AGC Weekly News

15-16 May 2021

Weekend Roster

Saturday
Tug Pilot: Andy Campbell
Instructors: Nigel McPhee, Graham Cochrane
Duty Pilot: Tristan Harvey-Smith

Sunday
Tug Pilot: Ron Burr
Winch Driver: Bradley Greer
Instructors: Norman Duke, Sam Tullett
Duty Pilot: Christian Derold

Reminder for our Special Winch Day

Graham Player, Winchmaster

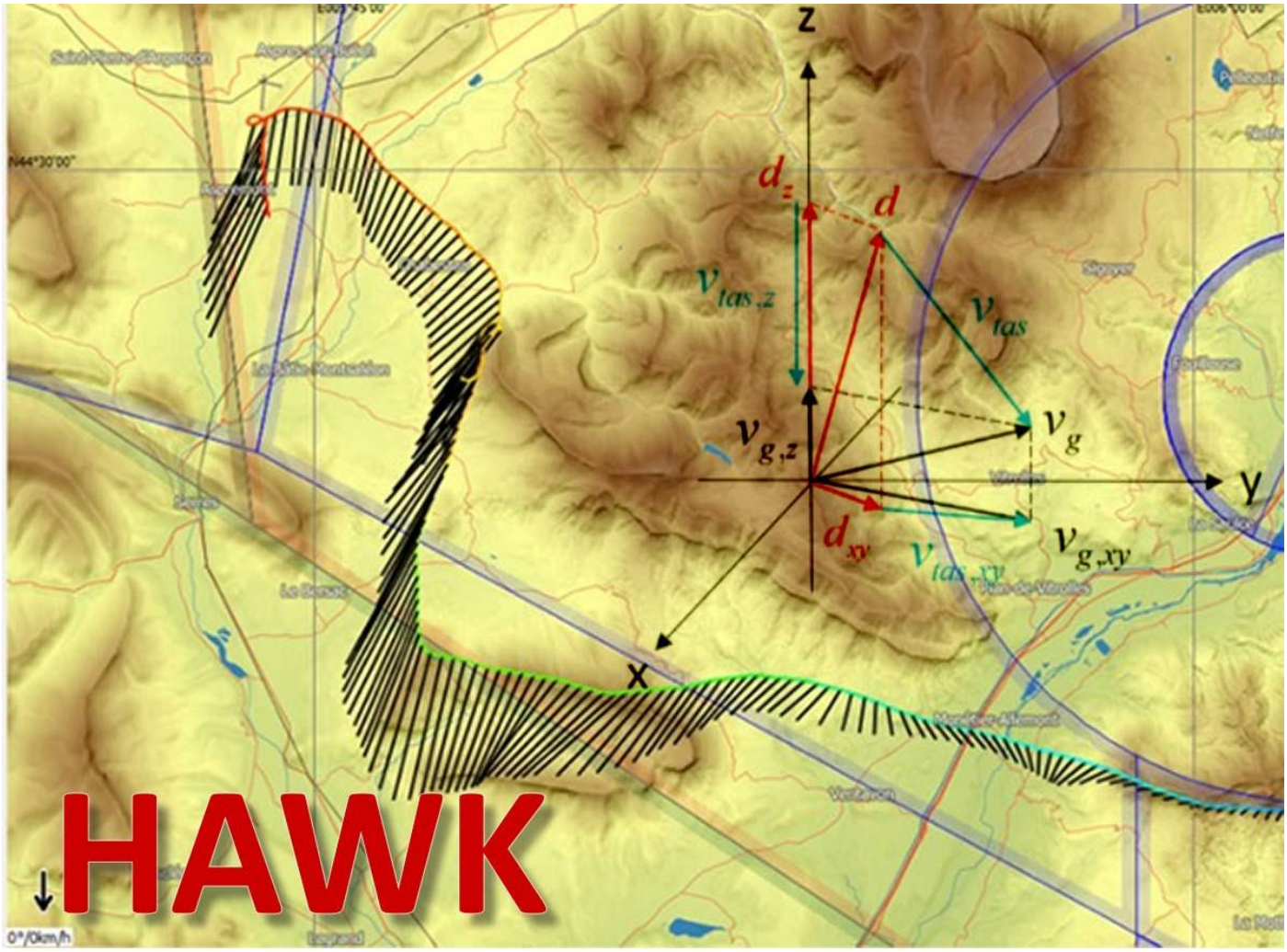
On Sunday 16th May, there will be a "Winching Day", weather permitting. We have a number of new winch drivers who will be undertaking training. As well there are some instructors who will be doing winch familiarization.

To help grease the wheels (so to speak), the launch charge rate will be halved for the day.

So, come out, and if you haven't done any winching, try something new and add a valuable adjunct to your logbook.

Working Bee – Thank You to The Workers!

The working bee went off very well, proving to be a good social event at the same time. Among many other jobs, the potholed access road was repaired, voluminous vegetation removed, and many rabbit holes filled on the airfield. I can't mention specific names for fear of missing somebody out, but suffice it to say the event was very well supported. Thank you all! The only downside was that as soon as launching began, so did the rain, but I guess at this time of year we can't expect wonderful soaring weather. *(PW)*



Introducing HAWK Real-time Wind Indication

Courtesy Wings & Wheels

For the glider pilot, it is essential to know how the air mass is moving in its surroundings. Today's TEK Varios work very well for measuring vertical airmass movement if the airplane's speed is approximately constant, e.g., when circling.

As important as the vertical movement of the airmass is the horizontal component, which we commonly refer to as wind. Especially in mountain flying, slope flying, and wave flying, pilots appreciate the wind information that is precise to the second. But the wind information is also especially important for lowland pilots to find and center the thermals, convergent lines, etc.

How do we get wind information in the glider when we haven't had an accurate real-time display of the wind for a long time? The reason is that the algorithms known today for wind estimation require a very long averaging time using a magnetic sensor. You can only estimate the average of a constant wind which is of very limited use.

We completely abandon the conventional approach. The airmass movement is three-dimensional. We, therefore, designed the algorithm HAWK which jointly estimates all three components of the air mass dynamics: It delivers horizontal wind and the vertical wind (“vario”) in real-time. No more separation of the wind calculation and the vario.

The HAWK unit consists of an ARM processor and a sensor unit. The sensor box contains the following sensors: GPS, pressure sensors for static and dynamic pressure, and an IMU (inertial measurement unit) with a three-axis accelerometer and a three-axis gyro sensor (angle changes). Depending on the sensor, signals are processed at a clock rate between 10 and 100 Hz. Most important: we do not use a magnetic sensor which is subject to random electromagnetic field disturbances difficult to compensate for (if at all) and large static error in the model of the earth magnetic field. What

sounds a trivial detail but is a key property of the algorithm. The HAWK algorithm is based on an extended Kalman filter.

Therefore, HAWK does not require a hardware update for LXNAV units. HAWK is an SW library.

A good question is why has this not done before? Why now? The answer is: thanks to advances in semiconductor technology, the computing power of microprocessors is now enormous. This allows us today to implement highly complex algorithms, which 10 years ago were only used in military technology for cost reasons, in numerous other applications today. Semiconductor sensors, with amazing accuracy, have also become very small and very cheap.

Experimental Results

HAWK has been tested in over a hundred flights by different pilots flying different gliders. During flight, all sensor signals have been recorded and analyzed later in the lab. The reports of the pilots are very positive. Here is a quote by the world record pilot Klaus Ohlmann

The second log shows very nicely the approach from the Durance to Serres with the strong wind increase and west turn in the Venturi between the bathtub and the Crete de Selles, which is typical for north winds. Really fantastic to follow this phenomenon live in the instrument. In addition to the currently valuable information for approaching the correct slope, this provides an excellent opportunity to analyze and understand the complex flow conditions in the mountains (translated).

What about the “vertical wind”? Does HAWK yield improved information versus a conventional TEK vario? First of all, conventional TEK vario work very well in stable thermals. However, even a perfectly compensated TEK shows us horizontal wind changes (gusts) as climbing (if the wind shear is positive) or sinking, although there is no vertical air motion (see banner photo). These false indications are due to the measurement method (one-dimensional energy conservation) and cannot be compensated The EKF (Extended Kalman Filter) estimates all three dimensions of air mass movement simultaneously. It is designed to correctly process time-varying air masses. When flying, this is the decisive advantage of the "EKF Varios". If the EKF indicates a climb during fast forward flight, the indicated climb value is equal to the climb of the vertical airmass, independent of the speed of the aircraft and horizontal speed or flight path changes.

From the above follows that the HAWK needs no calibration since it not based on an energy conservation law.

HAWK is a product from the LXNAV company and has been developed by Professor Heinrich Meyr and his Ph.D student Peng Huang.

Heinrich Meyr is a professor of electrical engineering at RWTH Aachen in Germany and a cofounder of Successful Startups. Dr. Meyer received his M.Sc. and Ph.D. from ETH Zurich, Switzerland. He has been flying gliders for many years. Today, flys an ASH25. His top flying destinations are Switzerland, Germany, France, New Zealand, South Africa (Gariep).

Wave Flying – Check this latest Clip.

Tim Bromhead has again produced a really interesting video on Wave Flying. Check it out on YouTube at this link below.

How to Fly a Glider in Wave to 19,000 feet - YouTube

https://www.youtube.com/watch?v=ItPnp4pJ_bg

Get High, Stay High

Adam Woolley (Courtesy Wings & Wheels)

When we soar across country we are inevitably treading a fine line. On one hand, we want to go as fast as possible, but on the other, we need to stay airborne! As time goes on and as our experience grows, there are times when we have trouble finding that balance. At first, we need all of our attention to simply stay afloat, then we realise to make any headway we need to push a bit harder. What happens then? Outlandings start occurring and that's ok. This is not such a bad thing as we need to do this to find out where the limits are, and to always take it as a learning experience. After all, it's a part of the game and is a good adventure in all reality. What can we learn in order to shorten this learning process though?

1/2 the Convection Height

Get high, stay high – you might have heard this one before! My general experience tells me that it is good to be above roughly half the height of convection. Let's say, cloud base at 10,000 feet? Stay above 5,000 feet. Typically, thermals will start being well-formed by this height and have their inertia all sorted out. This might sound very conservative, however, you'll come to learn that as you descend into the lower layers, you will find it more difficult to find thermals, to centre them, the sink will start to seem more widespread and severe too. So, it's best to stay high, both for the lesser sink, but also for the higher TAS and view on the world, you have many more options up there!

So you want to stay in the top half of convection, but how do I do it? Let us talk about a cracking day because I like flying them. Eight to ten knots to 10,000'. You've passed up many climbs, you're now at half convection and run into a five-knot climb, what do you do? Personally, after the season just been in Australia and what I learnt, it's better to take that five-knot climb for a few thousand feet. If you do the sums, it won't cost you much time against an eight-knot climb, but what it will do is save you from a three-knot grovel from down lower, which will cost you. You cannot do this all day, nor take it to base, but that five-

knot climb won't actually cost you that much in the scheme of things, but it will keep you running at a nice cruise speed.

Choosing the Right Speed

No two days are the same, we certainly all know this – thankfully they are not, otherwise it'd get boring I suppose?! Typically, if the lift is close together you can afford to push harder, but if the good climbs are a long way apart, it will be worth your while to cruise a bit more slowly, so you can be more selective. If you want to increase your cross-country speed, then it is all about using the strongest climbs, so you need to fly at the right speed to get to the bottom of the next good climb. How do I achieve this? I pick my target cloud in the distance, adjust my MC to the average of my last four climbs, then reduce it by one-knot and analyse the base speed it has suggested. I then ask myself; can I get to the target cloud at that speed, or do I need to back it off a little? I will fly either one of these speeds because I always like to have a backup plan behind my target cloud – as you know, they don't always work!

Safe Field Landing

One part of cross-country flying and making progress, is the ability to handle a low-level recovery. As your experience grows, it becomes easier to cope with getting low out on task. What must you always remember? The most important thing is to keep calm and keep thinking, there is always another thermal in front of you, you just have to find it. Many people in the early parts of their XC soaring career talk themselves into an outlanding. Me personally, I follow the above advice, then go over every trigger point before I finally put the wheel down & admit defeat. So, try hard to relax and remember that from launch height, it is quite unusual to land back without finding anything at all, this will ease your mind. I often also tell myself to stop racing, look outside the cockpit. Birds, dust, grass in the air, anything that might help. At the very least find a good paddock to use if all else fails. Try running along tree lines, scrub edges or any other irregularity that might trigger a thermal. Be positive in your search and keep moving along to the next possibility if you get no result. Most importantly, if all attempts do fail, make yourself adhere to a cut-off point, after which you concentrate solely on a safe field landing.

Parking Place Requested

Matt Findlay is seeking a secure, under-cover parking place for his glider in its glider trailer during this coming winter. His trailer has very poor ventilation and the glider gets sopping wet if left outside, hence his request.

If you can assist, please contact Matt on email matt@ampannealing.com

For sale

Ventus 2a: S/N 10 Equipped with LX9050 with Flarm and control column unit. Maughmer winglets - Refinished in 2008. Imported ex USA - no major damage history. Dittel FSG71M com and Trig TT21 Mode S (ADS-B out capable). Aluminium top Cobra trailer, wing wheel, tail dolly and tow-out bar. Re wired with LiFePo4 batteries.
My partner Malcolm wishes to sell his share as he is no longer based in Auckland. I will either keep my 50% share or sell outright (#2 choice). This aircraft is one of the best performing gliders in 15mtr class yet is a delight to fly, even when tanked, and exceptionally easy to handle. They land short and rig in minutes.
MY PARTNER IS VERY KEEN TO SELL HIS SHARE. Contact me - Ross Gaddes - for more details.

When making payments to the Club Bank Account Number 03 0104 0012743 00, PLEASE ALWAYS include the Invoice Number and Your Surname.

Thanks to all those who have contributed to this edition. If there is anything you would like to share with the members via this newsletter, text or photographs, please e-mail me. I will be grateful for any contributions, whatever they may be.

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