



PROP TORQUE

Official Newsletter of Launceston Model Aero Club Inc. PO Box 1204 Launceston TAS 7250

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From the President

Hello All

The weather gods seem to be smiling upon us at the moment. The run of calm weather, although expected at this time of the year, seems to have been with us for longer than in other years. Not much good if you're into slope soaring, though (I jest!).

As I don't seem to have a lot to write about this month, I thought I'd give you an update on my discus launched glider (DLG) project. I've now finished the airframe of my Apogee Sport. It's been a slow project, and I'm pleased the end is in sight. On the radio side, I thought some might be interested to hear how the twin demons of weight and size have been defeated in this project. I want to stress however that I take no credit for the design, but I have merely implemented it. The model has a Hitec HFS-05MS receiver (7.5g) and two Blue Bird servos (3.3g each). (By the way, many of you will have read on the Internet about a fabulous receiver available overseas called the Berg Microstamp. In spite of being a full range receiver, it weighs only 4g. However, it is not made for 36MHz and probably won't be: a shame - but I guess we're too small a market to bother with.

The flight battery is a single cell LiPo battery of 150mAh capacity (4.5g), and thereby hangs a tale. I already had a LiPo charger, and while it will handle one cell, the charging current is way too high. I did look at making my

own charger, but settled for a ready made one used for indoor flying (a lot of which is done using single cell LiPos, some as small as 20mAh). The charger is from Atomic Workshop

(no, it's not a relic from the Cold War) and is about the size of a thick credit card. It has a neat system of small plug-in modules that determine the maximum charging current, so you can set the 1C charge rate and avoid blowing up your battery.

Well after noting all those small weights, there was no way I was going to use a conventional switch harness; much too heavy and too bulky. What to do? I sourced some tiny polarised two-pin plugs and sockets (from a place called BSDMicro) to solder to the battery leads

and to the receiver battery pins (steady hand and strong glasses help here). This way I can disconnect the battery for charging - outside of the plane. A miniature slide switch in the battery positive lead completes the circuit.

With all the gear, I expect the model will weigh less than 4oz (113g) ready to fly. The wing area is about 200sq inches. For you maths buffs out there, this means a wing loading of 2.9 oz/sq ft (8.8 g/sq dm). With that sort of wing loading, I should be able to fly it in weakest of lift. When test flying is completed I will report some more. Meanwhile, back to the soldering iron....

I look forward to seeing you at the flying field.

.....**Gerry.**

INSIDE THIS ISSUE

- 1 From the President and Secretary
- 2 Web Site Jottings – Battery Care
- 3 Letter the Editor: "Do as I say not as I do!" Jacques Wakae.
- 4 Digital Servos: extracted from Hitec publication
- 6 Visit to Tingalpa Model Aero Club. by Andrew McEntyre
- 7 Candid Camera
- 8 Club Contacts and Coming Events

From the Secretary's Desk

Hi all,

Lately in my report to you I have been starting that I do not have much to report on, well this month is no exception, as we have not had a committee meeting in April.

As many of you will be aware we have 2 cracked windows in the clubhouse front wall, one in the door and one in the lower large window next to the door, the committee has decided to have them replaced and this will be done as soon as possible.

Birthdays this month are low in number also,

with Peter Steer being the only one in April.
We wish him a great day and all the best of wishes for the year ahead.
Well that wraps up my bit for this month but as usual I leave you with a thought to ponder upon:

A real friend is one who walks in, when the rest of the world walks out

Happy landings all

Geoff.

Contest Director's Report

Due to a bad weather forecast the Pattern competition was cancelled. A Pattern clinic will be held instead on 1st May 2009. *Cancelled see below*

Chris Klimeck

(Due to the condition of the strip, this has been postponed to a date TBA There will be a working bee when the strip has dried out - George).

Website Jottings... By George Carnie

For those "on the web" you'll have noticed no new reports or photos from me this month. This was due to the cancellation of the Pattern Event and therefore limited opportunity for any photography. Nevertheless, I thought I'd take this opportunity to touch on an often debated subject - battery types and their care (*This information is provided as a guide and is derived from web research but due to the rapid change in technology I'd urge all to do their own research on a regular basis*) –

Battery Care.

Whilst at the field recently, the question was asked about how to store batteries. Storage can be a critical factor in determining the lifespan of a battery and its ability to deliver the required capacity. Whilst sure to raise some debate, there are many views but a bit of research shows these to be the popular view of the "experts".

LiPo – Lithium cells shouldn't be stored as fully charged (or, what's more critical, discharged). It is best to keep them charged to about 50-75% of their capacity or with voltage on the recommended level for given cell type level. For LiPo this is 3.7v. Another thing to remember is that not all batteries are created

equal. LiPo's have historically had a maximum charge rate of 1C (i.e. 1 x Capacity e.g. a 2000mAh pack would be charged at maximum 2000mAh or 2.0 Amps). Hyperion has stated that their packs are capable of charging at 2C. New manufacturing technology has allowed some manufacturers like Hyperion to create 5C LiPo's. I have just bought a pack of their G³ VX 2200mAh batteries and these are capable of charging at 11A (although my charger is limited to 10A) and a surge discharge of 143 Amps! These packs are also smaller and lighter than the old packs, showing modern LiPo's have come a long way.

NiMh – Unlike NiCd batteries, to get the best use and longest life from your NiMh batteries, you should always store Ni-MH rechargeable batteries in a fully charged state.

It is also recommended that you charge your NiMH rechargeable batteries at least every 30 days or so during storage. New NiMH rechargeable batteries can last from 500 to 1000 charges.

When you receive your new NiMH rechargeable batteries or battery pack, you must charge them fully before the first use. They may show full voltage and power required to operate your device, but charging before you use them the first time is still very important. New NiMH rechargeable batteries can take from three to five charges and discharge (use) cycles before they reach their peak performance.

At normal room temperature, NiMH rechargeable batteries will generally lose about 1% of their charge per day. Higher temperatures will increase this loss, and lower temperatures (5-16C) will reduce this daily loss. This "shelf life" is less of a factor if you use them within the first five to ten days after they are charged.

One of the best ways to ensure that your NiMH rechargeable batteries will last as long as possible is to use them often. The more they are charged and used, the longer NiMH rechargeable batteries will last. Whether discharged or not, NiMH rechargeable batteries should be charged at least every sixty days.

Just a word of warning, not all batteries are created equal. Some members, including yours truly, purchased some NiMh cells off e-Bay from Hong Kong. I bought some for the house for the many gadgets around. They were very cheap. As I always cycle my batteries before putting to use to test their capacity, I was in for a rude shock. The 2500mAh had a capacity of 350mAh max, the 1000mAh had 160mAh and the 9v 280mAh had 60mAh!! I will still use them but will have to recharge more often. Fine

for remotes etc. However one member had made an Rx pack and had placed in a model and was waiting to fly. This would have resulted in disaster.

To be sure, test any new battery before putting into a model to ensure its rated capacity is correct.

NiCd – Ni-Cd batteries can be stored either fully charged or fully discharged.

Another battery type discussed are the A123 LiPh batteries, here is some information on these.

Li-Ph (Li-Ion FePO4) – A123 cells use a patented "Nanophosphate" LiFePO4 chemistry to provide an alternative to Lithium Polymer (Li-poly) type batteries. Each type has its own advantages. Quality made Lithium Polymer offer the highest possible energy and power density. That means that they pack more total power per gram, and are able to discharge more power in a given time per gram compared to LiFePO4 A123

A123-Brand cells do offer some important advantages:

SAFETY - LiFePO4 A123 cells are not prone to "thermal runaway" when subjected to over-voltage charging. As a result, it is extremely unlikely that they could catch fire, even if you or your charger makes a mistake in settings.

FAST CHARGE - LiFePO4 A123 cells can be safely charged at rates up to 5C! (*Please check the maximum charge rate on the pack*). That means that charging can be accomplished in as little as 15 minutes. Standard Li-poly packs take more than twice that long, however as I mentioned earlier, Hyperion now have 5C capable LiPo packs. If you compare a Li-poly battery pack with an A123 battery pack of the same weight, you will typically get more flight time from the Li-poly pack.

CYCLE LIFE - A123 data states a maximum discharge rate of 30C. While the cells are capable of 30C continuous rates, voltage will drop substantially. Some suppliers recommend Prop/Motor/Battery combinations such that 20C is the maximum current drawn when the A123 pack is freshly charged. Tests show that when used properly the A123 packs are capable of well over +300 cycles with less than 15% drop in capacity.

SHELF LIFE - In addition to their excellent cycle life, A123 LiFePO4 cells have been shown to degrade very little over a two-year period while unused. Even the best Li-poly may lose 10% capacity or more over two years of storage. Poor quality Li-poly may become unusable in less than a year, by comparison.

DURABLE CONSTRUCTION - The cylindrical A123 cell construction is more durable than typical Li-poly cells, and so less likely to incur daily dents, dings, and damage from light crashes.

Total Cost of Ownership - A123 LiFePO4 cylindrical cells are very reasonably priced in comparison to quality

Li-poly alternatives "Up Front". But the real value comes in over time, as the long Cycle Life, long Shelf Life, and Durable Construction all combine to lower the total cost per flight over the life of an A123 battery pack

So does that mean everyone should rush to A123 cells, rather than high-quality Li-poly? Not necessarily. It really depends on what your needs and preferences are. For applications that require maximum power and minimum weight - such as EDF Jets, "Serious 3D" Aerobatic models, Thermal Gliders, and Pylon racers - Lithium Polymer clearly remain the best choice. But if you don't mind a little more weight and/or less time per flight, then the A123 may offer advantages for you.

Sources:

<http://rechargeablebatteryinfo.com/rechargeable-batteries-faqs.php>

<http://www.espritmodel.com/index.asp?PageAction=VIEWPROD&ProdID=9599>

From the Editor's Desk

There have been two communications from Jacques this month for which I thank him very much. The first is a manual produced by Hitec on digital servos, (Servomanual.pdf), an edited version of which is included this month, and the second is a salutary letter to the editor on safety in testing electric motors.

News of on board model camera in WA.

By not owning a television for the past twenty years means that one occasionally misses interesting news footage such as a recent episode of a model aircraft taking a video of a Virgin Airlines plane landing at Perth WA airport. One of my sons sent me the link during this week. The video, now I believe on U Tube, includes some frames of the damaged model which was apparently difficult to control in the jet's slip stream! Doubtless we shall be hearing a lot more about this after the investigations have been completed.

Richard Cooper

Letter to the Editor

Hi Richard,

This short story for publication:

Just recently, I (JLW) purchased a new high current (125A/160A) speed controller.

Wanting to test the direction of rotation, I grabbed

the first lipo available with the correct connectors, a 5S1P 4000mAh, high Volt/high Amp!

Mistake one.

Since I only wanted a short duration test, I did not bother with installing a prop on the Motor, props can be dangerous inside, right!

Mistake two.

The motor, by the way, **WAS** (hint) a Hacker B50S with a high KV.

Mistake three.

The controller gave the correct beeps and since there was no prop attached, in my madness I gave full throttle.

Final mistake.

The motor spun-up like crazy and with a **very loud bang**, stopped dead.

I immediately throttled back and just in time too, as the controller was now exceedingly hot. Upon dismantling the wreck, I found that the rotating magnet had disintegrated under the excessive centrifugal forces and the remaining magnet bits had carved the inside windings pretty well. Scrap one \$500.00 motor!

Good thing there was no prop attached; stopping hard like that is bad for props. A bit of black humour here.

I always believed that manufacturers say never to run a motor without a load because all the energy to the motor is converted to heat, now I know that it is possible to exceed the maximum quoted RPM as well!

So next time you hear me tell you "never run your motor without a load",

Do as I say, not as I do!

Jacques Wakae.

(...I remember phoning Jacques with just such a story many years ago having not been able to resist testing one of his brand new controllers! Luckily permanent damage to not such an expensive motor, but the controller also needed repair! It is always very helpful, I find to hear that others are as enthusiastic about new gadgets. **Editor.**)

Extracts on Digital Servos.

From Servomanual.pdf, a Hitec publication.

Pulse Data

All Hitec servos require 3 to 5V peak to peak square wave pulse, with pulse duration from 0.9mS to 2.1mS with 1.5mS as centre. The pulse refreshes at 50Hz (20mS).

Voltage Range

Most Hitec Servos can be operated within a 4.8V-6V. Range. Only the HS-50 operates exclusively with 4

NiCad cells (4.8 volt).

Wire Colour Meanings

On all Hitec servos the Black wire is 'ground', the Red wire (centre) is 'power' and the third wire is 'signal'.

Direction of Rotation

All Hitec servos turn Clockwise direction.

One of the most frequently asked questions is "What servo should I use for....?"

While there have been many magazine articles that attempted to provide a general rule of thumb to answer these questions, we offer you the following suggestions:

1. Servos are rated for Speed and Torque. In many cases, Hitec will create one servo and then gear it for speed and sacrifice torque, then create its twin, geared for torque at the sacrifice of speed, i.e. 525/545, 625/645, 925/945.
2. If you are not sure, it is better to have more torque than you need, as torque is your friend.
3. When in doubt ask your peers about servo application questions. Look at what others Are using in comparable applications. Usually the kit manufacturer will suggest a servo of a certain physical size and torque value specification in the aircraft, car or boat plans. It is wise to follow their guidelines.
4. Even though micro servos like the HS-81 may offer 38oz/in of torque, they are not appropriate for larger powered aircraft due to the flight loads placed on the control surfaces during flight. The gear train can fail under excessive flight loads. Smaller servos have thinner gears that are inherently more fragile than those of "standard" sized servos.

What are the advantages of digital servos?

1. Instantaneous Response

The digital micro processor sends out signals five times faster than analogue servos. This results in a much faster response.

2. Precision Resolution

There are many more steps in the digital format compared to the conventional analogue version. This means that the servo is capable of finer adjustments.

3. Enormous Standing Torque

The standing torque of the digital servos is 3 times that of the analogue counterpart. Check it out, try moving the transmitter stick or wheel and at the same time hold the servo horn to keep it from twisting. You will not be able to prevent the horn from turning.

4. Metal Servo Arm

Hitec is the first servo manufacturer to include metal horns as a standard accessory for digital servos: these are not just any metal horn but Hitec's own

design super horn, because Hitec engineers were not satisfied with the traditional plastic or composite servo arms as they tend to flex and fail long before the servo reaches its maximum torque capability. This is another unique feature of Hitec digital servos.

5. Programming

These powerful servos offer programmable features such as, direction of rotation, centre Point, end points, failsafe option, speed and dead bandwidth adjustment using Hitec's Proprietary programmer and servo tester device. (Model HFP-10).

Changing Gears

Hitec offers gear sets for all servos available from your local hobby shop or from a mail order retailer. To replace the gears on any servo, carefully lay out the new gears on a clean work surface for re-assembly.

You will also need a supply of servo gear lubricant. We suggest the Hitec lube part # 58450. Use only specially designated servo grease when replacing servo gears. Using other type of grease not intended for servo gears may produce gas when used in sealed cases which may coat a nasty film on the motor brush that could stop the servo operation.

Coreless Servo warning

We would like to strongly discourage you from ever working on the coreless motors. Unlike conventional cored motors, the brush base of the coreless motors is extremely fragile and can be easily separated from the Printed Circuit Board. This is best left to authorized service technicians with the proper equipment.

Loosen or remove the screws located on the bottom of the servo case enough to pop the upper case off and expose the gears. If any gears or shafts are stuck in the upper case, remove them and plug them back into position on the lower case. Now carefully remove the gears while replacing them in order on your work surface in front of you. This is done so you can refer back to their positioning as you assemble the new set into the lower servo case. Clean all the old lubricant from the servo case in both the lower and upper case components. Be aware of small chunks of gear material that may be lodged in the lubricant and get it all cleaned out. Apply servo gear lube to the shafts and assemble the gear train applying lube to all gear components. When complete, pop the case top back on and tighten up the case screws.

CAUTION: Do not force the case top back on. If it will not fit back on smoothly, chances are the gears were installed incorrectly.

Special Warnings for Digital servos!!!

(1) If you accidentally plug in the Hitec "S" type digital servo into the old Airtronics (Sanwa) receiver, this will blow up the servo circuits so please take special care.

(2) Digital servos consume tremendous amount of power, so dry batteries cannot be used at all. Use large capacity NiCad batteries or better yet NiMH batteries.

(3) Do not use BEC system built in most 2 channel receivers. Make sure you bypass the BEC for stable operation. The Hitec AM, model HAS-02MB, HAS-03MB and HP-2RNB receivers are built with a BEC or battery eliminator circuit built into the battery port of the receiver. This will limit the amount of power some of the larger servos can draw from the receiver.

It is suggested that using these receivers with large power consumption servos like the HS-805BB, HS-815BB or the high end, premium coreless motor servos and digital servos, a "Y" harness be used to connect the receiver battery / switch harness and servo to the receiver. Typically this is done by connecting one of the upper "Y" connectors to the servo, the other upper connector to the switch harness and the lower "Y" connector into receiver port 1,2 or 3, depending on what channel you wish the servo to operate. This will allow the BEC to be bypassed, your large servo will always have power and the rest of the servos and the receiver will be powered from the port you plug the "Y" into.

Modern coreless and digital servos have impressive torque values. This takes a lot of Power. Receivers are capable of delivering only so much power to the servos plugged into it before the voltage draw down caused by the servo power consumption falls below what the receiver requires to "hear" the signal from the transmitter. When this occurs a "glitch" will result from loss of signal to the receiver. Large aircraft can easily use 6 or more powerful servos with some 1/3rd scale planes having multiple servos per control surface. There are several answers to this issue. Many modellers choose to use two receivers and others power the servos with a separate battery from that of the receiver. The point here is to be cautious when "Y" harnessing or "ganging" powerful servos together.

Using larger capacity NiCad batteries as well as Heavy Duty switch harnesses are highly recommended in these applications.

Servo Trouble Shooting

Servo makes a grinding noise or acts erratically.

Open the case and remove the gears. Examine them for broken teeth. If broken, replace with a new gear set.

Servo jitters

This may be a dirty potentiometer. Open the case and remove the gears. Spray a zero-residue tuner cleaner into and around the "pot" and work it in. Once the cleaner has dried, re-install the gears and close up the case.

Checking Servo Centring

Remove the servo from the plane or vehicle. With the arm still attached to the servo, place an ink dot towards the end of the wheel and another one on the case; these should be lined up for a reference point. Plug the servo into the Receiver and move the corresponding transmitter gimbal stick or wheel from stop to stop. After each movement, check the reference points for alignment.

Servo is locked in place:

Open the case and make sure the gears are properly aligned. Next check the case top for wear. If wear is evident, replace the case.

Servo hums under load:

This can be normal; the servo is trying to hold position against the force of a load. If it hums when no load is applied, try loosening the servo case screws a quarter to a half a turn.

Servo gets hot:

Get out the fire extinguisher! Check the servo wiring, it should match the receiver being used. The motor could be stalled due to a failed gear train. Actually several things could be wrong, this sounds like a candidate for the service department.

Tingalpa Model Aero Club

Andrew McEntyre's Recent Trip to Brisbane

During my last trip to Brisbane in late March, I took the opportunity to visit Tingalpa Model Aero Club. This was a Saturday morning about 10.30am: to my surprise there was only a handful of members present, it would appear that most don't like flying with a little breeze. I was able to speak with the club secretary Phil Gartshore for a good long chat, and he was saying that a lot of members come to the field early and leave when the wind comes up. Knowing Brisbane as I do, wind is an integral part of life in the sunshine state most of the

year round on the river area where the club is situated. The club is nestled in parkland known as Minnippi Parklands, alongside the Gateway arterial road behind it, and heavy bush land on the other side. You will see in the photos that the bushland is very dense, where many a model has ended up and never found according to Phil. The field is very well laid out but very compact and members with large models need to fly very close, as the ceiling height is restricted to 400 feet and in the flight path of Brisbane Airport only 2km away.

I was surprised to hear a comment by Phil regarding the use of 2.4GHz radios. "We have some twelve members that use the 2.4 GHz system but have had a number of problems with clashes and interference, which has resulted in several crashes. It is unconfirmed whether the high voltage power lines near by are causing any interference. We have restricted its use to only three 2.4GHz pilots at any one time. This seems to be working alright at present."

The club has approximately 250 members but only 30 or so attend to fly on weekends, a large number choose to fly during week days according to Phil. The club site is leased from Brisbane City Council on a 10-year lease arrangement. Both the club committee and the council have a very good working relationship with each other and very few restrictions placed on them.

Tingalpa has a professional instructor, who is supported by the club. This has been very beneficial to the club with regard to increasing membership. The club has purchased a new laptop computer for his personal use to manage his trainees and has paid the extra insurance required to become a professional instructor.

This club that has been able to manage a small flying site with both fixed wing and Helicopter flying. Both operate on the same frequency band, but the helicopters fly at the southern end of the field. They have in place selected times of the day when the helicopter pilots can use the main flight line for 15 minute flights.

It would seem that most clubs have the same problem when it comes to working bees: as Phil said it always comes back to a small number of helpers and invariably it's the committee and one or two others.

Overall I was very impressed with the layout of the club and the way they set it out to include all types of model flying from Electric, Helicopter, Fixed wing and Jet. I have included the link to the club site it is well worth a look.

<http://www.tmac.asn.au/>

Candid Camera



Pictures from Tingalpa Model Aero Club



Figure 1: Club House: observation deck visible above.

Figure 2: Pilot Box: 40 metres from pit area. Pipe frame with chain link fence.



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COMING EVENTS

May 16 th	Fun Fly Day		10am
June 6 th	Club Day		
June 11 th	Annual General Meeting	Kings Meadows Health Centre	TBA
June 20 th	Scale Day		10am