WARM AIR 25 September 2021

Aviation Sports Club Gliding Newsletter

THIS WEEKEND: **No Flying this Week**

www.ascgliding.org Bank Acct 38-9014-0625483-000

Saturday	Instructing:
	Towing:
	Duty Pilot
Sunday	Instructing:
	Towing:
	Duty Pilot

MEMBERS NEWS

- ***In Warm Air this Week;***
- ***Club News***
- ***Airmanship***
- **Our Avian compatriots part 13. Bird flight. Jonathan Pote.**
- ***Roster***

Thank you for the contributions from members.

Club News

Hi all, well we have dropped in COVID Lockdown to Alert Level 3 and let's hope we continue that trajectory. Keep up the good work and remember the soaring season is around the corner. So, let's make sure we do our bit to kick COVID to where the sun does not shine.

Membership Application/Renewal - 1 October 2021 - 30 September 2022

Please find attached this year's membership form. All members are required to complete and return to either Ray Burns (ray.burns.ggl@gmail.com) or Lionel (lionelpnz@gmail.com). The PDF document is PDF Fillable. Which means you can complete it on your computer (which means we don't have to de-cipher some of the handwriting!). I recommend you save this to your computer, open the form and complete the first two or three fields then save the form. Open it a second time before completing so that you can be sure your entries have been saved correctly.

For those of you new to the club, we all need to complete this form each year. Our year runs from 1 October to 30 September.
Those under 26 in full time education: The fee structure is $30 for membership and the $25 communication levy. That is all. Your total subs are $55.
While we are all locked down, now is the perfect time to get this completed and returned.

Many thanks,
Ray

(For those who missed Rays email sent on the Sunday 19th Sept, I have attached it into the Warm Air email)

Okay folks get your Diaries out and note the following events and dates.

Club Captain Kishan wants, needs, request you note the following.
9th October

- **Annual General Meeting**
- **Start of Season Briefing**
- **Working Bee & BBQ**

It is more than possible that we may have to postpone this event as we may still have some lockdown restrictions in place. However, we will monitor, and consider options closer to the time.

Labour Weekend, **Matamata** **Sat 23rd Oct 2021,**
We are intending to head to Matamata for the long weekend. This is just around the corner. The XC course is also being run at Matamata that weekend so if you want accommodation on in the bunkrooms I would book early.

Cross Country Course, Sat 23rd Oct 2021 - Wed 27th Oct 2021
For those planning on attending the XC course now is the time to register. Use either the Events tab on the GNZ homepage, or here:
https://msc.gliding.net.nz/events/msc-cross-country-coaching-course-oct-2021

New

2021-2022 NEW ZEALAND NATIONAL GLIDING CHAMPIONSHIPS

Hello All Contest Pilots,

Entries are now open for the 2021/22 National Champs at Matamata in January 2022. Early bird discounted entry finishes at the end of October, so get your entry in as soon as you can. Event and entry form link: https://msc.gliding.net.nz/events/multiclass-nationals-jan-2022

Also link to MSC Notice:
http://msc.gliding.co.nz/sites/msc/thumbs/2021/202109/7srwds23_940x940.jpg

We can guarantee a friendly and efficient competition with great soaring conditions.

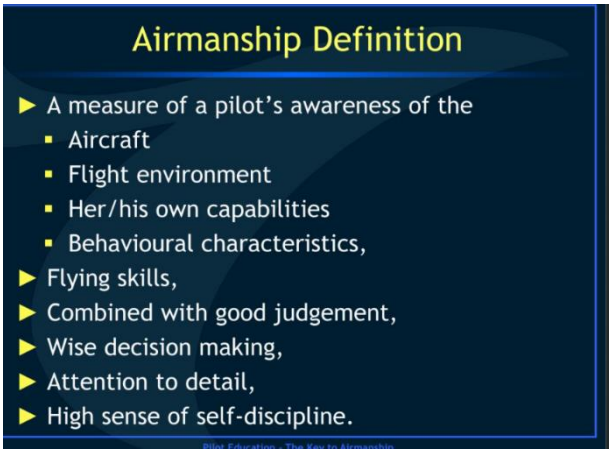
Cheers, Bob Gray MSC

Airmanship

Truly superior pilots are those who use their superior judgement to avoid those situations where they might have to use their superior skills.

Here below are some examples of good airmanship. And yes, this does not just mean being in the aircraft to demonstrate good airmanship. It means being a safety observer for others as well.

Attention to Detail



- *I was the wing runner for a two-seat glider which only had a single pilot about to launch. Having attached the tow rope to the glider, I did a final check with the pilot and checked that both canopies were closed and secured. The rear canopy was found not to have been secured and locked. I was able to alert and check in with the pilot, secure and confirm it was then locked. We were able to proceed with the launch.*

- *During a DI I observed some loose items in the rear luggage compartment. Some of these could have shifted in flight or fallen into the control linkages bay in the glider. We were able to remove and secure.*

- *During a DI I noted the canopy was very dirty and smeared. I gave it a good clean. I did not realise how visibility could be seriously restricted with a dirty canopy until I experienced late in the day low sun strike how bad this could impact vision. An important pre-flight action to take.*

- *I noticed that a dolly wheel had not been removed on a glider being prepared to launch and the pilot was in the cockpit doing their checks. I was able to run over and inform the pilot and we removed the dolly. I got a free beer from that.*

- *While doing a wing runner task, I noticed the airbrake were not flush with the wing as I was about to move to the wing runner launch position. I went back to the pilot and got them to check the airbrakes. They were in fact unlocked. This was promptly corrected, and we were able to proceed with the launch.*

High Sense of Discipline

- *During a rig of a glider and installing the tail I got interrupted when someone came over to have a discussion. When I finished the conversation, I was concerned I had got out of sequence with the rigging and checking. I took a moment and retraced my steps and did further secondary check of everything, followed by a dual check and sign off.*

- *I was in a hurry and the morning had not proceeded well with a number of things causing delays and irritations. I was keen to fly and the day was looking promising. My mood and patience were waring thin. I had missed breakfast and to be frank I was in a "s#*t' mood by the time I got to the airfield. My inner voice said this was not a good time to rush off and fly. I settled back and had a yarn with the others, had something to eat and just took the time to chill. I did take a flight later in the day, when I was in the right frame of mind.*

Good Judgement

- *After landing out in a paddock I had struck some pocked holes which had made it quite a heavy landing. I checked the glider over to check for any obvious damage and nothing was found. Once I was back at the field, I had the engineer come over and check for damage. Fortunately, there was not, but it was great peace of mind and a good learning experience to know what to look for.*

- *During a flight, my radio failed, and I could not get it working. Fortunately, I carry a personal handheld radio and I could use that as my back up.*

- *I had recently converted into a new glider type. The weather conditions were not particularly pleasant, especially the wind being quite gusty. I elected to leave it for the day.*

Wise Decision Making

- *During a soaring competition I was following another competitor. We were racing along a ridge and were rapidly approaching a low cloud bank ahead which allowed a small gap between the hill and the cloud base. Unsure of the terrain and obstacle ahead I turned away and headed for clear air. The other competitor continued and took the advantage. It was too much of a risk for to proceed. I still received a good result for the day.*

Flying skills and Combined with Good Judgement

- *While taking a passenger for a soaring flight, I noticed they had become a bit quiet. A checked in with them and confirmed they were not feeling well. I proceeded to return to home. I avoided excessive movement and explained what was happening and what to expect e.g., airbrake popping out and change in noise and feeling of the aircraft. Reminded them of the location of the air sick bag and opening the vent for fresh air as briefed. So back to earth and moment to reassure the passenger that this happens. So comforting words, good thorough briefing, and letting them know what to expect helped reduce the discomfort.*

Some good little videos to have a peak at on Airmanship and how we could improve.

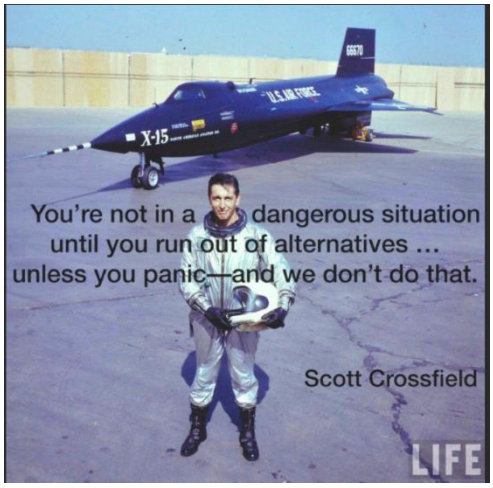
Poor airmanship - flight debrief - The Flying Reporter - YouTube

Airmanship / Short field landing "unintentional test" - POV - Flying - YouTube

Glider Pilot Confessions - 2 Turns that Almost Killed Me - YouTube

Decision Making Process in a Glider Emergency - YouTube

Airbrakes Open - YouTube



Our Avian compatriots part 13. Bird flight. Jonathan Pote.

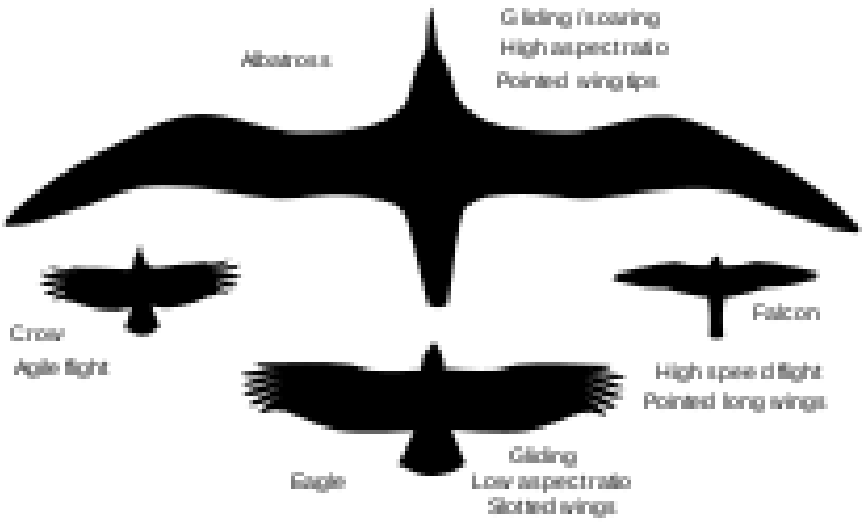
Avian flight

Apart from their different physiology, birds really score when it comes to anatomy, covered last week. Their skeleton and feathers, many individually moveable to some extent, make for the ultimate variable geometry aerodynamic object. They still have to live with weight and lift, drag and thrust just as aircraft do, but their wings provide lift both by downward wing movement compressing air and upward movement not cancelling this due to feather rotation to a vertical chord line as well as the outer wing flexing downwards. Added to that, both upward and (far more so) downward movement provides vectored thrust to move them forwards, the relative airflow thus generated creating more lift from the delicately shaped cambered airfoil. Much control is achieved by altering the shape and area of each wing as needed, and the rest of stability and maneuvering is provide by the tail which morphs into a vertical fin/rudder as needed.

Various theories exist about how bird flight evolved, including flight from falling or gliding (the *trees down* hypothesis), from running or leaping (the *ground up* hypothesis), from *wing-assisted incline running* (simple hang glider technique) or from *proavis* (pouncing) behavior. Probably all four routes were followed

The shape of the wing is important in determining the flight capabilities of a bird. Different shapes correspond to different trade-offs between advantages such as speed, low energy use, and maneuverability. Two important parameters are the aspect ratio and wing loading. Aspect ratio is the ratio of wingspan to the mean of its chord (or the square of the wingspan divided by wing area). A high aspect ratio means long, narrow wings that are useful for endurance flight because they possess a higher lift/drag ratio. Wing loading is the ratio of weight to wing area. Most kinds of bird wing can be grouped into four types, with some falling between two of these types. These types of wings are elliptical wings, high speed wings, high aspect ratio wings and slotted high-lift wings.

The diagram shows four wing planforms



Top is an Albatross. These glide for hours if not days without flapping their wings. They stay aloft ‘ridge soaring’ on the windward side of a swell, finding both live and offal food. Their wings have evolved similar to our gliders – a high aspect ratio and pointed tips for minimal induced drag.

Left is a Crow. Short, stubby wings, with spread primary feathers, gives great maneuverability, very useful as they fight others for food, albeit immobile carrion. Comparable to a purpose-built aerobatic aircraft.

Right is a Falcon, evolved for high speeds in the ‘stoop’. Moderate aspect ratio, great structural strength, pointed tips. A ‘fighter’ bird, evolved for the kill.

Bottom is an Eagle: Low wing loading, variable primary feather layout for low speed control, ideal for prolonged soaring in gently rising air as it searches for food below.

Not shown is a Piwakawaka. Fantail configuration such as these birds have bestows exceptional maneuverability, optimized for catching insects on the wing, often leaping from a twig. Swallows have a very different shape, but achieve the same maneuverability at speed. Watch one and imagine how you would feel if your glider could maneuver as forcefully as swallows do. And all for a tasty fly.

Two solutions to providing great maneuverability: Large tail, stubby variable geometry wings Piwakawaka, (using low airspeed) and Welcome Swallow (shaped for high speed/high 'G')

The Avian Flight Manual

Not surprisingly, as we use the same atmosphere and are subject to the same laws of physics, the Flight Manual for a bird is similar to that for our gliders: Birds have to master all the phases of flight familiar to glider pilots and more.

Daily Inspection

The DI is covered by an 'after flight/before flight' (AF/BF) inspection that will see the feathers preened and correctly interleaved. The bird's flexible neck allows its bill to access to all areas to smooth the feathers into their correct interleaved format. The avian approach is mirrored particularly by the military: As soon as the engine is shut down, the engineers check everything and rectify problems. An identical check just before the next flight should not find any problems, such as a low fluid level.

Take off

Take-off may be pre-meditated but a bird must always be prepared to take off immediately if danger threatens so the 'After Flight' preening is vital in case there is not enough time for a Before Flight check. To get airborne, smaller birds can jump high enough to complete a vertical take-off and then transition to forward flight by flapping. Heavier birds require a run (always into wind) to reach flying speed, a technique well demonstrated by ducks and swans taking off from water. Others always perch above ground level so as to be able to jump off a raised platform and commence a glide or soaring flight without muscular effort if not wanting to flap.

Cross-country Cruise

Once airborne and away from any threat, a bird enters a cruising mode. Now the wings are providing both lift and thrust and the aim is to minimize effort. The bird's body assumes the best streamline shape whilst neck or tail movement provides any trimming that cannot be achieved by wing adjustments.

Some species interpose flapping with periods of ballistic flight, wings folded and a minimum drag body shape adopted. This is apparently advantageous by reducing total drag (and therefore energy expenditure) over distance. Tui and Kererū do this.

Birds cruising a long distance as a group are aware that there is 'free energy' available astern and outboard of a flapping colleague by riding on the 'up portion' of the leader's tip vortices. A group flying in echelon or a 'V' can thus expend far less energy in total than as individuals, overall effort dropping below half for well-placed individuals The hard-working lead position is filled by different individuals in turn.

A skein of geese: Note that several are gliding but still maintaining formation

This energy recovery from a leader's wingtip vortex is being investigated by aircraft designers and one day a piloted formation lead passenger aircraft may have unmanned cargo aircraft formatting in echelon to best use its tip vortices. Take-offs and landings would have to be 'flown' by 'pilots' on the ground as with military UAVs today, but in the cruise, the drones would remain in necessarily close formation responding to control authority from the manned aircraft. Apart from savings in fuel and crew salaries, air traffic control could threat each formation as a single object, thus better using busy controlled airspace.

The Hover

Many birds find the ability to hover very useful for locating prey beneath them. In fact usually there is some wind speed to allow them to remain stationary relative to the ground whilst benefiting from some aerodynamic lift due to relative airflow. Birds always 'hover' (i.e. remain stationary) into wind. On helicopter/SAR flying, we used smoke flares to visualize wind flow over rugged cliff terrain to help establish a stable into-wind hover. If a kestrel was hovering nearby, we did not need the costly/polluting/incendiary flare for that information: The kestrel always indicated wind direction perfectly.

A Kestrel hovering. Note the extended alula ('slat) at the low airspeed

Landing.

A bird landing has to achieve exactly the same as a glider pilot: That is, to reduce total energy to a point where the potential energy is zero and the speed provides lift exactly equal to the weight. At this point a glider become simply a moving wheeled vehicle that will come to rest as drag and wheel friction sap its remaining kinetic energy.

Birds must achieve exactly the same final result as us – zero altitude, zero speed. Of course they are supremely 'current', with many flights every day, but they still have to flare to dissipate energy and touch the ground as they stall. They *always* land into wind in this situation. They are fortunate to almost always have far more space than they need and not to have to listen to a radio and obey instructions from air traffic control.

Alternatively they can approach from below the intended touchdown aiming point and lose remaining kinetic energy with a final climb to a perfectly placed stall. It may be necessary to land cross-wind in this situation, a cliff edge perhaps. When a bird flares to land, sometimes it is clear that the airflow above the wing has become turbulent (stalled) as the smaller feathers agitate visibly in the induced turbulence.

A large proportion of bird species are classed as *passerines* or perching birds. When they alight, often it is on a flexible branch which then oscillates as a result of the kinetic energy transferred to it. Once again variable geometry/variable C of G resulting mainly from neck movement in all three planes neutralizes that oscillation faster then would occur naturally. As the bird lands on a twig, the twig seems more rigid than apparent, but this energy equalization is the reason.

A Skylark landing: Maximum wing area, high angle of attack, high drag with tail

An Aplomado Falcon (USA & Mexico) landing. Note high angle of attack, tail feathers elevated to hold that AoA, alula (barely visible on port wing) extended to reduce tip airflow separation, nose down for a good view of the aiming point, primary wing feathers positioned for maximum efficiency, undercarriage down and locked.

Birds are so competent and current that they almost never crash. If only glider pilots could be the same…. There are exceptions, however. Once I was sitting on a windy Atlantic headland as the first swifts arrived on their spring migration. No doubt very hungry, they were seeking insects just above the gorse when turbulence thrust one down right beside me. It crashed through the prickly bush, emerging on the other side surrounded by a shower of dead prickles, and flew on apparently unscathed. I hope it completed an Ops10 later. The easy way to see birds crash is to watch water fowl trying to land on ice. Normally they would stall and drop into the water, hydraulic drag stopping them almost immediately. On ice they have no way of dissipating their kinetic energy quickly, and multiple ground-loops result. However, a quick re-arrangement of feathers (AF inspection) once they come to a stop and all is well. No need for an 'abnormal landing' check by an engineer.

Steep approaches

Sometimes birds need to use steep approaches just as glider pilots have to landing out, particularly when landing over trees onto a small patch of water in the case of ducks and geese etc. The aquatic birds sideslip in exactly the same way as we do (contorting their tail for control effect in yaw) but with far greater effect using their variable geometry. They have a further trick up their sleeves: Whiffling.

Whiffling involves the bird inverting all of its body bar the head; the many neck vertebrae make this possible. Whilst the eyes and brain are still flying a standard erect approach, the wings now have an inverted lift vector and the webbed feet are raised as airbrakes. The rate of descent becomes extreme, providing effective obstacle clearance.

A 'Whiffling' goose. The cambered airfoil shows up well

Have a look at the video clip: After the 'whiffle' there is also a spectacular sideslip at 1:18.

(1560) Whiffling Geese in Slow Motion - YouTube

Of course we glider pilots could do this as well. All that would be needed is a swivel joint behind the cockpit such that if too high on finals, one rolls the bulk of the glider, including the wings of course, inverted around the longitudinal axis, the cockpit (and pilot) remaining erect. Rolling back to the upright position as soon as that inverted lift vector has eaten up your excess potential energy sees the problem solved. It would be as well to inform the instructor if one is dual, but both the engineering and aerodynamics are simple enough.

VNE and Falcons

Some birds of prey, falcons in particular, catch their prey by 'stooping'. A Peregrine Falcon has been accurately recorded as achieving over two-hundred KPH in a dive. That is beyond terminal velocity for such a light even if streamlined object and falcons use wing power to accelerate downwards prior to folding their wings. The prey is often killed instantly by the impact, subsequently being caught in

the falcon's talons as it falls. Anything from a humming bird to a three kilogram crane will do as a target.

Peregrine stooping. 'Tear drop configuration': Perfect streamlining

Peregrine Falcons are found in every non-polar part of the world – Except New Zealand.

Control in pitch and yaw

Early aviators did not appreciate the need for a vertical stabilizer, because birds seem to cope without one. A rudder, yes, but that came from basic boat design, not birds. Many aircraft up to 1920 had no vertical fin at all. The rudder, held stationary, fulfilled this need by default – but not very well. Birds do, however, need aerodynamic stability in all three planes but use their tail to control both pitch AND yaw. Usually the yaw control is achieved by reshaping the wings or body. Their tail feathers (mainly used just for pitch control) can move into the vertical plane if required for yaw control.

Kestrel using tail feathers for yaw control

Avro 504 (1913). No vertical fin, just an aerodynamically balanced rudder

In cruising flight, birds have less need of pitch and yaw control as wing geometry changes can cope, so they can stow the tail feathers on the center line, reducing drag and thus energy expenditure. A spread tail is needed at lower speeds, such as take-off and landing. It seems counter-intuitive that baby birds often make their first flights with no tail feathers to speak of, but somehow they cope. Most of the time.

"I don't care if your friend has a Flight Simulator, you are going to learn to fly on your own

This Blue Tit and Chaffinch are falling as they fight – and yet the 'combination' is under control even if losing height. They will reach the ground unscathed and then separate to fly away

Aerobatics and 'flying for fun'.

Aerobatics in the form glider pilots know them are of little use to birds, where "gather food and avoid becoming food whilst frequently mating" is the benchmark of success.

In the mating season, male Kāhu will try to impress a female flying alongside her and performing true loops and barrel roles amongst much other erratic flight using their variable geometry. Kererū perform hammerhead stalls in the mating season, although often apparently alone. The bird stops flapping and rotates to 45 degrees nose up. The inevitable stall follows (with nary a wing drop) and the bird recovers to a normal glide angle with no overall height loss. In the UK, Wood Pigeons audibly clap their wings once as they stall in the hammerhead position.

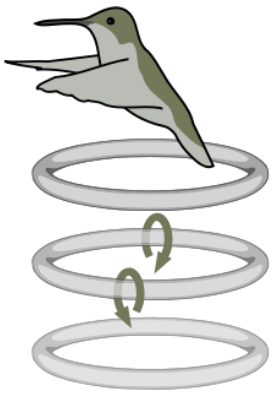
Birds of prey will sometimes attack their victims by coming up from underneath and rolling inverted so that their talons make the first contact with the luckless bird's vulnerable underside. Fighter pilots do the same in combat.

In the UK, Jackdaws (a small communal crow species) will play in the strong up-currents on windward cliffs. Wings extended, they rise rapidly to the top of the cliff, then fold their wings and plummet back to the bottom, repeating this over and over. It seems they clearly enjoy this activity.

Once, on a tramp, I was at the top of a vertical cliff with a gale blowing on to it. The up draft was so strong that a Tui, nose vertically down, wings fully folded, body perfectly streamlined, actually went upwards past me – *backwards!* Again I see no advantage in this for the Tui, except that it was enjoying the experience.

Humming Birds

Humming birds branched off the evolutionary tree many millions of years ago, developing their unique form of hovering flight, in some ways more akin to that of hovering insects than birds. Their extraordinarily rapid wing beats (12 – 80 cycles a second, with each wingtip describing a 'figure of eight') in the hover create an audible hum that gave them their name. Forward flight is aerodynamically similar to other birds but in the hover, each downstroke creates a circular vortex, rising on the outer circumference, descending on the inner. The overall downward motion of these vortices, 12 – 80 times a second, provides the upward force which supports the weight of the bird itself.



Schematic Humming bird hover

Finally, just to finish this week, a lovely image to study. The juvenile Bald Eagle clearly shows its airfoil, with bones at the leading edge acting as 'the main spar'. The Alulea are stowed as the airspeed is adequate. The brave little 'assailant' is using considerable negative incidence to provide a down force to hold it onto its adversary's back. Both birds' wings merge with their bodies with minimal interference drag.

I will tackle insect flight in a couple of weeks' time, but Man-powered flight is next.

Jonathan Pote jonathanpote47@gmail.com

New ROSTER

Ok hopefully as we reduce down through Lockdown, we will be back in the Air before long.

Month	Date	Duty Pilot	Instructor	Tow Pilot
	~~18~~	~~T PRENTICE~~	~~A FLETCHER~~	~~P EICHLER~~
	~~19~~	~~C BEST~~	~~P THORPE~~	~~R HEYNIKE~~
	~~25~~	~~E LEAL SCHWENKE~~	~~L PAGE~~	~~G CABRE~~
	~~26~~	~~R MCMILLAN~~	~~S WALLACE~~	~~F MCKENZIE~~

Duty Roster For Oct,Nov,Dec

Month	Date	Duty Pilot	Instructor	Tow Pilot	Comments
Oct	2	A MICHAEL	I WOODFIELD	P THORPE	
	3	R WHITBY	R BURNS	R CARSWELL	
	9	C DICKSON	A FLETCHER	D BELCHER	AGM / SOSB/ Working Bee??

	10	K JASICA	L PAGE	R HEYNIKE	
	16	J DICKSON	P THORPE	G CABRE	
	17	S HAY	S WALLACE	F MCKENZIE	
Labour W/E	23	K BHASHYAM	L PAGE	P THORPE	Matamata
	24	K PILLAI	R BURNS	R HEYNIKE	Matamata
	25	G LEYLAND	S WALLACE	D BELCHER	Matamata
	30	I O'KEEFE	I WOODFIELD	D BELCHER	
	31	M MORAN	R BURNS	G CABRE	
Nov	6	T O'ROURKE	A FLETCHER	F MCKENZIE	ATC
	7	R BAGCHI	P THORPE	R HEYNIKE	
	13	T PRENTICE	L PAGE	P THORPE	ATC
	14	C BEST	S WALLACE	R CARSWELL	ATC
	20	E LEAL SCHWENKE	I WOODFIELD	P EICHLER	ATC
	21	R MCMILLAN	R BURNS	G CABRE	ATC
	27	A MICHAEL	A FLETCHER	D BELCHER	
	28	R WHITBY	L PAGE	F MCKENZIE	
Dec	4	C DICKSON	S WALLACE	R CARSWELL	
	5	K JASICA	R BURNS	R HEYNIKE	
	11	J DICKSON	A FLETCHER	P EICHLER	
	12	S HAY	S WALLACE	G CABRE	
	18	K BHASHYAM	I WOODFIELD	D BELCHER	
	19	K PILLAI	P THORPE	F MCKENZIE	