R/C Sportflyer
September, 2004

Next Meeting at 1st Baptist Church, Gradview – Thursday, September 2 @ 7:00 p.m.

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Send newsletter information and items for sale or wanted to the newsletter editor. He's almost always home after 9:00 PM or call his work number, 913-624-2570, it has a recorder, or send via Internet.

Club Web Site: www.rcsportflyers.com

The Radio Control Sport Flyers fly from Stamm Field, located near the south-east corner of Longview Park, operated by the Jackson County Parks Department. For information about the Parks department, visit their web site at: http://www.jacksongov.org/rec.shtml For the calendar of parks events: http://www.jacksongov.org/rec_ce.shtml

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Minutes of the August 5, 2004 Meeting

We had 23 members and 1 visitor at the meeting. The visitor was Brian Thompson.
George Wright reviewed our financial situation, with details of income and spending for the last month. Our treasury is in good shape.

Club Annual Picnic:

Traditionally, the club picnic has been the last Saturday of September. There was some discussion about the date, because that is the weekend of the US Scale Masters at Gardner. For those of you that may not know, two of our members, John Urton and Kelly Tippetts will be competing at the Masters this year. In addition, many members will want to attend and, I'm sure, many will be helping at the meet. Consequently,
A motion was made and passed to move the date of the picnic to September 18h.

We also discussed the possibility of including the electric club in the picnic. They have been very cordial and have shown a very strong desire to fit in with RCSF. The consensus was to invite them to the picnic. We will ask them to contribute money for the meat, otherwise they will be included just as RCSF members and will share airspace with the wet powered planes.

The financing of the meat and prizes was discussed. It is a tradition that the club buys a prize that is given by drawing one of the raffle tickets from all those that were bought at the monthly meetings.
A motion was made and passed to spend $200.00 for the raffle ticket prize.
A motion was made and passed to spend up to $500.00 for the meat and raffle prizes.
(f the electric club contributes to the meat, that will be in addition to the $500.00)

Static Display at the Church: We have a static display scheduled on November 10th, a Wednesday evening, at the First Baptist Church of Grandview, where we meet during the winter. November isn't really that far away and we needed to get discussion going on what we would do. The discussion at the meeting went the direction of doing Delta Darts, and possibly have electrics fly, in addition to the static display.

Starter Tables: It'll all be over by the time you get this, but August 14th is the day the starter tables get built. With contributed lumber and labor, combined with union supervised labor, we will have starter tables at the field.

Show and Tell: Bob Armstrong had an Albatross, sized for a SuperTigre 2300. The structure was mostly done, so we'll probably see this one again. He is building it from scratch.

Calendar of Events – Models

Sept 2	RCSF Club Meeting – At the church – First Baptist Church of Grandview
Sept 4	RCSF Club Fun Fly
Sept 18	RCSF Club Annual Picnic
Oct 7	RCSF Club Meeting – At the church
Oct 9	RCSF Club Fun Fly
Nov 4	RCSF Club Meeting - At the church
Nov 6	RCSF Club Fun Fly
Nov 10	RCSF Static Display and Delta Darts at the church
Sept 10-12	KCRC 50th Anniversary Fly-in
Sept 23-26	US Scale Masters Championship – Gardner Airport

Calendar of Events – Full Scale

Sept 4	National antique aircraft fly-in, Blakesburg, Iowa

The following is from "The EZone, the virtual home of electric flight." This is probably the premier internet site for electric flyers. And, Keith Shaw is one of the most respected experts on electrics. The actual web site is: **http://www.rcgroups.com/links/index.php?id=4006** – Enjoy, Walt

Lunch with Keith - September 2002
By Keith Shaw September 26, 2002

Intro Note

Hello dear friends,
I apologize for the lapse in getting my second column to you, but the insidious internet gremlins keep diverting the questions that the E-Zone front office sent to me. We finally have that straightened out (I hope), so that your questions can be answered in a timely manner.

Antennas and carbon fiber

Hi Keith,
I have been told, "Never run an antenna in or close to carbon fiber". I have also been told that some people are doing it with no problems. What is the scoop on this? Also, on long servo runs as in long sailplane wings, would running the extension wires inside carbon fiber tubes help to eliminate the interference that is sometimes encountered?
Thanks for any help on this, Don Blackwell

Hi Don,
Carbon fiber is slightly conductive, so having an antenna near it can make the receiver antenna respond to a different frequency than intended, which shortens the effective range. It can also help spread any motor brush RF noise farther back into the fuselage. There are many parameters here, so it is difficult to make any blanket statements. I was involved in early experiments of all-carbon fuselages and carbon-skinned wings for glider use, and we had monumental problems getting the radio to work, even with the antenna strung to the top of the fin. That much carbon severely detuned the receiver so much that I needed to tune it with the plane assembled and strung up with rope in such a way that I didn't have to touch the plane and become part of the antenna circuit! However, there seemed to be few problems with planes that just had carbon wing spars or a few tow strips inlaid in the tail boom.
Your suggestions to route wing servo wiring inside a carbon wing tube probably would make your problem worse. On long lead situations, the use of a line driver or buffer amp can help. Several manufacturers offer these; one supplier, ElectroDynamics (http://www.electrodynam.com), is based here in Detroit.
Adding ferrite beads or wrapping the three-wire servo lead several times through a ferrite toroid at the receiver end can usually cure any long lead problem, but this requires some familiarity with RF electronics to pick the right units. I use ferrite beads and toroids of mix type 43. A good supplier for ferrite beads and toroids is Amidon. You can find out more about this stuff at their website http://www.amidon-inductive.com. Since the products are only available through large "official" electronics distributors, don't look for them at Radio Shack.
Keith

Properly trimming a model

Hi Keith,
Thanks for giving us access to your considerable experience and innovation.
I've read your article on low power aerobatics with great interest. It's slowly sinking in that a very significant aspect of successful aerobatics, and even just clean, efficient flight, is the proper trim of the aircraft. As you point out, if this trim is achieved by the displacement of control surfaces, induced drag increases and efficiencies decline.
As a relative newcomer to this hobby, I still struggle with how to properly trim a new model to maximize performance and to minimize induced drag. Sometimes I even struggle with getting a new model to fly straight.
Please address the issue of proper trim of a model to ensure efficient flight over the entire speed envelope. I'd enjoy seeing this discussed in terms of a check list of items-to-do or a description of tests/checks and accompanying symptoms of proper or improper implementation. For instance, what would cause a model to fly properly at one power setting and to start "porpoising" at higher throttle? The answer "center of gravity" seems correct based on your dive and recovery test and wing incidence is as designed by the manufacturer.
I'd also be interested in any info on the proper way to trim out a plane on its maiden flight.
Regards, Harry Mueller

Hi Harry,
Ironing out the inherent defects in a thoroughbred pattern design can take years of prototype development, and/or some pretty fancy computer mixing. However, for a simple sport flyer, the task is quite a bit easier, as we don't expect them to fly perfectly. In fact, much of what makes a nice handling sport plane is a little bit of positive stability, which can loosely mean that you don't have to "fly" it 100% of the time. It will behave itself in straight flight, groove in a turn, and settle nicely on landing. This usually comes at a small cost in some areas such as slight trim changes with power, having to hold some down elevator for inverted flight, etc.
The very first (and most important) factor in getting a good plane starts at the building board. There is no way to trim out a plane to handle true over a reasonable speed range with warped wings, banana fuselages, randomly shaped leading edges, tilted or crooked stabilizers and fins, and inaccurate incidences. The only answer to this is to build it right in the first place!
Even with a straight airframe, there are still many factors in the radio installation and surface hinging that can cause problems. The biggest hinge gap should be no more than the thickness of an index card. Servos should be mounted so that their long axis is parallel to the pushrod. Flexible or buckling pushrods can cause real problems, so check this by moving the surface by hand (with the radio on) to see if control link moves or has slop in it. Obviously, this requirement will be judged differently for a giant scale fighter compared to a park flyer!
Perhaps some notes on airplane expectations are in order. In general, trainers and most park flyers are designed to be easy to fly, and there is really no way to make them behave like a pattern design, so they will change trim with power. In addition, the stamped out foam ARFs are way too flimsy to ever get to fly straight and predictable. Even the big E3D designs have problems in this area. Just enjoy them for what they are.
Let's get back to trimming. Assuming you now have a straight model to start with, you need to set the CG according to the manufacturer's recommendation, or slightly forward for the test flight. Check for lateral balance (wing heaviness) by picking the model up with one hand on the spinner, and the other on the rear bottom of the fuselage. If one wing drops hard, tape some weight to the other tip until it stays reasonable level. Don't get carried away with this, since we're only checking for gross errors. By the way, this test will be affected by a banana fuselage or significant right thrust in the motor, as the spinner then may not line up with the center of the fuselage.
Test fly the plane yourself, or have your local ace do it for you. Get the plane to a comfortable height, even if you have to hold some neutral offset. Dial in trims for aileron and elevator with your left hand if you are coordinated enough. Try to trim it so that it will fly as straight as possible hands-off. Try a reduced power stall to see if there are any wingtip drop problems. Practice several landing approaches at altitude to become familiar with the plane's handling. When you are ready, bring it in and land. Retrieve the plane and look at where the control surfaces are with the radio still on. Sometimes the surface can be straight while the transmitter trim is offset, so just adjust the linkage to compensate. If there was significant aileron trim and/or a low speed tip stall problem, look carefully for a warp in the wing or stabilizer. Go home and straighten it out the best you can. If there was a lot of elevator trim needed to make the plane fly level at full power, and you noticed that you had to hold a lot of elevator at slow speed, there probably is a center of gravity problem or excessive incidence between the wing and tail. Sport gliders are notorious for this, as their incidence is set for most efficient glide, so high power makes them pitch up into a climb. This is actually what you want, as long as it isn't so severe that it tries to loop. Down thrust or computer-mixed power-to-elevator-trim coupling can help control this.
Assuming that the incidence between the wing and tail is reasonable for your purpose (usually 2 degrees or less for sport planes), the CG can be fine-tuned with the "dive test". When an airplane is flying at a given speed, it will fly level when the

wing lift, tail lift, and weight are in balance, much like a beam balance. See my article, "The Art of Low Powered Aerobatics" at the Ampere website,
http://members.aol.com/kmyersefo/aerobat.pdf. For positive stability, the center of gravity is ahead of the center of wing lift, and the tail lifts DOWN. If the speed increases, the tail will lift down harder and the nose will pull up in a climb. If the speed decreases, the tail will lift down less and the plane will descend. If the plane is really nose heavy it will take a lot of tail down lift to compensate (a lot of up elevator trim), and a significant increase in airspeed can actually make the airplane loop! Back in the ancient days when we only had rudder control, we used this trick to do loops and the Cuban eight.
To perform the dive test, set your power to half or so, and spend several passes of the field adjusting the elevator trim so that the plane flies level hands-off. On a pass at 100' or so, push the plane into approximately a 30-degree dive and hold it long enough so that its speed has significantly increased. Then take your hand off the stick and watch the plane's response. If it pulls up hard, it is really nose heavy. A very gentle pull out is ideal for sport flying, while no attempt to pull out means the plane has neutral pitch stability, ideal for pattern planes, but can be "trying" for low stick-time pilots, since the plane will require constantly flying due to the fact that it will go in whatever direction it is pointed. If it tries to tuck under (a very scary situation), it means that the CG too far back (tail heavy), where the weight is behind the wing lift, and the tail must lift UP to keep the balance. When the speed builds up, the tail lifts up even more, steeping the dive.
Trimming out the yaw axis on a plane can be very difficult, as it is affected by many subtle forces. An out of yaw trim plane "crabs" as it flies and causes a lot of drag. Fortunately, most designs that are built straight and have reasonable laterally balance need little yaw trimming. The intricacies of correcting a yaw problem are beyond this quick primer.
By the way, you mentioned that you have seen a plane hunt on the pitch axis at increased speed. This could be caused by a wing or tail that is too torsionally flexible, slop in the elevator linkage, CG just a little too far back, or a design defect in the plane. There is a "downwash" in the air behind the wing, and good designs go to great lengths to prevent the tail from riding in the downwash, which can cause erratic pitch response. This is one of the main reasons for the disproportionate use of T-tails and V-tails on sailplanes and pylon racers. Both of these seemingly diametrically opposed types operate over a very wide range of lift, which means a wide range of angle of attacks. At some combination of speed and angle of attack, a "normal" tail may end up in the wing downwash wake, while the T-tail stays above it. The V-tail only loses a small part of its effectiveness in any wake condition. Most sport planes fly in much less demanding aerodynamic conditions, so the normal tail does just fine.
Keith

Flimsy Ailerons

Lots of the fun-fly and 3D ships these days have very large flat ailerons with very poor torsional rigidity. What is the best (lightest) structural design for reducing this flex for a given thickness? For example, do triangle braces help, or is all the torsional strength in the skin?
Thanks, Dave Szuter

The classic Warren Truss structure is best for torsional stiffness. This is the structure that has "zig-zag" ribs, as shown by the following diagram.

The stiffness of the covering can make a BIG difference; MonoKote has probably five times the torsional rigidity of any other film covering, particularly if you make sure you iron it down to every rib. For even more torsional rigidity, you could borrow a technique that I have observed on some of the hi-tech imported hand-launched gliders where a narrow strip (about 1/32" wide) of .007 carbon fiber is glued to the diagonal truss members all the way from the leading edge to the trailing edge on top and bottom, before covering.
Keith

Motor and prop options for a Bell YFM-1A (Airacuda)

Hi Keith,
I'm currently building a 1/12th-scale electric-powered model of the Bell YFM-1A (a 2-engine pusher). The model will weigh about 8 lbs, and has 688 sq/in of wing area.
In trying to use my current motor inventory, I decided to use AstroFlight 015G motors. Unfortunately, that meant that I needed some 11.5x7 or 11.5x8 3-bladed pusher props, and I have found none available. Therefore, I decided (too late) just to reverse the polarity on the motors so that I could use the 'regular' (puller-type) props. It was 'too late' because I failed to allow enough room to retime the motors.
If I run the motors in reverse without retiming them, will there be any really serious performance/operation penalty? I'm planning on using 14x1250mAH cells per motor and an AstroFlight 204 motor control, with the motors wired in series. Any suggestions or comments would be appreciated.
Best regards, David F. Plummer, Bellevue, Washington

Hi Dave,
Ah, the Airacuda, such a neat design, but unfortunately a failure. I have seen several of these flown successfully with e-power, so that should be some encouragement!
Of course, the easiest solution is to use two-bladed pusher props for flying (both Graupner and APC make good ones), and just make some dummy three-bladers for static display.
As far as timing goes, you really do have to reverse the timing on any motor when you want to change rotation to use it as a pusher or use it with a gearbox. Running an incorrectly timed motor will eat the brushes and commutator at a frightening rate, create a LOT of extra heat, and cause huge amounts of RF noise that can disrupt your radio link. I definitely think you should change your motor mounting method so that you can correctly time the motors for this project.
Keith

Rudder Finesse

Hello Keith,
I have followed your articles and planes from afar in the UK, and I regularly read your articles on Ken Meyer's site just to bring be back to reality! I am always trying to improve my flying skills, and I have heard you mention "rudder finesse" on a few occasions. Please, could you explain this and put it into context with the maneuvers where you would use it.
Thank you, Paul Clark, Oxford, UK

Hello Paul,
I use the term "rudder finesse" to mean constantly using the rudder to compensate for the myriad of errors due to the non-ideal airplanes and conditions we fly in, rather than the usual practice of just flying ailerons and elevator, and only thinking about yaw control for stall turns, snaps, spins and other aerobatic maneuvers. Among the non-ideal situations that require rudder input are...
1) needing right rudder on takeoff and climb out due to P-factor, an effect that comes from prop rotation and the plane flying at a significant angle of attack. P-factor can be VERY strong on long-nose scale aircraft. I have to apply rudder correction on my Art Chester "Goon" every time I change the pitch angle during climbs and dives.
2) using rudder correction when flying maneuvers in a crosswind to hold a true heading. For example, an uncorrected crosswind loop would look like a helix.
3) compensating for adverse yaw induced by the ailerons. If you are only going to be flying positive "G" maneuvers, you can minimize this by using aileron-rudder mixing on your transmitter, aileron differential, or frieze-style ailerons. However all these methods produce exactly the wrong correction when you push negative, so it's better to just learn rudder finesse. Practice makes perfect, or at least, looking less awkward!
Keith

Ever wonder why?
Tell a man that there are 400 billion stars and he'll believe you. Tell him a bench has wet paint and he has to touch it.
How come Superman could stop bullets with his chest, but always ducked when someone threw a gun at him?
Why does sour cream have an Expiration date?
Do infants have as much fun in their infancy as adults do in adultery?
What would a chair look like if your knees bent the other way?
If "con" is the opposite of "pro," then what is the opposite of progress?
Why is lemon juice mostly artificial ingredients but dishwashing liquid contains real lemons?
Why buy a product that it takes 2000 flushes to get rid of?
Why do we wait until a pig is dead to "cure" it?
Why do we wash bath towels? Aren't we clean when we use them?
Why do we put suits in a garment bag and put garments in a suitcase?
Why doesn't glue stick to the inside of the bottle?
Do Roman paramedics refer to IV's as "4's"?