WARM AIR 3 June 2023

Aviation Sports Club Gliding Newsletter

THIS WEEKEND: ***www.ascgliding.org*** ASC Gliding | Facebook
Bank Acct 38-9014-0625483-000

Saturday	Instructing:	L Page
3rd June	Towing:	P Thorpe
	Duty Pilot	R Whitby
Sunday	Instructing:	A Fletcher
4th June	Towing:	R Heynike
	Duty Pilot	K Jasica
Monday	Instructing:	R Burns
5th June	Towing:	R Heynike
	Duty Pilot	R Bagchi

MEMBERS NEWS

In Warm Air this Week;

- ***Club News***
- ***Weekend Reports***
- ***Roster***

Thank you for the pictures, stories and contributions from members.

Club News

Flying this weekend unlikely

The vital parts for the Towplane have arrived in NZ and are being processed at a NZ Post Mail Centre. However, they now need to be dispatched to our repairer in Parakai. This only leaves tomorrow, and it is looking unlikely they will arrive in time to allow time to complete a repair. So, we will let you know if things change for the better and repairs are completed in time for flying at the weekend.

The Piako Club have contacted us and kindly offered if you would like to fly down at Matamata, you are most welcome. Contact their club or make a booking at their website Piako Gliding Club : Home (glidingmatamata.co.nz) Just be mindful they are also hosting NZ Airwomen's Rally event on the Sunday, so may be busy with that. Our friends at the Auckland Club may fly from Matamata as well, as their field is sodden.

Weekend Reports

Well, no ASC Gliding of course last weekend. But Peter Thorpe advises he did fly the Grob 109 with 40SQN ATC. The weather was patchy with some broken cloud at 1500ft, but they were able to fly 10 cadets. So, it was a successful day.

Well with so much water about we might as well refer to an article on Water Ballast.

Soaring with Water Ballast

What topic do you want to see in an upcoming newsletter? Email us sales@wingsandwheels.com

Roy Bourgeois is a well-known US and South African glider pilot who served many years as the Chief Pilot for the Greater Boston Soaring Club and now lives and flies in Arizona. He has held several US national records, competed in many US and Canadian Nationals, and has flown over 300,000 XC kilometers in his 4400 hours of gliding. He can be reached at royb@bw.legal

By Roy Bourgeois

There is surprisingly little written about the use of water ballast in gliders, and this is true of the flight manuals produced with many gliders and which explain the manufacturer's systems in detail but say very little about when and how to use the systems. Most of the knowledge in the sport seems to be handed down with the sale of used gliders as old owners impart their experiences to the new purchaser or are learned around the clubhouse or at contests. And it is not uncommon for an owner of a glider with water ballast capability to have never used the system at all. In New England where I lived for most of my years, I would go entire seasons without using water ballast except at contests. In South Africa where I also fly each year, we use ballast every day.

Why Ballast?

Adding water ballast increases the wing loading of the aircraft (the ratio of weight to wing area) and this increase shifts the glider polar toward the high-speed end of the polar graph. Stated simply, flying a heavier glider helps the high-speed performance of the machine at a sacrifice to low speed and circling/climb performance. By way of illustration, a glider that has a best L/D speed of 56 mph might see the same L/D occurring at 64 mph with ballast. The sink rate one would expect dry at 80 mph will occur with ballast at around 88 mph. But the stall speed increases correspondingly and the circling performance at our usual thermalling speeds is poorer. Thus, ballast is helpful during the strong parts of the day and a hindrance when lift is weak. Ballast is particularly problematic on weak days when thermals are narrow and steep angles of bank must be used.

Water ballast also negatively impacts the handling of the glider. The additional weight in the wings increases what designers call the "roll moment of inertia" making the wings heavier, more stable, and more reluctant to bank. Think of a tightrope walker who carries a long heavy pole - because he wants maximum stability in the roll axis. The added weight in the wings functions the same as that heavy pole. While I have done no testing to prove it, my sense of the effect of increased weight on handling is that it is nonlinear and that the last 75 lb / 35 kg of ballast has a larger adverse effect on handling than the earlier loading - perhaps because this last weight sits further out toward the wing tips. Because of this, I rarely fly my gliders at the maximum allowed weight - even in the strongest conditions. The small performance increase I get above 95% of maximum weight is not worth the significant penalty of poor handling at maximum weight. Others may disagree.

When Ballast?

So, other things being equal, we would want the glider heavy when we are flying mostly in the best part of the day, in a race where other competitors are using it, or in a speed record attempt. We would also want ballast on extended ridge flying where stability, turbulence

absorption, and high-speed performance are desired. We do not want water ballast on a high-wave flight with the risk of valves and other components freezing. We would not necessarily want ballast (and certainly not a lot of it) on a long thermal cross country where we will spend the initial hours struggling with weak thermals before we get to the good part of the day. For a long-distance flight, if the absence of ballast means we can start a full hour earlier in the day, we may well pick up more distance in that "extra" first hour than we will gain in 4 hours of higher speed ballasted flight later in the day. The ability to start early in weak conditions versus the weight to go fast later in the day is a tradeoff that the pilot needs to think through while factoring in the issue of water ballast and its adverse effect on climb and maneuverability. You can't do both.

The first generation of fiberglass gliders did not incorporate any provisions for ballast - but some of those gliders were later fitted with ballast bags in their wings by owners who wanted to fly heavier. The bags were made of a material like that used in life rafts or were modified from rubber fuel bladders that were put to this use. Gradually manufacturers themselves began adding ballast bags of increasing capacity and some owners added even more capacity post-manufacture (contest weight rules were a lot looser back then). Most bags had the disadvantage of being unbaffled and when a wing dropped on takeoff, water would rush to the tip end of the bag keeping the wing down and causing a ground loop. Eventually, manufacturers went to integral wing tanks with internal baffles or "fences" to keep the water from sloshing quickly spanwise. The most recent iteration of ballast systems was a trimmable tail tank that offsets the forward CG of the water in the tanks ahead of the wing spar. Tail tanks are interconnected to the wing dump valves and open when the wing ballast is being dumped.

Evolution of Ballast Systems
Some larger-span, 4-piece wing gliders use tanks in both the outer and inner panels. Frequently the manufacturer requires that the outer tanks be filled first for structural strength reasons. The same is true of gliders that have both wing and fuselage tanks. Some pilots chose to ignore these directives because loading the water inboard helps improve the roll rate - but this also reduces the design structural safety margins. Also, some gliders that can be flown in variable span versions (e.g., 15m and 18m) have an oversize ballast capacity when flown in the short wing configuration. This allows for the glider to be flown at ballasted weights in excess of the manufacturer's designated maximum weight when in the shorter wing configuration. Such a practice is both dangerous and unsportsmanlike and it is for this reason that competition gliders are weighed at contests and all FAI speed record applications require a signed pilot certification that the aircraft was flown consistent with the manufacturer's directives and limitations.

I hope that you find some of this helpful.

Stay safe. Have fun. Get better.

Roy Bourgeois

Soaring & Gliding Pilot Shop (wingsandwheels.com)

Duty Roster For Apr,May,Jun

Month	Date	Duty Pilot	Instructor	Tow Pilot
Kings Birthday	3	R WHITBY	L PAGE	P THORPE
	4	K JASICA	A FLETCHER	R HEYNIKE
	5	R BAGCHI	R BURNS	R HEYNIKE
June	10	T O'ROURKE	I WOODFIELD	P EICHLER
	11	I O'KEEFE	L PAGE	R CARSWELL
	17	K BHASHYAM	S WALLACE	D BELCHER
	18	T PRENTICE	P THORPE	G CABRE
	24	S CHAND	A FLETCHER	P THORPE
	25	N VYLE	R BURNS	R CARSWELL