gears and digital amps since the force required (especially for collective/cyclic) can be very high.

Gas planes of 26cc and above really do need metal-geared servos due to the higher levels of vibration encountered and the size/weight of the control surfaces. Once you get into Giant Scale you should be looking at the top-end servos from the likes of Hitec, JR, Savox, Seiko etc. From a performance and safety perspective, it makes no sense to try and save money by using anything less than the best you can afford.

Final Thoughts

It's important to remember that servos are just one link in a long chain of components that effectively connect your transmitter sticks to the control-surfaces on your model.

The failure of any one of the components in that chain can cause disaster.

One of the most common issues is not having enough battery or BEC capacity to handle the servos you're using.

Hi-torque and hi-speed servos (especially digital ones) can draw enormous amounts of current from your system and if your battery or BEC isn't up to the job, bad things will happen.

Originally, Futaba advised against using NiMH batteries with some of its hi-torque servos because the early nickel-metal batteries just weren't up to the task. Fortunately things are much better now and a good quality NiMH pack (of adequate size) will work just fine.

However, anyone who tries to drive a bunch of hi-torque digital servos using nothing more than an AA-sized receiver pack is going to be sorely disappointed with the performance (and wreckage) that results from such folly.

Also make sure that your extentions (if you're using any) are up to the task.

Always use heavy-duty extensions if you can afford to carry the extra weight as these will produce the least loss of torque in your servos. In fact some servos (notably the Futaba 3000 series) will behave very oddly (oscillating and hesitating) if your servo extensions are not up to the job.

Our thanks to RC MODEL REVIEWS rcmodelreviews.com

SVF MEMBERS PAGE

Photos by SVF Members.

From RCMDirect.co.uk

Electronic Speed Controllers (ESC) Explained

In electric if you need throttle control you will need an Electronic Speed Control (usually called an ESC).

These devices are controlled from the throttle channel of the radio and operate the motor much like an I/C engine throttle, from tick-over to full throttle, and all points between. Modern ESCs cover a wide range of applications and offer a sometimes-bewildering range of features and facilities including BEC, brakes, and various startup safety features (more on these later).

An ESC will generally have three sets of wiring. On one side you would have two wires, one black and one red, which go to the battery (Red +ve /Black –ve). On the same side you would normally have your servo or receiver cable, which goes into the throttle channel of your receiver. The other side would have three wires, which could be the same colors, or three different colors, depending on manufacturer and convention used, which normally go to the motor.

Note that this is always plugged into the throttle channel even if the speed controller has the BEC feature and so is providing the power to the radio receiver.

If the three cables on the ESC are black, red, and white, then connect the three wires to the motor in matching colors. Check the direction of the motor and, if it requires reversing, swap the black and white cables over.

In modern speed controllers where the three wires for the ESC are the same color, attach any three wires and, to turn the motor direction around, swap the black and yellow motor cables around.

ESC Ratings

The major things to look for when buying a speed control are the current rating, voltage rating, and features. The various features are individually covered below so let's have a look at the two main ratings.

First on the list is the maximum current rating. Typically this will be given as two figures e.g.18/22A, the first is the current, which the ESC will take continuously, and the second is the short term current allowed normally for no more than 10-30 seconds. So in the example, you could run at 18A forever and use up to 22A for short periods, e.g. at takeoff. We recommend when selecting a speed controller allowing 20% margin so if you have a motor that draws 15 amps, I would select an ESC, which would have a minimum rating of 18 amps, based on the following simple calculation: 15 amps x 1.20 (20%) = 18 amps.

The other main ESC rating is the maximum voltage, more commonly expressed as a number of cells both Lithium Polymer and NiMH/NiCad. This is pretty straightforward. If you try to use the ESC with more cells it will break. It's also worth noting that many speed controls also give a minimum voltage or number of cells.

ESC features BEC

BEC stands for Battery Elimination Circuit. It is a facility, which allows the radio receiver and servos to run off the main motor battery (within certain conditions) so that you do not need a separate receiver battery. There are certain limits associated with BEC circuits that you need to keep in mind. BEC works by reducing the motor battery voltage to down to the 5V needed by the receiver. Doing this creates heat. Because of this it will only work with a main battery of up to some specified number of cells, often 10 cells (or 12V), and also with a specified load often 1 or 1.5A. The load is sometimes expressed as a number of servos and may reduce as the number of main battery cells goes up. For example it may allow three servos up to two Li-Poly cells and only two servos for a three-cell Li-Poly pack, with no BEC over four Li-Poly cells.

Motor cut off

This feature is always associated with BEC. It cuts power to the motor before the battery is completely exhausted so that you still have power to the radio to get to a safe landing. Motor cut-off voltages nowadays are programmed into the speed controller and can auto detect the number of cells used once a power source is initially plugged in.

Brake

Just as it sounds. When the throttle is at zero it applies a braking effort to the motor to stop it turning. This is to allow folding propellers to fold neatly rather than wind milling around creating lots of drag. Most are used on gliders and old-timers, which typically use the motor to get them up and then thermal around, sometimes for ages.

Opto-isolation (OPTO)

This feature electrically isolates the signal from the radio throttle channel from the ESC. Doing this can dramatically reduce the level of radio interference, which can be created especially with very high currents. You cannot have both opto-isolation and BEC working at once in an ESC, though quite a few allow you to select at installation which of the two features you want to use.

PWM (Pulse Width Modulation / High rate control)

The control of motor speed is obtained by switching the power to the motor on and off in various ratios, e.g. maximum throttle is permanently on, half throttle is on half time, off half time, etc. This switching on and off is done many times a second. The speed at which the switching takes place has a large effect on overall efficiency. Early speed controls used what is known as "frame rate" switching, which means that they switched approximately 50 times a second, the same rate frames of information are delivered over the radio. Most modern ESCs switch at a much higher rate, which makes them much more efficient, i.e. they lose less power as heat in the controller. Switching rates around 3000 Hz (times a second) are about optimum. Anywhere between 1000 Hz and 5000 Hz is acceptable.

Timing Mode

Timing mode is similar to PWM and controls the on/off switching in the motor. There are two types:

- Soft timing: for two-, four-, six-pole motors (Mini AC, Kontronik, Hacker).
- Hard timing; six or more pole motors (Jeti Phasor, Mega, Plettenberg).

Hard timing increases both the motor revolutions and the current (up to 20%) with the same propeller and battery pack when compared to soft timing. Hard timing is more suitable for fast flying models.

Always use soft timing initially and after a few flights if the temperature of the batteries, speed controller, and motor are below 50° Celsius, then it is possible to test the system using the hard timing mode.

Note: Hard timing should not be used with any two-pole motors (Mini AC, Kontronik, Hacker).

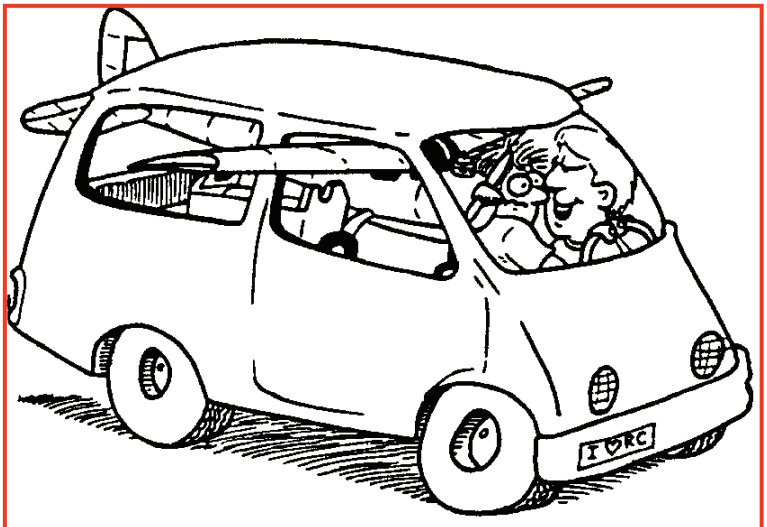
Turning the speed controller on/off

Brushless speed controllers do not normally come with an on/off switch, so to enable an ESC you need to plug the battery into the ESC. Prior to that you do need to ensure your throttle is set to idle/low and it is switched on. Normally a set of beeps or tones will donate it being armed.

To turn off or disarm an ESC just unplug the battery source.

Disabling BEC

To disable BEC on speed controllers where a separate receiver pack will be used is done by removing the middle cable from the servo, receiver cable which goes from the speed controller to the receiver. In OPTO speed controllers this is not required. □



"I just knew that this hobby would bring us closer... Careful, honey - you'll scratch the cowling."

"Quit complaining and put it down!... 'ya keep this up and I won't bring you out here anymore!"

SVF MEETING AUGUST 5, 2009 @ 7:30 P.M.
DEER VALLEY AIRPORT

Photos by SVF Members

The Donated Generator Removed To The SVF Field Building

Better Performance with Less Noise

By Brian Dorff

With the ongoing debate about the noise our little engines produce, much is being done to preserve our way of life while respecting the rights of others. At first, noise reduction sounds bad for pilots. We think that reduced noise means reduced power, and conventional wisdom supports this. It is not until you fully understand how engines and propellers operate that you will realize the gains that benefit not only our neighbors but our airplanes as well!

There are four contributors to the noise made by models (in no specific order): muffler type, engine speed (rpm), tip speed of the propeller, and vibration.

Muffler

The mufflers provided with today's engines are quite good for the rpm range in which they are designed to run. Mufflers that come with internal baffles should keep the baffles in. Removing them does nothing to boost power, it increases noise, and makes the engine idle poorly because of lack of back pressure. Pitts-style mufflers shouldn't have more exit area than the stock muffler does, and if it does, one of the ports may have to be partially or completely blocked. Again, this will help idle.

Engine speed

A large contributor of noise made by airplanes is an over-revving engine. Most modelers try to make their engines run as fast as possible, trying to obtain the rpm at which the manufacturer claims the largest brake-horsepower (BHP) number. What they don't realize is the peak efficiency for the engine occurs at peak torque, which is usually about 65%-75% of the peak BHP rpm.

Example 1: A manufacturer of a .46 engine claims 1.5 BHP at 16,000 rpm. After break-in you find that you can turn a 10 x 5 propeller at 15,500 rpm—very close to the peak BHP, but the airplane's performance is mediocre, it is loud, and consumes way too much fuel.

Now you find the engine's peak torque is about 70% of the peak BHP rpm (.70 x 16,000 rpm = 11,200 rpm). You switch to an 11 x 7 propeller and find that the rpm is 11,500. You are much closer to peak torque now, and the airplane flies better and is quieter because the frequency of the engine firing has reduced dramatically. The fuel also lasts longer, and the engine will last longer as well since it is not working as hard. A slower engine also helps in achieving the next goal …

Propeller Tip Speed

The tip speed of the propeller is critical in quieting the airplane. The point where things get noisy is 560-feet per second or about 380 mph. Going more than 400 mph is a big no-no. Even in an airplane that is built for speed, you should be able to choose a quiet propeller.

Example 2: Same setup as the last example, the 10 x 5 propeller is at 15,500 rpm and the 11 x 7 propeller is at 11,500 rpm. The formula for tip speed in miles per hour is: (Diameter in inches)(3.1416)(rpm)/1056. The number 1056 is a constant that converts inches per minute to miles per hour. A 10 x 5 has a tip-speed of 461 mph (a no-no). (10)(3.416)(15500)/1056 = 461.

We want our tip speeds no faster than 400 mph and it should be less than 380 mph if you want to keep your flying site. The 11 x 7 at 11,500 rpm has a tip-speed of 376 mph. (11)(3.1416)(11500)/1056 = 376. The tip speed is now down to a moderate level. But how do these propellers compare in performance? You can calculate airspeed by using the propeller pitch and the rpm of the propeller. The pitch of a propeller is the second number in the propeller designation. This is the distance in inches that the propeller will travel through the air in one revolution.

Multiplying the pitch by the rpm and dividing by 1056 will give the calculated speed of the model. 5 x 15,500/1056 = 73 mph; 7 x 11,500/1056 = 76 mph.

So your airplane will actually be traveling slightly faster with the 11 x 7 than with the 10 x 5, while turning 4,000 rpm slower. This reduces engine noise, propeller noise, fuel consumption, wear and tear on the engine, etc., without compromising performance.

continued

Continue……..

Propeller Loading Factor (PLF)

How do you know what to expect switching propellers? Being able to compare propellers before you run them is the key to optimizing your airplane's performance and getting rid of the noise. Say you are happy with the rpm that your engine is turning with the 11 x 7 propeller, but you want to try other propellers to see what you like best for flight performance.

Right now you are at the middle of the road, slightly fast and passable vertical performance, but what if you want more vertical? First we solve the PLF of our existing propeller, and then we compare it to others. PLF=D x D x P (D=diameter, P=pitch)

The 11 x 7s PLF would be 11 x 11 x 7= 847 PFL (compared with the 10 x 5s or l0 x l0 x 5=500 PLF). Now let's see what else is out there. To increase vertical you should either increase diameter, decrease pitch, or both.

To keep a PLF close to the same you will have to do both. If you are trying to raise the rpm, decrease pitch—and if you are trying to slow the motor, increase diameter. I would try the 12 x 6 first and then the 13 x 5. They have close PLFs. This is for comparison only. Switching propeller brands or not balancing a propeller, among other things, can vary your results.

Vibration

How does the vibration of your model relate to the sound it makes in the air? Well, sound is vibration. Imagine your beautiful model—a nice wooden structure covered in drum-tight plastic covering. Think of it as a percussion instrument. The piston is traveling up and down like a drumstick pounding away at your model. And your model echoes every stroke it makes. The same thing happens with an out-of-balance propeller. Noise. It's everywhere! Your new mission: get rid of all vibration.

Start at the Propeller

It moves 300+ mph at the tip—balance it! It will remove noise because all that vibration won't exist in your airframe. Our neighbors will thank you and your receiver crystal, your servo pots, fuel tank, and NiCds will thank you as well. You will be rewarded with much greater reliability and a longer airframe life span. Also consider a high-quality spinner. They are better balanced and look nicer.

Back to the other cause of vibration—the engine. It is not possible to balance an engine dynamically at all speeds, so some vibration will forever be present, especially with four-strokes. The only thing that you can do about it is to isolate the vibration from the aircraft, making less noise in the process. Iso-mounts vary in type and price; from rubber grommets between the firewall and the mount, to specialized mounts for specific engines and airplanes that cost $100 or more. A popular one is made by Dubro and is for any 40-90-size 2c or 4c engine. It sells for $20-$30. Well worth the investment!

While it may not be feasible to make every one of these criteria work on your aircraft, it is important to keep these points in mind when getting your airplane ready to fly. If we all do a little, we can make a big difference. Remember, a 3 dBA difference in sound and the intensity doubles. If you can make your airplane even 3 dBA quieter, you have made a huge cut in the noise that everyone around us has to hear. (Although the sound energy is halved for every 3 dBA drop, it takes a 10 dBA drop for the human ear to perceive the sound being half as loud. A 10 dBA drop results in one-tenth the original sound energy.) □

From the Anoka County Radio Control Club, Inc., Coon Rapids, Minnesota

SVF PHOTOGRAPHERS

The editor really appreciates receiving the photos from you members that send them in. I always felt that credit should go to that person when the photos are shown in the Slow Roll. That is becoming harder to do with so many photos on the pages. What I like to do is give you credit here. Then just mention the photos by *SVF Members*.
They are: *Marty Jones, Joe Balabon, Charlie Beverson, Barbara Vidales, Tony Quist, Howard Kenndy, Bud Tillack, Eric Stevens, Dr.Paul Steinberg, Jerry Wright, Ron Peterec and myself.*
Did I miss someone? We'll continue to give credit on page one. ***Bob Purdy***

QUIZ ANSWER

What is it? Some of you know, shhhh!

No one came forward, so the Editor gets the $$$

Answer P-38 TURBO CHARGER

Next month Issue

YEP! Its up to you members. Its your newsletter.

If you got something going let me know. Be the *SR* field reporter, great job and good benefits, like free fresh air. Maybe we can throw in some sun screen lotion & NEET. We'll give you COLD water too! See you then.

Would you like to be notified when the *SLOW ROLL* new issue is available? Give Gene your e-mail address. AZ49ER@COX.NET

This Month Issue

Lots of FYI articles, *if you read them*. There's Servo's info, retracts info and a NOISE article.

Check out the WARBIRDS Over the Rockies flyer and the fall OEAF flyer. Now is a good time to check the SCALEMASTER Flyer. Send those articles and photos in!

*Remember to **ZOOM** the **PDF** page to see more.*

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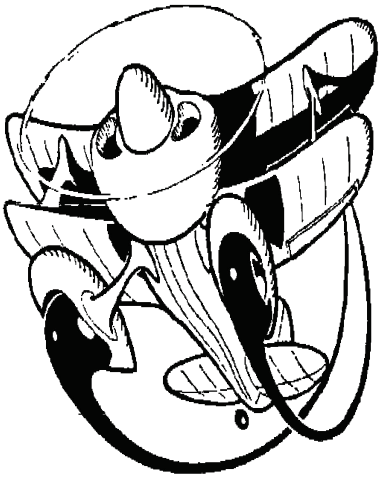

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