

# The Introduction To Gliding 6-Pack

*Welcome to your first six flights in a glider  
and to the start of an adventure*



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# **The Introduction To Gliding 6-Pack**

## *Welcome to your first six flights in a glider and to the start of an adventure*

### **Welcome To Our World**

Welcome to the world of silent flight. The combination of flights in the Introduction to Gliding 6-pack will introduce you to the joys of flying a glider, and give you a full sense of the thrill of controlling a glider. The higher flights will give you the opportunity to settle in to the glider and become familiar with the controls and the sensations of flight. The circuit-flights will introduce you to the challenges of launching and landing the glider. The entire package is aimed at starting you on the path to becoming a safe and competent cross-country glider pilot.

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*You do not need to read any of this booklet in order to fully enjoy your 6-pack experience! Your instructor will brief you on everything you need to know before each flight. But for those who like to learn from written information as well as from hands-on experience, this is for you*

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Don't be shy. We all had a first flight, and we all had lots to learn. Glider pilots love talking gliding! Ask questions and you will get lots of help. Your instructors are all Gliding New Zealand-qualified, some with thousands of hours of cross-country and instructing experience. They volunteer their time so you can learn how to soar.

### ***Pathway to Cross Country Gliding***

The training of a cross-country glider pilot starts with the first flight. Training is undertaken in two-seat trainers with a Gliding New Zealand-qualified gliding instructor. The emphasis throughout training is on safety and enabling you to learn in an enjoyable environment. Learning is structured in a series of achievable and enjoyable steps:

- ✓ Introduction To Gliding 6-pack
- ✓ Learn-to-Fly Course or ad hoc training
- ✓ First solo flight
- ✓ A Certificate training (enabling local operation)
- ✓ Post solo training to B Certificate level (enabling cross-country flying)
- ✓ Qualified Glider Pilot and passenger rating
- ✓ Glider Instructor Rating

### ***Performance awards***

Once a pilot goes cross-country there is a world of competition and achievement awards to pursue if so inclined. For those that choose, there is a lifetime of adventure to be had:

- ✓ Silver C (50km goal flight, 5 hour flight, 1000m gain of altitude)
- ✓ Gold C (300km free distance flight, 5 hour flight, 3000m gain of altitude)
- ✓ Diamonds (300km goal flight, 500km free distance flight, 5,000m gain of altitude)
- ✓ 1000km Diploma and 2000km Diploma

## The Piako Gliding Club's Fleet of Sailplanes

Gliders come in many shapes and sizes. They can be low cost or expensive! The Piako Gliding Club has two 2-seat gliders available for instructional purposes with dual controls and instruments front seat and rear. We have two single-seat gliders which you move onto later after you are sent solo, and in which you are able to learn cross-country flying and even take into competitions when you are ready if you are so inclined. Many choose to purchase their own glider, and often join a small syndicate of owners to manage costs.

### *Two-seat gliders*

G-PC. Puchacz; two seat glider for basic and cross-country soaring

G-PK. PW6; two seat glider for basic and cross-country soaring



### *Single Seat Gliders*

G-NI Astir; Single seat medium performance cross-country glider

G-SN PW5; Single seat medium performance cross-country glider



## Introducing The Glider

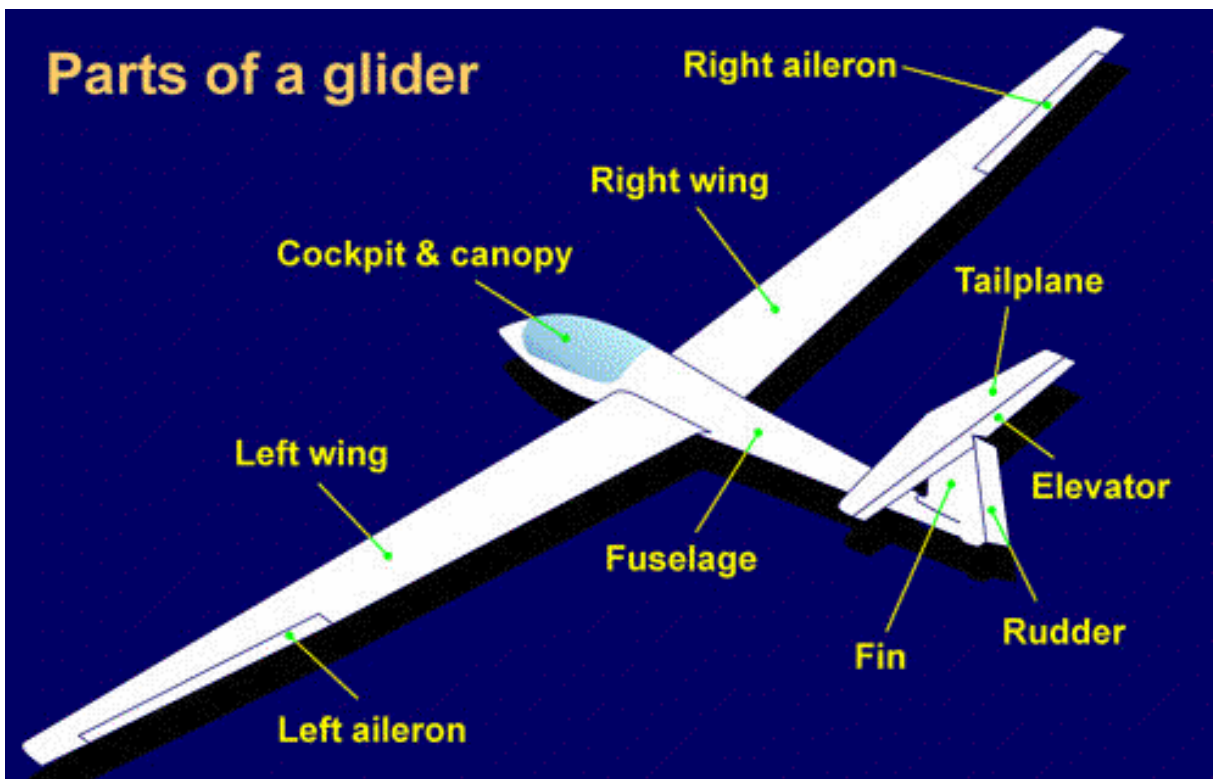
Experience silent flight, the purest form of flying. Gliders, also known as sailplanes, are highly specialised aircraft, designed with safety and soaring in mind. The two-seat gliders you will train in are capable of:

- ✓ Flying distances of 100kms, 300kms, and more
- ✓ Staying aloft for 5 hours or more
- ✓ Flying at speeds of well in excess of 200km/hr
- ✓ Soaring to heights of 3,000m, and higher with the addition of an oxygen system



### *Parts of the Glider*

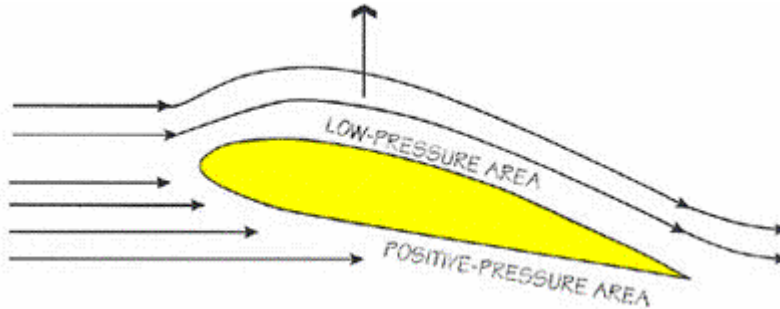
Gliders are designed to be strong, highly maneuverable, and controllable.



## *How Does A Glider Fly?*

The wings of a glider develop “lift”. When sufficient lift is developed the glider flies! The amount of lift that the wings produce is determined amongst other things by design issues such as their shape, by the speed of the air moving over them and the angle that the

air meets the wing (Angle of Attack).



The faster the air moves over a wing, the greater the lift it will produce. Watch a glider as it is being launched. You will notice the wings quickly develop lift and

support the glider as the glider accelerates during the launch. Air moves over the wing as a result of the forward motion of the glider. This forward motion is provided during the “launch” phase of the glider by a towplane or winch; during the “free flight” phase the glider generates forward motion by descending... in the same way a bicycle rolling down a hill maintains its speed.

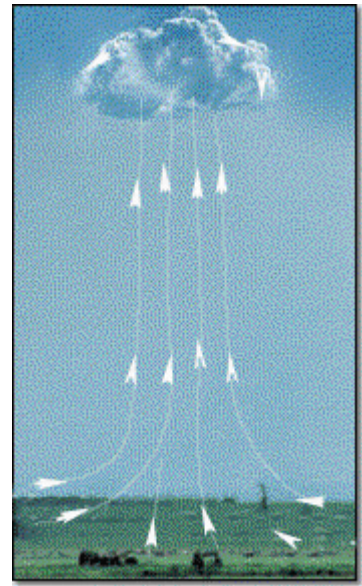
## Achieving Sustained Flight In A Glider

Your glider is always descending through the air. Like a bicycle rolling downhill, the descent provides the forward momentum of the glider that enables it to fly. The art to sustained flight in a glider is to find air that is moving upwards more quickly than the glider is sinking! It may come as a surprise, but there are vast amounts of air moving upwards and downwards. As a glider pilot you will learn to read the sky and use the energy of the upwardly moving air to enable you to travel cross-country long distances and at high speed.

"Lift" is the term used by glider pilots to describe rising air. The three main types of lift you will learn to utilise are: Thermal, Ridge, and Wave.

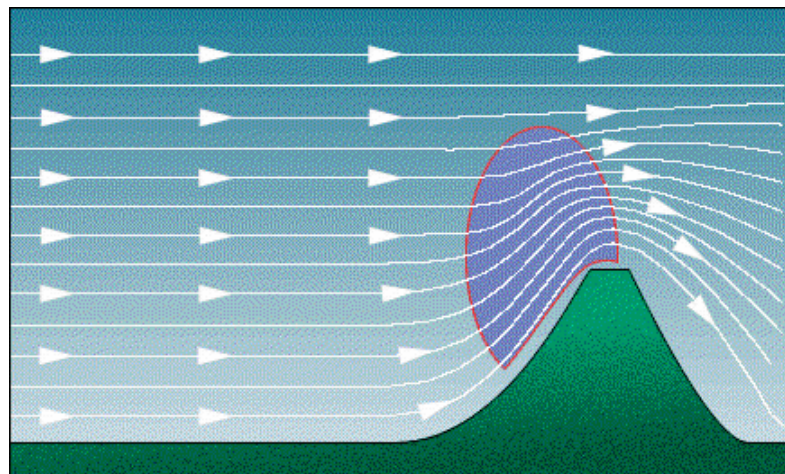
### *Thermal Lift*

Uneven heating of the ground and the air above it causes the warmer, and therefore lighter, air to rise. Under the right conditions, a bubble or column of rising air will break away and can rise to many thousands of feet. By circling in the rising air of the thermal, the glider will climb with it. The top of a thermal is often marked by a cumulus cloud - these are the puffy clouds you often see on a warm summer day. The "trigger" for a thermal, the area that warms more quickly than the area around it, can be something as small as a tennis court, or the roof of a house, but as the thermal develops as it rises it can generate enough energy to lift a glider vertically at speeds of up to a thousand feet per minute!



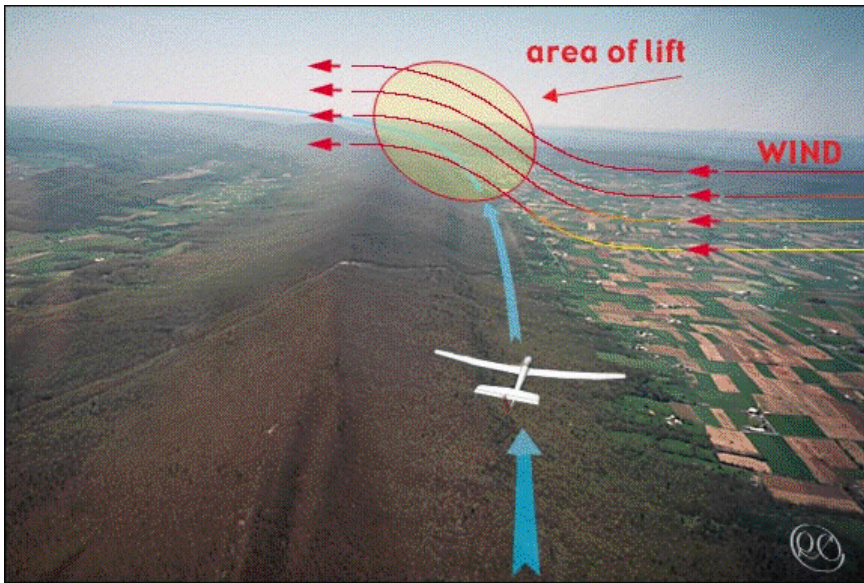
### *Ridge Lift*

Wind blowing across a large hill or ridge is deflected upwards on the windward face giving ridge lift. The Kaimai Range at Matamata often produces excellent ridge lift, especially in the winter westerly winds, enabling good year round soaring.



The air on the lee side of the hill is sinking so this area is generally avoided by the pilot. Also air immediately adjacent to the slope may be flowing in a turbulent manner, an “eddy” and is an area for extra care.

The glider can fly along the windward slope climbing in the rising air, often to heights in excess of 6,000'. With long ridges such as found in New Zealand, long distances can be covered utilising ridge lift.



### *Wave Lift*

Wind blowing across a large hill or mountain can produce Ridge Lift on the windward side, and under the correct conditions will form standing waves and "bounce" many times on the downwind side. Wave lift may be found at many times the height of the hill

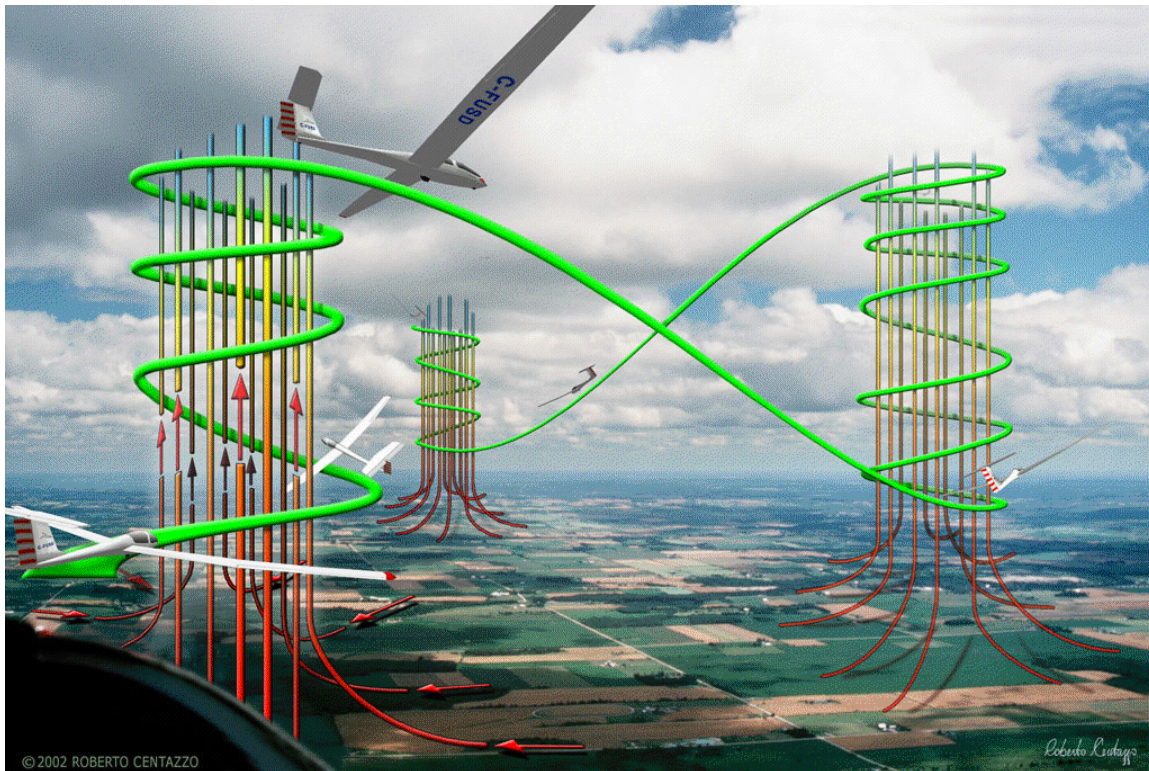


creating it. Glider flights above 20,000 feet above the Kaimais at Matamata are not uncommon.



## *Cross Country Soaring*

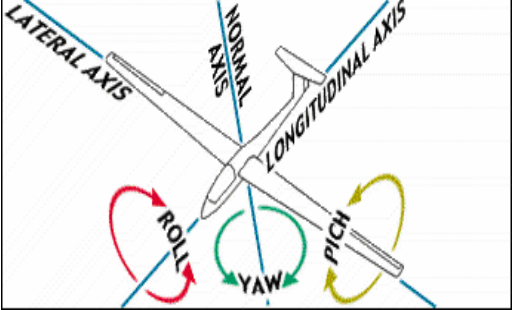
A cross-country soaring flight is achieved by utilising the various sources of lift available to you. Often in summer a cross-country flight will be made solely using thermal lift. A thermal is used to gain altitude, and then the pilot soars to the next thermal where they "top up" in the thermal and off they go to the next thermal and so on. Almost like filling up the petrol tank of a car on a long journey! In this way, glider flights of over 500kms are possible from Matamata.



## Controlling the Glider

### *Describing the Orientation of A Glider*

Pitch, Yaw, and Roll. These are the terms used to describe the orientation of a glider.

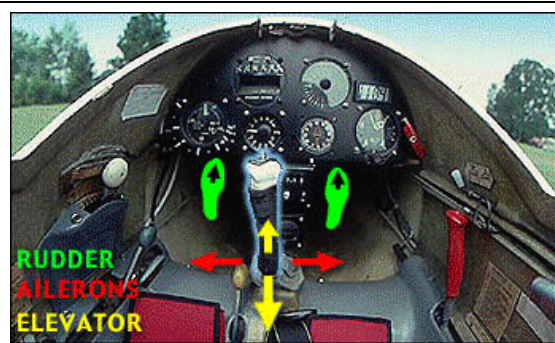
The glider pitches up and down	You feel the nose moving up relative to the horizon, or down relative to the horizon.	
The glider rolls left and it rolls right.	Sitting in the cockpit, you feel the glider bank to the left or right. When the left wing is lowered, the glider is said to be rolled or banked to the left.	
The glider yaws to the left and to the right.	Sitting in the cockpit, the nose feels like it swings to the left or right. If you look straight ahead, you will notice the glider still tracks in its original direction. Yawing does not change the track of the glider over the ground.	

### *Controls, and controlling the glider*

The control surfaces: The ailerons, the elevators, and the rudder of a glider enable the pilot to control the attitude of the glider, which controls its speed and direction of travel. The elevator is the horizontal control on the tail and is used to control the climbing or diving motion (pitch) around the lateral axis. Ailerons control the banking (the roll to the right or left) around the longitudinal axis. The rudder is the vertical control surface on the tail and controls the yawing motion around the vertical axis.

The faster the airspeed of the glider, the more responsive are the controls. The further you move the controls, the bigger will be the result on the glider's attitude. You will notice that the control movements are generally much larger during the very start of a launch for example when airspeed is low, and that as airspeed increases the size of movements to get the same result become smaller.

“The stick” is used to control the ailerons, and elevator; the rudder pedals control the rudder. Easing the stick forward will pitch the nose down relative to the horizon and the glider will increase its airspeed. Ease the stick back and the nose will



Pressing one of the rudder pedals moves the RUDDER, this produces a yawing movement around the normal axis of the glider.

Moving the control stick sideways operates the AILERONS, produces a rolling movement around the longitudinal axis.

Moving the control stick forward or backward operates the ELEVATOR. This produces a pitching motion around the lateral axis of the aircraft.

pitch up and the airspeed will decrease. The attitude of the glider is what determines its airspeed.

Move the stick to the left and you will notice the left aileron rising, and the right aileron moving downwards resulting in the glider rolling to the left. It is this banking action which results in the glider changing its direction of travel! As long as the stick is held to the side, the glider will continue to increase its angle of bank creating a steeper and tighter turn. Once you reach the angle of bank that you want, return the stick to the centre. The glider will continue to maintain the bank and the resulting turn until you push the stick to the opposite side and roll the glider's wing level again.

The rudder pedals are used to move the rudder and control the yaw of the glider. The instructor will explain this in more detail, but for now suffice to say that whenever you move the stick to the left or right, you will need to apply rudder to the left or right respectively to counter adverse yaw induced by the ailerons.

## Going Flying

### *Your Initial Flights*

Your first flights will focus on familiarising you with the sensations of flying, orientate you to the glider, and demonstrate how easy it is to control the glider, and how stable the glider is in flight.

Learning to fly a sailplane is not a horse race - every flight will teach you something different, don't feel you have to rush.

### *Settling into the cockpit*

Your training will take place in a two-seat glider which has fully duplicated controls and instruments in the front seat and in the rear seat. Your instructor will sit in the back seat. The front seat is the best seat in town, and it is reserved for you.



Before getting into the cockpit, take some time to orientate yourself. Initially the instructor will help you through the ritual of settling in, then you will take over and look after yourself. The things that are easiest to check and adjust before sitting in the glider are the position of the rudder pedals and the ballast weights. These will be explained by the instructor. The ballast is a critical factor in determining the balance and controllability of the glider. You will need to know how much you weigh in order to set up the ballast correctly... it is not rocket science, but does need to be done correctly so don't lie about your weight!

Make sure the straps (shoulder belts and lap belts) are positioned out of the way, sit in the



glider, wiggle a bit to get everything comfy, check that the rudder pedals are positioned correctly, then do up the straps and adjust them. When adjusting your straps, pull your lap belts snug first to pull you down into the seat, then adjust the shoulder straps. Your instructor will take you through this to ensure it is done correctly.

## *The instruments*

When seated in the cockpit you will see the control panel in front of you. You will be taken through the instruments and controls before your first flight. Every glider you fly in will have an airspeed indicator (ASI), variometer (sensitive rate of climb indicator), and an altimeter to tell you your height. The relative locations of these instruments within the instrument panel can vary between gliders so take your time to orient yourself whenever you get into the glider.



Something else you will notice when seated in the glider and looking forward is a piece of yarn or string taped to the outside of the canopy. The "Yaw String" is used to indicate the flow of air across the glider, and helps you to determine when to apply left and right rudder. Even a \$300,000 glider has a yaw string!



## *Pre-TakeOff and Pre-Landing Checks*

There are some things that we do by checklists in aviation. This is to ensure that we do the things that must be done every time we fly, and that they are done in the correct order. There are times to be creative and there are times to do things by rote.

### **Pre-take off checks CB-SIFT-CBE**

- C** Controls: Check elevator, ailerons and rudder for free and full movement
- B** Ballast: Ensure pilot weight(s) plus ballast within placarded limits
- S** Straps: Check harness(s) correctly fastened and adjusted

- I** Instruments: Set and functioning as required. Include radio, barograph and oxygen if installed.
- F** Flaps: Set for takeoff
- T** Trim: Set for takeoff
- C** Canopy: Check closed and locked and push upwards to check hinges and pins
- B** Brakes: Check fully open, then closed and LOCKED
- E** Eventualities: Assess conditions and consider options for non-normal situations

**Pre-landing checks (SUFEB)**

- S** Straps: Check harness(s) correctly fastened and adjusted tightly
- U** Undercarriage: Check down and locked
- F** Flaps: Check set for landing
- B** Brakes: Check functioning (by brief full extension) then utilise as required

Your instructor will introduce you to these checks early on, and you will be encouraged to learn the checks and perform them in a progressive manner as you advance through your training.

***Who is in charge, who has control?***

The instructors are in charge of everything that occurs on the ground and in the air. It is important to know this as everyone's safety depends on knowing this. Having said that. Safety is everyone's responsibility. If you see something that you think may be unsafe. Bring it to the attention of an instructor or the individual concerned. Be polite, do not challenge, simply identify what you think is unsafe.

During your training you will fly with an instructor. An important issue is who is physically flying the glider at any given time. The instructor will hand over control and take back control as required. If the instructor wants you to take control he or she will ensure you are ready and then say "you have control", you respond by taking control of the glider and saying "I have control". When the instructor wants control back they will say "I have control" at which point you immediately release the controls and say "you have control". Should you want to hand control back to the instructor, say "you have control" but continue to fly the glider until you hear the instructor say "I have control".

## You, the Pilot

### *Preparedness to fly*

As a pilot you are responsible for your own safety - and when you are qualified - the safety of any passengers you may be flying with, and the safety of the glider. There is a checklist of items to check yourself for personal preparedness to fly: "I'm Safe":

<b>I</b>	Illness	If you are not feeling well, don't fly. Simple as that
<b>M</b>	Medication	If you are taking ANY medications, check with an instructor for possible bad side-effects while flying. Don't assume anything as funny things can happen at altitude. If the instructor doesn't know they can find out for you.
<b>S</b>	Stress	Stress reduces your ability to deal with the complex environment of the cockpit. Going flying to burn off stress is not a great idea. You want to be relaxed to have a safe enjoyable flight.
<b>A</b>	Alcohol or drugs	The power pilots talk about 12 hours "bottle to throttle". Good saying! Don't fly if you have been drinking alcohol in the last 8-12 hours, and don't fly if you have a hangover or feel any lingering effects. The effects of altitude combined with recreational drugs are little known... just say no!
<b>F</b>	Fatigue	A lot can happen in the cockpit and very quickly. Be alert when flying, a fatigued pilot makes poor decisions and mistakes.
<b>E</b>	Eating and drinking	Eat sensible foods, don't be low on sugar when flying, and be sure you are not dehydrated.

### *Talking like a pilot*

Every area of endeavor has its own special language to communicate specific concepts – jargon! Learning the jargon is important as it enables you to communicate clearly with other pilots and it makes you sound the part!

### **The Alphabet**

You will notice that pilots use a phonetic alphabet. Why? Radio communications can be unclear at times, but there is no room for lack of clarity in communications when flying.

<b>A</b>	Alpha	<b>H</b>	Hotel	<b>O</b>	Oscar	<b>V</b>	Victor
<b>B</b>	Bravo	<b>I</b>	India	<b>P</b>	Papa	<b>W</b>	Whiskey
<b>C</b>	Charlie	<b>J</b>	Juliett	<b>Q</b>	Quebec	<b>X</b>	Xray
<b>D</b>	Delta	<b>K</b>	Kilo	<b>R</b>	Romeo	<b>Y</b>	Yankee
<b>E</b>	Echo	<b>L</b>	Lima	<b>S</b>	Sierra	<b>Z</b>	Zulu
<b>F</b>	Foxtrot	<b>M</b>	Mike	<b>T</b>	Tango		
<b>G</b>	Golf	<b>N</b>	November	<b>U</b>	Uniform		

## Jargon

### Wing runner

The wing runner is the person who hooks up the winch cable or aerotow rope to the glider, assesses when the circuit is clear and it is safe to launch. They also support the glider's wing in a level position during the initial part of the launch until there is sufficient airspeed for the wings to provide support and for the ailerons to exert enough control. The wing runner is a critical element in a safe gliding operation. Part of your training will involve learning how to handle the launch operation from both inside the cockpit and as a wing runner.

### Daily Inspection (DI)

At the beginning of every day, club members help to pull the gliders and tow plane or winch out of the hangar and prepare the gliders for flying. After a wash, each glider is given a Daily Inspection by a member who is qualified to DI the glider. This is a close inspection of all systems and components of the glider to ensure it is in an airworthy state.

### ASI

Air speed indicator. This instrument indicates the speed of the air moving past the glider. In some cases this can be quite different from the speed of the glider over the ground, for example when there is a strong headwind the ground-speed will be less than the indicated airspeed.

### VNE

Velocity Never Exceed. The placarded maximum speed of an individual glider. An important number to know, as bad things happen when VNE is exceeded.

### Launch Point

The launch point is the area where the gliders are launched from. This can be an area of intense activity and is an area of danger. Ensure that you stay off of the active part of the runway (which is marked by white markers), unless you have business on the runway, and are either trained in the activity you are performing, or are accompanied by someone who is. It is also important that cars are parked behind the point where gliders are being launched and this will generally be on the upwind side of the caravan or launch point.



### Horizon

The imaginary line where the sky meets the ground. This is a critical reference point for your flying for controlling the attitude of the glider. At times you need to imagine where the horizon is, for example when flying towards a hill.



### Launch method

We launch gliders by two methods at Matamata. In an aerotow, the glider is connected to a power plane by a rope and the tow plane provides the forward motion needed to get the glider to release altitude. Release altitude can be from 1000 feet upwards.. With a winch launch, the glider is connected to a winch at the far end of the airfield by a 1000 metre cable. The cable is wound onto a drum by a fire breathing V8 engine and the glider is pulled forward providing the forward motion required to develop lift. Release altitude on a winch launch us generally 1300-1500 feet.

### Ops Normal Call

Gliders on cross-country flights can be hundreds of kilometers from the airfield. Ops Normal (operations normal) calls are made by the glider pilot to the launch point approximately every hour to give a current location in the event the glider does not return home at the end of the day. Solo pilots also sign an intentions form before each flight, so they are aware of other activities on the airfield and so that the Club has some knowledge of where the Pilot is likely to fly.

### Units of measure

- Distances are in nautical miles (nm) or kilometers (km). 1nm approx=2km
- Air speed and ground speed are expressed in knots (nm/hr)
- Altitude is in feet
- Vertical speed is in knots or feet/min. 1 knot approximately = 100 feet/min

## Appendix: Syllabus of Training - Ground Handling and A-Certificate

### A-Certificate Syllabus (Training to local flying stage)

	Brief	Comp	Date		Brief	Comp	Date
<b>AIR EXPERIENCE / FAMIL</b>				<b>WIRE LAUNCH (note 1)</b>			
- Glider familiarisation				- Launch procedures			
- Fitness for flight (I'M SAFE)				- Ground run & liftoff			
- Strapping in and comfort				- Rotation and safety climb			
- Local area famil/orientation				- Full climb			
- Pre t/o checks (CB SIFT CBE)				- Top of climb / release			
				- Signals / calls for speed			
				- Launch in crosswinds			
<b>CONTROLS</b>				<b>SITUATIONAL AWARENESS</b>			
- Handing/taking over control				- Lookout / scanning			
- Principles of flight				- Collision avoidance			
- Effects of control (Primary)				- Right of way / etiquette			
- Effects of control (Secondary)				- Use of radio			
- Turns (up to 30° A o B)							
- Straight and Level				<b>NON-NORMAL SITUATIONS</b>			
- Use of trim				- Low acceleration on t/o			
- Use of airbrakes				- Low level launch failure			
				- Brake out signal			
<b>STALLING</b>				- Wave off signal			
- HASELL checks				- Release hang-up			
- Reduced G famil				- Aerotow upset			
- Slow speed handling				- No instrument circuit			
- Stall recognition/recovery				<b>CIRCUIT</b>			
- Stall avoidance				- Wind assessment			
- Stall with brakes out				- Safe speed near the ground			
- Stall in a turn				- Joining			
- Incipient spin & recovery				- Pre-landing checks (SUFB)			
- Full spin & recovery (demo)				- Downwind / base leg			
- Spiral dive & recovery				- Final approach / aim pt			
				- Flare / landing			
<b>AEROTOW LAUNCH(note 1)</b>				- Bounce recovery			
- Launch procedure				- Correcting if low			
- Ground roll				- Correcting if high			
- Lift off / initial position				- Landing in crosswind			
- Normal high tow position				- Baulked approach			
- Release				<b>SOLO FLIGHT</b>			
- Out of position recovery				- Responsibilities as PiC			
- Launch in crosswinds				- Handling & performance			

<b>A CERTIFICATE</b>			
- 3 Safe solo flights			
- 10 Oral question exam			

Note 1.  
As applicable to the Site

## *Ground Handling Syllabus*

Ground Training	Brief	Comp	Date	Ground Training	Brief	Comp	Date
Use of Training Record				Airfield familiarisation			
Use of logbook				Timekeeping			
Daily club operations routine				Intro to use of radio			
Removal of gliders				Safety on the airfield			
Cleaning gliders				1st aid / Fire / Accident plan			
Ground towing / handling				Launch procedures			
Securing / picketing gliders				Refuelling procedures			
Rigging and de-rigging				Overview of GNZ			
Intro to Daily Inspection (DI)				Intro to Club Rules			
Local airspace				Intro to the MOAP			

## **Acknowledgments**

The sincere thanks of the Instructors Panel of the Piako Gliding Club is given to those from whom we borrowed and poached materials for this gliding primer! These include:

### ***Roberto Centazzo***

We made extensive use of Roberto's absolutely excellent figures and images including those in the section "How Does A Glider Achieve Sustained Flight", and "Controlling the Glider". You can see more of Roberto's work on the web at:

<http://www.yorksoaring.com/>

### ***British Gliding Association***

Particular thanks for the "Parts of a Glider" diagram, and the aerial photo found in the section "Going Flying" borrowed from:

<http://www.gliding.co.uk/>

### ***Gliding New Zealand***

We have borrowed information from various parts of the Gliding New Zealand Instructor's Manual and training syllabus. You can visit the GNZ website for even more training materials at:

<http://www.gliding.co.nz/>

If you see something in here that you think has been poached and you have not received due credit, please contact Trevor Atkins at [trevor.atkins@hortvision.co.nz](mailto:trevor.atkins@hortvision.co.nz) so it can be remedied.