



SWARMS Propwash

April 2005

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Presidents report

Well I've just come back from the kids display at the flying field. What a great day!

The weather was kind and we had about fifty children plus helpers invade the field at about ten thirty. They were very well behaved and the new fencing arrangement for the pit area works well for this sort of display.

The kids were primary school aged and were part of a group from an after school activity group aged between five and twelve. They seemed to enjoy the flying although the cool drinks, lamingtons and the sausage sizzle may have won out there.

The club made about \$170 profit and I've been asked if we would be interested in doing another one in the next school holidays for another activities group. Thanks to Dennis, Dennis, Tracy, Julian and Kate for catering and all the members who flew.

The mats went down on the taxiways on Sunday. Thanks to all those members who helped. The hardest work was ripping up the old one!

Samples of the new the tee-shirts will be available for trying soon. The ordered ones will be in jade green and have the club logo and your name (if you wish) on them and will cost around \$26-28 each. Note that all orders for tee-shirts must be paid for in advance of placing the order.

Well that's it for this month.

Remember what goes up must come down – it just depends on how!

Regards Ian Clapp

Dodgey's dribblings.....

Hi everyone

Hope you all had a very good Easter. I apologise for the lateness of this edition but I hadn't any contributions up till a few weeks ago and had to spit the dummy a little to request articles by email. Fortunately people came to the rescue and so I have enough to make an edition - although most of the submissions were about real planes but that OK as it still reflects the life's and interest's of our members. Bob now has his Private Pilots Licence (PPL) and took me for a scenic flight the other day over Bunbury in the small low wing Sud Aviation craft. We circled over the model field at 1,000 ft and it was surprising how high we were in comparison to the models. Even my glider which I used to get so high you could hardly see it would be only around 500 ft up I reckon. Dave Shearer send in some photos of his new glider which he keeps at Narrogin. On an average day he reckons he can travel for 500 kms, 750kms on a good day with lots of thermals. Notice the airspeed in the cockpit photo of 120 knots which is around 230 kms/hr!

Anyway back to modelling. Ken Grant send me a photo of his Beaufighter which is coming along nicely. This will be a large all electric model with 2x Speed 700 motors and a 40 Volt electric pack. It has to built very light therefore. I have also been around Clappy's a few times recently to check on the progress of his new Rookie jet which is fitted with a Neil Giggin's home made turbine. Neil has made quite a few of these now and charges \$2000 and then you need to buy the FADEC controller which is another \$300. However Neil will give you assistance to make it a smooth transition to jet flying which would have to be worth a lot. Once Clappy gets his going then hopefully others will be able to learn from him. There is a large cost in setting up the fuel supply as is it quite complex and the fittings are expensive. Jets have really come onto the scene lately and hardly anyone is building ducted fan planes anymore. I expect the prices of the turbine units to come down in time especially as soon as the Chinese start to make them! I would predict that in a few years we will be able to buy them for less than a grand.

Finally, I would like to give a warm welcome to two new members – Dave Pointon from the Manjimup club who has just moved to Bunbury and has his gold wings and also has partially completed his trainers course. Also to Tim Cornish who lives in Busselton and will soon be trying for his bronze wings with his Hurricane trainer. Tim's father is also an r/c aeromodeller and a member up at Whiteman's Park.

What Causes Batteries to Fail?

In this article, we'll examine the impact that declining capacity, increasing internal resistance, elevated self-discharge and premature voltage cut-off on discharge have on the overall battery design of a mobile device. We'll then examine how battery analysers can be used to help track down these problems during the design phase.

Capacity on the Decline

The amount of charge a battery can hold gradually decreases due to usage and aging. Specified to deliver a capacity of 100% when new, the battery requires replacement when the capacity drops to below 80% of the nominal rating.

The energy storage of a battery can be divided into three imaginary sections consisting of: available energy, an empty zone that can be refilled, and the unusable part (rock content) that increases with aging (**Figure 1**).

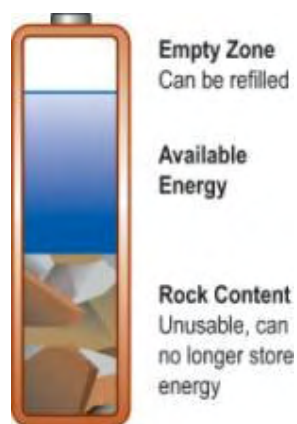


Figure 1: The three imaginary sections of a battery—available energy, empty zone and rock

In nickel-based batteries, the so-called rock content is commonly present in the form of crystalline formation, also known as memory. To prevent memory, nickel-based batteries should be deep-cycled once every one or two months. If no full discharge is applied for four months and longer, a restoration becomes increasingly more difficult the longer this is put off. The two nickel-based chemistries used in mobile communications systems are the rugged nickel cadmium (Ni-Cd), a battery that has been around for the last 50 years, and the higher energy-dense but more delicate nickel metal hydride (Ni-MH).

The common lead-acid battery will suffer performance degradation by sulphation and grid corrosion. Sulphation is a thin layer that forms on the negative cell plate if the battery is being denied a fully saturated charge.

Sulphation can, in part, be corrected with cycling and/or a topping charge. The grid corrosion, which occurs on the positive plate, is caused by overcharge.

Lithium-ion (Li-ion) battery loses capacity through cell oxidation, a process that occurs naturally during use and aging. The typical life span of a Li-ion battery is two to three years, whether used or not. Storing the battery in a cool place at a 40% charge minimizes aging. An aged Li-ion cannot be restored with cycling or any other external means.

Internal Resistance Increases

The capacity of a battery defines the stored energy. Internal resistance, on the other hand, governs how much energy can be delivered at any given time. While a good battery with low internal resistance is able to provide high current on demand, the voltage of a battery with elevated resistance collapses under a heavy load. Although the battery may hold sufficient capacity, the resulting voltage drop triggers the "low battery" indicator and the equipment stops functioning. Heating the battery will momentarily increase the output by lowering the resistance.

A battery with high internal resistance may still perform adequately on a low-current appliance such as a flashlight, portable CD player or wall clock. Cell phones and PDA's, on the other hand, require heavy current bursts. **Figure 2** simulates low and high internal battery resistance with a free-flowing and restricted tap.

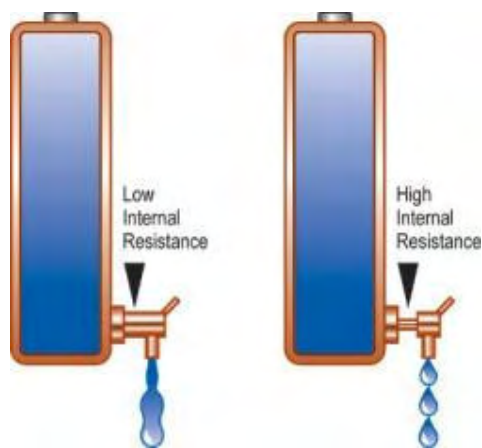


Figure 2: A battery with low internal resistance is able to provide high current on demand. With elevated resistance, the battery voltage collapses and the equipment cuts off.

Ni-Cd batteries offer very low internal resistance and deliver high current on demand. In comparison, Ni-MH batteries start with a slightly higher resistance and then have their resistance readings increase rapidly after 300 to 400 cycles.

The internal resistance of lead-acid batteries is very low. The battery responds well to short current bursts but has difficulty providing a sustained high load. Over time, the internal resistance increases through sulphation and grid corrosion.

Li-ion batteries have a slightly higher internal resistance than nickel-based batteries. Aging gradually increases its cell resistance and Li-ion loses its performance due to elevated resistance rather than capacity loss.

Elevated Self-Discharge

All batteries suffer from self-discharge, of which nickel-based batteries are among the highest. The self-discharge is highest right after charge and then levels off. Nickel-based batteries lose 10% to 15% of their capacity in the first 24 hours after charge, then 10% to

15% per month afterwards.

Lead-acid batteries are one of the best batteries in terms of self-discharge. These batteries only self-discharge 5% per month. Unfortunately, this chemistry has the lowest energy density and is ill suited for portable applications.

Li-ion self-discharges about 5% in the first 24 hours and 1% to 2% afterwards. Adding the protection circuit increases the discharge by another 3% per month.

The self-discharge on all battery chemistries increase at higher temperatures. Typically, the rate doubles with every 10 deg. C. A noticeable energy loss occurs if a battery is left in a hot vehicle.

Usage and aging also affect self-discharge. Ni-MH is good for 300 to 400 cycles, whereas Ni-Cd may last over 1000 cycles before high self-discharge affects the performance. An older nickel-based battery may lose its energy during the day through self-discharge rather than actual use. The battery gets flat at the end of the day, even if not used.

Nothing can be done to reverse self-discharge. Factors that accelerate self-discharge in nickel-based batteries are damaged separators induced by excess crystalline formation, allowing the packs to cook during charging, and high cycle count, which promotes swelling in the cell. Lead-acid and lithium-based batteries do not increase the self-discharge with use in the same manner as their nickel-based cousins do.

Battery Analysers Needed

As the issues above point out, designers can simply not rely on the green light as an indication that they have a strong battery pack working in their system design. The green "ready" light does not verify battery performance but simply reveals that the pack is fully charged.

To get a more detailed understanding of true battery performance, designers need to turn to a battery analysis instrument, which provide accurate state-of-health information. Additionally, designers can use these instruments to prolong battery life and restore lost capacity in a battery pack design packs. Future replacements of the batteries can be predicted, improving system reliability and cutting costs.

Wrap Up

Rechargeable batteries do not die suddenly but gradually get weaker over time. By using a battery analyser, designers can better predict how a battery will perform in the field. In the end, this will lead to better overall system performance and better runtimes for users.

FOR SALE

Saito 65 – as new never been started

Also trainer and associated gear

Contact Laurie Riley on 97552065

FOR SALE

7-cell Ni-cad 2000maH battery – cost \$35 accept \$20

3x JR Servos on plate - \$20

2 channel Acoms Tx, Rx and servos. Tx incl ni-cads and wired for Hi-Tech charger. Suitable for glider \$50

Contact Paul Dodge on 97252527

Brenda's Wednesday 'Old Timers' report

John Lodge came back from Qld for a holiday the other week and visited the field and had a go with Dennis's plane. John was one of the clubs best pilots and recently left to go live in north Qld. He seems well and has a boat that he spends all his spare time on now instead of flying models.

Dennis again managed to crash into a tree carefully picked out for Ken to be able to climb and retrieve. Richard is still flying a Zephyr with a new 52 4-stroke he recently bought. The Zephyr wings broke a while ago but Bernie has kindly repaired them.

We have had the cows in the field again as the electric fence doesn't seem to be working and the cows are smart enough to just walk over it.

A new BBQ has now been purchased as the old one was looking a bit sad and had a couple of leaks and also didn't have a lid or roaster.

During a hot spell we ran out of gas and all of the food in the fridge defrosted which meant that we had to throw away around \$60 of food. We have since had another leak and lost all the gas again but this is now being fixed.

The toilet has to be emptied again as it is starting to smell and at the meeting the other day it was decided to have it cleaned out on a regular basis. This is still much cheaper than building or buying a new one.

The water tank needs cleaning if anyone is willing to have a go! Its full of algae at the moment and needs to be done before the winter rain.

Thanks as always to the delicious Lamington cakes that Kate makes.

Well that's all from me and Dennis. Take care everyone.

Brenda Green

PS I'm 68 this week – Paul kindly told me I didn't look a day over 67!

Learning to fly model Helicopters - what do I need?

Helicopters require a little more work to build than aircraft, however ARF helicopters are becoming available more and more these days (just check out eBay!). Even ARF helicopters however require some knowledge to complete correctly. With that said there are always people in the club who fly helicopters and can help new members find their feet in this great adventure.

The extra equipment you will need will include a starter if you don't have one yet and a starter probe to suit your particular helicopter. This combination is essential, as you cannot flick start the main rotors! Next on the list is a gyro, this is needed to help control the yaw (tail rotor or rudder!) better. A budget piezo type will do fine till you master the basics. For the servos - if you can afford them it's best to buy good servos for a helicopter, as they will work much harder in a helicopter than in a plane. Another reason for doing this is that the linkage set up on a helicopter is very precise and once it's set up you don't want any slop in it. Battery power is next, if you are using a normal 600-mah battery in your plane, then this is too small for five servos and a gyro to continually run for several flights. It is possible to use your 600-mah battery if pushed to do so, however if you do not have access to a field charger then your day will be reduced to only two or three flights. When first learning, all the flights you can get in each visit to the field helps bring you closer to flying your helicopter. A big help at the stage is a training undercarriage, this straps under the main skids and helps stop the helicopter from tipping over and damaging itself.

The radio you chose for your first plane may or may not be useable. If you have a computer 6-channel radio, then you shouldn't have a problem setting up your helicopter. A basic 4-channel radio will not fly a helicopter. Buying a basic 5-channel radio is too costly when you consider you will outgrow it long before you ever get your monies worth. Doing your homework in the beginning can really pay dividends later on. The little extra money spent now will be much less than a second radio later. A thing to also consider at this point is, does it suit planes also? Most modern radios do, but some competition models specialise in only one type of aircraft - so ask before you buy.

Tools can be an extra cost if you don't already own any Allen keys, small screwdrivers, small nut drivers and some loctite for building your new helicopter. When considering a helicopter take the time to do your homework and learn all you can about the helicopter you prefer best. This includes spare parts, availability and costs. Upgrade parts and also how well your chosen helicopter flies straight out of the box. Many helicopters fly well with expensive upgrades, few fly well with little or no upgrades.

When first looking at r/c helicopters, you will also notice the different sizes in most of the modern helicopters. Most people start with the small size .32 to .36 engine, this is a cost thing usually but some choose this path for transport reasons or storage. The other large versions include .46, .50, .61 and some more recent models even

using .90 engines. The large models have more weight and fly smoother than their little brothers but at considerably more cost. Again there are many web sites listed on the Internet, but you may like to check out <http://www.helifever.com/> for a great starting point.

Probably the only other thing to consider when thinking of RC helicopters is a PC computer simulator. A simulator will not only speed up the learning process ten fold, it will serve as a very useful tool when learning new stunts as your skills progress. Best of all it never costs you a cent every time you crash! Think of the costs of a crash in the real world, that's right - too costly to think of!

Hopefully this has helped sort out some questions about getting started in RC helicopters – make sure that you take some time to go down to a field and see some of these pilots at work, doing what they love best.

Joke

An old farmer up north had owned a large farm for several years. He had a large dam out the back, fixed up nice, with picnic tables, courts and some mango trees. The dam was properly shaped and fixed up for swimming. One evening the old farmer decided to go down to the dam, to look things over as he hadn't been there for a while.

He grabbed a bucket to bring back some fruit from the trees. As he neared the dam he heard voices shouting and laughing with glee. As he came closer he saw it was a bunch of young women skinny dipping in his dam.

He made the women aware of his presence and they all went to the deep end of the dam. One of the women shouted "We're not getting out until you leave!" The old man frowned thinking the girls were being a bit rude to him since it WAS his dam and so he replied

"I didn't come down here to watch you ladies swim naked or make you get out of the dam naked."

And holding up the bucket he added "I'm just here to feed the crocodile!"

Wanted

90 2-stroke motor – any sort – must be cheap!

Please contact Paul Dodge on 97252527

Report from Dave Shearer

I have had to put the modelling on hold for the last few months due to a fairly heavy commitment towards gliding with the Narrogin soaring club. Jenny is also involved and has logged about 35 hours since she started and will shortly qualify for her 'B' certificate. I have eased my way back in re-qualifying for my "C" and recently did a 5 hour flight in one of the club single seaters.

We recently travelled to Goulburn, near Canberra, to pick up a glider we had purchased. The total distance for the journey was 8,500 km. We got to Goulburn on the third day and were heading back the same day. We made such good time we had 3 days in Adelaide and had a look at the Clipsal 500 and caught up with various family members. We did the Nullabor in 2 days and had the glider back at Narrogin on the third. The biggest day was about 1500 km sitting on about 120. The trailer towed like a dream. It's still a bloody boring trip though.

The aircraft is a Romanian built single seat racing class glider, and has a total of 240 hours total time since new. The performance is quite reasonable for what it is and it has a best glide ratio of 1:37 which makes it quite competitive in the Sports class on handicap. I intend to use it fairly extensively next summer doing X-country flying. The aircraft is capable of 500 km. flights on a good day and could possibly do a 750 km. flight if the conditions were booming. That sort of day would be thermals to 10,000 ' and averaging at least 6 knots.

The gliding season is slowing down as the colder weather approaches and I hope to get back to the models shortly.

I have attached a couple of photos of Golf-Whiskey-India as it is known, lurking outside it's T-hangar at Narrogin, and a couple of others of general interest. The cockpit shot is in the Astir at 4500' cruising in sink looking for the next thermal. You can see the various showing about 3 knots down at about 65 knots airspeed.

The release height is usually about 2000' above the ground from an aerotow. These cost \$4 per minute so if you feel a good thermal while on tow it is common to release and grab it. In theory my glider can travel 37km from a height of 1 km, at its best gliding speed. However, you fly cross country at many combinations of speed and rate of descent depending on the strength of the day.

The idea is to find a thermal and turn constantly in it. This is called centreing the thermal. They can be as weak as 1 knot, which is about 100' per minute, and in high summer can boom to 10 knots and more, and be as rough as guts. Gliding may look graceful but it can be hard work in a rough summer thermal.

It isn't easy initially and takes quite a bit of practice. However the ability to find and use thermals is the whole key to cross country flying. You gain height in the climb, then charge off on your specific task losing height as you go. Then you find another thermal, climb, and then continue on. But not always.

Most tasks are triangular flights for obvious reasons, and the real experts in the very high performance open class gliders can fly over 1000 km routinely, averaging well over 100kph. I stress these are the experts. Not me.

Sometimes the glider doesn't make it home. The way back can be an aerotow out of a paddock or retrieval by trailer. My trailer is a very good one, fully enclosed with very good rigging/derigging gear. I think I'm am going to need it.

The big cost in learning to glide is the cost of the launches. My five hour flight in the Astir77 single shows the economics once you have got to single seat status and are basically fully trained and can use thermals.

The launch cost me \$20 [5 minutes] The first 2 3/4 hours cost \$70 and the remaining 2 1/4 hours were free. That is the club policy because it encourages distance and duration flying.

So basically my flight cost me \$18 per hour. Compare that to power flying (*about \$150/hr – Ed*). The only reason I have bought my own glider is for convenience. I can fly whenever I want to and take advantage of the best conditions. If any club members want to know more about the sport I am happy to oblige.



View from cockpit of Astir – cruising at 4300 feet



Dave's new glider Golf Whiskey India

Photos from Dave (cont)



Golf Whiskey India safely contained in trailer

Upcoming events

Air Show

Sat/Sun 23/24th April – Air Show for light kit or scratch built (real) aircraft at the Bunbury Airport. This will also include a small time slot for a 40 min display of model aircraft on the Sunday.

AGM

Probably first Sunday in June (to be confirmed). Any items for discussion please send to Larry.

Report form Bob Main

Hi everyone – I now have my private pilots licence (PPL) and have been flying around in real aircraft instead of flying my models. My radio transmitter has been out of action and away for some weeks, hence my absence from the field. I recently flew up to Cunderdin for the air show. I flew up in a Sud Aviation Horizon (see below VH-YOG). It took about 90 minutes to get there and about 60 to get back. It is a bit of a strange aeroplane. It has retractable undercarriage which you have to wind up and down with a crank handle. It takes 19 turns each way. The undercarriage is also connected to the flaps, so when you lower the undercarriage you also lower the flaps and vice versa. We had a bit of a smell of fuel at one stage during the flight when changing fuel tanks and operating the boost pump. I enclose a couple of pictures. R A Wheeler lives at Coolup and owns a Stearman PT17, a proper aeroplane; a bi-plane with a big radial engine. The other picture is of the Sukhoi flown by Jurgis Kairys. What he did with this aeroplane was quite amazing. You can look it up on the Web at www.jkairys.com.



Ken Grants Beaufighter



Hi Paul,
Enclosed are some shots of my Beaufighter. The first one (above) is the real thing. The second one is the fuselage/tail in construction using a home made jig and the third one is the model from which the plans are made complete with invasion stripes. The model has two 700 geared 3.7:1 brushed series wired motors with 28 Ni-Cad 2400maH cells and a single 50A/30 cell Kontronic speed controller. Each motor has 15x10 propellers fitted and the all total weight is expected to be around 7.5kg. The model is being built using lite-ply for the formers and sheeted with balsa then covered with dope and tissue. The retracts are on main and tail and are air operated.

Ken Grant



Clappy's Turbine Jet!



Clappy has just finished his composite ARF turbine powered 'Rookie' jet which is fitted with a Neil Giggin's home made turbine delivering around 7 kgs of thrust. Turbines run on kerosene with a 1-2% oil mix. They are started by turning them over quickly with compressed air or with a built in electric starter motor and then a standard glo-plug ignites the fuel. Initially propane gas is passed through to enable an easy ignition and then the gas is switched to Kerosene once the engine has run up to temperature.

The electronic FADEC unit controls everything and monitors the engines temperature, fuel supply and speed and will shut down if something goes wrong. The turbine rotor spins at anything from 30 to 150,000 rpm so it has to be accurately balanced and they normally run on ceramic bearings.

Here is photo of Neil helping out with another jet that he is involved with and Clappy's Rookie in the foreground.....



Note from Roy the treasurer

Please find attached both February's and March treasurers report. I finally got out to the flying field 2 weekends ago after a three week break but then had to go to Perth again so missed last weekend. Went to KAMS scale meet which was pretty dull, although I think it was Neil Giggin's who had a scale F-15 Turbine there. That looked pretty impressive but I didn't get to see it fly. I then ducked over to the WARMS field in Henderson and there was quite a display of models on offer there. Caught up with Ray Sherburn and had a chat. He tells me that people at his club have a lot of trouble landing on designated runways because they just fly off a field and commended our club on our runway landing abilities. So we can't all be that bad.

Anyway, in between laying wood floors at home I should be able to make it to the field in the next couple of Sundays so I might see you there.

Treasurer's reports

March 05 treasurer's report			
Receipts		Expenses	
Fees	30.00	Hardware (gas/diaphragm)	124.30
Food and Drink	131.50		
Total	161.50		
Investments		Total	124.30
Debenture stock	3000.00		
Bank Balance			
Bank statement	1779.00		
Cash on hand	3.30		
Balance (credit)	1782.30		

February 05 treasurer's report			
Receipts		Expenses	
Fees	187.50	Gov tax on bank a/c	0.30
		AWA fees	212.50
Total	187.50	Total	212.80
Investments			
Debenture stock	3000.00		
Bank Balance			
Bank statement	1753.70		
Cash on hand	3.30		
Balance (credit)	1757.00		