Official Newsletter of the Southern Ontario Glider Group Inc

TASK

A Model Aeronautics Association of Canada Chartered Club

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Any material for inclusion should be sent to the Editor.

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Editorial

Since the last issue of TASK, I have enjoyed a wealth of experiences and fun times on the field. In addition, there have been some great days for slope soaring at King's Forest. I met some fella's from GNATS there and we thoroughly enjoyed sharing the slope. They invited me to visit their field - a good opportunity to learn a bit about the club. I understand that they allow gas power on the field and indulge in some towing. Towing - yes; Gas - No!

We have seen our new members gain skill very quickly this summer and many are enjoying the freedom to fly without the buddy box - probably preparing for their wings test!

This months articles are laid out on the covering page and they range in topics but most notably is the absence of a real good glider column. Let's face it - I do not have enough experience to communicate to our veterans. Each and every one of you have been involved to some degree in the design, or building of a glider and we need to hear from you (hmmmm - seems I've read this before!). I have searched our library for a good article that I could just steal and plunk into the newsletter but believe it or not, there aren't any! Do you know why?. I'm willing to bet it's because the knowledge is sitting at home right now reading this news letter. In order to be really meaningful to the club, articles need to come from within. I certainly have enjoyed reading articles produced by the people I know. I will bring the subject to the first meeting on SUNDAY OCTOBER 1st. It's your news letter and you are paying for it. Lets make it more fun for the readers! (end of soap box).

As I was scanning through my library to find a good "Back to Basics" article I came across an old war time flight training manual published for the Canadian Air Force and passed on by my father. I always enjoy witnessing the evolution of science and this book is a classic. Of particular interest was the description of the radio altimeter...

" The RADIO ALTIMETER indicates the actual height of the aircraft above the earth, or above any object on the earth over which the aircraft is passing. The principle is extremely simple. A radio transmitter in the aircraft sends a signal towards the earth whose frequency changes at a definite rate with respect to time. This signal is reflected by the earth and returns as an ECHO after a time interval equal to twice the height divided by the velocity of the signal. During this interval, the frequency of the transmitter has changed and now differs from that of the echo by the rate of change of frequency x the time of transit. The reflected wave is combined with some of the outgoing wave in the plane receiver and the difference, or "beat" frequency is read by a frequency meter. Since the reading of the meter is that of the beat frequency it is proportional to the time delay of the echo - hence to the height and can be calibrated in feet."

In other words..... Keep your eyes on the ground!
Hat's off to those magnificent men and their flying machines!

ATTENTION :

The first meeting of the season will be Sunday October 1st at 2:00 pm at the Rocton Library.

FOR SALE

1 - Futaba Conquest 4 channel FM radio
4 servos / batteries and charger incl.
Freq. 72.710 (ch 46)

Price - $150.00
Call Doug Wilkins @ 905 679-4973

GETTING TO KNOW THE SAGITTA 900

By Mike Penney

I have now had several flights on my Sagitta 900 and I am quite pleased with the performance. As I was told, it fly's quickly but is very manoeuvrable. Thermal performance is excellent and I have enjoyed "specking out" on occasion.

As was suggested, the spoilers were downsized by about two inches each side and their performance is adequate but not touchy. This was a good opportunity to learn fibreglass technique and as a project, I made a glass canopy to accommodate the full size servo's which I had chosen to use. Briefly, the canopy was formed by shaping the wooden canopy supplied with the kit, covering it with MonoKote, waxing it and layering the light fibreglass cloth onto the wooden canopy. Each layer was painted on to keep resin to a minimum. I chose to stop at seven layers and the dried product easily released from the mould. Next, I mounted a plywood base to the canopy with cut outs for the servos and carefully sanded the entire canopy, painting with resin first then coats of epoxy paint. The result is a light, strong canopy with ample room to allow the fitting of parts in the tight compartments of the fuse tip.

Packing enough nose weight into the tip is a real art. I had to reshape my lead several times to get the most into what little space was available. I even had to spill over to the battery bay. There was ample room for the radio and convenient bays under the wing for ballast loading. Kurt Fritz finds that he often requires ballast for proper operation in moderate weather. I will be doing the same. I chose not to go with the remote release tow hook as I saw it as one more mechanical device to fail. Perhaps under more competitive conditions I might find a use for one but for now the standard tow hook works very well. I was shocked to see an exact replica of my Sagitta fold up under the strain of the winch launch at the August Novathon contest. I have heard others state that carbon fibre reinforcement under the wings would be a good modification. Mine was already covered by that time so I placed the tow hook well forward and worked it back a little at a time. I have settled on a location which produces a satisfactory launch without undue stress to the wing. This wing is rather rigid and could use more attention to the stress points.

Some pilots suggested modifying the rudder to trade the half lap styling for a more conventional rudder / fin profile but I decided that there must be a reason for the design and I wanted to explore it before making that decision. I have had no difficulty controlling the plane and with this large rudder, the thermal turn is quite adequate. There can be a slight wavering at high speeds and I will investigate this further. I have had many successful hi-start launches but I will need to upgrade my Hi-start to a more heavy duty one. I have a source for surgical tubing and I may try to get the best of both worlds using a much thicker surgical tube.

I chose to finish the fuse in Epoxy Paint for the experience and to improve the overall appearance. I found that using a SLOW sponge roller gave me the best results but next time, I'm going to take it to a body shop and have them do a spray. The stabilator configuration is not as scary as I had expected and control is smooth. The stab is quite fragile and securing the two halves together can be trying. I took Kurt's advice and bent the metal rods enough to bind and hold the stab in place without fooling with the collars. The shape of the Sagitta just appeals to me and I take it each time I go to the field. I still have not settled on the trim yet but looking through the magazines is giving me ideas. In the mean time, I look forward to each flight and hope to continue for some time!

ElectroSpeak

By Mike Penney

SELECTING YOUR PROPELLER

We are fortunate as a club to enjoy a mix of electric's and gliders. Both models have their exciting aspects and both involve skill and learning. That however seems to be the extent of their similarities. As a casual electric flyer, I have had the opportunity to scratch design and fly my own models and to my astonishment, they flew! The fact is, I was not very scientific about the design but I did adhere to certain principals and I relied on certain formulae to determine the minimum requirements for a flying model.

This month I would like to discuss the propeller as part of the propulsion system. Let me preface by confessing that I am not an expert on propulsion but then neither are many of us. I am trying to understand this myself so please respond if you detect any ill logic. I will include a couple of the equations used in electric design for the benefit of the beginners (You veterans can go back to sleep - I'll call on you later). Sure we can all go out and buy a beginner kit, install the recommended motor and prop and go flying but

it probably won't take long before we thirst for more. Perhaps there are certain characteristics about the model which need improvement.

Doug Wilkins' latest acquisition, an Astro Viking flew well enough on direct drive using the 05 can and prop that it came with but he had heard that going to a geared arrangement would improve the overall efficiency of the power plant resulting in extended flying times. Now Doug, being a prolific rubber power modeller can relate to extended flight time. The basic principal is that a wider prop diameter will grab more air and a geared motor will run more efficiently making use of higher voltage to reduce current drain. Interestingly, Doug had a great deal of trouble with his gear box chewing up pinions and he eventually had to go to a different gear box before he could experiment with props - but more on gear boxes in another issue! . So - just what is the best prop for use with a 2:1 geared 05 can floating an Astro Viking around the sky. For Doug, it's the prop which gives maximum flight time while providing sufficient climb and power to fly in moderate weather conditions. For someone flying a fully aerobatic model with high wing loading the answer is very different. That's why it can be difficult getting an objective opinion from other modellers as they each have very specific needs from their power plants.

Ultimately, the final answer comes only after testing and often reworking the prop but some simple formulae will help you to find a starting prop. Let's make some basic assumptions about Doug's craft and while the exact numbers may not be realistic, they will serve the purpose for demonstration.

1 - Comfortable cruising speed at 15 miles per hour

2 - Motor output under no-load is in the range of 10,000 RPM

3 - 2:1 gear box

From the above information we will expect
10,000 / 2 = 5,000 RPM at the output shaft of the gearbox.

Prop pitch is measured in inches per revolution so that, for example a six inch pitch will want to travel 6 inches in each revolution or:

>6 (in/Rev) x 5,000 (rpm)= 30,000 inches per minute

>30,000 (in/min) / 12 (in per foot) / 5280 (feet per mile) = .4734 miles per min

>.4734 (miles/min) x 60 minutes =28.5 miles per hour.

The above can be boiled down into one easy number : 1052

> PITCH X RPM / 1052 = AIR SPEED
>6 X 5,000 / 1052 = 28.5 m/hr
>4 X 5,000 / 1052 = 19.0 m/hr

The above suggests that a six inch pitch is a bit much to start with and a four inch pitch would be a better choice however, remember that Doug is throttling way back to conserve energy for the extended flight so with reduced RPM he is in the right ball park using the 6" pitch range. When he measured the static current draw using several props he reported that while increased prop diameter results (to a point) in higher current draw, different brands of prop gave significantly different power output.

Part of the problem is that most commercial props are designed for gas power and will have thick airfoils for the purpose of strength. I would refer you to the excellent work presented by Kieth Shaw in the E.M.F.S.O. Symposium of 1992 (copy available for loan) in which Kieth states his preference for REV UP props simply because their airfoil best suits electric model flying. Now Doug is good at modifying and building props. For him, Kieth would suggest perhaps getting an inexpensive ZINGER prop and reworking the airfoil to match the REV UP . This will give him more control on his final results and save him money in the process. Kieth states that "The single best thing you can do to improve the performance of an electric airplane is to play with the prop. You can change the performance by 30 or 40% with the same WATTS input."! This can add up to great extended flights Doug.

There are other aspects of propeller selection which effect the final outcome. Rob Campbell reminds me that the correct propeller will unload by about 15 - 20% in the air as a result of less drag loss (actually a bit less with old timers). Choosing the correct prop to unload by 20% will ensure maximum efficiency in flight. That prop which Doug found to exhibit 20 amps of static current draw would then draw about .8 x 20 = 16 amps in full out flight. This should be within the range of his LEISURE 05 can motor.

There are ways to fine tune the propeller design if you can accurately measure things like airspeed and battery capacity. By using these numbers against flight times, you can determine the actual current draw during flight (hence the % of prop unloading) and the performance of the plane in terms of cruising speed and climb out.

>BATTERY CAPACITY = 1400 milliamp hours = 1.4 amp hours

>FULL SPEED FIGHT TIME = 5 MINUTES = .083 HOURS

>FULL SPEED AVERAGE CURRENT DRAW = 1.4 (amp hours) / .083 (hours) = 16.86 amps

If the static current draw for this system was 20 amps then...

>UNLOADING = 1- (16.86 amps / 20 amps) = 15.7%

The value of 15.7% unloading is likely reasonable for the very slow ASTRO VIKING.

The prop air foil is quite different for slow airplanes than for fast ones (as is the wing airfoil). An under cambered airfoil will probably be in order for that VIKING .

Another great contributor to the world of electric modelling is Keith Walker. Among his many articles found in the Compendium of Technical Articles from the Electric Model Flyer, of interest to us here are his comments regarding the selection of the" Right Prop". Firstly, Keith confirms that " The factors which contribute most to prop efficiency are blade thickness and airfoil shape".

Keith then goes on to say that " One other thing effecting the long term performance of the propulsion unit is the weight of the prop". This might be contributing to the early wear in Doug's pinion gear, especially if the gear is not properly aligned. One of the props which Keith is partial to is the KYOSHO because it is strong yet thin and wide and has a " distinctive under camber". They too are prohibitively expensive. Keith uses the old wooden ZINGER prop and carves it to resemble to KYOSHO. His plane flew just as well, it was much cheaper and his pinion gear stopped wearing out! Keith goes on to discuss many of the other variables such as gear ratio, motor size etc. and I will make this compendium available also for loan.

My argument here is that while the science of propulsion systems is becoming more defined, You will always find room for improvement by flying and tweaking that prop! After all, that's where the fun is - improving and field testing your design. I will be interested in seeing what Doug comes up with over the next couple of months and I am sure to report it right here!

Happy Hovering!

STRENGTH OF GLUE JOINTS

....by Richard Lahde and Bob Bayard

In the process of continuing some work that one of us (BB) started on the strength of wing spars, we felt the need to find the best way to glue strips of carbon fibre/epoxy laminates to each other and to other materials such as spruce. This note reports our findings on the strengths of aliphatic glue, gap-filling cyanoacrylate and fast (5 minute), medium speed (30 minute) and slow epoxy. The slow epoxy is the kind that sets up in about three hours and is best left overnight to harden.

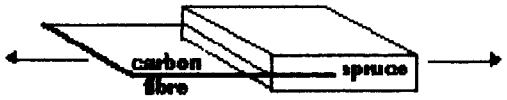
The strength we were interested in is shear strength, the ability of the glue joints to resist sliding or breaking along the glued surface. A typical test sample is shown in the sketch. In this case a strip of carbon fibre laminate is glued on its upper and lower surface to spruce. We have tested not only CF/spruce but also CF/balsa and CF/CF joints.

Epoxy does not bond well to the epoxy surface of the carbon fibre/epoxy laminate if the laminate surface is even partially un-sanded. Cyan is somewhat more tolerant of some shiny surface spots on the laminate. Best, of course, is to sand the laminate surfaces until no shiny spots remain. The results we present here are based on "no shiny spots" laminate preparation, though the reason we know about the shiny spot problem is that we were not too thorough in our sanding the earlier phases of our inquiry.

The best joints are made with the least glue, by clamping the two pieces and squeezing out excess glue. When we made joints with thicker glue, the glue pulls apart in chunks rather than shearing along the whole surface. The strength is very low, no more than about one fourth the strength of a well made joint.

A good joint between CF and balsa fails by pulling slivers of balsa off the piece. The glue is not torn. Bonds between these two materials are weakest of all.

Glue joints between CF and spruce are much stronger than CF/balsa and fail by a combination of pulling some splinters out of the



wood and by shearing some of the glue itself. Joints between CF and CF fail mostly by separating at the glue-laminate interface, even for well sanded surfaces. The strength of the CF/CF
joints is close to that of the CF/spruce, maybe a bit more. Some of these joints taxed our tension machine and it had to be re-engineered in order to break all of the samples.

Aliphatic glue makes the weakest bond of the glues we tested. Next is 5 minute epoxy. The fast epoxy is somewhat weaker than the slow epoxies. The cyanoacrylate is the strongest by quite a bit, being about twice as strong as the slowest epoxy and about four times as strong as the fast epoxy. The average breaking shear stresses for our samples are given in the table on the following pages:

GLUE	AVERAGE STRENGTH (psi)
Aliphatic	1220
Epoxy - fast (5 minute)	1530
Epoxy - medium (30 minute)	2190
Epoxy - slow (3 hour)	3410
Cyanoacrylate	6560

In summary, if you want a good joint between CF/epoxy laminate and spruce or other laminate, sand until all shiny spots disappear, clean it, put slow cyan on it and squeeze the extra glue out. That's your best joint.

SUNDAY AFTERNOON SPECIAL

By Fred Freeman

Scene - any club's flying field in late autumn....

(A and B having a conversation)

A Hey, Guys! Just got a bubble! Oh, Oh, there it goes again.

B Where are you? I can't see you.

A I'm over here - on your right.

B I still can't....Ah, I see you now. I'm coming over.

C Somebody's crowding my pattern - gimme a break.

B Jeez! It's wall to wall...Lookit 'em go!

A Oh, better move on - I think it's moving behind us now.

C Blimey! Never seen such stuff! I just about got turned over - did you see that?

B Kee-rist!! Full spoilers out and it's *still* going up.

A I've had my spoilers out for the last 5 minutes - don't seem to make any difference . Just try to keep it in sight.

C What a day. Look at the colour of that cloud! I'm in it..no..there I am - whew! I though I'd lost it when it hit the cloud base and it suddenly dived.

A That's turbulence. Often happens this time of year. You OK?

C Yes, I think so. Not used to this high flying, but boy am I enjoying myself!

A Just try to keep it on the cloud area - don't go into the blue or you'll loose sight of it. Follow me. I'm moving off...that's right, keep coming. We'll try the north side, getting too high here.

B By Jeez! Don't this beat golf?! I just can't seem to go wrong, Wowee! Still climbing!! Who said it moved off?

A This has to be part of the same system - look at those clouds boiling.

C There's a huge hole in the cloud. You can see blue sky through it.

A Don't go near it! It'll suck you right up like a vacuum cleaner - keep working towards me - you're getting too high. It's time to come down a bit.

C I need a rest. My back's killing me and I need a leak!

B My neck's going to be sore tomorrow. Hey! Who's that looping on my right?

C It's me. I've tried everything else, so I figured to loop it but it just goes back up again.

A Try spinning it. Will it spin, C?

C Don't know, never tried.

A OK. Slow it down -That's right, now full up - full rudder.

C It's just spiralling - doesn't seem to want to spin.

A Ok, well, take it easy - don't tear the wings off it!!

B My god, look at this!! I've got full up and full spoilers out and still it climbs!

A OK. I'm going to move back over to the left - got to try and get down lower - follow me C. We'll spiral down.

C OK I'm with you. Coming over now.

B Is that you near me C? Can't make out whether you're higher or lower than I am. I think you're lower. It's a two metre ship isn't it?

C Yes, that's me B. I am lower and I think I lost quite a bit of height following A back.

A We've both lost some height you and I, C. Just keep it coming down easy a bit longer. Then we'll climb up again.

C Think I'd better land it - Don't want to dampen your thermal and if I don't land, that's what's going to happen!

B I think I'm out of it. I'm lower down than I was a couple of minutes ago. How long now, A.

A I've got just 38.50 on my watch but I'm not sure how much later you launched.

C I've got 29:10 on my watch and B was in the air well before I was. I'd say may be 15 minutes.

B Jee-sus! About 44 minutes! Maybe I'll go for the hour! That'll go for my silver, won't it?

A Yes, it will. But you have to land it for it to count!

B If I ever get it down I *will* land it, by jeez!

A What's happening?! All of a sudden we're down to 200 feet!

B Where did it all go? Well, better make that landing.

C I'm already down - Boy! I never expected to get so much fun out of a 33 minute dive!!!

THE BIG BIRD BASH: SEPTEMBER 3, 1995

By Stan Shaw

Well the labour day weekend finally arrived and we lucked out with a warm windy day, the rain coming late in the afternoon after the flying finished!. I had some concern that we would see a poor turnout but I was surprised as fourteen people showed up!, I think that having open class and a standard class had something to do with it, anyway, we got three winches operational with a plots meeting shortly after 10:00 am. The task was seven minutes precision duration with 25 point landing spots.

We allowed one hour time slots for each round where the pilot flew one, timed one and retrieved one. This allowed the sand baggers no mercy -- they had so much time that they didn't know what to do with it. With only one frequency conflict, the flying was relaxed and enjoyable because with the wind you were in great lift or terrible sink. For the most exciting flying it was Bud Wallace's bird of time, which broke a wing on the launch -- it looked funny with a big "V" dihedral but landed safely. Yes Stan's lead foot was to blame. I was impressed by Mike Kucera's flying using his two meter spirit. He will be an expert flyer next year for sure.

It was a pleasure to welcome our visitors from the GNATS and HALTON HILLS but COGG was absent. Anyway after the dust settled (it never did), the winners were as follows:

OPEN CLASS

1)	Bill Moar	1394	
2)	Lou Klemen		1247
3)	Bill Woodward	1164	

STANDARD CLASS

1)	Kurt Fritz	1043	
2)	Ed Plowes		887
3)	Mike Kucera		792

Best Sportsman : Mike Kucera

Many thanks to everyone who came out to support this final contest.

NOVATHON OPEN CLASS CONTEST:
AUGUST 13, 1995 - C.D. Bill Moar

Lovely weather beginning with south winds brought out 23 participants. Winds eventually veered to the west causing the winch lines to cross from time to time. The final round saw the three top contenders go man on man. That is where Mike Thomas showed his stuff. His ship consisted of a Sagitta fuse and tail feathers topped with an S.D 7037 airfoil and seemed never to come down. The results were as follows...

Open Class

1) Mike Thomas
2) Gerry Fritz
3) Ed Plowes

Novice Class

1) Ken Lockwood
2) Mike Penney

A very nice time had by all and congratulations to Mike Thomas for exceeding his L.S.F. requirements.