

Silent Knights Soaring News

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Editor's Note: Sorry we missed the April issue! We need articles for future issues of SKSS Soaring News. Please email me with items you would like to contribute.

Presidents

"The summer flying season is in full bloom, our family picnic/funfly was a great success and the second annual DEFF (Delaware Electric Funfly 9/25/04) and the SKSS sponsored ESL contest (8/21-22/04) are coming up soon. John Kirchstein and John Jenks have agreed to be CD's for the ESL contest. Ensuring that the ESL contest goes successfully and smoothly requires contributions of time and effort on the part of the membership and we need volunteers. Winches need to be manned, scores need to be kept, participants need to be registered, etc. so please help by calling or emailing John K. or John J. and volunteer.

The club electric trainer (an EZ400G) is completed and, with the clubs Eclipse transmitter, buddy cord and Futaba buddy box, is available for new pilots to learn on. The flight characteristics make it a capable powered trainer (it's reasonably slow, glides well and will thermal as well). We do ask that experienced flyers/members NOT use the trainer for their own enjoyment but reserve its use for new pilots and instructors

Our next issue of the newsletter is scheduled for October and October is the month our by-laws specify for nomination of officers for the next year. Serving as an officer of the club is an opportunity to contribute and to get to know all members. There is always help available if needed and I urge all of you to consider being selected for office. We need to elect a President, Vice President, Secretary and Treasurer and we should make sure that all members have an opportunity to serve. Particularly, some of our newer members would benefit very much from serving as an officer. Think about it, plan on it and contribute. Help make the club better by serving as an officer.

Come fly with us." Bill Groft

Frequency Pins

Thanks to the efforts of Jim Faassen and Bill Brenchley, the Club has a new frequency board with pins for all frequencies (6 meter and 72 MHz) located OUTSIDE the birdhouse so it is not necessary to go inside to pick up a frequency pin. *The lock on the frequency board has the same combination as that on the field gate* so access is extremely easy! You must now insert your AMA card into the slot when you take the pin so all will know who is flying on that frequency. Club rules require that ALL pilots must have a frequency pin BEFORE they turn on their transmitter. Our By Laws state that you are responsible for any and all damages if you cause the crash of a plane being flown by a person with the proper frequency pin if

Silent Knights Soaring Society

President – Bill Groft
Vice President – Bob Muma
Treasurer – Bob Bickerton
Secretary – Jim Faassen
News Editor – Bob Bickerton

AMA Chartered Club # 950

you turn your transmitter on and you don't have a proper frequency pin.

USE FREQUENCY PINS!!!!!!

Sailplanes and More

It's summer and flying time is here though, for me, the weather hasn't cooperated like I wish. I do have my Whisper repaired and did get to try it with the new Multiplex Royal Evo. Both were great but the Whisper still needs some 'dialing in'.

In reading some of the model magazines and surfing the web it seems to me that there is a resurgence of interest in RES (rudder, elevator, spoiler) sailplanes. True, the newest planes are of molded or carbon/Kevlar composite construction (read expensive) but in RES competition even some older designs can do quite well. One new one in particular caught my attention is the AVA from Kennedy Composites (www.KennedyComposites.com). It has a 127 inch wingspan but only 37 ounce flying weight with one large spoiler in the center wing panel. Construction is similar to the 2 meter Organic and is light but strong. I guess you expect high quality construction for \$660 plus S&H but it sure is gorgeous and flight reports confirm it is an excellent sailplane. Check it out.

An AVAe took 1st place at the Nats and perhaps that's indicative of the many electric conversions of a number of original sailplane designs. Organics', Graphites' and Erasers' etc are all now available in electric powered versions. A sign of the times???

And, speaking of electric powered sailplanes, one problem one has is trying to drive 6 servos (2 aileron, 2 flap, rudder and elevator) from the Battery Eliminator Circuit (BEC) of an electronic speed control (ESC). Most ESC's won't handle the current and will overheat. In the past the solution was to bypass the BEC and use a separate receiver battery. But, as I learned from member Gerald Terfloth, there is a better solution – the Switching Battery Eliminator Circuit or SBEC. Read on!!

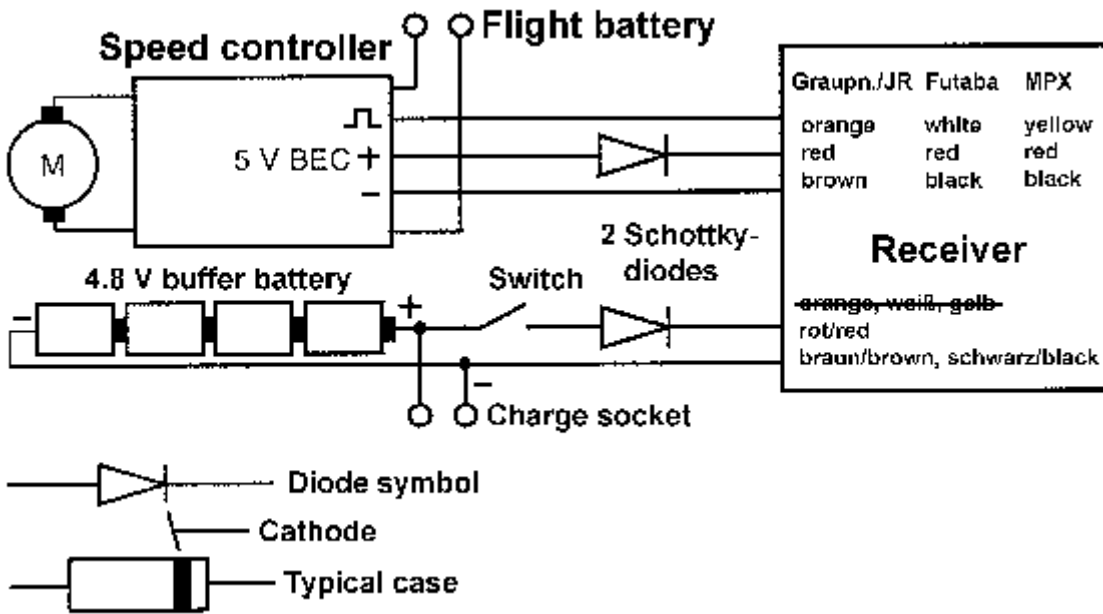
To (S)BEC or not, is that the question? By Gerald Terfloth

Fear can be a strong driver but it can be overcome by training, education and knowledge. So, after reading about total losses of kilo-dollar toys by trying to save money (in the wrong place) and running six digital servos on a 3m electric glider, I decided to do some homework. Battery eliminator circuits (BEC) are typically incorporated into electronic speed controllers (ESC) operating with up to 10 cells (NiCD, NiMH). These BECs are typically linear voltage regulators providing 5 V to the receiver by reducing the voltage of the battery pack. Each such device can dissipate a limited amount of heat, which is generated by the ESC when running partial throttle and by the BEC by creating the voltage drop. ESC manufacturers provide some guidance regarding the number of servos that can be driven through the BEC at a given number of batteries. However, finding the idle and stall current draws for servos

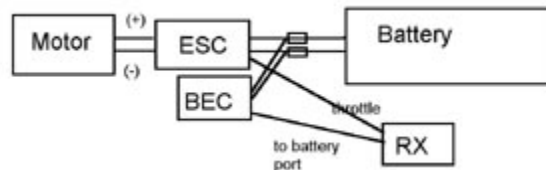
can turn out to be a challenge. After some searching, I found actual current draws for an 8-servo glider. Peak currents were in the 3.5A range! This would certainly cause the ESC/BEC device to go into thermal overload and/or destruction, resulting in the loss of the model, not to mention the associated safety risk. What are the ways to address this? Eliminate the built-in BEC or use an ESC without BEC. How do we get power for the receiver, servos and other ancillaries?

Option 1: Use a separate receiver battery. It's obvious but now one has to maintain two batteries and there is a weight penalty. Some planes may not provide enough space in the right place to accommodate the appropriately sized receiver battery.

Option 2: Buffer the BEC. Matthias Schulze provides a nice discussion (and this figure) on his website. Note that his view regarding switched BECs is – ahem – dogmatic.



Option 3: Use a switched BEC. Two products seem to dominate the market – the UBEC and SBEC. To the uninitiated observer, the major difference is their size and weight, with the SBEC being smaller and lighter. There has been a lot of discussion on online fora such as RCGroups about glitching but the majority of reports are very positive. Look for posts by GregoryJ, the manufacturer. He walks through some basic equations, if that makes you more comfortable. I was delighted to see that even he got some wrong...and recognized it! The long and short is that heat dissipation is not a problem for the SBEC. It is used in helicopter drag racing, where 3.5 kW are going into the motor.



That really convinced me. I ordered one from Aircraft-World (<http://www.aircraft-world.com/>) and have been using it happily in my Eraser XE electric on a 10-cell 2400 NiCd, Hacker 70 ESC, Plettenberg 220/20/A2 P4 7:1, 18x10 Graupner prop. A recent article in the German magazine FMT put this system at a climb rate of 18 meter/second (3500 feet / minute). I have not verified this but the 94 oz AUW glider requires significant down elevator compensation with throttle to NOT go vertical. This system provides 4 climbs to good altitude. I digress...This glider has limited space in the fuse and getting the desired CG with the radio and servos easily accessible without surgery precluded the use of a separate receiver battery. The SBEC is small, easy to install and use, and has been without glitches in almost three months of use. Highly recommended.

References

UBEC information at <http://www.hobby-lobby.com/ubec.htm>

SBEC information and a discussion with some basic physics at <http://www.firmtronics.com/>

Discussion of buffer battery, switched BECs and other goodies: http://www.schulze-elektronik-gmbh.de/tips_e.htm

SBEC glitching

<http://www.rcgroups.com/forums/showthread.php?t=228292&page=2&pp=15&highlight=sbec>

SBEC in helicopter (drag racing)

<http://www.rcgroups.com/forums/showthread.php?p=2155489#post2155489>

Eraser XE electric <http://www.icare-rc.com/eraser.htm>

Electric Corner

Foam is in, either FFF (FanFoldFoam or BlueCor insulation material) or Depron (the foam in food trays at MacDonaldis).



Download the 3DX or Ultimate from the web, get a sheet of foam and sharp Exacto knife, spend an hour or so cutting out the wing, fuselage and tail feathers, install some micro radio gear and a small motor (GWS or small brushless) then go fly. Don't want to build (?) then order one of the three shockflyers from Hobby-Lobby for \$34.95 (Edge 540, Extra 330S or SuperStar), glue it together and go fly. All these models are flat plate fuselage and wing (no airfoil) and they fly extremely well. My Edge 540 is shown in

the picture.

The past few months have seen the introduction of many new, small, relatively inexpensive brushless motors for electric flight. Middletown Electronics and Hobbies is stocking and selling the EFlite brand imported by Horizon. Bill Shields, an owner of MEH, provided samples of all three to Jack Alderson for some real world tests. I grabbed my Whattmeter and Tachometer, Jack supplied a couple of planes and gearboxes and John Alderson (Jack's grandson) furnished the flying expertise. There are three motors available:

an EFlite (EF) 400 (Kv 4200), an EF 370 (Kv 4100) and an EF 370 (Kv 5400). All are ball bearing, silver in color and an attractive package; they ship with a pinion, an adaptor to fit them to GWS gearboxes, and a prop adaptor for direct drive – very useful additions. For our tests we used (1) Jack’s 40” foam Ultimate Bipe with a 6.3:1 GWS gearbox for the EF 400 and, (2) Jack’s Troy-Built XP-1 [a foam monoplane] for the EF 370’s (6.6:1 GWS Gearbox). We measured current, voltage and RPM with different props then John flew for two minutes (normal and 3D flying) then we repeated the measurements. The following tables show the results.

Table 1 EFlite Brushless Motor Data 3S1P Battery

EF 400 @6.3:1	Propellor	Current (Amps)	RPM (Static)	Voltage
Initial	12X3.8	15	5400	12.4
After 2 min		15.5	5400	11.9
Initial	11X4.7	13.6	5900	12.5
After 2 min		13.6	5900	12.0
EF 370 (4100) @ 6.6:1 gearing				
Initial	11X3.8	11.4	5900	12.4
After 2 min		10.9	5900	12.4
Initial	10x3.8	11	6100	12.3
After 2 min		10	6000	11.9
EF 370 (5400) @ 6.6:1 gearing				
Initial	11x3.8	20 (too high)	6800	12.5
Initial	9x3.8	13.2 (too high)	8000	12.5
Initial	8x3.8	10.5	8600	12.5
After 2 min		9.7	8500	11.9

Table 2 EFlite Brushless Motor Data 2S1P Battery

EF 370 (4100) 6.6:1	10x3.8	5	4400	8.3
	11x3.8	5.3	4300	8.2
	12x3.8	7.3	4000	8.3
	13X4.7	10.5	3900	8.2
EF 370 (5400) 6.6:1	13X4.7	17	4300	8.0
	10X3.8	9	5600	7.9

Table 3 Weights as tested

Model	Plane + radio	Motor + gearbox	Total (less battery)
40” Ultimate (EF)	9 oz	3.4 oz	12.4 oz

400)			
XP-1 (EF 370)	10 oz	2.5 oz	12.3 oz

Numbers, schnumbers! Flying is what counts and our young but experienced pilot reported that both planes flew well on three cells and the tested gear/prop combinations. (John was flying in a small area adjacent to Jack's home and we witnessed the performance including flying around and under a tree!). The surprising performance, though, was with the EF 370 (5400) and the 8x3.8 prop – sufficient power to hover and climb out vertically and perform high alpha circles, flat turns and some of John's own 3D maneuvers. On two cells, John found that performance was marginal with the exception of the EF 370 (5400) with the 10x3.8 prop; this combination did work well though performance didn't match any of the three cell powered flights. Our conclusion – these little motors perform very well and are a less expensive (~\$50) alternative to the better known brands. So, get yourself down to Middletown Electronics and Hobbies and pick one up – once you go brushless you'll be hooked.

How to: Build your own Brushless

Brushless electric motors for electric flight are expensive, right? Well, not if you make your own. Sounds difficult, doesn't it. It isn't if you buy the parts (now in kit form) from www.gobrushless.com. You'll need a stator, a can, some 26

AWG magnet wire, 5x5x2 neodymium magnets, two ball bearings, a shaft for the prop and



some patience. All but the patience are available very inexpensively from the above shop on the web. Space here won't allow detailed instructions but you can download them in MS Word format from the website (or email me and I'll send them). I've built two and Bill Groft has built one and they run amazingly well. One of mine powers my 7.6 ounce BeBe Jodel (40 minutes on one charge, 2s1p ETEC 1200 mah) and the other will soon go in something. Basically, you wrap a stator tooth with a number of turns (perhaps 20) of wire, skip two teeth, continue winding the fourth, then skip two teeth and wind the 7th. Then start over with the second, fifth, and eighth teeth and, finally, start over with the third, sixth

and ninth tooth. Connect all the start ends to together and the three remaining ends connect to your brushless speed control. Glue 12 evenly spaced magnets in the periphery of the can, assemble the stator, can, bearings and shaft and have fun. It's only a little more complicated but it truly is not difficult. Kits weren't available when I made mine but, I have a lathe so made the can and front plate (this is not necessary with kits now available!!!). Be mindful, these are not large motors, only a little over an inch in diameter and are meant to fly planes in the 10oz or under size but they do work and work very well. Get on the web, read, order and try it. Make your next Park Flyer brushless.