LESSON 1:

Cypress Lodge Flight Training

Introduction

The intention of the package is to cover the basic knowledge required prior to certification as a pilot. This package is not a stand alone document, other material that the potential Aerochute pilot should be
familiar with are:

- **Students Package** – issued by your instructor.

- **Aerochute Operators Manual** – issued with your new Aerochute
- from the manufacturer or distributor.

- **Ram Air Parachute Operators Manual**

- **RAA Operations and Technical Manuals** - Issued by the RAA as part of your membership.

Note that the above references are not exhaustive. Other recommended study references are:

- ParaglidingFlight by Denis Pagan.
- Micro Meteorology by Denis Pagan.
- Visual Terminal and Visual Navigation Charts available from Airservices Australia.
- The American Powered Parachute Manual

The Ground School Package

To maximize flying time when at the airfield, the material in this package should be **reviewed prior to the flying lessons**.

Revision periods at the airfield will cover information that require further clarification or amplification.

These lessons include Basic Aeronautical Knowledge and Advanced Safety:

1. The FTF Ground school package.
2. Aerochute familiarization.
3. Principles of flight.
4. Rules of the Air.
5. Flying the Aerochute.
6. Emergency procedures.
7. Meteorology.
8. Radio Calls

Advanced Safety
Human Factors
Low Flying RAA

Flying Fundamentals

- Flying is a totally immersive activity.

  Before you embark on flying powered parachutes for sport and recreation, the following brief will enable you maintain situational awareness at all times and to visualise the progression from student to pilot and provide some value as to what to expect from your training experience.

The RAM Air Parachute

The Ram Air Parachute retains its rigid shape during flight due to the air pressure created from air flow “ramming” into the open front cells of the parachute. The parachute has an upper and lower surface and leading and trailing edges.

The fabric construction make for a flexibility and provides shock absorption whilst maintaining lift in the same way as a conventional wing .

The parachute is created from low porosity material which prevents air from escaping thus once the air pressure reaches it maximum , the outside air can no longer enter the parachute and is forced to flow around the leading edge.

Similarly, the internal air can only escape slowly and with the air being rammed against the leading edge the result is the formation of an aerodynamically balanced wing.

Lift, Weight, Thrust & Drag

In straight and level un-accelerated flight,

Lift = Weight and Thrust= Drag.

As the wing moves through the air, it forces the air to flow around it. Air flowing over the curved upper surface has further to travel and therefore travels faster Airflow on the lower flatter surface has less distance to travel and therefore travels slower.

The lower air pressure from the faster airflow on top of the parachute creates a lifting force and when forward motion is achieved and this exceeds the weight of the aircraft the flight is achieved.

Thrust is achieved from the engine and propeller combination to provide the forward motion. Drag is produced by air resistance to the aircraft and parachute, and any form factor that presented to the forward airflow (including pilot and passenger).

When weight and drag exceed lift and thrust, then the aircraft will descend.

Throttle Control

The throttle controls take off, climb and descent rather than speed in a powered parachute. This is achieved by changing the angle of attack of the wing – the angle that the wing meets the airflow.

When the throttle is pushed forward to increase power, the thrust of the propeller moves the craft forward. This changes the angle of attack resulting in lift and climb. When the throttle is pulled back to decrease power, the craft moves back under the wing resulting in a lower angle of attack and descending flight.

During normal climb, cruise and descent , the aircraft and parachute are balanced and the angle of attack adjust automatically with the thrust applied with the throttle. The pilot must adjust the throttle setting depending on the (TOW) take off weight and the atmospheric conditions. Temperature and altitude play an important part in performance of the aircraft in flight.

Inherent Stability

The unique nature of the powered parachute's safety and ease of operation is the pendulum effect which relates directly to a suspension point (the parachute) and a weight at a lower point (the airframe and pilot).

When a pendulum is released the weight swings to the lowest point by itself , this is the configuration that allows a powered parachute to fly virtually unattended.

This effect means there is a constant gentle movement as the aircraft balances itself to the most stable position and where any sudden control or wind gust movement will be short term as the aircraft will return to stable flight once the control pressures are removed.

The balloon and the parachute are 2 examples of inherently stable aircraft.

Effects of gusty conditions on stability

Strong windy and gusty conditions will cause the larger and lighter wing of a powered parachute to move first, displacing the suspension point of the pendulum.

A side gust will move the wing to the side first then the aircraft will swing back under it. This may be particularly dangerous at low levels near trees and other obstacles.

A gust from the front will move the wing back and increasing the angle of attack. The aircraft will climb then swing back under the aircraft.

A gust from the rear will swing the parachute forward and lower the angle of attack, a lull will be felt as the aircraft starts to descend.

The severity of the gusts or “wind shear” will determine how dramatic an effect it will have on your flight and understanding micro meteorology around your designated flying areas and any thermal activity during the day will determine whether flying should be continued or attempted.

Axis of Movement
YAW, PITCH and ROLL

The aircraft pivots about three axis points. :

- Vertical axis
- Lateral Axis
- Longitudinal axis

In conventional aircraft these movements are controlled by rudder, ailerons and elevators controls.

The powered parachute pilot only needs to consider the pitch movement control with the throttle and the vertical axis as the pendulum effect balances the roll or banking effect.

The very simple control movements of Left and Right, and throttle up and down, makes the powered parachute extremely easy to fly.

Steering Controls - Ground

Ground steering is accomplished by pulling the steering lines right to go right or left to go left.

Do not attempt takeoff with any folded or closed cells.

To assist in opening the closed end cells on takeoff roll, it is common for one or more of the cells to be flat due to outside pressure on the canopy surface.

To the pilot, it will appear that the canopy is folded down over the cell openings.

Steering Controls - Ground

To open these cells, once the chute is overhead, the pilot pumps the steering lines and releases them quickly.

End cell closures will eventually correct themselves as air being forced into the open leading edge will push through the cross ports within the chute to fully inflate the chute.

Pumping the steering lines forces air forward in the outer cells, opening them and allowing air to come in for full inflation.

Until you have the experience, and a pilot certificate, if this happens, **always abort the takeoff** and reset the parachute again.

Steering Controls - Flight

The pilot controls in -flight steering in the same method. When the pilot pulls either steering line for a turn, the steering control lines pull down that side of the parachute to which it is attached.

The drag created by the lowered trailing edge slows that side of the parachute, causing the other side to fly faster creating a turn. The more the trailing edge is deflected, the faster the turn, the shorter the radius and the more altitude lost.

Whenever drag is increased there is a loss of lift.

This altitude loss with passenger, can be **300 + feet** in a very tight turn, and can be minimised or eliminated simply by adding throttle. Lost altitude in a steep turn, coupled with gusting winds and no additional throttle can result in a potentially unsafe situation if close to ground.

The Effects **of Wind Direction**

When the craft is on the ground the parachute will seek to face directly into the wind and the parachute will try to pull the craft into the same direction.

A difference between the wind direction and the takeoff direction may not allow the parachute to inflate properly and if there is enough differential pressure this could conceivably cause the parachute to tip the aircraft over.

You must understand the wind conditions and characteristics of your airfield and areas.

The Effects **of Wind Direction**

Always line the craft directly into the wind. If there is airflow the parachute will act as a kite and launch easily.

As you start your takeoff roll the parachute may fall to one side or the other. Gently pull the steering lines on the opposite side to create drag thus pulling it back to center.

In no wind conditions you have to get the aircraft moving to create airflow over the parachute. Once centered, the parachute forms an even wall and application of power and steering line pressure will launch the canopy overhead and then you may add power for immediate takeoff.

Air Speed and Ground Speed

Non pilots are often confused by the terms "air speed and ground speed“.

Think of air speed as simply a **speed performance**. The powered parachute flies through the air at a fixed ~65 kmph, regardless of whether the throttle is at a full or partial setting.

The powered parachute does not increase in air speed with an increase in power because as power is increased the angle of attack is also increased, which produces more lift and drag, coinciding with the increase in thrust.

Therefore, the powered parachute climbs, but does not fly at a greater air speed. (The air speed + tailwind/- headwind speed = the ground speed of the aircraft).

Air Speed and Ground Speed

Ground speed is the speed which the craft is actually moving over the ground. It varies with the wind speed and the direction the powered parachute is facing in respect to the wind.

Going into a l0 kmph head wind produces a ground speed of 65 kmph minus 10 kmph or 55 kmph ground speed.

A 10 kmph tail wind produces ground speed of 65 kmph plus 10 kmph or 75 kmph ground speed.

This must be considered when flying cross country. For instance, you cannot fly to a given point with a tail wind using half your fuel supply and expect to get back facing into a head wind.

Engine Out

Engine out situations, while rare, can happen and you must be prepared. Given the high lift canopy, the glide ratio of the powered chute is 3 to 1. That is the craft will glide three feet forward, for every one foot of descent.

The glide path will change depending upon the wind speed and the direction the powered parachute is facing. Facing into a headwind results in a steeper glide angle, but a slower ground speed on landing. With a tail wind, the glide angle would be shallower, but the ground speed would be faster.

In engine out situations, first check the terrain you are over to determine where you can land. Put the craft into the wind if possible, but remember if you attempt to turn you will lose altitude, so make sure you have room. Once in the glide path, attempt your normal landing. You will need to adjust your ‘flare technique” to soften your landing.

At ~ 15 feet above the ground, the descent is slowed by pulling with both steering lines (flaring the parachute) and this significantly slows the aircraft for landing.

Flying Fundamentals

Group D - RAA Avoiding Controlled Airspace

When operating Visual Flight Rules (VFR) in G airspace, the following tolerances must be applied to the planned tracks in order to avoid controlled airspace (CTA) or restricted areas (R###):Denotes a restricted area (D###) Denotes a danger area (P###) Denotes a prohibited area and these can be reviewed as part of flight planning on VTC and in ERSA references.

Air legislation and airspace changes are frequent and continuous so as a pilot you can reference the latest information from your flight planning before departure to ensure currency.

LESSON 1:

COMPLETED