The *SENIOR PATTERN ASSOCIATION*

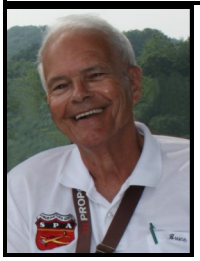
Official S I G (Special Interest Group) of AMA

Dedicated to the building, flying and competition of vintage Pattern model aircraft

SPA NEWSLETTER www.seniorpattern.com **JAN/FEB 2013**

PRECISION AEROBATICS from PATTERN'S Golden Age

IN THIS ISSUE



FROM THE PRESIDENT There's much "winter-project" building going on based on the remarks on the SPA Discussion List. At the outset of 2013 there are about 150 to 200 modelers around the world that participate in the **Discussion List.** If you have access to a computer and the Internet, let me encourage you to join us in 2013 on the Discussion List. You may join from within our SPA website at : www.seniorpattern.com.

With a "lull" in contest activity, Duane has recruited some talented modelers and craftsmen to input in this edition, and has some great info-type columns "in-the-mill". Make no mistake, this edition is a genuine "keeper". Electric practitioners Ed Lyerly, Warren Oliver and others share a "cache" of scoop on the ***"voltburners."*** Eric Nessler inputs much valuable advice on trimming tips for our new ADVANCED class, added for this coming season which assists pilots in the transition from Sportsman to Expert. I am elated not only with the class addition, but also the newly available engines, new "approved" ARF models, etc.

Of special interest to me personally is the article by Bernie Olson who unearthed a "classic" model I had the privilege of filming in competition for the USA International Aerobatics team in Huntsville, AL at the Team Selections in 1972. Primed to learn more? Proceed through the pages and enjoy!

Our same slate of contributing Board members will all be assuming their same rolls for the coming cycle with "Mr. May" (Scott Sappington) relieving Mike Robinson as Secretary/Treasurer.

Your first New Year's resolution for 2013 should be to remit your 2013 dues to Scott in the SASE (stamped and self-addressed envelope), provided with this newsletter— he'll appreciate it.

Remember——SPA participation is "KEEN in 2013"! Join us and enjoy!!!

The New Patterns are Keen in 2013

TO OUR SPA FAMILY

Join our Discussion list from within the webpage or inform any officer and we'll "sign you up". It's like a gigantic Mailing-list, but at NO CHARGE. A service to membership and potentials from SPA.

EDITORIAL*: *A year ago in the January 2012 issue, we featured the "Special Engine Edition", which focused on the "...new challenge we face now that the "old reliable" OS .91 is no longer readily available from your favorite supplier." Now what do we do? Alternatives were discussed, along with high hopes for the new, (and more expensive) OS .81. In the end however, the smaller OS wouldn't "haul the mail", and the other alternatives didn't work out as well as planned, so the replacement .95 (which wasn't even discussed because the rules excluded it), was eventually approved by your BoD, along with a .65 2-stroke.

This issue we turn our attention to another alternative—**electric propulsion.** Just a short time ago, electrics were banned for a year as we (as an organization), tried to figure out what to do—now electrics are not only ***back,*** they are being tried by some of our established experts in SPA with good success. For various reasons, electrics are becoming the "latest thing",—the "new kid on the block". This shouldn't be surprising, since it is part of the fun to want to experiment with what's new—the "hot setup". As more accomplished expert SPA pilots experiment with them, more of us "non-electric types" are becoming intrigued ourselves-why not?

I asked Ed Lyerly, (one of the first of the "electric guys", and the person who advised most of those experts), to share some of his knowledge with us in a series of articles on electric power at a very basic level, (in other words, where I am). He was kind enough to do so under the condition and understanding that his suggestions are ***not the only way to go***. After all, nobody has tried out all of the increasing number of products out there, but Ed's suggestions will work successfully and get you going until you develop your own personal tastes.

Following Ed's article, we have a general discussion on electric set-ups taken from the SPA Discussion List—lots of good recommendations to apply to your own "electric efforts". Later, Eric Nessler discusses the finer points of airplane trim needed for the new ADVANCED class, where Knife Edge, and point rolls are introduced—these tips can, of course benefit any of us in ANY class to provide a plane that flies better. For sure, the experts are better pilots than the rest of us—but they also have planes that are easier to fly—where you're not constantly needing to make corrections to make them go where you want. The experts know how to make them fly their best. Ed and Eric, your articles are very much appreciated by the rest of us. It's articles like yours and others who have contributed, that make this SPA newsletter (somewhat) interesting to read—thanks for being willing to share your knowledge, and we welcome more instructive articles from the field.

Finally this month we have a *featured plane*—one that was discussed a lot on the DL recently. Bernie Olson from SPA West reports on his new "Doc Brooks" Crusader– a plane featured in the February 1965 MAN. I remember reading the original article back then and thinking how "cool" it was, what with that "neat-o" air scoop and scale-like looks. I don't think I'm the only one. Bernie's Crusader is new, and I'm looking forward to further reports on how it performs.

With the new Advanced class (and the choices it brings), plus the new maneuver sequences that should lead to keener competition in all classes, I'm excited about the upcoming 2013 season. Happy building!!!

SPA EAST Still Tentative 2013 SPA Schedule SPA WEST

March 23rd-24th Prattville, Al.....(CD Larry Hill)

April 27th-28th Cullman, Al. .....(CD Steve Bryum)

April 27th-28th Fort Worth.....(CD Ken Knotts)

May 18th-19th Knoxville, TN.....(CD Phil Spelt)

May 18th-19th LAFFS, Shirley, Ak.....(CD Richard Tibbits)

June 8th-9th Dan Quinten Memorial, Tula, Ok.....(CD Lindy Quinten)

June 22nd-23rd Americus, GA. [Hodges].....(CD Dan Dougherty)

July 20th-21st Hotlanta, GA. .....(CD Dan Dougherty)

August 24th- 25th Chattanooga, TN. .....(CD Mike Robinson)

September 7th Texas Wings .....(CD Tim Ried)

September 14th-15th Asheville, NC. Masters.....(CD Will Hicks)

October 5th-6th SPA West Open -Ft Worth.....(CD Ken Knotts)

***Ed Lyerly was one of the first within SPA** to advocate electric power, and is now commonly referred to as SPA's "electric guru". He has already helped several SPA pilots experimenting with electric power to get off the ground. When I approached him about writing a series of articles about electric propulsion, he cautioned me saying that obviously, he hasn't tried out every system, and advises others based on his own personal experience in what works for someone starting out, "...everyone will have their own preferences when they have some real world experience under their belt (just like glow power). What I can provide are the details on what will work reliably and provide a competitive electric power train for someone trying it for the 1st time". I enthusiastically replied "that's what we need", so Ed graciously offered to help those of us thinking of "dabbling" in electric propulsion. Hope you enjoy it—thanks Ed!! .....Editor*

Electric Power for the SPA—Part 1


..Ed Lyerly SPA L7

So you are flying SPA using glow power and would like to try electric power …… or you are thinking about starting SPA flying, and would like to do it using electric power. If so, I can help by providing you with an electric power train that will allow you to be competitive. After flying electric powered models for 10 years (mostly converted glow kits) I viewed flying in SPA as an interesting new challenge. Even with no previous "pattern" flying" experience I did OK in the novice division in 2010.

The two biggest challenges in converting a SPA legal plane to electric are prop size and power allowed under the current SPA rules….The SPA limits prop size to 13.5" diameter. Anyone who has flown electric powered sport planes knows that the single biggest advantage of electric power is that an electric motor can turn a large prop very efficiently, and that a larger prop is more efficient than a smaller one. So, limiting electric powered models to a 13.5" diameter prop is a serious handicap. It does, however, keep electric powered models from looking like cartoon figures with huge props in order to exploit their max efficiency.

The other issue is power. Electric powered models are limited to 1400 watts maximum power. 746 watts = 1.0 HP , so 1400 watts/ 746 = 1.88 HP. By choosing to use electric power you do not have the option to up the nitro in your fuel or buy a Bill Collins engine to get more power to pull your heavier plane with the authority needed ……. you have to build a plane that is light enough so that you have an adequate power to weight ratio to get the performance needed. Through experimentation I have determined an all up weight and some power system options that will allow you to be SPA legal, and still be competitive.

So here is where I suggest you get started. You know how the realtors say price is mainly about ***location, location, location*** ……. Well SPA with electric power is mainly about ***weight, weight, WEIGHT !*** I'll tell you up front that an electric powered SPA legal airplane will be a PIG in any other class than SPA Novice class at anything over 8.0 lbs all up weight. To be competitive in either the Sportsman or Expert classes will require 7.5 lbs total weight or less. Your goal should be 7.0 lbs. To achieve this, every single component has to be evaluated based on how much it weighs.

The strategy I have successfully employed is to use the standard size receivers paired with the lightest servos capable of doing the job needed. I have had good success running small, lightweight servos like the **HiTec 5245** and the **Futaba 9650** on 6 volts and a standard metal gear servo like a **Futaba 9405** on the rudder ….. where power and ruggedness is required. You can get the 6V input by tapping off your motor batteries with a BEC (battery elimination circuit) to save the weight of a separate receiver pack. My choice is the 6V model from Radical R/C #100971.

Motor choice and Lipo battery choice are the other major areas that add weight. Experience has proven to me that the ideal motor for the 1400 watt power limit using a 13.5" prop on 6 Lipo cells has a KV of between 500 and 550. KV is a relative term-- it just means that if you took the prop off the motor and hooked up a battery …… a 500 KV motor would turn 500 RPM for every volt supplied. That has little to do with what RPM that motor will turn with a prop installed, but that is the way all electric motors are rated. That is why I say (from experience) you need a 500 to 550 KV motor ….. as it will make close to the maximum allowed 1400 watts using a 13.5" prop using a 6S pack of lipo batteries. While there are other choices, motors I have had excellent results with are the **Scorpion 4020-12 (542 kv).** Other choices I recommend are: **Torque 4016T/500 and AXI 4120/18.** If you want to try another motor ….. just make sure it has a KV of between 500 and 550 and can handle 1400 watts of power. You can get these from Hodges Hobbies or Atlanta Hobbies among others.

For a speed control (or ESC as they are called) I have had excellent success with the Turnigy Plush 80. Get the programming card with it. ***Wait until the next issue*** when we discuss batteries and you can order all three items and save some postage.

All the best in your electric efforts …… for any of you with internet access, these threads about electric power in a SPA airframe might be of interest:

http://www.rcgroups.com/forums/showthread.php?t=857052&highlight=intruder
http://www.rcgroups.com/forums/showthread.php?t=989858&highlight=curare
http://www.rcgroups.com/forums/showthread.php?t=1116052&highlight=curare

QUESTIONS for the "ELECTRIC GUYS"

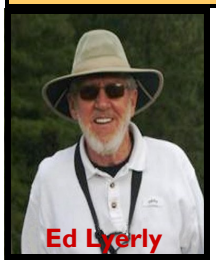
Questions (on our behalf), by Dan Dougherty...

- ***What Hobby King motor, speed controller (ESC), and battery would you choose for an electric Dirty Birdy that would normally turn out 6 3/4 pounds with an OS 91, etc. ? Don't pull punches for class, assume Expert pattern capability.***
- ***Can you expect the electric to end up lighter or heavier? How much ?***
- ***Would you use a separate BEC or the one in the ESC? Assuming 4 servos in stead of 5(no throttle).***
- ***Would you use a stock prop or cut something down?***
- ***How much air passage area (sq. in.) do you need in the firewall ? Where would you exit ?***

Answers PAGE 4

From the Discussion List

Opinions on All Things Electric



Some things to be aware of when choosing batteries for our application.

1) Not all "C" ratings are created equal. **2)** All manufacturers lie (exaggerate their C ratings) ….. some exaggerate more than others. **3)** A quality pack when charged produces 4.2 volts/cell at rest and 3.7 volts/cell when used within its "C" rating. That means that a 6 cell pack fully charged will be 25.2 volts "resting". Under load it should be able to hold 22.2 volts (3.7 volts/cell). **4)** If you want to make 1400 watts (the maximum allowed by the SPA) and you have a 5000mah pack rated at 20C ….. you should be good as gold right ?

So 1400 watts / 22.2 volts = 63 amps. That is only 12.6C on a 5000mah pack . Problem is that after about 30 seconds almost all 20C packs will drop in voltage under load. It is not unusual for that drop to be 10% (which makes the pack voltage only 20 volts). Since voltage drops, so do the amps (motor, prop, throttle range remain the same).

So ….. you now have 20 volts and less than 63 amps (probably around 55). So …. total power available at that point is 20 volts x 55 amps = 1100 watts. That is over 20% power loss shortly after takeoff. On the other hand, a higher rated pack …… 30C or better, will usually hold that 3.7 volts/cell under a 63 amp load, thus maintaining close to the 1400 watts throughout the flight.

5) My suggestion is to be skeptical of the "C" ratings. Rule of thumb, cut them in half and start there. You need to pull about 65 amps to make the 1400 watts, so that is your baseline.

Finally…… understand that those 50C-60C packs are going to be heavier than a 30C-35C pack. You are looking for the best compromise in weight and performance. Think energy density ….. then "C" rating. I have had excellent results with Zippy Rhino 30C packs. Turnigy 30C+ packs also seem to be excellent……...Ed Lyerly SPA L7

I have found that a good 6S 5000 mAh battery will get you through the expert pattern with some to spare if one uses throttle control properly. I land after one extra maneuver with about 20% showing in the battery. I believe that building light and flying slowly leads to the best results. I can hear Jamie saying "Bull Crap" even as I say that. I fly normal turn arounds, but at half throttle. I also approach maneuvers at about half throttle. The plane I am flying now weights about 7.5 lbs with the battery and does really well in the verticals. I am not sure why I would want it lighter.

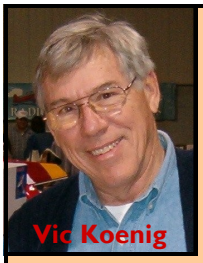
The 5300 mAh battery is also a good choice and gives you some extra at the cost of a little weight. They also seem to have it in stock more often. At this point I would not buy anything but Gen Ace batteries from Hobby Partz. I have used Zippy, Rhino, NanoTech and a few lesser known brands and nothing compares to the Gen Ace batteries I have now. I caught the 60-120C 6S 5000 mAh batteries on sale for $105. They are normally about $10 more than that. I have at least 75 flights on each of these four batteries and they look exactly like they just came out of the box. You can barely tell they are warm immediately after the flight. I do always store them at the storage level (about 60%). It only takes about 15 minutes to charge them to 100% from there. They say they can be charged at 5C, but I use 2C. With four batteries, a good charger, and 5-10 minutes breaks between flights you can basically fly continuously. You never need more than three at a contest. I think it is false economy to go for the lower C rated batteries. You may save $35 per battery, but they just don't last as long. The Gen Aces seem to have a flatter discharge curve as well. A bunch of the heli guys here in K town also use these batteries and they just really perform well.

I have used several motors. These included a couple inexpensive ones from Hobbyking and a Rimfire 80 (not so cheap) and have settled on the **4020-12 Scorpion** ($139 on their web site). http://www.scorpionsystem.com/catalog/motors/s40/S-4020-12/ The Scorpion motors are just more efficient. This one weighs about 300 gr (this is about the same as the Rimfire) and if you turn it lose with a 6S battery and a 13.5x9 pattern (not electric) prop it will hit 2000 Watts. I use a watt meter and the throttle curve to limit it to the legal limit of 1400 Watts. I also use the flight mode switch to shift throttle curves as the flight proceeds to compensate for battery voltage drop.

I like to use the BEC Pro from Castle Creation for control system power. So far (knock on wood) these have performed flawlessly in several planes. It is good for 20 Amps and weighs less than any battery. Beware of the built in BECs. Particularly with JR/Spectrum systems. Good strong servos can cause drops in supply voltage potentially resulting in brown outs. If I did use a battery, I would go for the LiPoFe batteries that Jamie has recommended. These can deliver much higher currents than NiMh or Nicads. I have experienced one brown out and it was a VERY long few seconds before control was restored. The most direct evidence of this I have is potential problem is when I first got my Spectrum 8 with the telemetry system. I was using the receiver battery level alarm capability and set the alarm at 4 Volts on a four cell Nicad pack. I couldn't touch the sticks without the alarm sounding! A five cell Nicad and a 5 cell NiMh did better, but the alarm would still sound if you got on all the servos at once. I then tried a 3 Amp BEC and a 5 Amp BEC. Same results. The 20 Amp CC Pro completely eliminates the issue. This is one place that over kill makes real sense to me.

I have tried to simulate an OS 91 with all the stuff I have tried. Eric Nessler has gone for higher RPM and smaller props to simulate a two stroke 61 very successfully — (curse you Red Barron).

The warning about being careful around these systems is very important. A prop that is sitting still is so very easy to disregard. This is why I suggested the disconnect be exterior to the fuselage that became part of the rules. I do not think the batteries are any more dangerous to store than glow fuel; however, I do store mine in a fire proof cabinet. That's my two cents worth. ……..Warren



Thought I'd "show and tell" what I currently have on my bench. I just got a new Turnagy motor I like so well I bought three. It's in the photo and sells for 38.00. Today I flew the plane and tach'ed the motor. Using an APC 13.5x9 cut to 13 just like we normally use on the OS91, it got to 11.000. I now run a Turnagy cherry wood 13/10 and get 10,500. I plan to use a throttle curve to keep me out of the max speed, I just don't need it and I'll save watts, and drop the top speed RPM too.

I used to use the Turnagy 6S, 20C, 5000 battery but didn't get the life or performance I thought I should. I now have new Zippy 6S, 35C, 5000 batteries that are too new for me to tell what kind of a life span I'll get, but I am impressed so far. The new Bird-E is 6 pounds 14 ounces AUW and is an exemplary performer. This plane is heavier than most I have built, the wings ended up at 1 pound 8 ounces ready to bolt to the plane and I'll get them much lower next time. This set was from an earlier plane.

Easy verticals at 1/3 throttle and vertical acceleration at a setting at 1/2 or higher. Someone said larger ESC's seldom have an internal BEC but the Turnagy Plush 80 I use has a BEC and does all I can expect for motor control. If you choose it though, be sure to buy the programmer card, your life will be much easier. On this series of Dirty Birdies, I started building them as them top loaders and that makes battery changes very easy, I highly recommend this. Next planes will also use a 5/8 wing tube instead of 7/8. The weight difference is over an ounce even using carbon fiber wing tubes….Vic Koenig

Electrics pound for pound work out about the same…. The difference is, that the airplane can be built much more fragile cause of the lack of vibration. Not to get off subject, but to give you my personal feelings, electrics ARE the new age, like them or not, however, like me with the 2 meter stuff, I prefer glow for my pattern stuff. Heck, I've even gone back to two stroke motors for my SPA/ BPA planes, with Nova Rossi 60's , and YS 170's on my two meter birds, but its *my preference.* What a person needs to figure out for themselves is, what can I run that will give me consistently the power I need, because power is power, regardless. It comes down to preference. It can all be made to look simple and easy but it comes thru a learning curve, and believe me, electric has a learning curve, not difficult, but just a curve. Like the OS 91's we fly, (take Bruce for an example), find out what a successful pilot does to the motor—what he runs and all the other things—fuel, prop etc, then just copy it. It'll probably work for you too, it's the same with electrics.

Here are my electric concerns-we need to consider both the pros and cons:

1. Constant power drop, due to voltage dropping off minute by minute, weather you notice it or not.
2. On a hard crash, battery's could, and will short out causing a fire hazard, and a total loss of plane and content.
3. Care and transport of battery's, (like fuel, but more dangerous), JMO, but, I carry $2000 worth of lipos in my VW trunk daily.
4. Charging, requires generators or electricity, (but no biggie, harbor freight $79 two stroke generator, 900 watts will charge any needs a modeler would have).
5. Constantly having to deal with heat on battery's on a 95 degree day.
6. The danger of learning an electric motor system—assume its hot (able to start any time), and running, once power is hooked up. This system ***is like bad human gas— silent, but deadly***, and needs to be worked on with no prop attached, cause sooner or later, it will bite ya!! The plus side of electrics, a heck of a lot cheaper. EVERYTHING else I fly is electric with great luck, just prefer to stick to old school with pattern stuff—it's my choice. Personally, when I see smoke, I'm a happy camper, but not so with electrics, he he he.

Now, back to the question many wonder about— yes I run separate battery power to my radio, a preference that just makes since in case of an ESC failure. My radio LIFE battery weighs 1.7 oz, so there's not much of a penalty there. Choose the prop to get the wattage needed—-a no brainer.

You can get motors from $40 to scorpions $120—-quality is the difference.

Get all the air you can get, my ESC's are usually mounted on the bottom of my planes exposed to the outside air, but ESC's are not as critical, heat wise as battery's. If your battery's start running over 120, there life will be shortened.

I've just scratched the surface on battery flight, and I like it all, and it boils down to personal choice. ….Jamie Strong

Castle Creations has a new ESC called Talon 90. With the coupon included in the package you can get a free usb programming cable coupon, but what I find real interesting is that you can just program the ESC with a maximum RPM setting. For some reason I find that appealing...not sure why yet, but it caught my eye. Tower expects to have them in stock in a couple of weeks for $77.00. It does have a non whimp BEC built in.
http://www3.towerhobbies.com/cgi-bin/wti0001p?&I=LXCYNG&P=7
Technical info is at: http://www.castlecreations.com/products/talon.html

I am building a Big Stik 60 from Great Plains (electrified). I think I'm gonna try this out. When you figure the freight cost on imports it's not a horrible price (in my opinion).

Reply: Boy it seems like they built this one just for us! The next time I buy it will be at the top of my list unless you give it a bad review. With the good built in BEC the price is very competitive. Thanks

Warren

For those pilots opting for the new Advanced class, it will be a bit like transitioning through "Triple A baseball" before moving up to "the show" of the majors. Until now, our Sportsman graduates have had a tough go of it —finding they were now facing ***the very best—the polished Experts.*** Some may spend several years lower down in the standings before acquiring the skills to be truly competitive. Advanced class will be the training ground for "the show", where the finer points of pattern competition are honed. ADVANCED class makes it possible to be in the thick of competition while working on those skills. In this article, Eric Nessler talks about those "finer points" that are absolutely essential before the final "move-up" to Expert……..*Editor*

Advancing into Advanced-by Eric Nessler ***Are you Nose Heavy?***

I am more excited for the coming season of SPA competition that I have been in quite a long time. For the first time in several years, we're going to have a class below Expert flying knife edge maneuvers. The new Advanced class is an intermediate step between Sportsman and Expert. When the pattern committee convened this year, we concluded one of the big differences between the majority of our Sportsman fliers and our Expert fliers is the level of smoothness our experts are showing in their rudder corrections. I call it "Left Hand Skills" (since most of us are mode 2 fliers), and as you progress up the SPA ladder ***this is one skill set you can't be without.*** The decision was made that we needed to introduce some knife edging maneuvers into Advanced to help build coordination in that left hand. Learning point rolls, slow rolls and sustained knife edge itself goes a long way to nurturing dexterity in your rudder hand, and pays big dividends in seamless rudder corrections in looping maneuvers.

Another benefit of the Knife Edge is that it will teach you about CG and electronic setup of your radio, and how to perfect this. To fly at the expert level takes a lot of trimming, adjustments and experimentation. These are skills that can be learned before landing in Expert. The top Expert fliers, I can guarantee you, are not fighting their airplane's bad tendencies to much of an extent. They are adjusting, trimming, and mixing the airplane until it does what it is told. These things are not cheating, they are what is required to have a properly setup airplane. SPA is a social activity, but we are all pretty serious about competition. If you take two equally skilled fliers, and one has an airplane that is properly trimmed, guess who wins. You want to be that guy!

In my experience from helping others trim their airplanes, most typically start with their airplanes too nose heavy. This is not always our fault. In my experience every pattern airplane I have built or trimmed, has required a much more rearward CG than the plans called for initially. I think this is a built in safety factor by the designers. They would rather have people starting out way nose heavy, than missing rearward and losing their airplane and then blaming them. Easy tell-tale signs of a nose heavy condition are excessive down elevator required to hold the airplane level when flown inverted, unwillingness to track on a 45 degree line, and high landing speeds where it's nearly impossible to pull the nose up to scrub speed. In the past, our pre-expert fliers have been able to get away with a setup like this, but it's about to get harder.

As we phase into a pattern cycle that requires knife edge maneuvers, a nose heavy airplane will reveal itself in a way that will cost points, on big K-factor maneuvers. A nose heavy airplane will almost always pitch to the canopy in knife edge. Here are the physics behind why this happens. A nose heavy airplane will require excessive up elevator trim to fly straight and level hands off. It needs that excessive up elevator trim to overcome the nose heavy condition (gravity), and bring it's symmetrical wing into a positive angle of attack to maintain enough lift to not lose altitude. Now, if you roll the airplane 90 degrees and begin your knife edge, gravity is now working on the side of the airplane pulling it toward the ground, so you input top rudder control to maintain your level knife edge. The rub here, is you still have all of that up elevator trim, but it is no longer fighting gravity, and since the plane is now on its side, the up elevator trim makes it pitch to its canopy.

You have 2 choices to fix this. You can either fix it electronically with your transmitter, or you can add tail weight. If your airplane is pitching to the canopy, and also exhibiting some of the other symptoms above, my advice would be to first attack with tail weight. I typically take my first shot with a full ounce on the tail. Most of our designs are pretty docile, even when moderately tail heavy, so don't be afraid to experiment. What you are looking for is mild down elevator input required to fly inverted, and a responsive airplane that goes where it is directed, and stays there. Please note, that as you add tail weight your elevator and rudder will become more sensitive, so you will have to dial back their control throws to keep your presentation smooth. As you are approaching a more neutrally balanced airplane the knife edge pitching condition will be severely lessened, and sometimes eliminated altogether. Since the plane no longer dives when rolled inverted, you'll find your horizontal rolls will be much improved, as well as your entry and exits of your inverted maneuvers. Typically what I will do when I find a balance I'm comfortable with, is put the airplane on the CG machine and record the new CG. Then I will go back and see if I can move my flight pack rearward, or relocate my rudder servo rearward if not already there. Then I will put it back on the CG machine and be able to reduce the amount of tail weight needed to be at my new preferred CG position.

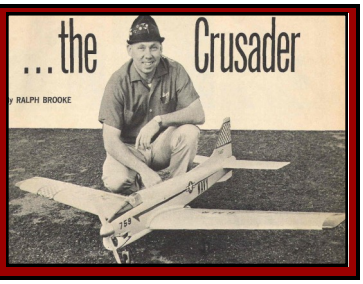
You will know if you've gone too far with the tail weight if the airplane starts "hunting" in level flight, that is, it won't hold a heading. It may also climb when inverted and on landing a tail heavy airplane will tend to balloon on approach, and may require down elevator to bring it in. I've been there, it's uncomfortable, and if you get there you've definitely gone too far!

When you achieve the balance and feel you like, the plane may still have a smidgen of pitch in knife edge. If that is the case, I would suggest a programmable mix from your radio. You will setup the mix with your rudder as the "master" channel and your elevator as the "slave" channel. You can now, through trial and error and a lot of flights, dial in the right amount of elevator to make it knife edge arrow straight. From my own experience, I would say if you are beyond 8-10% of elevator in your mix, you need to go back and reconsider your tail weight situation. When you are done, getting a perfect 10 on Knife Edge Flight will be as simple as rolling it on it's side, and giving just enough top rudder to hold it level. Have fun practicing, and I look forward to flying with you next season. ……. Eric Nessler

Building Ralph Brooke's CRUSADER

…….By Bernie Olson

For many years I've had a "thing" for this ultra cool-looking, scale-like pattern version of the F8U Navy Crusader designed by Doc Brooks. The plane appeared in the Feb1965 MAN. Now we finally have an SPA pilot with the good taste to build one; he was kind enough to share his impressions….Editor



Ever come across a model that you know you just have to build someday? Well, the Crusader flipped that switch for me. Ralph 'Doc' Brooke designed, built and campaigned the model in 1964 and Model Airplane News published a build article in February of the following year. Doc won the Canadian Nats, won the Oklahoma City Invitational, then took third at the US Nats in '64 with the Crusader then planned to compete with it at the subsequent World Champs in Sweden.

This design was a Harbinger for many that would follow over the next decade. The fuselage profile and wing plan-form would have still fit in nicely at contests in the mid-seventies. As a size comparison with the Curare of that later period, the Crusader has 5 inches more span and 3 inches less length.

The model I built started life as a kit produced by Lazer Works located in Wichita Falls, Texas. Documentation includes full size plans and supplemental instructions where the kit deviates from the plans. This is a partial kit that includes laser cut fuselage frames and lower side skins; wing ribs, spar webs and material for spar caps. Everything else is provided by the builder. Part fit was excellent and the ribs came with break-away tabs to assure a straight build.

Horizontal and vertical tails use built up stick construction covered with 1/16 inch sheet. Plans show a removable empennage although I chose to permanently attach it. The horizontal tail is swept with a straight hingeline. As a result, the elevator is much wider at the tip than the root – a little unusual but it works fine and looks swoopy.

Designed for early proportional equipment, the fuselage is cavernous for today's equipment. The original model was powered by a Fox .59. I intended to install an OS .61 but couldn't get it to fit without affecting the lines of the aircraft so chose an OS .55 instead. The engine is installed per plans to a ¼ inch aluminum plate that's bolted to maple beams that are epoxied inside the fuselage. The engine is set up with 3° right- and 3° down-thrust per Doc's recommendation. My model uses an MK bladder tank; something that Doc didn't have available. One of the most notable features of the model is its large snorkel inlet. The original cowl was carved from a large balsa block. I chose to make a mold and lay one up from fiberglass which worked out nicely. The original also used a clear canopy that was cut from the back of a WWII canopy. I started that way but failed to get a fit that looked right so went ahead and carved a balsa version instead.

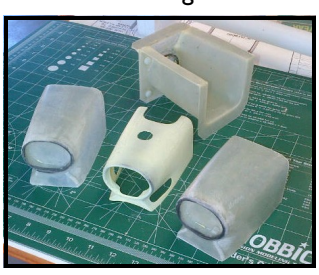
The wing uses traditional built up construction covered with 1/16 inch sheeting. In the MAN article Doc recommended using a foam core wing and I have to concur. Although the built up version is fine, a foam wing would be more durable to abuse.

Inside the fuselage, the leading edge of the wing is cut away to clear some space for the back end of the fuel tank allowing it to sit lower in the fuselage and better align with the carb. Conventional full span strip ailerons are installed.

Doc finished the original with Jap Tissue and dope and, of course, today we have more options than he did. I covered the wing with Monokote to save weight. The fuselage & empennage are covered with ¾ ounce glass cloth and matching Lusterkote. Although the original looked great in classic Air Superiority Gray I thought that could get tough to see on a cloudy so I chose to emulate a Blue Angels scheme which still honors the Crusader's roots.

My model required about 2 ½ ounces of lead in the nose to balance at the plans location bringing unfueled weight up to 6 pounds, 10 ounces. Doc's plane came in at 7 pounds 2 ounce – light considering the early proportional radios available at the time.

First flight was shockingly delightful. The Crusader only required a couple clicks of aileron and one of down to fly straight. The first loop was round and big; the roll nicely axial and inverted flight easily done. The first stall turn was dead straight up, nice break then straight down. Throttle up for recovery and the engine didn't relight.



Oh well, time to land. The glide was stable and predictable leading to a smooth first landing. Further attempts indicated the engine had some dirt in the carb so it was time to take it home for cleaning before doing anything silly—the Crusader will get to fly again next weekend. More to follow…For the original Crusader article refer to this link: http://trentonrcflyers.com/pattern/articles/crusader.pdf

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