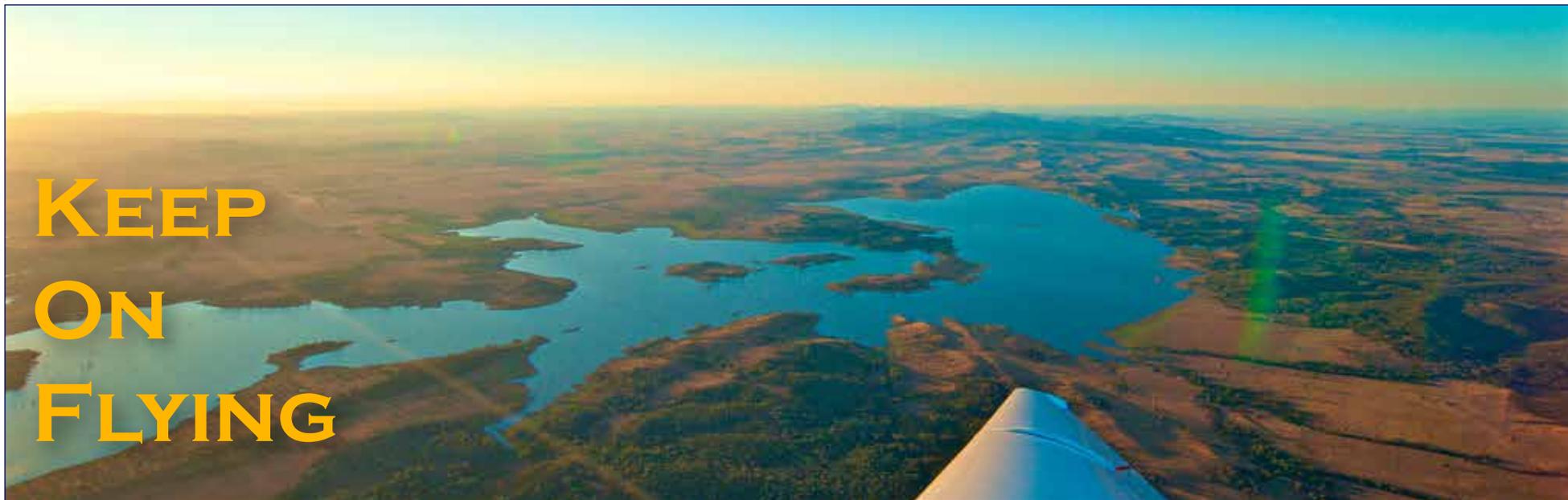


# KEEP SOARING

SPRING 2017

Pioneering  
Fake News!

WATER, WATER EVERYWHERE  
THE GOOD OIL ON BATTERIES  
KEEPIT REGATTA  
MICRO SAFARI  
AND THE EVER POPULAR EX-MANAGERS REPORT



## And so it begins...

Though we fly almost all year round at Keepit, there's a sense, from this end of New South Wales at least, that the season starts when you put away the jeans and take out the shorts.

This season is a landmark for me. It's ten years since I started gliding and 10 years at Lake Keepit. In that time, the club has grown and prospered though with little help from me.

More members, more gliders and towns-full of accommodation added. When I started training, we had three tugs available didn't we? And still had to winch launch some days, because none worked.

Today, the club is one of the best run in the country and praised by visitors as being a really welcoming place to come and fly.

From my perspective, as a relatively new member, the success of the club is as much to do with the

members as the committee. The members elect the right people and then support them to keep the club running as a club.

I was well aware of this as the Princess and I left on our mini-safari to Maralinga and Alice in July. Volunteer members up to their necks in chilly mud while we taxied down the strip.

Hopefully the payback is that they don't have to sweat Keep Soaring out every... well now and then. It would be impossible to do a newsletter like this without the contributions of members.

Dave Shorter in particular has been a constant, welcome and expert contributor. Often the reason for this is that Dave answers my ignorant questions... in long form. For example, though my glider takes literally hundreds of litres of water, usually the only stuff aboard is either inside me or leaking out the bottom.

So I ask Dave for a set of instructions and he send something of his knowledge which everyone can benefit from. Thanks Dave. I'll leave the woobla in the usual place.

Flying for 10 years without water ballast may seem like an admission of failure but not really. I'm increasingly part of the Slow Flying movement. As you may know, the Slow Food movement started in the communist party newsletter in Italy. It seems only natural then that the slow flying movement should come from a newsletter like this in Australia.

Fast flying is all very well and it's as well to know how to do it if you want to fly cross country any long distance... but all that fuss and bother. Does it make your gliding any more enjoyable?

I love flying. I love being in the air, especially at the dying of the day as the air whispers over the wings and you struggle to make it home in the lowering

sun. I love flying somewhere new. I love lowering the undercarriage and giving a circuit call over some runway where nobody's listening in on the radio.

I find that if I set myself goals on every flight to exceed my personal best or keep the hurry up button pressed all the time, it can spoil a good flight almost as much as a hard landing when there are people watching (see above).

I remember while training, Allbutts suddenly called "My aircraft" while on tow. He took the stick and while I had my hands in the air wondering what mistake I had made this time, Al said something like "have a look around... what a fantastic day to be in the air. You can see over the horizon it's so clear."

Now I know that many of you are saying to yourself, "Al's rubbish at flying fast so it doesn't count" but remember, Allbutts has more air hours than most of you have had roots, or hot dinners at least and when he says slow down and take a while to smell the roses, then maybe you should listen.

In other ways, it has been a fairly grim start to the season with an unusual number of bad accidents. One of the best types of flying is flying with your friends and it gets better every year. So for the sake of fun alone, have fun but fly safe as you'll be around to do it next year!

*Complaints and take-over offers  
to the normal email address.*

Ed.



*The best of Slow Flying: This year's mini safari to Rylstone. Hanging around for the big wet thing in the middle to move along so we could land on the strip getting a soaking underneath.*





# OUT OF THE BLUE STUFF INTO THE BLACK STUFF

## Keepit Regatta 2017

For many of us, the Keepit regatta is an annual fixture in the calendar for the last week in February. The regatta attracts a gang of fliers from other clubs as far afield as Alice Springs, Warwick and even New Zealand for a week of competition fun.

What sets the regatta apart from other competitions is that pilots who don't have a lot of competition experience can pair with more experienced pilots and the pair is scored off the slowest flight. For top fliers it's like sailing with a bucket tied to the rudder and for the less experienced, it's a great chance to find out how it's done.

And for those in the middle, the regatta offers some great flying in great company with rather more laughs

than you get in most comps... to the point where it's necessary to turn down the radio or switch from the chat frequency when the comedy gets too much.

This year started with one of the hottest Januarys on record where it was proved on many days that great heat does not mean great thermals. On some days, unless you could get over 9,000', it was just too hot in the cockpit.

February was a lot wetter but it wasn't constant rain. Most days started off brilliantly sunny and full of promise and ended overdeveloped with patches of thunderstorms over a wide region.

The effect that this had on the regatta was in some was small and in others, profound. Most days were flyable but they started very early.

Tradition has it that gliding is an afternoon activity. If you like getting up early, take up surfing or cycling. But not this year. Most days, it was a mad panic to get gridded before breakfast was down... well before coffee time.

This meant getting up early, getting DI'd early, making lunch and towing to the grid at what seemed like the crack of dawn. Many days were over by 2.30. But the flying was often epic and unforgettable.

The practice day was particularly black in places with stratospheric lift in most of the same places, normally in the black stuff, just at the edge of the wet stuff.

A storm front stretching from Kaputar over a 100 km to the west provided some fantastic rides with one eye on the ASI to avoid over-speeding and the other

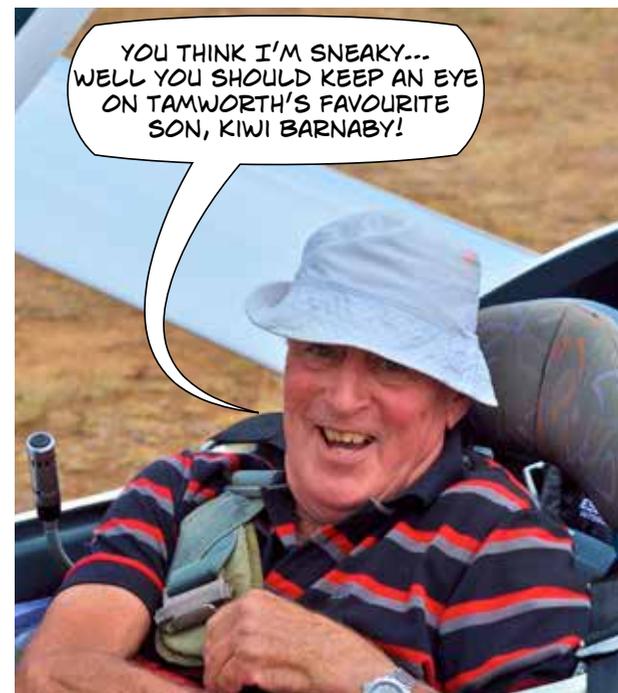


on the vario to avoid being sucked into the black...one hand on the stick and the other on the camera trying to take a pano out of the clear view panel.

The epic lift in the black proved to be a bad lesson in that most of the black in the following week was not lifting (at least not where I flew). Those with sustainers or engines were generally bolder and paid for it with engine starts to get home, including Casey memorably using two wings-full of diesel to get home.

Almost everyone abandoned or outlanded... except one. While we were packing up, congratulating ourselves on our lack-lustre but save performance, the quiet Kiwi, Lindsey Stephens crept around the back of the large storm which had trapped most of us, made the turn point and then crept home for a conspicuous win. There's a lesson in this. Keep an eye on the quiet ones.

Later in the week, the storm clouds were closer to Keepit and the task was set for an easy two triangles through Rangarai and Gunnedah. It proved to be a fantastic get-high, stay-high day, floating between towering grey cloud masses which somehow provided slightly more lift than rain.



# KEEPIT REGATTA 2018

**The Keepit Regatta is back!**

The club's ever-popular LKSC Regatta is back again. The Regatta is a relaxed and casual competition, ideal for pilots who are new to competition and those who just like chasing their mates around the skies.

The Regatta is also a coaching event too where pilots can pair up with someone more experienced and either fly in a two seater or lead-and-follow fly in single seaters. The slowest of the pair is scored so here's a chance to fly as fast as Dave Shorter!

Flights are discussed and compared at morning briefing so the regatta is a great way to improve your general flying.

The rules are very simple and the tasks are all Assigned Area Tasks. Team flying and mentoring are encouraged. Groups work planning tasks, debriefing and analysing their traces to improve their performance.

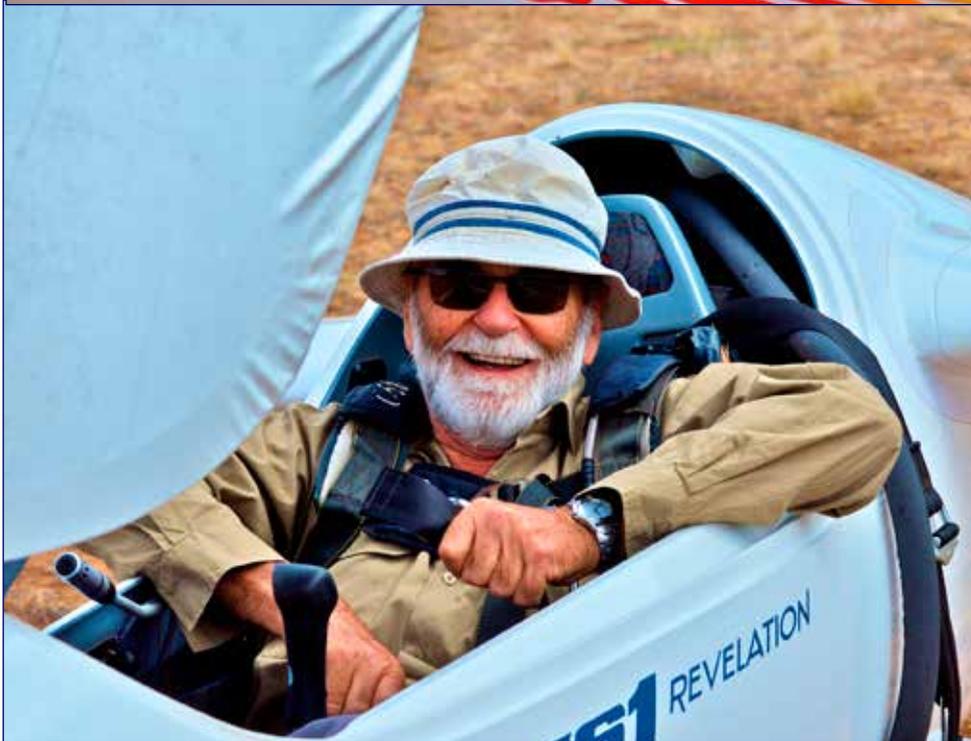
At the briefing session each morning, one of the experienced pilots will talk to a topic of interest. We have lined up some good mentors for the less experienced. So come along and learn from the best.

**A link to the entry form is up on the Keepit website. Pilot numbers are limited so get in soon!**

<http://www.keepitsoaring.com/LKSC/index.php/comps/lksc-regatta>

<http://www.soaringstuff.net/KeepitFast>





# CLUB NEWS

Hi John, Manager's gumph below... It's a bit rushed because you're off on the safari on Saturday morning and if you want an easy AFR on Friday, then suck it up!

## Your favourite club continues apace.

The 'season' started about 28th August. The concept of a 'summer Tuggie' has changed somewhat to more like a Tuggie tag team.

We have started with Pete Richie, Aussies Pete Summerfeldt and Rory Rearden, then the first of the imports Ollie Dunnett (see pic) who will be followed by Jake Mathews.

We also have the instructing tag team Aussie Mark Dorney, followed by Mike Birch, Jordan Bridge, Michael Harrison and Malcom George to take us up to May (and then hopefully Mark Dorney again).

Overheard in the clubhouse the other day 'why not get more Aussie instructors and tuggies?' Well!!! If I could I would. If you know any then send them here. They are like hens teeth!!

This year in May we held Lake Keepits 3rd instructor course and recently our First Ever aerobatics course! Thanks Pat Barfield for his time and expertise. If you want to get involved, get in touch.

There have been a heap of 3 and a few 500km flights achieved over the last few weeks. Lots of single seaters and Barnsey has been busy coaching in the Duo.

Your favourite club is continuing to grow and diversify, we even have a regular vintage gathering. (gliders, not old folk or woobla.)

Next one in early October. Facefriend is a great way to keep up with the happenings inventively entitled 'Lake Keepit Soaring Club, our page is updated regularly. If you have interesting (wholesome and Gliding related) things to add send to manager@keepitsoaring.com.

Keepit Fast is rapidly (did you see what I did there?) approaching. Jacques' long weekends are under way, the Regatta will soon be here. Normal ops is around 22 to 30 launches a day, every day.

## Paradise is going at full tilt.

Photos Ollie in the tug (*Ed. I guess he's the pale, underage looking one*), Milly having a flight, group of XC pilots (not all old folks!) after a few 300's. (*Ed: Not sure about the "few three hundreds". I thought they'd gone down from 375 to 330 ml to suit the Euros. What's more perplexing is that they seem to be drinking foreigner's beer not VB.*)

There's a great video of Aeros on the Facebook page I don't know how to get stills off it.

Cheers!

Val.

(If you stuff this up JC, you'll get your's later. I know where you live!)



# GALILEO GOES GLIDING

## THE FULL STORY ON WATER BALLAST



## Fly Like a Rock

*Dave Shorter*

It's a well established phenomenon that if you throw a feather, it won't go far, but throw a rock with the same force and see how far it goes. And so it is with gliders. An empty glider is a bit like the feather – fill the wings up with water and it goes like a rock.

Conversely, try dropping the feather and the rock together. Which one falls quickest? Similarly with gliders – the sink rate of the heavy glider is significantly greater.

The extract on the following page from the website <https://aviation.stackexchange.com/> gives a very clear explanation of the benefits of ballast. See box.

So, how much water? Under what conditions do you benefit? And what gain in speed can you achieve?

### Putting Water into your Glider

Read your manual first. Make sure you balance the wing tanks with the appropriate amount of water in the tail tank. The wing tanks are normally ahead of the CofG of the glider and need to be balanced by water in the tail.

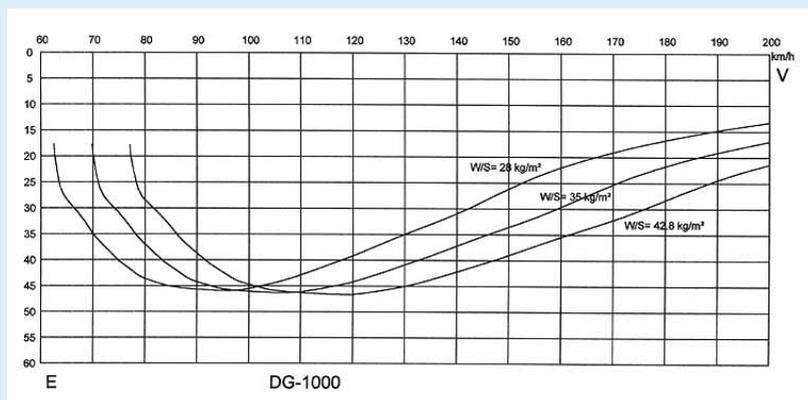
In the JS1, you need 1 litre of disposable water in the tank for every 25 litres in the wings. Your glider's flight manual is the guide.

**Never put hose pressure into the wings** – many very nice glider wings have been split open this way. If you're pressure filling, you should have a maximum of around 1 metre of head with your filling system. An overflow pipe in the water filling system a metre above the wing surface will achieve this.

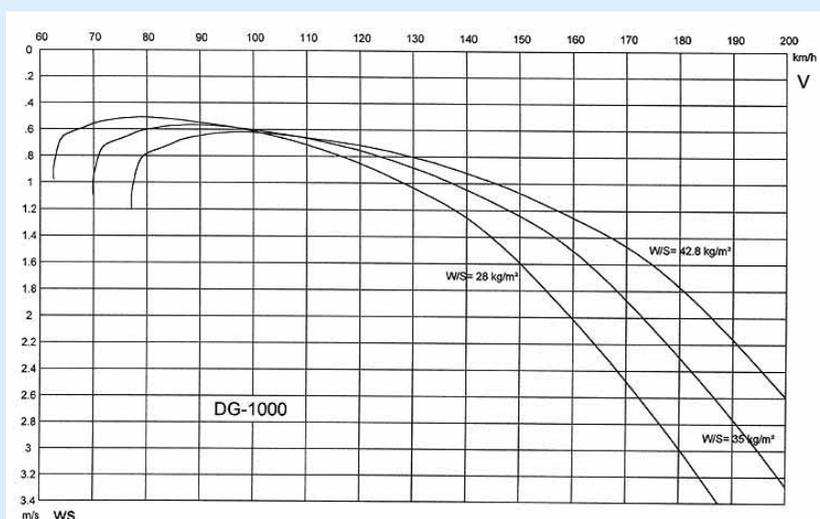
# The Polar Curve and Water Ballast

Let's look at this L/D(=E) diagram of the enticing DG-1000 from DG Flugzeugbau (but fear not, 'tis true for all gliders).

The first graph shows L/D at various wing loadings. The best L/D ratio is equal for different wing loadings, but occurs at different speeds - the higher the load, the higher speed. You can also see that the minimum/stall speed is also higher for higher loads.



The next diagram shows the polar curve: You can see that the minimum sink rate occurs at lightest load. The heavier the load, the longer you will have to circle in the same thermal for a given height gain.



Higher wing loading is a trade-off between higher average speed and less efficient climbing. In case of strong thermals and/or long glide intervals, the optimum moves toward more, in weak conditions towards less or no ballast.

The good thing is that you can dump water rather quickly (also partially), so that in a competition you usually tend to fill up (and dump in case) rather than start light (the Quintus for example can take up to 250 litres!)

Aft ballast in the vertical tailplane is sometimes used to balance a forward CG caused by water in the wings - depending on your ship, partial dumping can be problematic.

Of course there are many philosophies and tactical debates concerning the "water or no water" dispute, but once you've overtaken an identical, lighter ship with full wings and no height loss, you get to see how much fun ballast can be (until the next thermal, that is).



*Cheap water flow meters can be quite reliable provided the battery is not going flat, and the flow rate is sufficient. I keep two meters "in-line" to check on each other, and regularly check the flow calibration into a calibrated bucket. (Min flow 6litres/min for the Hoselink to register properly. Keep a spare battery and change at least annually or once a year.*

If you're not filling the tanks completely full, you'll need to measure the amount you put in. Pouring water into the wing with a 20 litre bucket and funnel is a bit fatiguing. Cheap digital water flow meters are available – see <https://www.hoselink.com.au>, <https://au.wellindal.com/garden/gardena/p-2907> or google “water flow meter”.

I've had some variable results with meters giving misleading results, particularly if the flow rate is too low, or batteries going down. I currently have two cheap meters in line, both reading as a check against each other (see picture). I also have a calibrated 10 litre bucket which I use to check that they are reading accurately. (I think the Neta flow meter may possibly be no longer available.)

After filling is completed, don't forget to check that all dump valves are working - including your tail tank.

## Before Launch

Towing a glider with water can be tricky – particularly traversing sloping ground. If the wing walker is on the uphill side, water may run downhill in the lower wing, resulting in that wing scraping along the ground. The wing walker may be insufficient heavy to keep the wing down, so add a weight such as a couple of old bottles of water to keep the wing from lifting.

Keep a careful eye out the rear when towing, to ensure you don't travel the length of the field dragging one wing on the ground and risk wrecking an aileron on a tuft of grass.

Many gliders need to stay level to prevent loss of water from a wing on the ground, so prelaunch, you

will need to prop the wings. Adjustable aluminium extension poles for painting, available from Bunnings paint shop, work well.

If the ground is uneven you can adjust the support height each side to ensure your wings are level. CAUTION – using small diameter broomsticks, or dowel poles to prop the wings can dimple the underside of the wing surface. Ensure that the bearing surface on top of the pole has something to spread the load, and if possible position the wing support directly under a rib.

If you don't have sticks, just keep the wing walker on until launch, and persuade your friendly wing-man to manage the wing walker after you've launched.

## Launching with Water

If it's your first flight with water, don't be concerned. Some people advise you to try your first flight with half water, but you'll find the glider quite manageable full of water. It feels more solid, doesn't get bounced around as much, and the glider is just as easy to handle full as empty, *provided you fly a bit faster*.

It is important to ensure your wing-man balances the wings before the tuggie starts to roll. If the wings are not balanced, when the wing-man lets go you'll have a lot of trouble holding that heavy wing up until you get full aileron control.

Conversely, if the wing-man gets your wings properly balanced before you roll, the inertia in your wings keeps the wings much more stable than an empty glider, and the launch is much easier to control.

**You'll need to aerotow at a higher speed.** A fully ballasted 18m glider gets quite “mushy” and uncomfortable aerotowing at 60 knots, and this can be quite dangerous.

If you're heavy, make sure the tuggie knows, and request a 70 knot tow. If on tow out you're not getting that speed, quickly request “plus 5/10 knots” (don't ask for 70 knots – he may already think he's flying at that speed, or his ASI may be over-reading – always say “plus” whatever you need.)

Aerotow with high take-off weight requires a powerful tow plane. Many tow planes are not certified to tow gliders with high take-off weights. Reduce the take-off weight if necessary!

**Winch launching with ballast?** A fully ballasted single seat glider all-up-weight won't be too different to that of a two seater trainer, so a winch with enough power to launch the training gliders should be able to handle a ballasted single seater.

However, stall speed is appreciably higher and minimum airspeed needs to be adjusted up (GFA guidance 1.3xVs min.) The JS1 manual specifies Min/Max speeds for 600kg AUW of 62/81 knots.

**Self-launching with ballast.** Modern self-launchers can carry about one and a half times the pilot's weight in water. This means that the glider is going to take a lot longer to lift off... on a typical Keepit day, about 50% longer. On a hot day, even further than that.

Check the flight manual for information on flap position. On gliders which are happy to take off with positive flaps, it may be recommended to use 0° or

negative flaps on the initial part of the take-off roll and move to positive flaps when you have aileron control authority

## Flying with Water Ballast

This is the fun part. As a rule of thumb you can expect to achieve another 10% in XC speed on a reasonable day. You should be cruising around 10 knots faster between thermals. And you'll need to fly faster when thermalling. Your glider will feel more solid and secure (if you happen to dump water you'll be surprised at the difference in feel, how light, jumpy and twitchy an empty glider feels in comparison to what it was like full.)

Remember that stall speed increases with wing loading – the whole polar curve shifts right. If your best L/D glide ratio occurs at 50 knots empty, you'll need to be flying at minimum 60-65 knots to prevent the glider mushing. Whereas you may find that an empty glider goes up best at around 50-52 knots, the same glider will require up around 60 knots to climb.

If you're heavy, enjoy the extra speed.

## Aerobatics

Glider may be approved to do simple aerobatics when not full of water, but most are not approved to do so when water ballasted. "Intentional spins with water ballast are not permitted." read one's flight manual!



## When to Dump Water?

The essential thing to remember is that it is all a question of trading off the higher inter-thermal speeds against the lower climb rates in thermals. If the thermals are strong, what you lose in climb rate is relatively insignificant.

But if it's a weak day, then the difference in sink rate can mean the difference in climbing or not.

Consider a hypothetical case – assume that thermalling empty the glider sink rate is 2 knots, versus 2½ knots sink rate for a ballasted glider – a ½ knot difference.

If you find a thermal where the air is going up at 3 knots, the empty glider will climb at 1 knot, while the ballasted glider will barely climb, achieving just ½ knot – half the rate of climb! A very severe penalty – you take twice as long to climb. Instead of, say, 25% of total flight time spent climbing, you'd be spending 50% of your time climbing.

You should dump your water. (The penalty is probably even bigger than this, as the heavier glider needs to fly faster to avoid stalling, or mushing, so it can't stay as close to the stronger lift in the centre of the thermal.)

If you're climbing at average 4 knots, the penalty of ½ knot is 13% and still significant.

But if you find thermals of 6-8 knots, the penalty is less than 10%, you'll be spending less than 25% of your time climbing, and the higher inter-thermal cruising speeds you can achieve with ballast more than offsets this climbing penalty.

In Australia in summer we're blessed with strong conditions, and very rarely do you take off without full water ballast. In comps, it's always an advantage to stay full, at least until you reach the first thermal on track. If it's a very weak day, you can dump down then – you've had the benefit of the flatter first glide to that thermal.

Some recommendations I've seen for older gliders suggest that ballast is not worthwhile unless conditions exceed 4 knots for the day. I think most of us tend to hang on to our water far too long.

The decision to dump or reduce loading depends a lot on your view about how conditions will develop, and also how well your glider climbs when heavy.

My Mosquito never seemed to climb very well with a wing loading much above 43 Kg/m<sup>2</sup> whereas the modern wing profiles seem to still climb well in weak conditions fully loaded (over 50 Kg/m<sup>2</sup>).

In Europe I'm told the calculation of how much water to carry is a very precise "art" as the weaker conditions make wing loading critical.

While on the ground, you should check the rate of water flow, remembering that in-air the flow rate could differ. (In straight flight the air pressure under the wings is higher than above, and flow is probably slower, while in a steeply banked thermal with extra G forces the glider probably sheds water quicker).

Typically, tanks will empty in around 4-5 minutes – some dump much faster than this. If you're having trouble climbing try dumping half your water – maybe a minute with taps open and see how it "feels" before getting rid of it all.

Normally, the tail tank empties at a rate which keeps the glider in balance but make sure the tail tank dump valve is open at the same time as the wing valves.

And remember thermalling etiquette – don't dump on top of other gliders thermalling below.

You also need to remember to dump before landing – I normally open the taps on final glide at around 15 km from home.

## Landing with Water

Most manufacturers don't recommend landing with full water – but if you need to, remember extra speed, at least another 10 knots over normal approach speed and a gentle round-out. Flaring the glider at normal approach speed with a heavy glider can give a nasty surprise – the glider doesn't respond to the flare the same way and you may have a heavy landing.

You must have the extra speed so that the glider will respond to your flare, and the stall speed is around 10 knots higher, so touchdown will be correspondingly higher. Much harder on the undercarriage.

## Problems dumping water

If you suspect that the water ballast isn't dumping symmetrically (typically by the position of the stick at low airspeeds) you must close the dump valves of the wing tanks immediately, to avoid greater asymmetry.

When flying with asymmetric water ballast you have to increase the airspeed, especially in turns, so that you can avoid a stall at all costs. A fully developed spin may not be recoverable with asymmetric load.

Fly the a normal circuit and touch down approx. 6 knots faster than usual and after touch down, carefully control the bank angle to avoid a wing touching the ground too early.

It is dangerous to fly with empty wing tanks while ballast is remaining in the fin tank because the CofG position might get dangerously after, therefore it is prohibited to put water in the fin tank if there is any risk of icing.

If the operating force of the fin ballast control handle is unusually low (you don't feel the force of the retaining spring) you should suspect that the valve cannot be opened. In this case you should shut all the valves, wings and tail, to avoid an inadmissibly aft CofG position.

If you must perform the landing with full ballast, try to avoid an outlanding. (That's verbatim from the manual!)

**Leaky dump valves** – often a problem. Drip, drip, drip. Try a bit of Vaseline around the rim of the valve seat. But be careful. Some dump valves rely on rubber to seal, and grease (to a lesser extent Vaseline) can degrade the rubber.

Neoprene is more resistant to grease. Silicon grease won't worry rubber seals. Some dump valves have a threaded centre into which you can screw a tool to pull down more firmly and improve the seal before launch. But if you partially dump water during the flight the valves may drip in air. Just depends how significant the rate of drip is.



Uneven, or restricted dumping of water - In a DG-202 I owned the neck of the water bags could twist during transport in the trailer, which restricted water flow when dumping.

The club's Discus IUO at one stage also had problems with one dump valve not working properly. This meant that you ended up with a very asymmetric wing loading.

Always check before launch that both wings are dumping water evenly. If you suspect they're not in flight, add another 5-10 knots to your approach speed when landing, and prepare for a ground loop at the end of your ground roll as you lose speed. In air, it's probably a good idea to consciously maintain a bit extra speed as a spin with asymmetric wing loading could be interesting.

## Bags vs Integral Tanks

There are potentially some issues with integral tanks – the wing structure forms the tank. Composite resins, and gelcoat absorb water and ultimately can deteriorate and weaken with water penetration.

The inside of the tanks may be sashed with paint or gelcoat during the manufacturing process to provide a water seal at the spar/skin joints.

How well this seal withstands continual moisture is unknown. Some gliders are known to have developed leaks and water penetration into the structure.

It is recommended that gliders be stored with water dump valves open to allow residual water to dry out – some people have installed small fans to aid the ventilation when hangared.

Water bags contain the moisture inside a vinyl sleeve which protects the integrity of the resin structure. But bags can also develop leaks, and the vinyl deteriorates with age and need repair or replacement.

Fortunately, there are a number of Australian companies which can supply good new water bags for a lot less than OEM bags.

IAN'S IPAD  
MY IPAD

JOHN - CAN YOU CHANGE THAT  
TO BEER O'CLOCK?  
TODAY AFTER NOON

1103 □

Mate! Can youse cast your eye over this? I know it's been six months (or sex mounce as the kiwis would say) but malcolms's internet's broke out here. Better not use the goat's gonads - goat of arms paper. I got the iPad down now. There may be the odd bit of spelling which needs your magic touch.

## Living Next Door to Alice

(that's the title so make it look important)

It's nearly 9 months since I finally arrived in ASP, Joy having been here since November 2016.

It all started when "The Authorities" (to pinch an expletive from the editor of this rag) said....."I've applied for a job in Alice Springs". ~~I knew which side my bread was buttered on~~ had nothing better to do so I copped it sweet went along with the idea, knowing their tolerance for woobla out there.

The moving process was fraught with challenges from renting out our house in Tamworth, moving ~~a few cases of VB and my shorts~~ personal effects to ASP, finding ~~a kumpie~~ accommodation here and all compounded by a broken rib - mine. Don't ask how!

Having got our rental property organised to our liking, our lease which we expected to be renewed until 2018 wasn't going to be when they copped a look at us so we started the process all over again.....Happy Days - not!

367  
94  
408

All these trials and tribulations are far outweighed by the pissups experiences we have had since being here. The scenery is breathtaking with a rawness and vastness that has to be seen to be believed except when the bay yard's on fire. (Does that sound poncey mate?)

Leo "your brain or mine" Davis tried to convey the vastness of the Simpson Desert (he said it was bigly huge so far as I remember) but it wasn't until I flew from Birdsville to ASP in PKD that I realised the enormity of the place. It's really BIG.



Whilst I had loaded up the plane with a slab and a few sarnies taken precautions with food, water EPIRBs etc, you are suddenly aware of the enormity of the area and the dire consequences of what happens when the noise stops something going wrong. Having come to grips with red sandhills and only red sandhills as far as the eye can see, there is an abrupt change in geography about 80 nm SE of ASP. Sand hills give way almost instantly to ranges of rocky hills and valleys some of which are ~~are~~ clenching quite symmetrical and fascinating.



Joy is accepting the challenge of working in a totally different environment to that of Tamworth and I am on a great bludge have started teaching R&A students at the Aero Club. We have had visits from Tamworth friends, one of Joy's relos from back 'ome, the Shorters, Casey Lewis and the Clarks. Christ some of those buggers can put the woobla away. That's me an a freeloader making like a local.

As far as gliding is concerned, the club here is going through difficult times with a low member base because you can't get a screwit into the ground but the CFI, Robert "I'm a Dutchman" Smits (also a member of LKSC) is planning some intensive 5 day courses which should bring a few in off the streets boost numbers.

The opportunities for cross country flying are downright scary interesting to say the least. For the faint hearted, outlanding areas are limited with the only viable options being North along the Stuart Hwy or West along the Tanami Road. Self Launch or Sustainer facilities would mitigate the risk of flying over very extensive tiger country and the potential for records is definately here.



Years ago Hans Werner Grosse set records from here, some of which still stand (Dr Google is your friend) and there have been a couple of tentative expeditions to suss things out so the future looks interesting ~~if you've got the bottle.~~

We haven't made full use of PKD but have been to Kings Creek Station, the closest airstrip to Kings Canyon where we walked around the rim and onto Uluru for a flyover and to refuel.

I have also been out to Newhaven in PKD which is a wildlife sanctuary operated by the Australian Wildlife Conservancy. Again refer Dr G but a fascinating aspect is the project to fence 65,000,000 hectares which will allow the ~~ferals~~ area to revert to a ~~free zone for ferals~~ feral free zone which is just what the buggers need.

Needless to say The Centre is a place full of ~~wierdos~~ interesting characters. Local lore has it that ASP is populated by either Missionaries, Mercenaries or Madmen - I'll leave it to your vivid imaginations to categorise Joy and me if that bastard Clark doesn't do it for me.

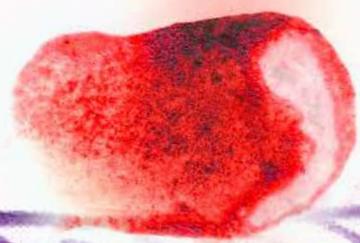
An example is a chap called Joel Fleming. Joel is a ~~wheelchair bloke~~ quadriplegic who runs a 4 wheel drive school where Joy attended as a work requirement (her company car is a Toyota and not a sissy Prius).

Joel is fascinated by Peter Warburton a British explorer in the 1800's who was ~~strangled~~ stranded for several weeks on one his expeditions. Joel is of the opinion that Warburton and Co could only have survived because they had access to water or a lot of beer.

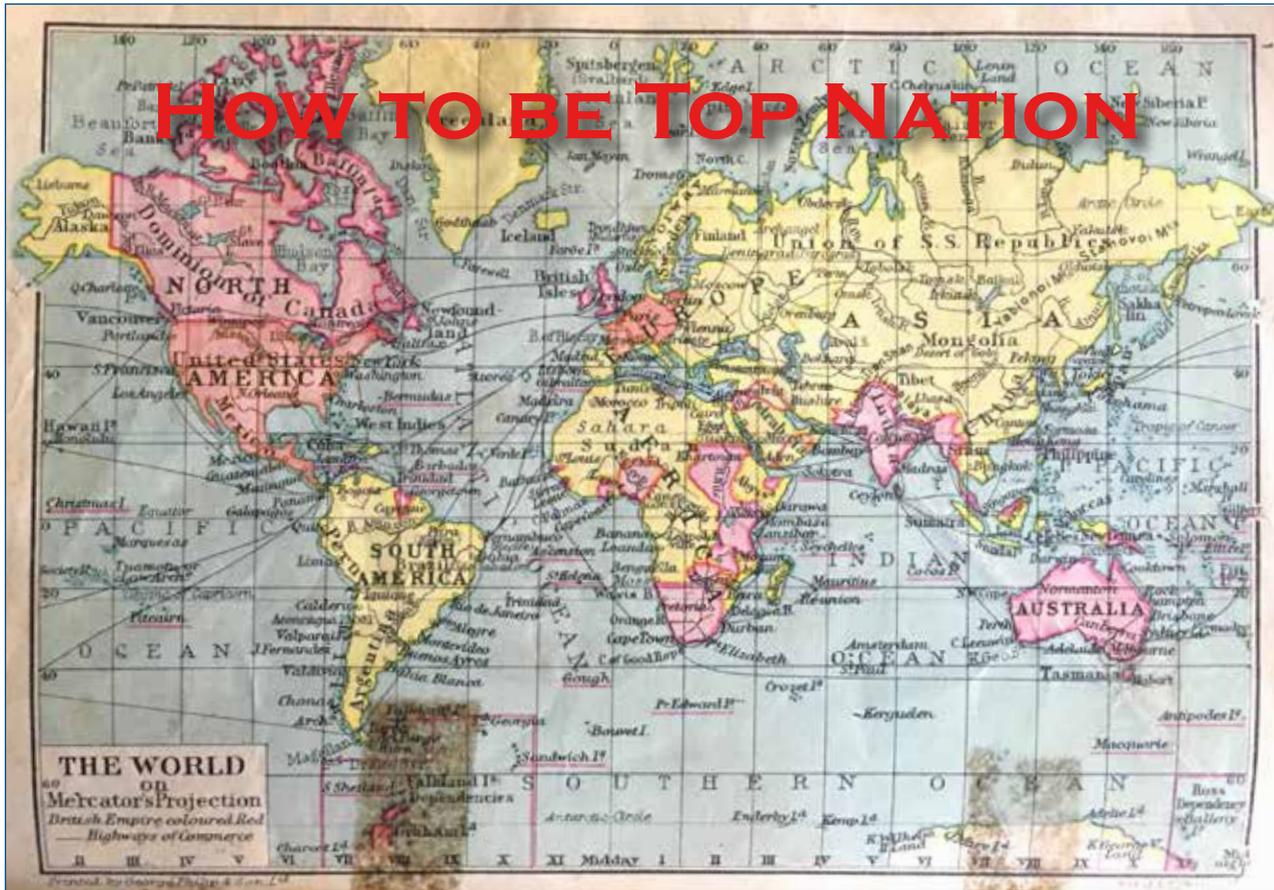
Finding the wells is a passion of Joel's and whilst he has led several trips into the general area, using PKD to grid search a larger area in a short time should lead to success. This will be a fabulous experience as the people involved, both European and Indigenous, are highly skilled across many fields of expertise.

Finally, it has been a wonderful experience so far. Whilst there is much sadness here when confronted by the local Aboriginal situation a lot has been tried over the years with ~~zero~~ varying degrees of success. It seems getting the buggers to school education is the key but the implementation is a huge hurdle. ~~It sure was when I was a kiddie.~~ We have met people and seen things that are unique to the Centre and hopefully we are the wiser for it.

All things taken into consideration, would Joy and I do it again? - you bet!



# HOW TO BE TOP NATION



Some long time ago in the last century, in the room where we learned history, geography and were caned, there was a great yellowing map on the wall showing the British Empire and the rest of the world. The school was founded in 1292 and I assume the map of the world had been there ever since... and we owned most of it.

My ancestors were the traditional custodians of everywhere that mattered, including all the sea and France from Calais to Bordeaux. England was Top Nation and most of the colonials (the French excepting) knew their place.

By the time I was transported to Australia, England was no longer top nation and most of her colonies were long gone.

Those of us with memories were suffering inter-generational trauma from the loss of the best half of France, and it took me some time to get used to an Australia full of uppity Australians who seemed to think that not only did Australia no longer belong to England, but that Australians were every bit as good as those from the mother country.

Of course, with a year or two of absence, I realised that in many cases Australians were better.

Australia was the fairest society in the English speaking world back then. I doubt anyone would say that right now, but that's the subject of another rant.

Australian's are seldom uppity on the world stage these days. With good cause. Our politicians still bend over and grovel as they have always done but now our cricketers and rugby players seem to lose more than they win, our swimmers are mainly famous for bottling and our tennis players for Olympic tantra.

No, if you want to see uppity colonials today, you have to look elsewhere.

I'm not talking about uppity Kiwis, they're everywhere. Note that the map alongside does not even have NZ on it. There's a whole website devoted to maps without NZ.

Obviously, the Kiwis own rugby. They also own sailing, not only on the water but also in the boat builders, mast makers and sail lofts in the world and they are world-class uppity but... If you want real uppity, you go to South Africa.

Every student of gliding history knows that in sailplanes, Germany is Top Nation. They invented the sport and have dominated design and development for close to a century. If you didn't fly a German glider, you were flying second best.

Until now.

The problem with world domination is that you get complacent, stale and a victim of your own success, leaving smaller and more nimble players to do the innovation. A great example of this is the British motorcycle industry. In 1965, it was the biggest and most successful in the world.



By 1972, the British motorcycle industry had all but ceased to exist. A combination of poor management, average designs and a failure to re-invest in modern machinery and designs made the entire industry vulnerable to attack from the outside.

And who is doing the attacking in the sailplane business? There are numerous companies in the old Eastern Block with lots of composite aircraft experience doing interesting things but they're never going to be Top Nation due to the gloom thing no doubt.

The most successful new sailplane builder right now is one which comes from a country with no experience in building gliders at all, yet they have gone from startup to being a serious contender for Top Nation in less than a decade. Yes, it's South Africa.

South Africa is not top of most people's list as a holiday destination (though why not? It's got some fantastic places and things to see.) The reason I was there was that some uppity Yarpie was marrying my daughter.

He did ask. I could have said no but while I was thinking of a suitable wind-up, my wife texted 'With my blessing' and I had nowhere to go.

What do you do with 2 weeks in South Africa, assuming that you're flying into Johannesburg? There are only so many lions and tigers you can see. So a deal was done that saw us spending a day in Potchefstroom at the Jonker Bros. factory before the festival of bad taste and excess which was my daughter's wedding. (She takes after me.)

Potch is an interesting town and reportedly has few of the problems which plague the rest of that sorry country.

It's a university town so the Jonker's factory is a great site (perhaps the only one) for work experience.

I have been to a few glider factories from the traditional to the ultra modern and while the visits were interesting, they were generally not impressive from a technical point of view, at least not from a technical factory owner's point of view.

Building sailplanes is a strange mix of aircraft engineering and the type of cottage industry skills you'd see at a surfboard factory, 40 or more years ago. Many of the techniques in use in Germany have not changed significantly in 50 years.



Fair enough, they got it mostly right back then, but the world moves on.

With that in mind, I was not expecting too many surprises at the Jonker's factory. The first one came just inside the front door where we saw a group of young engineers having an induction session and it went on from there. I was really surprised at two rooms full of eager young engineers modelling entire gliders on high end CAD systems whose annual subscription would run into hundreds of thousands of dollars.

Have a look at the maintenance manual of most new gliders. While a lot of the drawings will be obviously CAD, there will be some, notably the control

system drawings which are still copies of a drawing done with a quill pen. Fair enough, they got it mostly right back then, but the world moves on.

At Jonkers, the entire plane, including the full control system is modelled in 3D. I saw many beautiful on-screen views including drawings of multi-part silencers flowing around engine assemblies to get the required noise reduction and at the same time keep the fuselage volume down.

Potch is remote and remote means you have to be independent. It's a major factor behind Kiwi ingenuity. However, I was surprised to see the number of computer controlled water jet and laser cutters, CNC

mills, lathes and cloth cutters at work... more than I had seen in Germany where it's probably easier to out-source parts.

From experience, outsourcing may be cheaper but may triple development time compared with doing something in-house.

I was a little surprised to see that the workforce is an even mix of skin colours. No doubt labour rates are fairly low in SA, as in fact they are in the USA compared with Europe but in a country where unemployment is high, Jonkers must be a great place to work so they get the pick of who is on offer.

I spent a lot of time with the production manager talking factories and learned that Jonker's procedures and standards are every bit as stringent as I have found in Seattle companies who employ ex-aviation industry workers.

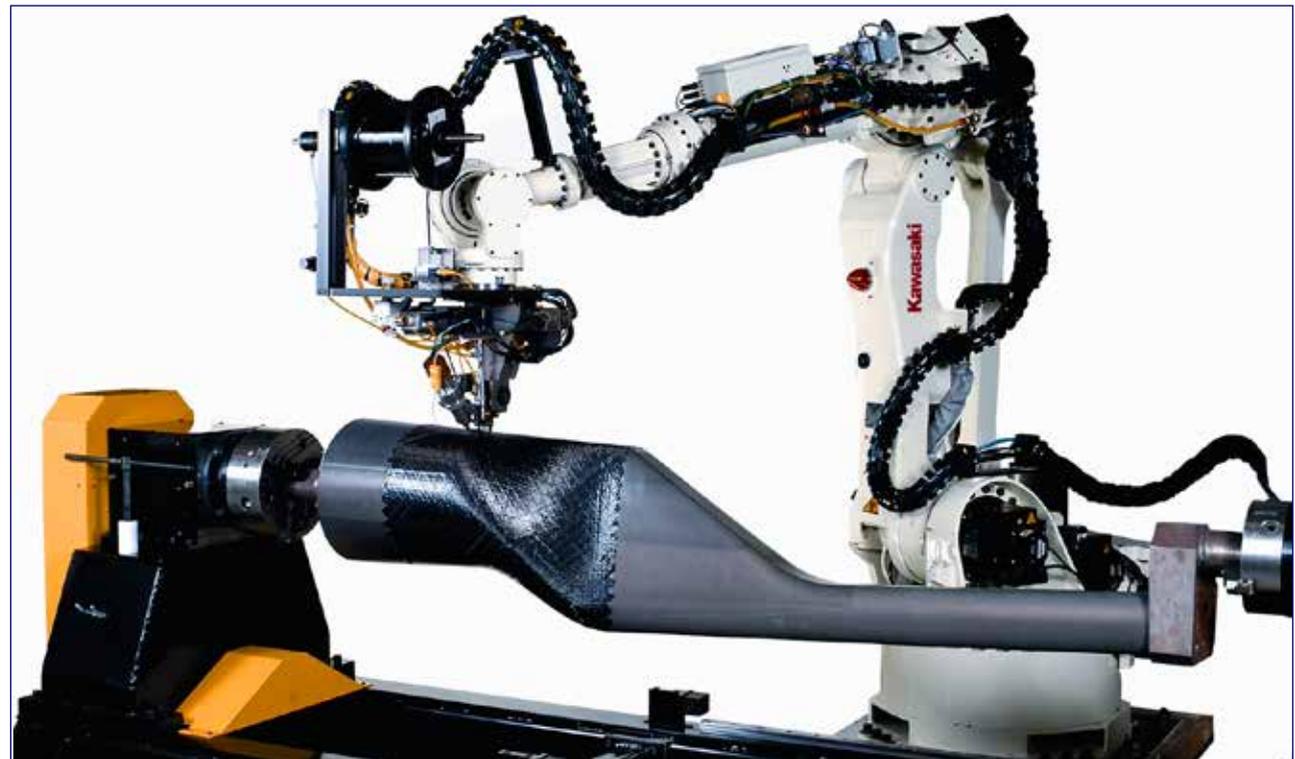
I talked to Uys Jonkers for a few hours and was really impressed by his desire not rest on their current success, but to move onwards and upwards as soon as possible. This means exploring new ways of designing gliders, new processes for composite construction and new methods of assembly and finishing to improve the product and remove the variations between individual gliders which are common elsewhere.

The Germans pioneered composite building techniques for gliders and have been Top Nation for over 50 years.

In the beginning, layups were done with a jam jar of resin, a paint brush and a squeegee... and in many cases still are. Glass has given way to carbon and balsa cores to foam but the building techniques of sailplanes remain much the same while the rest of the composite world has largely moved on. It works fine and why change something which works?

There are a few good reasons for doing change but one is that it's often said that the differences between different makes of gliders are less than the difference between gliders from the same mould. There's too much variation in assembly and finishing to use these techniques for building commercial transport aircraft.

In most of the commercial aviation world, pre-preg systems have largely replaced wet resin layups. Carbon cloth is pre-impregnated with an accurately controlled mixture of resin and hardener and kept cool until it



is required. In many cases, the pre-preg cloth is CNC cut before laying up in the mould. The result is a very consistent process compared with a wet layup.

Curing is done under heat and pressure in an autoclave with vacuum bagging or an inflatable bladder squeezing out excess resin. The process is clean and controllable and results in a lighter and stronger product which does not soften at low temperatures they way most sailplanes do. But mostly, the process reduces variation between components.

The costs of this technique have dropped over time to the point where many composite products such as one-off yacht masts, costing much less than a series production sailplane can be economically made with pre-preg layup in a CNC machined aluminium mould.

An alternative technique which is used on products from boats to executive jets is resin infusion. Here, dry fibre is laid up and instead of using a paint brush, resin is sucked through the fibres in a closed mould. The infusion process has to be carefully controlled to get the same consistency as with pre-preg.

For maximum performance, manufacturers are turning to Automated Fibre Placement and Automated Tape Laying. The key to both these is the word Automate. Instead of laying up by hand, a robotic machine is used to either lay fibre or pre-preg directly into a mould or to lay a matrix of fibres into a pattern which is later pressed or sucked into a mould.

With AFP, the fibres are often coated with a thermosetting resin and the machine heats the fibres with a laser or UV heat source as they are laid to



produce a laminate which needs no autoclave, so-called out of autoclave moulding.

With ATL, pre-preg fibres can be laid directly into a shallow mould by machine, a process which works well for wings. The huge advantage over a conventional pre-preg system is that the machine which lays the pre-preg, puts it down exactly where engineering says the stresses are. The head contains a cutting mechanism so fibres are laid only where needed, resulting in the strongest and lightest layup and the least waste.

While it's possible to spend many millions on an ATL machine, it's possible to buy one for the cost of a good glider (ask me where!) There are big savings in materials and labour and the product quality is optimal so there's little excuse not to use these techniques.

After seeing the Jonker Brothers' factory my guess is that we're going to see a lot of innovation coming from that side of the equator and those manufacturers north of it will have a chance to experience true disruption.

I own a German glider. It's good but by no means perfectly made. But in the unlikely event of the leader of the opposition declaring a budget surplus large enough to allow a new glider, say a 21 metre self launcher, for me, it would no longer be a given that the glider came from Germany. By then Germany may no longer be Top Nation when it comes to glider building.





# ALICE SPRINGS MICRO SAFARI

For some time I have been thinking of putting my wife up for a Kitty Wills award "For services to gliding and glider pilots above and beyond etc..." In 1938 over the Easter holiday, Kitty drove 1280 miles, towing a glider trailer, in something like a Standard Vanguard on UK roads.

In the last decade, my wife Geraldine (AKA the Princess) has driven of tens of thousands of miles towing a trailer through Australia's outback and made the annual gliding safaris of a small group of us possible.

Unlike Kitty, the Princess was in a modern four wheel drive and wasn't towing a old glider tailer but she was travelling in remote areas, often on roads with less than one car an hour and most of the time, without phone signals. Many of the cars broke down. So perhaps she does deserve an award.

Of course there's a danger that an award of any sort alerts the recipient to the fact that what they are doing is out of the ordinary and they decide to stop, so I put the award idea on hold for a while.

Last year's safari was one of the less arduous. We'd set out for Alice Springs, perhaps a 5000 km round trip by road, but only made it to Clare Valley in the wine growing region of South Australia, about half way.

During a series of relaxed dinners, and there were many since the weather was unusually bad, one of the other pilots was pushing the idea that the Princess get a CRM114 which was either a gadget from Dr. Strangelove or a very expensive French turboprop aircraft.

Over the course of the safari, the idea of a 'noisy' aeroplane in which she could to some extent experience the joys of remote area flying was planted.

The princess is more than usually suspicious of aircraft, especially those which make noise, but the idea of a touring motor glider with wings big enough to slow its plummet from the skies should the noise stop and with fuel consumption enough to satisfy a greenie such as herself, seemed to be acceptable.

One of the carrots was that we could travel together and go to places which were too far for gliding safaris such as Alice Springs and Ayer's Rock. The former mid-week manager at Lake Keepit Gliding Club, Ian Downes had gone to Alice with his wife, leaving Val Phillips well in control.

Ian was not the best at manager's reports for this newsletter, so I helped where I could, sometimes writing the whole thing. And of course there was that memorable picture of Ian in the rubber fetish suit which was the fault of photoshop.

While he was on the way to set up house in Alice Ian had dropped in on the princess and I at a remarkably early hour at an outback motel during the last safari so some sort of payback or revenge was in order.

The initial idea, inspired by the film Steelyard Blues, was an elephant poo drop on their house. Falling faecal matter doesn't seem to be outlawed but the baggage restrictions in the Ximango made this unlikely. However another idea presented itself.

Hands up anyone who remembers Maralinga? Maralinga was established in the 50s as Britain's main nuclear testing site on Australia's mainland. After a



series of atmospheric tests and further experiments, in 1967 Maralinga was cleaned up and handed back to its traditional owners leaving more than 22 kilograms of plutonium lying on the ground.

While looking at a possible route to Alice for the gilding safari, I had discovered that tours were being done at Maralinga. It's a place which has always fascinated me but it's so far away from anywhere that if you were going anywhere close, you'd have to take the tour... wouldn't you?

It looked like the perfect place to get a house warming present for a friend.

"So m'sieur, you going to give the safaristi a blow by blow, day by day account? Bated breath...(smoked salmon for lunch),"

It's long been a tradition that I do an email account of the trip for the club newsgroup. The initial idea behind it was to try and encourage more people to try this form of adventure soaring but the emails have now got a life of their own.

"We made reasonable time to Cobar for refuelling... reasonable based on the traditional safari headwind. The next leg was a bit touch and go. I'm not used to looking at some computer thingy and having it say that you'll be in the circuit at such and such a time and actually being there.

"It's fascinating to fly so easily over places where you have suffered... and I guess most safarians have places on the road to Broken Hill where we have



*The dreamy wet stuff beyond, beckoning our AI.*

suffered, from the swamps of despair near Nygan to the cliffs of insanity towards Broken Hill.

We made Broken Hill about 15 minutes before sunset, tied down and went to the Princess Suite as usual. The forecast for the next day were a bit confusing but the winds were forecast to drop towards the west.

"Geraldine asked at one point whether we were across the border and then panicked... she had three uneaten mandarins. She was nearly arrested for interstate transportation of illegal avocados one year and even though we were at 6000', mandarins had to be eaten before we crossed into South Australia.

"More of a problem was the peel. Being an relentless greenie, she would not throw the peel over the side, and left that up to me. This was followed by a big argument about what would happen if a piece of peel fell on a horsie, somewhere near... well near nowhere in particular."

We had strong headwinds that day and made slow progress westwards. It's long been known that the prevailing winds are from west to east and the meteorologists involved in the bomb tests were concerned to make sure that radioactive plumes did not drift downwind over prominent population centres so it was either Brisbane or Adelaide which got clobbered.

We flew into light rain and heard a report on the radio about strong winds on the ground... 25 gusting to 35. No mention of knots or kilometres or location. I had a close look at two airstrips but they were narrow dirt strips with a strong crosswind and I doubted my and the Ximango's ability to cope, so we aimed for Port Pirie which has three cross runways and landed straight into a benign 6 knots.

We met talked to the pilot of a Flying Doctor Kingair at Port Pirie, South Australia's lead poisoning capital who had glowing reports about the tour at Maralinga, though he said he would not go there if the wind was very strong.

The leg from Port Pirie across the water to Whyalla was brilliant. We don't get to glide enough over the sea! The gap is pretty narrow and at the climb rate of the Ximango, within glide angle back from the middle. We landed at Ceduna around lunchtime and after refuelling, we had lunch by the sea in town and were fairly quickly back in the air.

The first third of the leg to Maralinga is over billiard table flat farmland at the edge of the Nullarbor. Beyond that, the terrain changes to strange and uncomfortable striated ridges, covered by scrub in a giraffe skin pattern.

I presumed that these were remnants of old sand hills but perhaps, bearing in mind the direction of the ridges, they were caused by one of the Maralinga blasts? Beyond, things fairly abruptly changed to more typical flat treeless plain.

Flying pretty much into the sun meant we could not enjoy any glow from the terrain. When the single strip loomed up, it was a bit of a surprise. Not only far

bigger than I had imagined... it's supposedly cleared as a space shuttle emergency strip... but also nicely bitumened (back in 1956). And according to locals, never repaired since.

We had been asked to buzz the 'village' and because the Rotax is not as loud as a Lycoming, we went over at about 300' which P2 thought was a thousand feet too low. The strip was so long that I started finals over the piano keys and still managed to get lost after touchdown looking for the taxiway.

The tour guide, Robin, had been waiting two hours or so (the phone reception is patchy!) in case he missed the plane. We tied down to some heritage concrete blocks which had been used to tie down one of six Mustangs which were placed in the path of the blasts to see how they fared. The aircraft were recovered some years later and apparently most are flying today in the USA.

I don't usually organise anything more complicated than dinner so it was not a complete surprise to discover that catering is strictly BYO at Maralinga. One of us had not read this on the website and told the other one and regrettably, the emergency muesli bars and nuts were left in the Ximango, a 6 km walk away in the dark... although there's no real dark around here what with one thing and another. In fact, they generate power by pointing solar panel like things at the ground rather than the sky.

Both of us can lose a few kgs and we're not strangers to the alcohol free night even if never on safaris. Being one of the stolen generation (English boarding school) and growing up with rationing, I am no stranger to starvation either, unlike Geraldine who grew up in a



*8,000' over the strangely striated sandhills towards Maralinga. Oh to be in a real glider!*



*That's not an airstrip, THIS is an airstrip. She authorised me to land there, considering the size.*

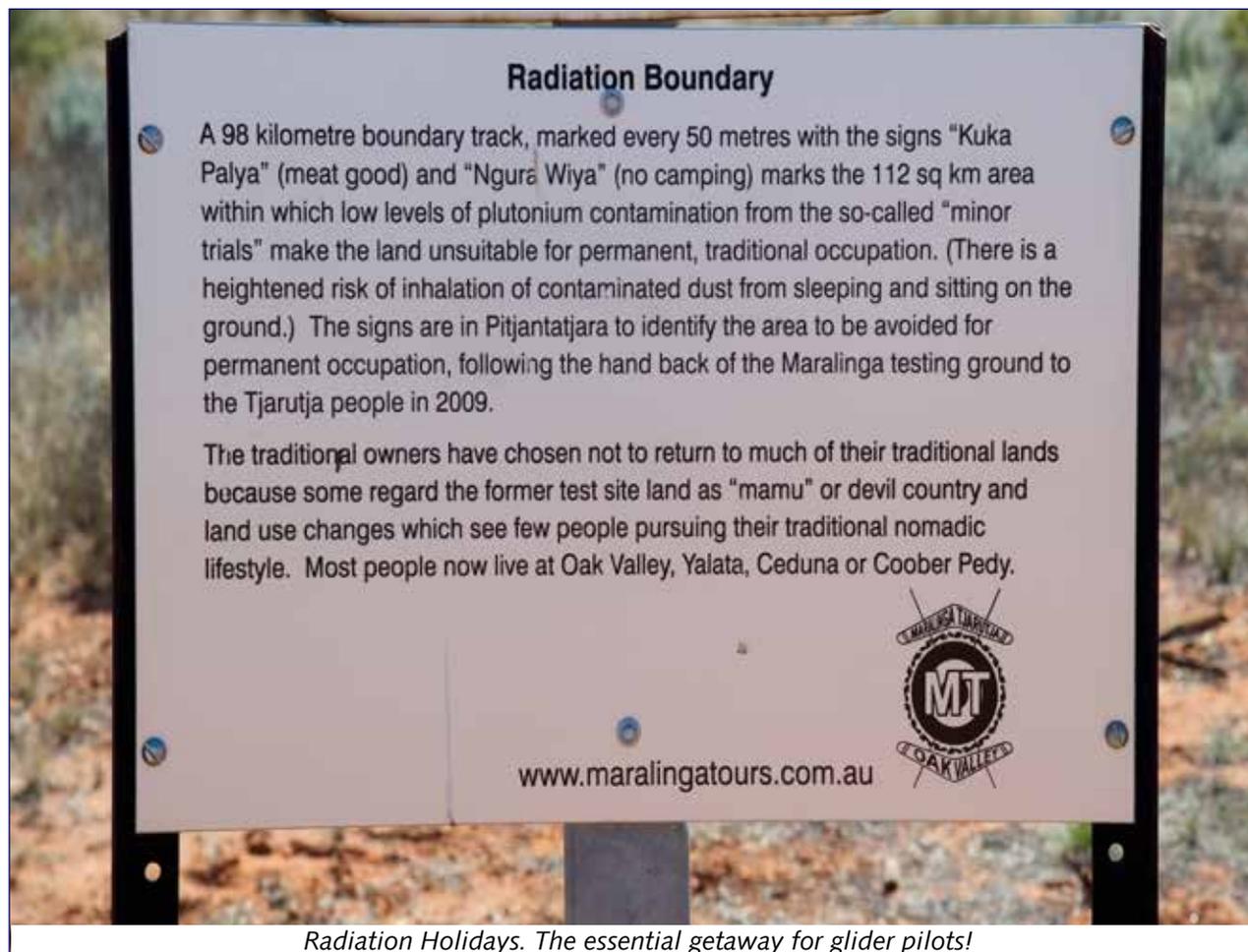
time of plenty and a land of plenty. However it is me who was panicking. The nearest shop is 4 hours away by road!

However Priscilla, Queen of the (Maralinga) Desert, the wife of the caretaker, came to our rescue with a box of food. Of course, everything out here is deep frozen and most 'food' that's deep frozen isn't. In fact, real food was talked about and things were looking quite good until Geraldine mentioned the V word. I would have gratefully downed a chop or two but once the Vegetarian word escapes, it's misery all around.

Things took a turn for the worst after 'dinner'. Our daughter Zoe sent me a text message along with a picture. The phone coverage out there is so slow that in the 10 minutes it took to download the picture, I discussed with the Princess whether Zoe's news might be that she'd got a new kitten to replace the 'needy' one she gave away but no. She was expecting a baby of a different kind. This caused the Princess to go into a major panic, saying she would not be allowed to hold a baby if she came back all radioactive.

We woke, part hungry, to the eerie glow that's Maralinga in the pre-dawn, clutching our stomachs and got ready for the tour. I did not think this would be an important part of the culture of my people but it turned out to be a chapter of shame for both the UK and Australia.

After the tour, back in our donga, the Princess made some excuse about getting up early the next day and had a decontamination shower. I resisted a little and had a nervous one shortly afterwards with a good scrub. If we'd had more than one set of clothes, we probably would have burned our old ones. Radiation



*Radiation Holidays. The essential getaway for glider pilots!*

gets to you like that.

At dawn the following day, we set off northwards to Cadney Homestead which is a roadhouse on the Stuart Highway serving Avgas, Mogas and bacon and egg rolls of which we ate a few. Most of the terrain we flew over was quite daunting and some of the most 'interesting' I'd seen.

It's a funny thing that after spending hundreds of hours gliding in this sort of country, the noisy thing up front makes you more nervous than silence!

I'd bought two books on Maralinga before setting off but decided not to read them just in case the facts

put me off doing the tour. Now I was sufficiently disturbed that I had to.

And a souvenir house warming present? To tell the truth for once, when we visited the site of one of the low air-burst bombs where the sand had melted into glass, I could have picked up a few lumps but was by that stage almost too nervous to breath the air, let alone stir up any dust! We settled on a few layers of melted glass from an observation post which had melted while being burned during the 'clean up' of '67. It proved to be sufficiently convincing that the recipient would not touch it and I assume it's still glowing away on the kitchen table in Alice.



*These straggly plants are all that has re-grown around ground zero. A few kilometres away, there are moderately tall trees. The ground was turned to a sheet of green glass which was scraped off in one of the many clean-ups leaving just the attractive lumps which remain... as the ideal house warming present.*

**The tour...** well, it started at 9:30 and ran until about 4:30 and there was never a dull moment. Robin who is 99% of Maralinga Tours seemed to know almost everything about Maralinga didn't attempt to politicise the tour. He just set took us around, told the stories and let us make up our own minds. From my later reading, he was never factually wrong.

The British nuclear tests don't reflect well on anyone apart from the wretched servicemen who had to slave away in 45° heat to build the place. And it was men. No woman was allowed to put a foot on the ground. Notice in the picture below, the air hostess standing on the last step at the foot of the gangway?

It wasn't just the British. That fawning toady Menzies gave them permission to let do the testing on the basis of a 15 minute phone call and didn't tell parliament for another 3 months. The tests themselves were held first in the Abrollos Islands, then at Emu Field, some 400 km north of Maralinga which was deemed to be too remote.

After the nuclear test ban treaty, the major tests stopped and only minor trials were carried out. These, however were frequently more polluting than any of the major blasts. Surprisingly, the radiation from a nuclear explosion does not last particularly long... certainly nowhere near as long as the radioactivity from elements such as plutonium and uranium which have a half life of 25,000 to 4.1 billion years.

The English wanted to know what might happen in the event of a nuclear accident where a truck or a plane carrying nuclear materials crashed. The so-called minor trials involved 'Broken Arrow' experiments such as wrapping plutonium with

dynamite and wood to see what happens if you set fire to it and then blow it up and that was how 22 kilograms of plutonium were spread around the site.

There were countless inexplicable experiments on volunteer servicemen who were never told about the risks other than that they should take a good long shower afterwards.

It's possible that the local aborigines never lived at Maralinga but they certainly moved through regularly. It was the responsibility of the sole Native Patrol Officer to clear them from the area before the tests... his patrol area stretched from Kalgoorlie to Parkes... about the same as Paris to New York.

There are many stories, discounted by the authorities then and now, of a serviceman discovering a group of aborigines camping in a crater just days after it had been formed by a nuclear blast a hundred metres or so above.

The land has been given back to its traditional owners now... but they won't return. They believe it's been poisoned and probably it still is. The area of the tour is limited to the site of the major blasts. We didn't visit the sites of minor trials.

Nobody appears to have been sick at Maralinga apart from one person who was treated with milk and iodine for food poisoning... but then the hospital records were lost. Even later, none of the often mysterious illnesses and rotten deaths of the servicemen who worked there were, according to the various governments, not due to the considerable radiation exposure although the NZ government seem to count four times as many odd cases as other governments but then they would, wouldn't they?

# MARALINGA RUNWAY

Up to 30 planes were using the strip each day during the Test series. The strip is one of the longest in the Southern Hemisphere and still highly regarded by both the Civil Aviation Safety Authority and the RAAF. Completed in 1956 it has never needed any surface repairs. It remains as an emergency strip for planes flying across Australia today and was registered as a suitable back-up, should the US Space Shuttle have needed it!

The 80 metre long touch-down pads at either end were built upon reinforced concrete - built to last the anticipated 30 years of British use of the Maralinga Atomic Testing site.



Test site staff leaving Maralinga 1964



Covent Flight from Maralinga 1964



Crew of B-29 bomber  
Training Bombers were used  
to keep the runway for  
initial destination tests



Bristol Britannia aircraft at Maralinga



RAAF Bristol Freighters were used to bring heavy equipment that had been shipped from Britain to Adelaide and then flown to Maralinga.



Terminal 1960s - A DC3 belonging to Airlines of South Australia and used to provide passenger transport between Adelaide and Maralinga in the late 50s and 60s

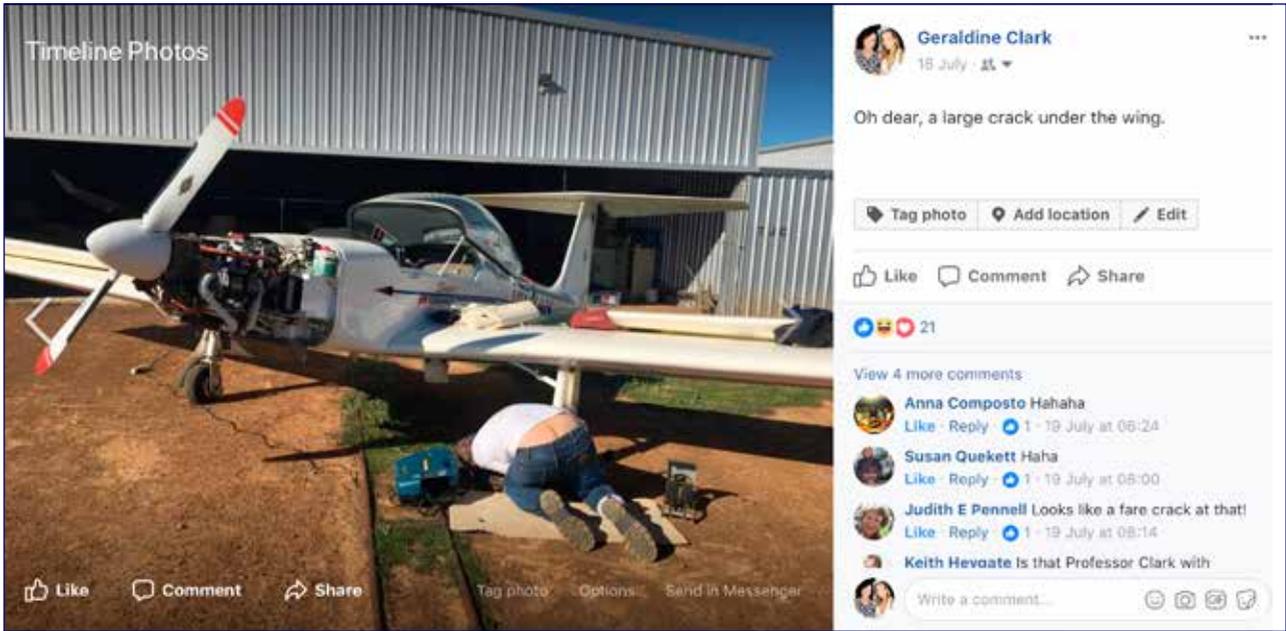


RAAF Canberra - Another type of RAAF plane regularly using the Maralinga facilities, these Canberra Bombers were generally on loan to the RAAF from the RAF



[www.maralingatours.com.au](http://www.maralingatours.com.au)





# SUPPORT YOUR LOCAL MILLER!



The community of LKSC bakers (and there are a few of them!) are fortunate to have one of Australia's best flour mills right on their doorstep. Demeter Farm Mill flour comes from the Wholegrain Milling Company at 17-21 Borthistle Road Gunnedah NSW 2380.

A good range of organic bakers flour as well as grains and muesli can be bought direct from the mill in 1, 5 and 10 kg bags.



# POWER TO THE PEOPLE

## The Good Oil on Batteries

*Dave Shorter*

Keeping glider batteries charged and in good condition is a continuous problem for glider pilots. They deteriorate, run out of charge at inconvenient times, and are the cause of many instrument malfunctioning problems.

How can such a simple device, based on technology of 100 years ago cause so much trouble?

The typical battery used in gliders is a sealed lead acid (SLA) battery, housed in a standard sized plastic container, 151mm long x 65mm wide x 95mm high.

Based on “ancient” lead acid battery technology, used forever in automotive batteries, they consist of 6 cells, of nominal 2.1 volts/cell, assembled in series to give us the 12volts of power we need.

The liquid electrolyte between the lead plates of an old car battery has been replaced by a gel, which doesn't spill, and more recently by “Absorbent Glass Mat” (AGM) technology – where the electrolyte is held in a mat of glass fibre between the plates.

AGM batteries have a very low internal resistance, and will fully charge at a lower voltage, will accept a higher charge current and will fully charge in less time (3 hours). They can be discharged deeper than conventional batteries without major damage.

They self-discharge at a lower rate, and even after 12 months sitting idle they can supposedly be recharged and put back into service without any major damage (although I would not recommend this practice.)

You may see the term “Valve Regulated” or VRLA, which refers to valves (vents and diffusers) fitted inside the battery that allow safe dispersal of hydrogen gas when the battery is recharged (particularly at excess voltage).

Valve activation allows some active material to escape thus decreasing the overall capacity of the battery with age. All modern SLA batteries will be valve regulated.

# “All Oils Ain’t Oils”

## Deep Cycle Batteries are what you want

As with Castrol oil, so it is with batteries – all batteries are not alike. Batteries are designed with different uses in mind – cranking batteries to start automobiles, or motorbikes, require a high discharge current, but are rarely cycled down to low voltage.

Standby batteries for power supply backup similarly spend most of their lives at full charge. The lead plates in these may contain a lattice or holes to increase the surface area and deliver the higher current when required.

Batteries for gliders require a “deep cycle” capability, being regularly run down to low depths of discharge (DOD), utilising a significant proportion of the battery capacity, for extended cycles of operation. The lead plates tend to be more solid and may weigh more.

At a former club I belonged to, one of the members was a technician who serviced medical equipment with standby SLA battery power. The batteries were conveniently 12volt 6AH of standard size, and were replaced annually by the technician, mostly having never been used.

We had a constant renewable source of batteries at no cost .... But we needed them, as they wore out in no time at all, due to the deep cycling of charge with glider usage. Radio distortion problems were a constant at that club.

## The Ratings - Amps, Ampere-Hours, Charge Capacity, Voltage

**Ampere Hour (AH)** rating is a measure of the charge capacity or total current that the battery can deliver. It is the current(amps) x hours that the battery will sustain until fully discharged. Battery manufacturers typically use a 20 hour test cycle to specify this rating.

So for a 7AH battery it would deliver 350 milliamps for 20 hours (20 hrs x 0.35amps =7 AH). BUT, the higher the current you draw, the less AH capacity you’ll get. For the same battery a 5 hour cycle rating would give around 5.6AH – 18-20% less! If the battery is discharged over 1 hour the AH capacity will be reduced by around 50% - and so will the life.

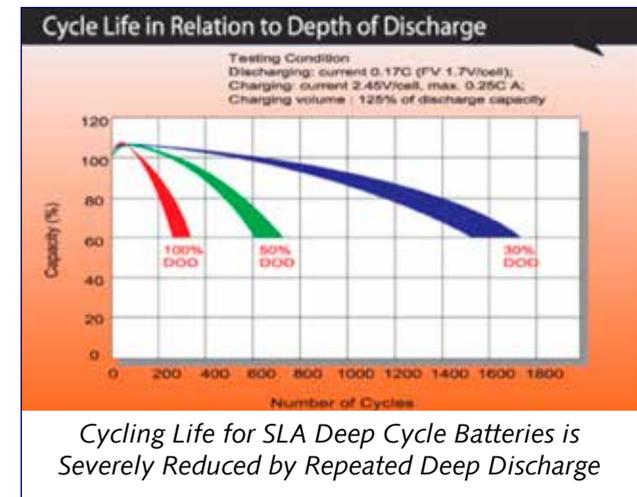
State of Charge of a battery is usually indicated by the voltage. Voltage drops as the battery is used. Unfortunately the true state of charge by voltage measurement can only be ascertained properly when the battery is at rest (no load voltage).

For longest battery life manufacturers recommend that batteries not be discharged regularly below 30-40% of capacity, but we regularly run our batteries lower than this, which is why they don’t last.

My LXNav instrument gives a “low battery” warning at 11.4volts with all instruments operating, which probably corresponds to around 11.6-11.8 volts no-load. Various different sources suggest that with 20-30% capacity remaining no-load voltage will be somewhere between 11.8-12.0 volts.

Using the full capacity on a regular cyclical basis is not recommended, and will quickly destroy the battery. The achievable life cycles for an AGM battery is very dependent on the depth of regular discharge (DOD)

– typical quoted life cycles from one manufacturer are around 250/300 cycles for 100% DOD, 600/700 for 50% DOD and 1600 cycles for 30% DOD.



## Battery Charging

Charging SLA batteries and maintaining full charge while stored is important for extending battery life. You need a multi-stage smart charger, one that charges at a higher voltage (typically around 14-14.5 volts) until nearly full charged, then switches to a trickle voltage state (typically around 13.2v) to finalise full charge and maintain that voltage.

A smart charger may be left continuously connected to your battery, and will maintain the optimum charge and voltage ready for use.

Suitable smart chargers are made by Projecta, Ctek and Battery Fighter (find them on Ebay or with Google search).

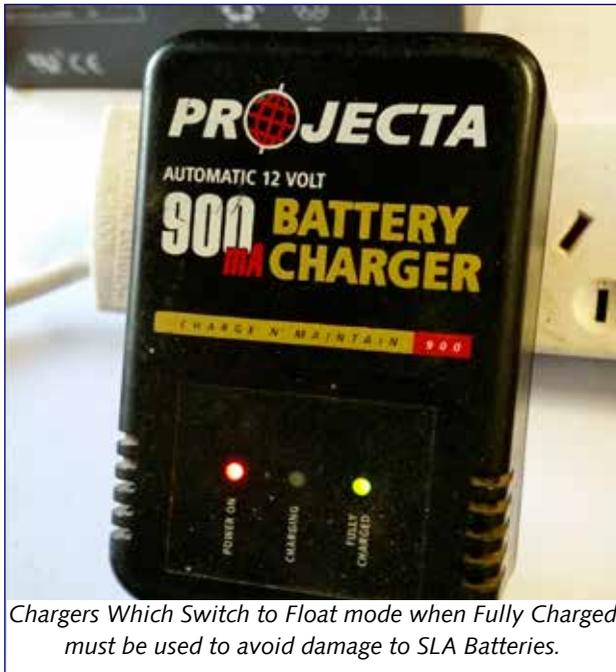
See:

<https://www.projecta.com.au/battery-charger-products/>

<http://www.ctek.com/products>

<http://batteryfighter.com.au/shop/product/13287/BFA012.html>

*(Editor's note: CTeK is well worth the extra money over Battery Fighter. Typical 5A CTeK chargers can be bought for around \$100)*



I've used 900mA Projecta chargers on my 10AH AGM batteries and they've worked well. At a charging current of 900mA a fully discharged 7AH battery would take around 8 hours to recharge – normally not fully discharged so time required is much less. The Ctek 3Amp charger would reduce that time required considerably – but the slower rate of charge is probably better long term for battery life.

## Ensuring Sufficient Capacity

So from all of this you can see that extra battery capacity will result in minimising the depth of discharge (DOD) and extending the life of your batteries. Most gliders these days will carry two batteries, and if you switch to your alternate battery before discharging the first one, you can minimise the DOD. Some gliders have provision for another battery in the fin.

Fusion brand batteries also make a 10AH battery with the same plan dimensions which will fit in a standard battery mounting location, but about 17mm higher. This may fit in your glider, and provides a substantial boost to battery capacity.

See <http://www.batteriesdirect.com.au/shop/product/13281/cbc12v10ah.html>

In today's gliders, fitted with Nav instrument, LCD screens, flarm, transponders, ADS-B, backup loggers, backup vario, and radio, the current drain from the normal quiescent state of your instruments can be around 800mA to 2 amps. (My glider is 850mA occasionally fluctuating to 1.2Amps – probably when the GPS gets excited?).

Instruments which are readable in direct sunlight may draw considerably more when the screen is in full sun than when in shade, for example when you're underneath a cloud.

Radio is the big killer – when you transmit you draw big power. In my glider the current drain jumps to over 3 amps when I transmit. So you can see that a 7AH battery could easily get down to 20-30% DOD after 4-5 hours flying, depending on how talkative you've been.



## Test the Salesman's Story

If you want to test the state of your batteries, or the manufacturer's claimed performance, a simple method is to hook the battery up to a 12volt halogen light globe, and monitor the voltage as time goes on. I used 14 watt 2 pin halogen globes which draw around 1.2amps, which is a bit more than a typical glider loading.

The two 10AH SLA batteries I've been using for the last 12 months, fell well short of their rated capacity, dropping to less than 11.4volts after 4½ and 5½ hours respectively, equivalent to 5 and 6 AH – which explains why I've been getting low battery warnings from my LXnav computer on long flights. An older battery didn't last as long.



Battery Test Rig - 14 Watt 2Pin Halogen lamps provide a Battery load of 1.2Amps

## The Lithium battery alternative.

Lithium batteries have been around for some time now, and have earned some bad press by spontaneously catching alight when misused. But batteries built with Lithium Iron Phosphate (Lithium Ferro Phosphate, LiFePO<sub>4</sub> or LFP) cathodes offer a safe alternative with many of the benefits of lithium-ion technology. They can deliver high current, lightweight, high charging rate and long life.

For the technically minded - LiFePO<sub>4</sub> is a natural mineral of the olivine family which replaces lithium cobalt oxide (LiCoO<sub>2</sub>) as the cathode material. Because of its abundance, low cost, low toxicity (cobalt is a problem in environment), higher power density, and longer lifetimes than the more common LiCoO<sub>2</sub> design found in consumer electronics, LiFePO<sub>4</sub> batteries are increasingly finding applications for common use. The inherent safety of LiFePO<sub>4</sub> batteries is major advantage.

LiFePO<sub>4</sub> Glider Batteries now commercially available.

To start the jet sustainer motor on my JS1 glider - there is an electric actuator to open the doors and erect the motor, glow plugs to fire up the kerosene, electric start motor to spin it up to speed, a solenoid pump to deliver prodigious quantities of fuel, and instrumentation to power up .... all happening at the same time.

The current drawn from the battery is more than a standard SLA battery can produce, and a lithium battery is the only solution.

The JS1 gliders have been supplied with LiFePO<sub>4</sub> "Tenergy" Brand batteries which are rated 10AH and are built into a standard 150x65x95mm case. Tenergy LFP batteries are not available in Australia and shipping companies are wary of lithium batteries, so they're difficult to obtain.

But now there is an equivalent/better Australian-made battery built by Fusion which meets these same specs (in the same sized battery case as a standard 7AH SLA battery).

<http://www.batteriesdirect.com.au/shop/product/25922/v-lfp-12-10.html>



Fusion Australian-made LiFePO<sub>4</sub> Batteries

## Checking the LiFePO<sub>4</sub> claims

I replaced my exhausted Tenergy battery with a Fusion 10AH battery six months ago and it's performed OK ever since then.

I ran it on my halogen lamp test rig to see whether the claimed 10AH was fair dinkum - it continued to run with the light shining brightly, drawing 1.25 amps dropping down to 1.04 amps and 10.8 volts, after 10 hours. (I forgot I had it on test and left it on overnight by mistake). *(Editor's note: Poor Carol! And I thought my wife had it tough!)* That's around 11AH!! - well in excess of the claimed rating. After resting, the battery recovered to 11.9 no-load volts.

I've since recharged this battery, and run further check tests to verify that the battery wasn't damaged by this extreme test run. Still works as previously. Most LFP batteries include additional internal circuitry to protect against short circuit, under/over voltage protection and manage cell balancing.

Fusion batteries claim to include "State of the Art Battery Management System (BMS)" to handle this stuff. If you push it too far it will turn off as self protection.

I tested a Shorai LiFePO<sub>4</sub> battery I've been using for the jet motor start on my glider, and it shut down in less than 6 hours. The Shorai battery, designed for motorcycle applications, despite a claim of Pb starting equivalence of 18AH, on test had a deep cycle rating of less than 6AH. My original five year old Tenergy battery failed and no longer will hold its charge.

# LiFePO4 Charging

As with SLA batteries the charging is important to maximise life and performance. Fusion LiFePO4 batteries can be charged with SLA chargers, but won't reach full capacity as the fully charged voltage is higher.

CTek make a charger specifically designed for LiFePO4 batteries with a 8 step charging process which maximises the battery capacity and protects it from damage from inappropriate charging. See <https://www.batteriesdirect.com.au/shop/product/24277/ctek-ctlithium5.0.html>



*Battery Chargers specifically designed for LiFePO4 batteries safely charge to Maximum Capacity*

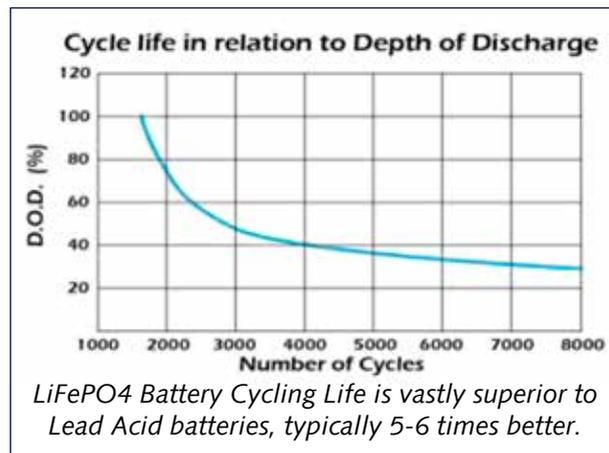
## When Shopping for Batteries – What's Important

- If SLA, buy Absorbent Glass Mat (AGM)
- Must have Deep Cycle capability
- AH Capacity – as much as you can fit, and carry.
- Install 10AH if long flights intended
- Duplicate battery for extra capacity and save running low.
- Upgrade to the superior LiFePO4 batteries.

## LiFePO4 battery vs AGM SLA comparisons

- Highest and safest Power-to-weight ratio of any lithium battery, way in excess of SLA batteries.
- Half the weight of equivalent lead-acid battery – 10AH battery is 1.54Kg. (7AH SLA is 2.5Kg)
- 10AH in 150x65x95mm case – 7AH SLA in same case
- Cycling to 100% DOD (depth of discharge) – 1740 cycles. (250/300 for SLA)
- Cycling to 50% DOD (depth of discharge) – 2800 cycles. (600/700 for SLA)
- High charging rate, up to 20amps max.
- Low loss of charge, can be stored 12 months without recharge. (SLA steadily loses charge).
- Internal BMS circuitry to balance cells and protect against low/high volts and short circuit
- Price significantly higher – around \$181 for 10AH vs \$44 for 10AH SLA

The consequences of the increased durability/cycling, higher capacity per unit volume, resulting in stressing the batteries less, will all lead to significantly longer life, and significantly less problems.



## Solar Power

With SLGs the battery situation is more critical. In the first place, the glider normally has more battery capacity to start the engine. However, if the on-board electronics run the battery down too far, there may not be enough capacity to raise the motor, let alone start it.

The best option for SLGs and probably for any new glider is to fit solar panels. With one or two small panels in normal mostly sunny weather putting out 2 amps, the glider's batteries may have as much charge at the end of the flight as at the start.

For SLGs and sustainer gliders, solar panels can be retrofitted into the engine bay doors by a qualified person or workshop because they're not a structural part of the glider. Recessing solar panels into the fuselage of a glider after it is built is normally not possible.

Most German gliders are fitted with Strobl solar panels which work very well however there are rumours that this supplier may not continue due to the retirement of the boss fellah.

There are many modern developments either available now or soon to be available such as printed solar panels and even solar paint. Professor Paul Dastoor and researchers from the university of Newcastle in NSW have developed a liquid semiconductor which can be made into low-cost, flexible solar cells which in the future may be easily applied to surfaces such as on gliders.



**When you are a low-time pilot**, the first question is often 'how far can I fly today given the current conditions.' You may often hear people saying 'it's a 750 km day' or similar but this does not mean much if you are just starting X-Country soaring.

How good is the day? What is a reasonable task for me to attempt?

For someone new to X-Country soaring, best thing is to progress through the basic badge tasks – 50km straight flight, then a 300km triangle or cats cradle, then more.

If you're thinking of more, it is possible to make theoretical calculations of speed achievable given known average climb rates. Maurie Bradney's books, "Flying Further and Faster Pts I and II" (obtainable on the LKSC and GFA websites) include a table of X-C

speeds achievable for various conditions. From these you can estimate with a known length of day the task distance you could expect to achieve.

The other resource which will give you a good guide to the potential of the day is the "Potential Flight Distance" display in Matthew Scutter's weather forecasting program Skysight. This displays on a colour graded map the potential distance flyable by an experienced pilot in a ballasted 18m Ventus2.

Factor in the comparative glider handicaps (say less 30% for a Cirrus or Std Libelle, less 40% for PW5) and then another factor for pilot experience. Pilot experience factor is the challenge. My first 300km flight took 7 1/2 hours... today in a JS1 (Ventus 2 equivalent) that would be something like 2 1/2 hours... or in the same glider as the first flight I did, I'd

expect to do it in less than half that time. So the pilot factor for a newbie may be another 50%.

Jacques Graells for his GP racing weekends has established a sophisticated handicapping system which takes account of glider performance, ballast, and pilot experience, and tasks are set with big circles for the lower handicap pilots, so they can "cut the corners" and fly a fair distance commensurate with their skill. These weekends provide a great opportunity, in a supportive environment for new pilots to have a go.

But if you're on your own, and want to fly a task, and Trevor West in his JS1 reckons it looks like a 750km day, you should be able to manage your first 300km, and the experienced pilot in a Discus or LS7 should try 500. Off you go ....

*Dave Shorter*

# Simple Tasks from Keepit

Here are some examples of flights you might tackle from Keepit. You need not use standard Keepit database turnpoints – any place can be nominated as a turnpoint – all you need are the coordinates. You be the inventor. Create your task (and the points you need) to suit the predicted weather.

The Gap (Breeza Rail Junction) S31°21.42" E150°35.5" is no longer in our database and is very useful for some tasks – add it to your database. As is Liverpool Range (S31°46.467' E150°39.383') – both useful for cat's cradle and deferred start triangle tasks.

Gilgandra North (S31°26.6' E148°16.48') and NW of Goondiwindi (S28:21,E150:03) are other points I've used for particular tasks included below.

Any of these tasks can be declared in the opposite direction.

## Silver Distance

Mullaley 61km, Barraba 55km, Baan Baa 67km

## Gold Distance

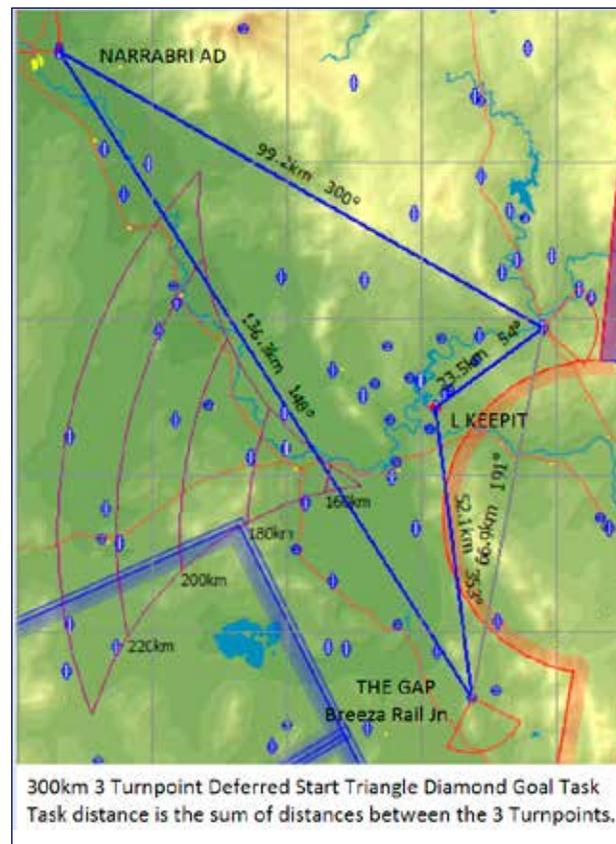
300 km 3point cat's cradle tasks

Narrabri/Breeza/Barraba 302km

Narrabri/Breeza/Baan Baa 309km

Kaputar/Quirindi/Boggabri 302km

Tambar Springs/Edgeroi/Middlebrook 306km



## Diamond Goal 300km

Edgeroi/The Gap 320km (2point triangle)

Manilla/Narrabri/The Gap 302km (3point deferred start triangle)

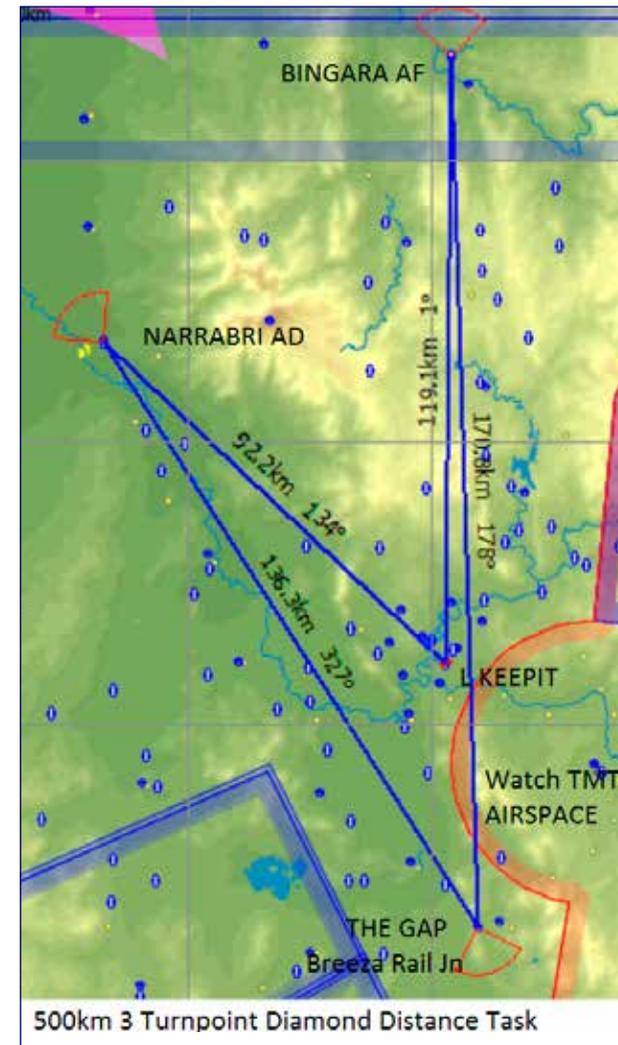
Manilla/Narrabri/Tambar Springs 312km (3point FAI triangle)

Warialda AF 300.9km (Out&Return)

## Diamond Distance 500km

Gurley/The Gap/Barraba 503km (3point cat's cradle)

Bingara/The Gap/Narrabri 518km (3point cat's cradle)



Coolatai/Quirindi AD 500.6km (2point triangle)

Dunmore/Moree/Premer 513km (3point FAI triangle)

Dunmore/Gurley/Coonabarabran 503km (3point FAI triangle)

Liverpool Range/Coonabarabran/Upper Horton AF 501km (3point FAI triangle)

Gurley/Toorawenah 526km (2point FAI triangle)

(Careful many 500km tasks require flight over the Pilliga – difficult to avoid for this distance, especially 2point FAI triangles)

Goondiwindi 526km (Out&Return)

### 750km Diploma

North Star/Quirindi/Narrabri 754km (3point cat's cradle)

Liverpool Range/Gilgandra North/Moree AD 756km (3point FAI triangle)

Narromine/Walgett 755km (2point FAI triangle)

Inglestone Nth 760km (Out&Return)

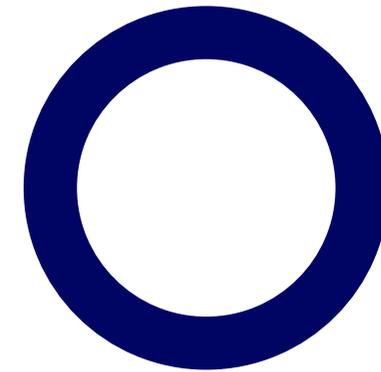
### 1000km Diploma

St George/The Gap/Narrabri 1009km (3point Cat's Cradle)

Liverpool Range/Haddon Rig/Goondiwindi 1024km (3point FAI triangle)

Trangie/NW of Goondiwindi (S28:21,E150:03) 1001km (2point FAI Triangle)

Roma AF 1022km (Out&Return)



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