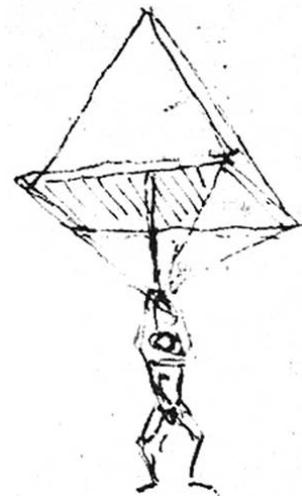




Paramotor Flight Instruction Course Manual

Revised, September 2017



*“When once you have tasted flight,
you will forever walk the earth
with your eyes turned skyward,
for there you have been,
and there you will always
long to return.”*

Leonardo da Vinci

Course Structure

This manual is designed to supplement field and classroom concepts for the Airparamo Paramotor Flight Instruction Course. The information here is tailored for both foot-launch and wheel launch paramotoring. Paramotor instruction can be divided into two distinct paths: Foot-Launch (where the pilot carries the motor unit on their back) and Wheel-Launch (where the pilot sits in a wheeled framework with the motor unit integrated as one unit).

Goals of Instruction

This is the beginning of a magnificent journey where you will realize your dreams of personal flight. The goals of the instruction are simple:

- 1) Have fun throughout the entire process. After all, you got into this to enjoy the experience.
- 2) For you to learn as much as possible.
- 3) Keep you from breaking yourself or your gear.

The Paramotor Flight Instruction Course will provide you with fundamental skills and knowledge for you to start on your own path toward independent and safe flight. When you complete the Paramotor Flight Instruction course, you will be a competent beginner pilot, solely responsible for your safety, flying site selection, condition judging, decision making, understanding of the laws pertaining to flight, care and maintenance of your equipment, and self assessment.

8 Levels of Awareness

One of the main roles of the Airparamo Paramotor Flight Instruction Course is to expose and explore 8 areas of awareness. These are not listed in any particular order, as they are all very important:

- 1) **Weather For Flight.** Includes finding good data on the internet, local cues, using a windsock and other markers to determine direction, speed and quality of the air, recognizing the different cloud types.
- 2) **Locations For Takeoff & Landing.** Finding the pros and cons of a given place by recognizing obstacles, vegetation, slope, and ground features.
- 3) **Use of Equipment.** Including paraglider, motor unit, trike, and accessories.
- 4) **Maintenance & Storage of Equipment.** Includes pre and post flight checks, folding paraglider techniques, storage, repairs, bolt tightening, untangling lines, fuel and oil preparation and use.
- 5) **Flight theories.** Includes aerodynamics and what makes a paraglider fly, the relationship of ground and air speed, how terrain can affect airflow, glide and climb slopes, wind gradients, the effect of wind speed on paramotor operations, wake turbulence, downwind altitude safety, determining ground speed from the air, flare techniques and height, understanding of density/temperature/altitude.
- 6) **Law & Etiquette.** Understanding of the laws we operate under and being a good ambassador to aviation and the paramotor community.
- 7) **Situational Awareness.** The continuous understanding of what is going on around you. This is important to identify aircraft flight patterns, where other fast and slow pilots and other airborne entities (birds, drones) are flying.
- 8) **Know Thy Self.** Continuous reflection on your abilities, skills, and predispositions, your current state of body and mind, your level of experience, your currency (length of time from the last time you flew), your risk tolerance.

Course Length

This course is designed to be completed in 7 to 15 segments in 2 to 4 hour lengths, Due to the unique qualities and circumstances of each student and the unpredictable weather conditions, the time can vary greatly from as short as a few days to several months. Your requirement is your commitment in time, effort, and safety.

Challenges

Paramotor instruction is challenging to both your mind and body. Even though they look easy, especially in the hands of a skilled pilot, paramotors are very hard to master. Additionally, there is a huge amount of information and skills that must be learned to become a competent beginner pilot. There can be a strong physical aspect to Paramotor instruction and flight. Your health, fitness, and age will influence the physical aspect of your instruction from mild to rigorous. This is not to say

that you must be an athlete and a genius to become a paramotor pilot, but the physical and mental demands of instruction precede the ease of proficient flight.

What to Bring & Wear

Be sure to come prepared. Come rested, fed, and hydrated. Be sure to bring ankle supporting footwear with good traction, long pants (even in summer), sun block, insect repellent, sunglasses, a hat, at least one gallon of water, a few snacks, work gloves, and a camera if you like. Also bring clothing for changes in weather.

Weather

Occasionally the weather may be unfavorable for flight instruction and we must cancel or postpone a class. If this happens, we will issue a "wind check" to come back and finish the class another day. No refunds can be issued after the instruction starts.

Locations

We instruct and fly in several areas in the Metro Phoenix, Arizona area. Our main location is based at Ak-Chin Regional Airport (formerly PRA or Phoenix Regional Airport) in Maricopa. It's located about 35 miles directly South of Phoenix. Visit www.airparamo.com/training/sites for more info.

Spectators & Cameras

Lastly, spectators, photographers, friends and family are not recommended during the initial instruction --especially the first solo flights-- since they tend to cause unwelcome distractions that directly result in a safety issue.

Conclusion

Paramotor flight is an amazing, often life changing experience. But it requires dedication and hard work to master the skills and knowledge necessary to become a proficient and safe paramotor pilot. At Airparamo, we are committed to getting you to be a proficient and safe paramotor pilot in a fun and relaxed environment.

Mo Sheldon
Advanced Flight Instructor, ASC and USPPA Certified
www.Airparamo.com
602-692-7995

Instruction

About Airparamo & Mo Sheldon

Airparamo is a paramotor flight school located south of Phoenix, Arizona and offers paramotor instruction --both foot and wheel launched-- all year round (except holidays). Mo Sheldon, is an Advanced Flight Instructor certified through ASC (Aero Sports Connection) and USPPA (United States Powered Paraglider Association). He offers instruction with state-of-the-art equipment and teaching techniques for your safe and effective training.

Airparamo offers different instructional programs for prospective pilots who want to learn this exciting form of personal flight. These training programs are divided into the following courses.

Discovery Flights

\$125 for 10 minutes

\$165 for 20 minutes

\$285 for 40 minutes

We offer group discounts of three or more.

A Discovery Flight with a paramotor instructor is an excellent way to get a good understanding of what it is like to fly a paramotor. During the flight, the student passenger can steer the paraglider if desired. Up to \$100 of the Discovery Flight can be applied to the Paramotor Flight Instruction Course.



Paramotor Flight Instruction Courses

These courses will guide the student from terminology of the equipment, through the student's first solo flights, and covers up to 10 supervised solo flights, building a strong foundation to be a competent beginner pilot.

The courses will include a tandem flight, terminology and maintenance of the equipment, basic meteorology (weather to fly in), aviation regulations, inflation techniques (forward and reserve) with a backpack engine, foot launch techniques, simulator work, towed flight, flight patterns and landing procedures.

Everyone progresses at a different rate, so the necessary time will be taken with you to insure you gain the skills and knowledge to fly safely before you are encouraged to fly by yourself. Students may spread out instruction over several weekends if desired.

Because it is best to learn on the equipment one will actually fly in the future, students are encouraged to purchase or have their own equipment to complete this course.

Payment for the Paramotor Flight Instruction Course is required in full at the beginning of the course. There are no refunds for training, unless extraordinary circumstances arise which are decided at the sole discretion of Airparamo staff.

Per Day Training

\$185/ session (from 2-3 hours), \$95 per hour

After the completion of the PPG Basic Solo Course, a PPG Advanced Course will focus more on finding areas where the student needs to improve and build experience and confidence. We will provide focused attention to ground handling, inflation, foot launch techniques, flight and landing patterns as well as in flight emergency procedures as the student requires.

Instructor & Tandem Training

Instructor and tandem training is available. Please contact us for pricing and details.

Recommended Reading & Watching

Here is a list of books Airparamo highly recommends:

The Powered Paragliding Bible 4 by Jeff Goin

Paperback; 320 pages; full color

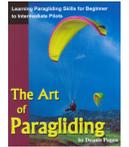
This book is the most thorough manual ever produced for our sport, offering a concise treatment of subject matter for anyone serious about flying. It will be appreciated by those just learning as well as those wanting to master the sport. Colorful photos and carefully designed diagrams on each page add to the wealth of well organized content.



The Art of Paragliding by Dennis Pagen

ISBN 0-936310-09-X; 8 1/2 x 11 paperback; 342 pages

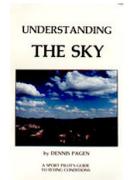
Dennis Pagen is very well known in both Hang-Gliding, Ultralight and Paragliding circles, having written and published books on all three subjects, as well as on meteorology for pilots. Whether you are new to paragliding or wish to take a refresher course to polish your skills, this book is sure to provide a goldmine of information, including 248 illustrations and 86 photos.



Understanding the Sky by Dennis Pagen

ISBN: 0936310103; Paperback

The book takes a very complicated subject and boils it down to the bare essentials necessary to have a working knowledge of weather. Quite a feat! Of course it helps to have an interest in weather from a ultralight pilot's perspective.



Here is a list of videos Airparamo highly recommends:

Risk & Reward by Philip Russman of Lite Touch Films

Running time: 70 minutes

After 3 years of research and gathering video from around the world, this is must see for all PPG pilots, beginner and advanced. Introduced by William Shatner, this DVD covers a wealth of information packed into 70 action packed minutes of exceptional video, narration and music. Risk and Reward covers fundamentals that are certain save wear and tear on your equipment, your body, and your wallet, including the 4 most common causes of injury and more importantly how to avoid them.



Paramotor Instruction Course Syllabus

1. Course Overview

- 1) 3 Goals of Instruction
- 2) 8 Levels of Awareness

2. Discovery Flight

This is an amazing opportunity to take to the skies with an instructor.

3. Theory

- a. Weather Theory
 - i. Atmosphere

Solar Radiation, Convection, Coriolis Effect, Warm/Cold Front, Clouds Types

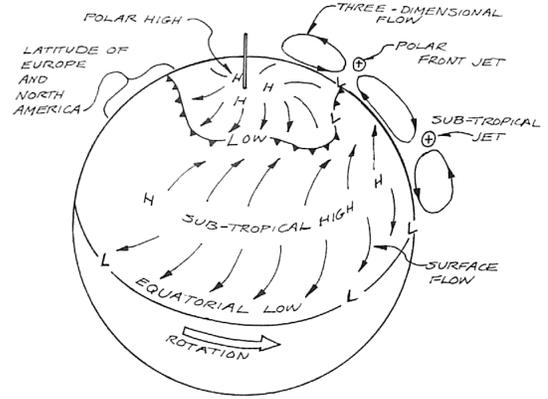


Figure - Circulation on the Earth

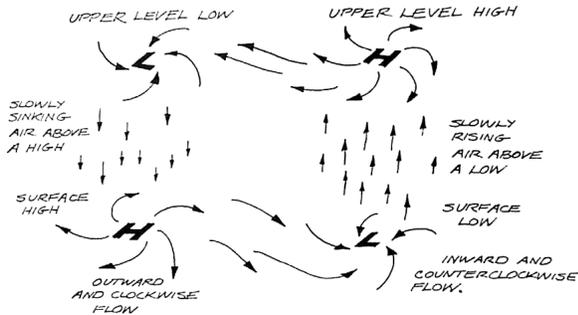


Figure - Flow Patterns Around Pressure Systems

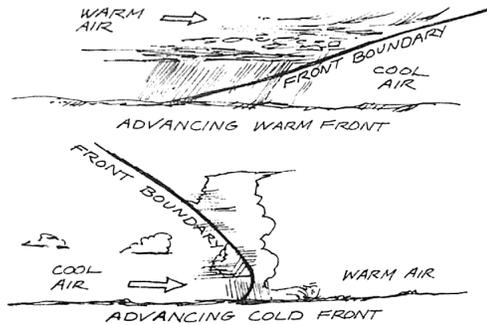


Figure - Warm and Cold Fronts



Figure - Frontal and Pressure Systems

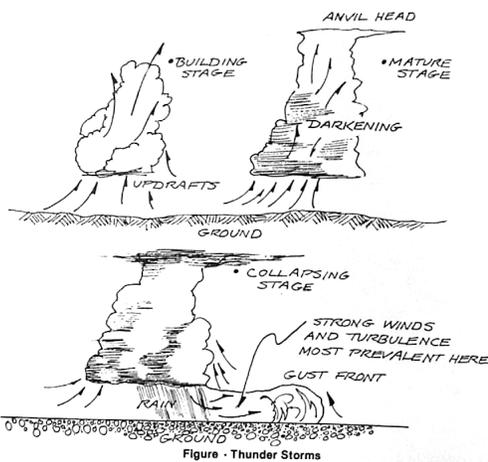


Figure - Thunder Storms

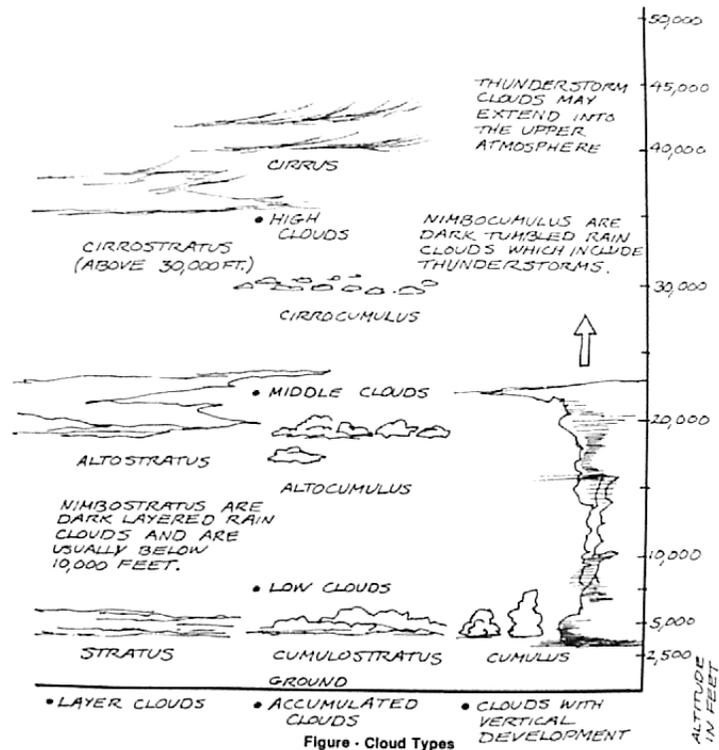


Figure - Cloud Types

- ii. Air
 - (1) Fluid With Mass
 - (2) Pressure and Altitude
 - (3) Humidity
 - (4) Temperature
 - (5) Density
- iii. Wind
 - (1) Mechanical Turbulence
 - (2) Rotor
 - (3) Wind Gradient

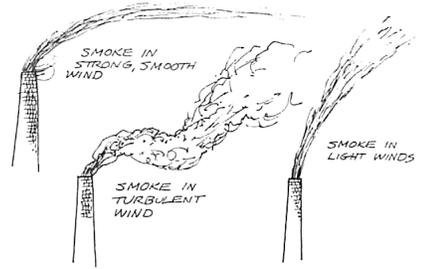


Figure - Using Smoke as a Wind Indicator

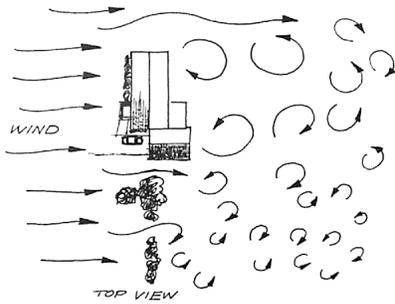


Figure - Mechanical Turbulence



Figure - Rotors

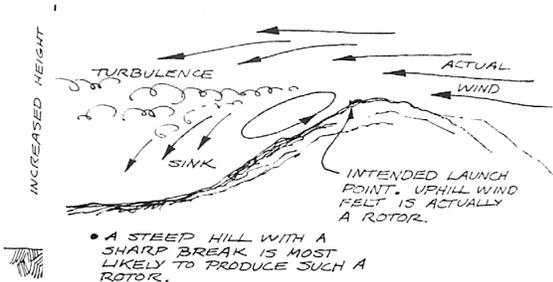


Figure - Rotor Dangers

- iv. Thermals
 - (1) Solar Radiation
 - (2) Convection
 - (3) Stability/Instability
 - (4) Dew Point
 - (5) Dust Devils

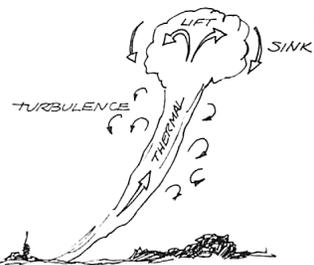


Figure - Thermal Turbulence

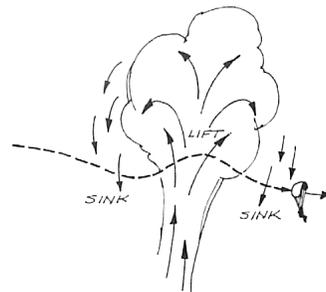
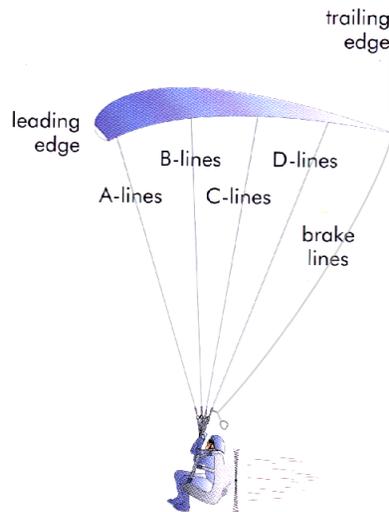
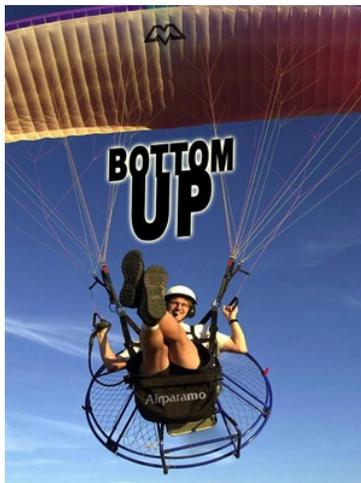
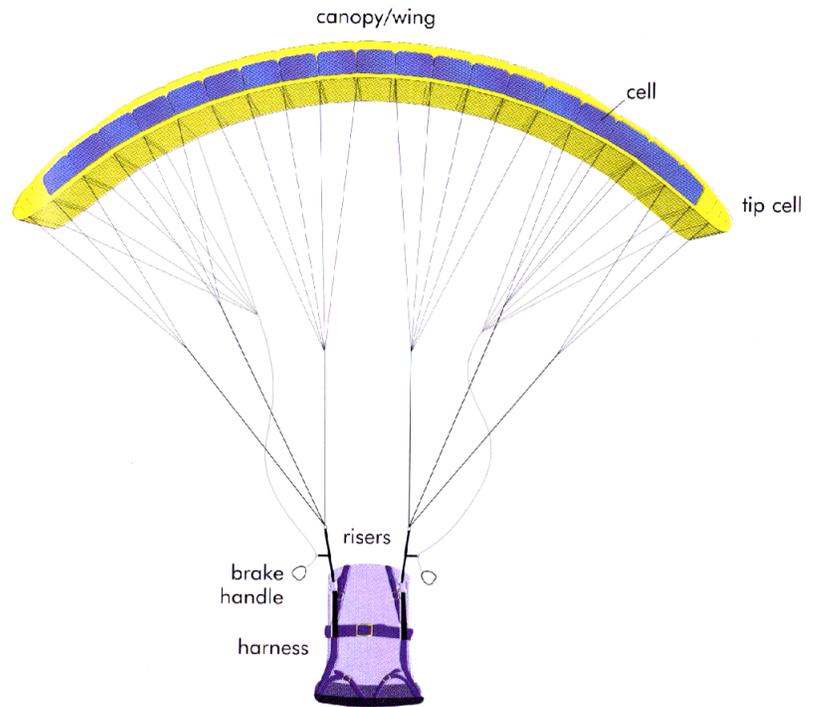


Figure - Lift and Sink Around A Thermal

- b. What Is A Paramotor
 - i. Personal Flight Realized
 - ii. Equipment
 - (1) Wing/Paraglider
 - (a) Canopy
 - (b) Lines
 - (c) Risers
 - (2) Motor Unit
 - (a) Harness
 - (b) Cage/Frame
 - (c) Motor
 - (d) Throttle
 - (3) Accessories
 - (a) Helmet
 - (b) Radio
 - (c) Reserve Parachute
 - (d) Knee Protectors
 - (e) Gloves
 - (f) GPS



c. Flight Theory

i. The Airfoil - Why It Flies

- (1) Basic Shape
- (2) Lift
- (3) Drag
- (4) Glide
- (5) Chord Line, Angle of Attack, and Attitude
- (6) Vortices

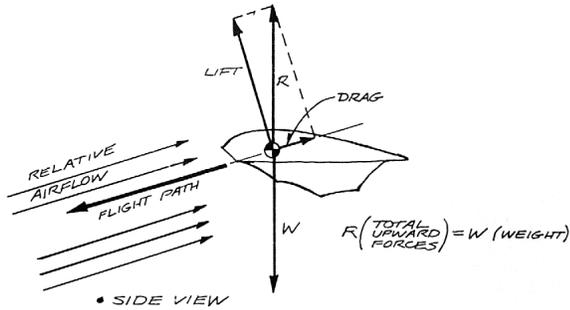


Figure - Forces on a Wing

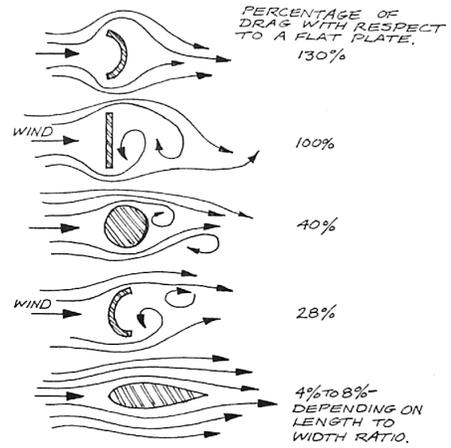


Figure - Drag of Various Shapes

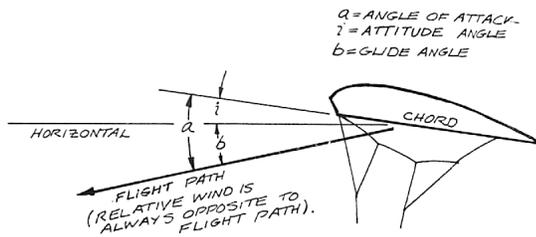


Figure - Primary Flight Angles

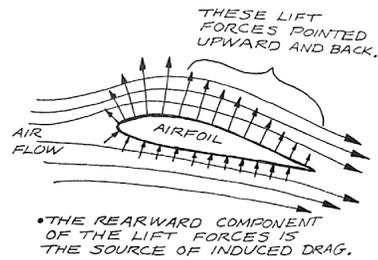


Figure - Induced Drag

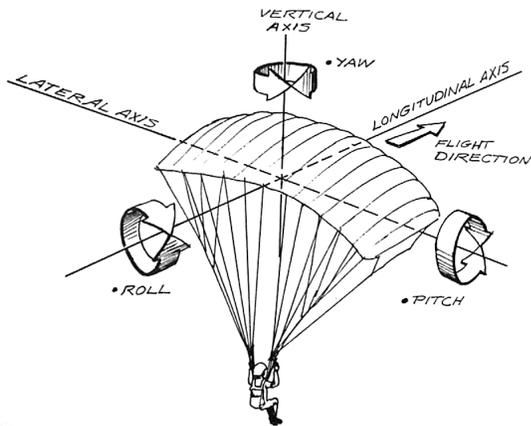


Figure - Axes of Rotation

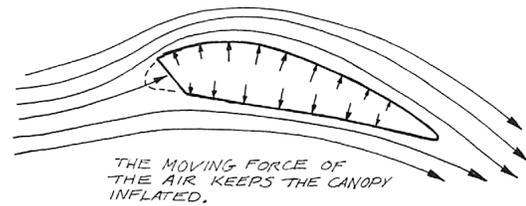


Figure - Paraglider Airfoil - The Inflated Canopy

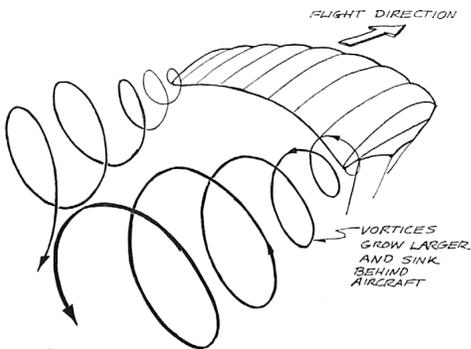


Figure - Wingtip Vortices

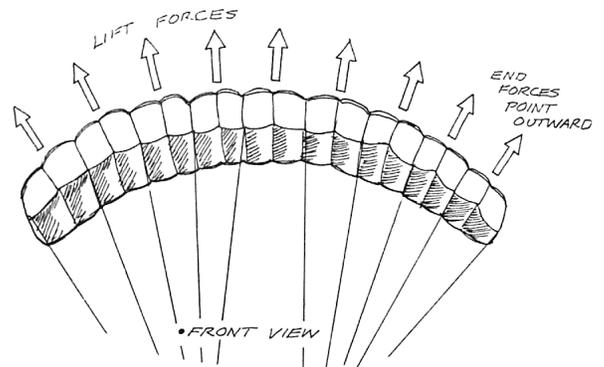


Figure - Canopy Outward Inflation

- ii. Airspeed and Ground Speed
 - (1) Upwind/Downwind
 - (2) Crabbing
 - (3) Stall
 - (4) Min Sink
 - (5) Best Glide
 - (6) Percieved glide slope in wind
- iii. How Brakes Work
- iv. Wind gradients

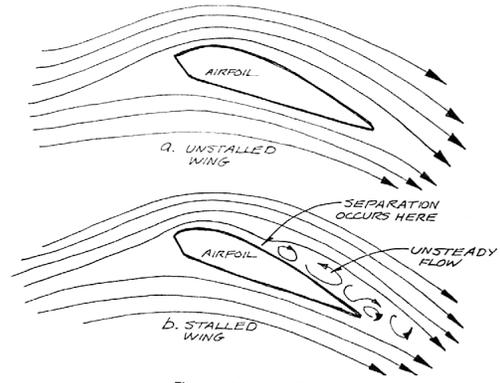


Figure - Stalls on a Wing

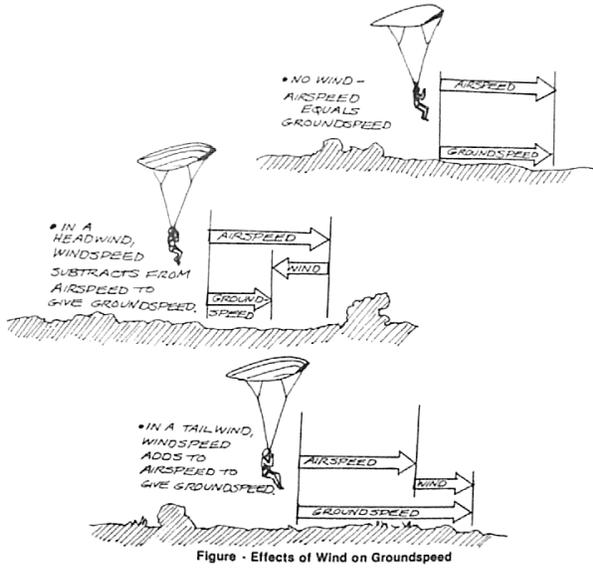


Figure - Effects of Wind on Groundspeed

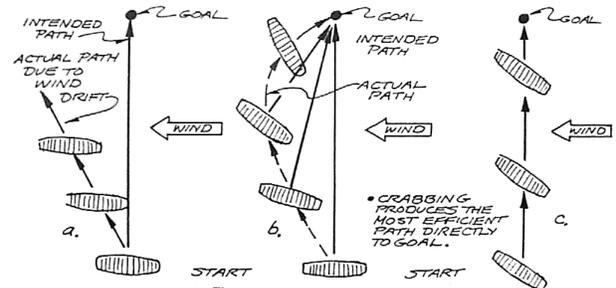


Figure - Crabbing in a Crosswind

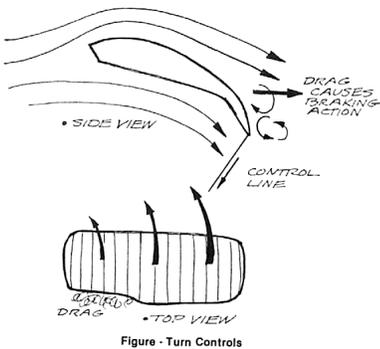


Figure - Turn Controls

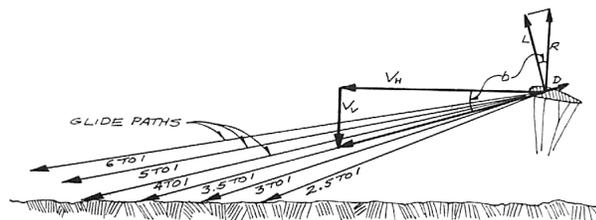
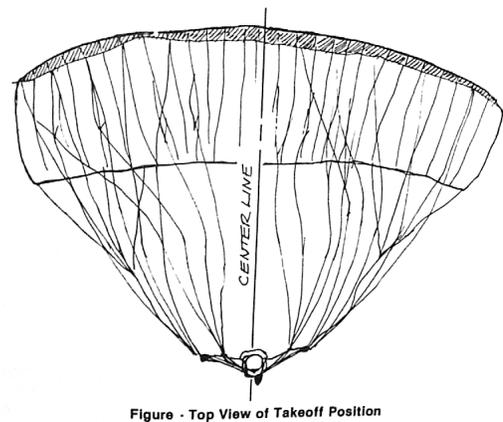
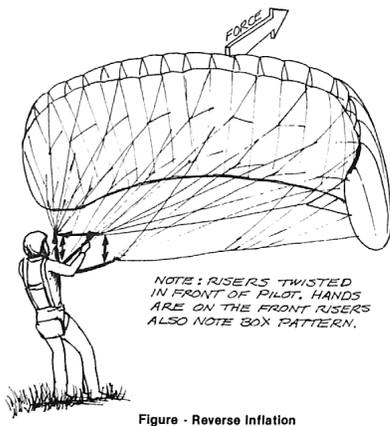
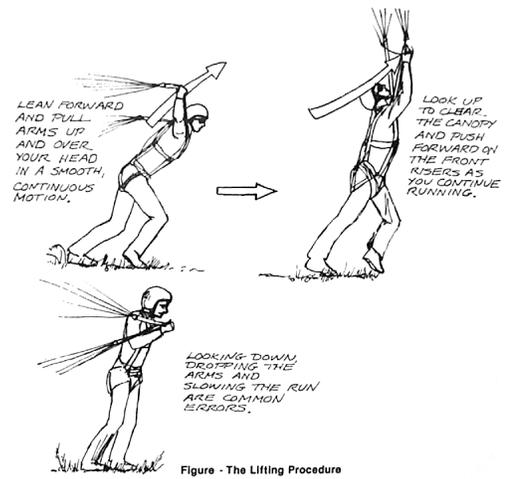
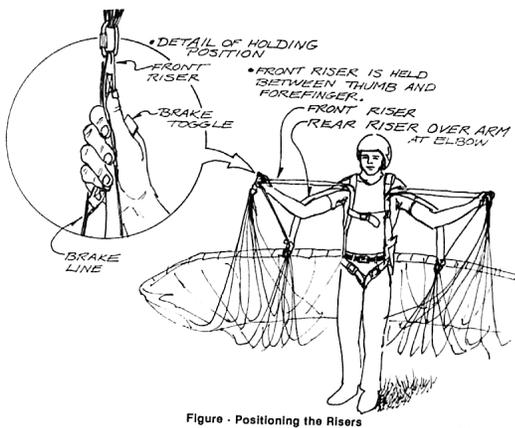
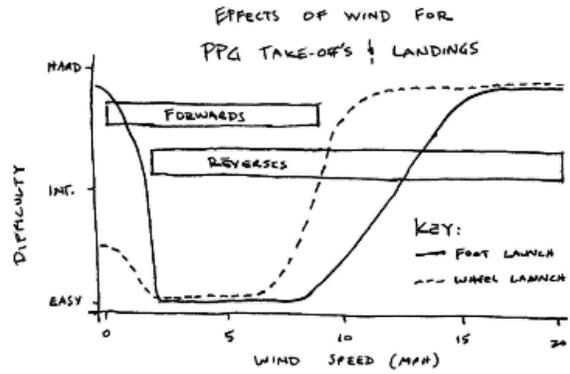


Figure - Glide Ratio

- d. Getting Lift
 - i. The Motor's Primary Function
 - ii. Thermals
 - iii. Updrafts
 - (1) Ridge Lift

- e. Launching
 - i. Terrain
 - (1) Flat
 - (2) Sloped
 - (3) Clear of Obstructions
 - (a) Buildings
 - (b) Power Lines
 - (4) Ground
 - (a) Vegetation
 - (b) Surface Texture
 - ii. Wind
 - (1) Laminar or Gusty
 - (2) Direction
 - (3) 0 To 2: Intermediate
 - (a) Light and Irritable
 - (4) 3 To 12: Beginner
 - (5) 13 To 20: Intermediate To Advanced
 - iii. Launch Type: Forward or Reverse?



- f. Flying
 - i. Hand Positions
 - ii. Where To Look
 - iii. Flight Plan
 - iv. Steering With Brakes and Weight Shift
 - v. Right of Way Rules
 - (1) Right Has Right of Way
 - vi. Thermaling Rules
 - (1) Same Direction as Other Pilots
 - vii. XC

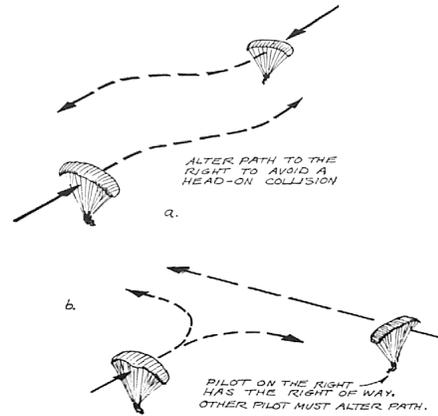


Figure - Approach Right of Ways

- g. Landing
 - i. Checking Wind Direction and Obstacles
 - ii. Picking A Landing Spot
 - iii. Landing Approaches
 - (1) 45 Degree Box From Obstructions
 - (2) Finding Where You Will Land From the Air
 - (3) Adjusting Your Glide
 - (a) Figure 8's
 - iv. Flare

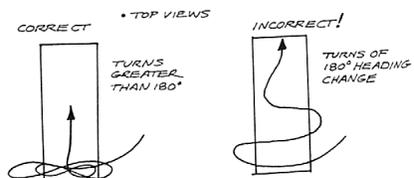
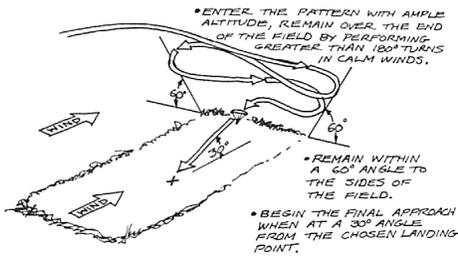


Figure - Figure 8 Landing Approach

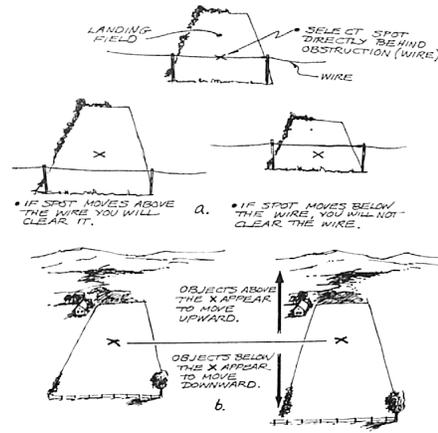


Figure - Glide Path Judgement

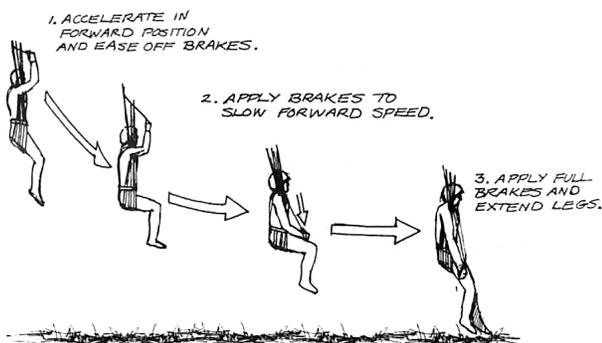


Figure - Landing Sequence

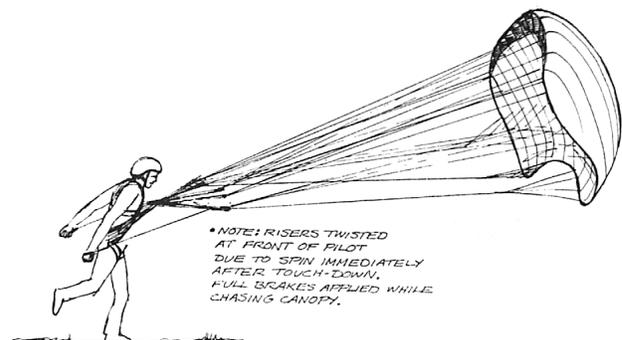


Figure - Landing in High Winds

h. Dynamic and Transient Canopy States

- i. Collapses
 - (1) Tip
 - (2) Half Wing
 - (3) Asymmetric
 - (4) Big Ears
- ii. Pendulum/Surge
 - (1) Pitch
 - (2) Roll
 - (3) Spiral
- iii. Stalls
 - (1) B Line
 - (2) Full
 - (3) Spins

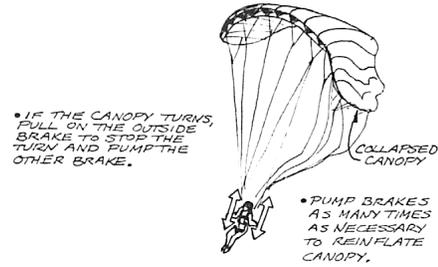


Figure - Canopy Collapse

i. When Everything Goes Wrong

- i. Turning Off the Motor
 - (1) Pull Spark Plug
 - (2) Crimp Fuel Line
- ii. Flying Without Brakes
 - (1) Steering With the D Risers
- iii. Reserve Deployment
 - (1) Not A Second Chance, A Last Chance

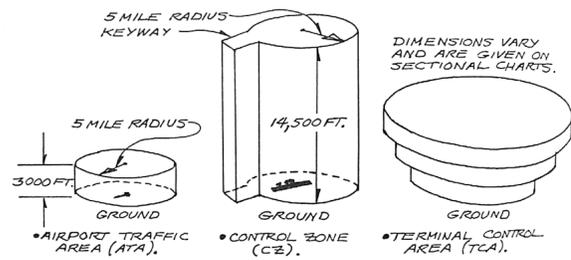


Figure - Restricted Airspace

j. Legal Stuff

- i. FAR 103
 - (1) 254 Pounds or Less
 - (2) 5 Gallons of Gas Max
 - (3) 55 Knots Max; 24 Knots Stall
 - (4) Recreation or Sport Purposes Only
 - (5) No Clouds
 - (6) Daylight Only
 - (a) Strobes Extend 1/2 Hour
 - (7) Not In Congested Areas
 - (8) No License, No Medical Exams, No Numbers, No Required Maintenance.
- ii. Tandem Exemptions
 - (1) BFI - Basic Flight Instructor
- iii. Sport Pilot Applicability

4. Buying Equipment

- a. Used or New?
- b. Backpack or wheels?
- c. Glider Selection
 - i. DGAC, DHV, or AFNOR Ratings
 - ii. Correct Size
 - iii. Handling
 - (1) Ease of Inflation
 - (2) Turning, Braking
 - (3) Stability
 - iv. Construction
 - v. Features
- d. Motor Selection
 - i. Reliability
 - ii. Thrust / Power
 - iii. Weight
 - iv. Noise
 - v. Comfort
 - vi. Electric Start Vs. Manual Start
 - vii. Portability
 - viii. Cage Strength
- e. Accessories
 - i. Windssock
 - ii. Ear Protection
 - iii. Helmet
 - iv. Communication Gear
 - (1) Radio
 - (2) Noise Cancelling Mic



- v. Altimeter/Vario
- vi. GPS
- vii. Windmeter
- viii. Engine Gauges
 - (1) Tachometer, Temperature (EHT, CHT)
- ix. Gas Supplies
 - (1) Gas Can(S), Oil Mixing Measurer
- x. Basic Tools

5. Equipment Familiarization

a. Glider

- i. Canopy
 - (1) Fabric
 - (2) Cells
 - (3) Openings
 - (4) Ribs
- ii. Lines
 - (1) Spectra, Kevlar
 - (2) Attachment Points
 - (3) Cascade
- iii. Quick Links
 - (1) Tightness
 - (2) Line Keepers
- iv. Risers
 - (1) A,B,C,D's
 - (2) Hook In Points
- v. Brakes
- vi. Speed System
 - (1) Speed Bar
 - (2) Trim Tabs
- vii. Placard
 - (1) Certifications: EN, DHV, AFNOR.
 - (2) Weight Range
 - (3) Date of manufacture
- viii. Care and Maintenance
 - (1) UV
 - (2) Heat
 - (3) Moisture
 - (4) Salt, Sand, Dirt, Grit
 - (5) Washing
 - (6) Storage / Memory
 - (7) Repairs



b. Motor

- i. Controls
 - (1) On/Off
 - (2) Starter
 - (3) Other
- ii. Two Stroke Engine
 - (1) Operation
 - (2) Intake/Compression (Suck/Squeeze), Combustions/Exhaust (Bang/Blow)
 - (3) Oil and Gas Mix
- iii. Tuned Exhaust
- iv. Air Intake Silencer
- v. Carburetor
 - (1) Float
 - (2) Membrane
- vi. Propeller
 - (1) Size
 - (2) Pitch
 - (3) 2, 3, or 4 Blades
 - (4) Care and Maintenance
 - (5) Balance
 - (6) Repair
- vii. Cage
- viii. Harness
 - (1) Straps, Buckles, and Adjustments
 - (2) Carabiners



- ix. Reserve Placement
- x. Care and Maintenance

c. Trike

d. Flying Accessories

- i. Helmet
- ii. Ear Protection
 - (1) Over Ear
 - (2) In Ear
- iii. Radio
- iv. Boots
- v. Eye Protection / Glasses
- vi. Knee Pads
- vii. Gloves

6. Canopy Handling

a. Layout

b. How To Avoid Being Dragged

c. Forward Inflations

- i. Hooking In
- ii. Riser and Brake Arrangement In Hands
- iii. Feeling Symmetrical Tension In the A Lines
- iv. Body Position, Driving Stance, Anchor
- v. Walk/Run
- vi. Tension Feedback In A Lines
- vii. When To Let Go of As
- viii. Stay Centered Under Wing
- ix. Kite With Brakes



d. Reverse Inflations

- i. Sideways Hook In
- ii. Turning To Face the Canopy
- iii. No Hands Inflation
- iv. Riser and Brake Arrangement In Hands
- v. Build A Wall
 - (1) Fly the Glider 1' Up and Set It Down, Cells Facing Upwards
- vi. Kiting Overhead With Brakes or D's and As
 - (1) Controlling Overshoot
- vii. Stay Under Center of Wing
- viii. Kiting Overhead With Brake Lines
- ix. Reversing After Landing
- x. Canopy Deflation With D Risers

e. Kiting Fun

- i. Walking the Wing Overhead
- ii. Chicken Wars With Other Pilots
- iii. Timed On A Footstool

f. Rope Towing

- i. Towing Procedure
- ii. Launches, Forward and Reverse
- iii. Straight and Level Flight
- iv. Flare Timing
- v. Landing

g. Packing Up the Glider

- i. Stowing Brakes
- ii. Unhooking
- iii. Canopy Layout
- iv. Lines On Top
- v. Risers Stowed
- vi. Folding
 - (1) Accordion, Halvsies, or Stuff



7. Motor Handling

- a. Familiarization
- b. Getting It On
 - i. Getting In On the Ground
 - ii. Standing Up
- c. Walking/Rolling Without Power
- d. Full Power Test
- e. Quick Shut Off
- f. Kiting With No Power
- g. Kiting With Power
- h. Standing, Walking, Jogging

8. Simulator

- a. Hang Test
- b. Getting Into the Seat
- c. Hand Positions
- d. Throttle Test
- e. Communication
 - i. Helmet and Radio
 - ii. Sign Language
 - (1) Yes/No With Feet
 - (2) Throttle, Arm Points Up/Down
 - (3) Land Now, Both Arms Point Down To Ground
 - (4) Turn, Arm Points Left/Right
 - (5) Flare, Both Arms Moving Down
- f. Simulated Flight
 - i. Take-Off
 - ii. Practice Pattern
 - iii. Turns
 - iv. Prepare For Landing
 - (1) Look at Windssock
 - (2) Aim For the Wind
 - (3) Shut Off Engine
 - v. Landing
 - (1) Flare Timing
 - (2) Stay On Feet
 - (3) Turn Around



9. Flying

- a. Look At Windssock Often
- b. Launches, Forward and Reverse
- c. Turns, 360s, S Turns
- d. Landing Approaches
- e. Flare Timing
- f. Landing

10. Conclusion

- a. What You Have Learned
- b. Final Thoughts and Recommendations
 - i. Get Lots of Kiting Practice
 - ii. If Possible, Fly With Others
 - iii. Keep Current, You Will Forget With Time
 - iv. Further Training On Improving Technique
 - v. Beware of the PPG Addiction Dilemma



11. Practice, Practice, Practice

- a. Go Fly!

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Notes:

Appendix A: 20 Nuggets of Paramotor Flight Wisdom

1. Every takeoff is optional. Every landing is mandatory.
2. If you let the throttle out, the houses get bigger. If you push the throttle in, they get smaller. That is, unless you push the throttle in and pull on the brakes real hard, then they get bigger again.
3. Flying isn't dangerous. Crashing is what's dangerous.
4. It's always better to be down here wishing you were up there than up there wishing you were down here.
5. The ONLY time you have too much fuel is when you're on fire.
6. A 'good' landing is one from which you can walk away. A 'great' landing is one after which they can use the PPG again.
7. Learn from the mistakes of others. You won't live long enough to make all of them yourself.
8. The probability of survival is inversely proportional to the angle and speed of arrival. Large speed and angle of arrival, small probability of survival and vice versa.
9. Stay out of clouds. The silver lining everyone keeps talking about might be another airplane going in the opposite direction. Reliable sources also report that mountains have been known to hide out in clouds.
10. Always try to keep the number of landings you make equal to the number of take offs you've made.
11. You start with a bag full of luck and an empty bag of experience. The trick is to fill the bag of experience before you empty the bag of luck.
12. If all you can see is ground that's going round and round and all you can hear is commotion coming from your wing flapping around you, things are not at all as they should be.
13. In the ongoing battle between objects travelling through the air and the ground not travelling at all, the ground has yet to lose.
14. Good judgment comes from experience. Unfortunately, experience usually comes from bad judgment.
15. It's always a good idea to keep the pilot end going forward as much as possible.
16. Keep looking around. There's always something you've missed. (Isn't that why they came up with checklists?)
17. Gravity is not just a good idea. It's the law. And it's not subject to repeal.
18. The three most useless things to a pilot are the altitude above you, runway behind you and a tenth of a second ago.
19. There are old pilots and there are bold pilots. There are, however, few old, bold pilots.
20. Always be open learning new stuff.

Appendix B: Hand Signals

*by John Phillips
November 26, 2003*

I pass this along as its beauty lives in the simplicity.

As paramotoring grows in popularity so do the number of pilots flying together. In some cases radios are worn and communications between the pilots is good. Other times there are no radios, or not everyone is wearing one, and communications are poor or nonexistent.

A friend I fly with always uses hand signals to alert me before he is going to make a turn. When he is ready to turn left he simply sticks his arm out to the left, just like on a bicycle. I immediately know what he is about to do and am prepared for it. As we are usually flying in close proximity I appreciate the advance notice of his intentions.

Appendix C: Airspace ABCs

By Grant Smith

When giving check rides or refresher courses I find that knowledge of the Federal Airspace System is one of the areas where pilots frequently have difficulty. I typically have the applicant refer to a Sectional Chart for the local area and have them find their flying location. Then I ask, "When you first take off, what classification of airspace are you immediately flying in?" We then progress on an imaginary typical flight and discuss the airspace changes and the effect on the flight requirements as we proceed across the chart.

One significant point of confusion among students is that we fly in "controlled airspace" all the time yet we are not controlled by anyone. In the back of their mind, the student knows there are "air traffic controllers". Yet, when we fly in Class E controlled airspace, we do not talk to the controller. This does not compute until it is explained that our primary concern is that we have the required VFR weather minimums that will allow us to operate without the requirement to be under the watchful jurisdiction of the controller.

In other words, we need to know the various types and locations of airspace so that we can avoid the necessity of being controlled, or if required, we can maintain the necessary controller contact and authorization. Once this useful concept is grasped, a pilot is more susceptible to learning the otherwise insignificant airspace designations. I have developed the following litany to assist in remembering the significance and location of the various airspace designations.

A is for Altitude. Class A airspace is high Altitude airspace. It starts at 18,000 feet which is high enough that you don't want to go there even in an Ultralight without oxygen. It covers nearly all of the USA. Specifically, it covers the 48 contiguous states and most of Alaska and extends to 12 NM or more beyond the coastline.

B is for Big. Class B is for Big airplanes and Big airports. It is shown by a wide shaded Blue line and Blue numbers specify the altitude limits. Boycott Class B airspace because you may not enter unless you have a clearance and it is not likely you will get one in your little Ultralight. The magic words "Ultralight E123 cleared to enter the Class B Airspace", are not likely to be transmitted.

C is for Communicate. This is the highest class of airspace that the typical ultralight pilot is likely to enter. You must Communicate before you enter Class C airspace. Class C airspace is shown by a wide shaded line and numbers similar to Class B airspace. However, it is not blue it is magenta. Magenta a Common Color for printers. Communication involves sending and receiving. You must talk to the controller and he must reply to indicate that you were heard. For example, you say "Widby Approach Ultralight E123." and Widby Approach responds "Ultralight E123 standby" You have communicated with Widby Approach. You may now enter Widby Approach Class C airspace with caution. Caution is recommended because it is a high density, high speed traffic area.

D is for Directions. Class D airspace is designated at airports with an operating control tower. A tower controller gives Directions for you to follow. Examples are: "Ultralight E123 report one mile south of the field." "Ultralight E123 enter left downwind for runway 24." "Ultralight E123 taxi via Taxiway Brovo to parking." If the tower is not open 24 hours a day. The airspace reverts to Class E or Class F when the tower is closed. Refer to the Aeronautical Information Manual (AIM) to determine the tower hours of operation and the class of airspace after closing. See Renton, Washington airport (KRNT) airport for an example.

E is for Everywhere. Class E airspace is Everywhere. It is similar to Class A Airspace in that it covers the Entire US up to the overlying Class A Airspace. The question is not where it is but how high is the floor. It is generally 700 or 1200 feet AGL as noted by the wide, feathered on one side, shaded magenta line (see the Sectional Chart legend). The feathered side is a 700 foot floor and the sharp edge side is a 1200 foot AGL floor. However it is generally easiest to just look at the relative congestion to determine the lower floor. Some moderate size airports, not busy enough to justify the expense of a control tower may have a Class E surface area associated with the airport designated by a dashed magenta line. The dashed magenta line is similar to the blue dashed line around a towered airport. Ultralights may not enter this non tower airport surface area without permission from the controlling authority (FAR 103.17). Note: The controlling authority is not the airport manager! It is the Federal Air Traffic Control Facility responsible for the surrounding airspace. It may be an approach or enroute air traffic control facility. A Flight Service Station can help you contact the controlling facility. In rare, remote locations the floor of the Class E airspace may be higher than 1200 feet AGL but it is never higher than 14,500 feet MSL. Examples of this may be found on the Seattle Sectional Chart Legend.

F is for FAAs Failure or Foreign. The FAA has failed to designate any Class F Airspace in the USA. Only Foreign Governments designate Class F Airspace.

G is for Good. Class G Airspace is the Good Stuff. It is uncontrolled. That doesn't mean you can do whatever you want. You are still limited by FAR 103. However, you will never have a need to talk with a controller and the weather minimums are the lowest you will find for Ultralight operations.

If you need a mnemonic to assist in remembering the above word associations, try the following:

Big Astronauts Communicate Good Directions Everywhere. Notice there is no F as there is no Class F airspace in the US. I am not a big fan of mnemonic word association, as you still need to remember what the mnemonic means and associate it with the real world. If this doesn't help, then I hope you found it amusing.

Appendix D: Demons of the Air

*by Mo Sheldon
June 24, 2004*

Most incidents could be avoided by being aware of what I like to call "Demons Of The Air". These Demons come out to cause havoc with our thinking and judgement when we take to the air. They have caused significant trouble for me and other pilots. I share them with you to hopefully reduce your possibility of a future incident. Here is a list of some of the Demons I have identified to be aware and cautious of the next time you take to the air:

The 'Down Wind' and 'Cross Wind' Demons. These Demons seduce you to take-off or land or fly down or cross wind low to the ground. It's easy to get caught up in the rush of ground whizzing under you. Or to think you can pull a cross or down wind take-off or landing off. Having wheels can seem to give you added ease and protection. However, emergency landings are challenging enough in perfect conditions. And having an emergency landing in down wind or cross wind is simply a recipe for disaster, especially over rough terrain. Here are three excellent precautionary measures that have helped me to keep these Demons at bay:

- 1) I try to always take-off and land into the wind. If the wind changes direction, I reset my gear or compensate accordingly to head directly into the wind.
- 2) I always have enough altitude to position myself for a safe landing into the wind. This means that when I fly down or cross wind, I give myself enough altitude to safely turn and land into the wind.
- 3) I constantly am scanning for places to safely land. For me, this habit is so ingrained it's like second nature.

The 'Density' Demon. This is a sly Demon that sneaks in to get you when you want to climb and you don't get a climb like you expect. The reality is that a rise in temperature and altitude make our wings have less lift and our motors and props produce less thrust. Even a 10 degree change in temperature can greatly affect climb rate, changing a climb from acceptable to poor. The best precaution for this Demon is to give yourself additional room on takeoff and landing and fly with a greater altitude.

The 'Invincible' Demon. This Demon plays on your ego, seducing you to push yourself and your gear beyond it's limitations. The fact is our bodies are made of soft stuff that can break and die if it is smacked too hard. A good precaution is to wear protective gear such as helmets, knee pads, pants, eyewear, and gloves. I know of 3 PPG pilots (myself included) that openly admit their helmet saved their lives in separate PPG incidents.

The 'Watch This' Demon. This Demon comes out to play when cameras and spectators (especially family) show up. Be aware that this Demon can very powerfully cloud your judgement and thinking. The best way to tell this Demon is at play is if you find yourself taking more risks beyond what you normally do or feeling more cocky than usual in front of crowds and cameras. Pushing your limits can be healthy, but I suggest practicing alone or around experienced pilots first, not in front of spectators and cameras. A powerful precaution is be able to say 'no' and choose to pack things up to fly another day.

The 'Nothing Fails' Demon. We like to think our gear will never fail us. This Demon plays on this wish. But our gear and carelessness can and do fail us. It is not uncommon for me to forget something like attaching a velcro strap or connecting a riser with a twist or forgetting to add fuel or notice a developing crack in my exhaust. The best way to control this Demon is to follow strict pre- and post-flight checks of your gear. A good pre- and post-flight inspection will catch any oversights in your set-up and spot any inevitable problems with your gear.

The 'Predictable Weather' Demon. Mother Nature does follow general patterns, but from time to time her logic throws you for a loop. Here's an example of what I'm talking about: I did a tandem flight recently in an area I have flown dozens of times in perfect morning conditions. On this flight at about 300' above ground I began to loose altitude. I went to full throttle and still I was losing altitude. This went on for what seemed like 60 seconds where I began to seriously consider places for an emergency landing. Then suddenly, without warning I slowly started to gain altitude again. Nothing was different with the operation of my motor or wing. My only guess is I must have flown into a huge pocket of sinking air. The fact is even in perfect conditions, the air can (and will) become unpredictable. A good precaution for this Demon is to give yourself extra room to make decisions calmly and with complete control.

Be sure you are aware of your Demons. If you recognize and accept that they exist and affect you, you will greatly reduce your chances of an incident. If you ignore them, you are needlessly adding significant risk to your flying, which inevitably increases the likelihood of you having an incident.

Appendix E: Paramotor Check Lists

1. Preflight
 - a. Local conditions
 - i. Check sectional chart for airspace awareness
 - ii. Check with the local FSS for TFR's
 - iii. Check times of sunrise/sunset
 - iv. Check local weather forecast
 - b. If flying alone
 - i. Let someone know your flight plans
 - ii. Carry a cell phone
 - c. Set up windsock
 - i. Check wind direction, amount, quality (change of speed and direction)
 - d. Plan your launch and landing
 - i. Assess the launch and landing area
 - ii. Have a more than one plan in place for an engine out or in-flight emergency
 - e. Unpack and assemble gear
 - i. Assemble motor
 - (1) Check motor master kill switch is set "Off"
 - (2) Check fuel level and add fuel if necessary
 - (3) Check all velcro straps are secure
 - (4) Harness inspection (straps, webbing, stitching, seatboard)
 - (5) Check harness is attached correctly
 - (6) Check throttle cable is free
 - (7) Check all bolts and carabiners
 - (8) Move propeller back and forth and check for unusual play in bearings
 - (9) Check rubber vibration mounts for cracks
 - (10) Check wiring (loose connector or worn wires)
 - (11) Check fuel and intake lines for wear
 - (12) Move muffler and carburetor for unusual play
 - (13) Check belt tension
 - (14) Check for cracks on exhaust, frame, and motor
 - (15) Check for unusual leaking
 - (16) Check air intake silencer or filter is secured
 - ii. Assemble wheels (skip this step if you are footlaunching)
 - (1) Check motor master kill switch is set "Off"
 - (2) Attach motor to wheels
 - (3) Check all bolts and carabiners
 - (4) Check all cables are tight
 - (5) Check all velcro straps are secure
 - (6) Check tire pressure
 - f. Warm up the engine
 - i. Turn motor master kill switch to "On"
 - ii. Aim direction of prop blast
 - iii. Announce "Clear prop" and start motor
 - iv. Check kill switch operation with a momentary "blip"
 - v. Conduct a full throttle check
 - vi. Check for unusual vibration and that motor functions normally
 - vii. Shut the motor down with the master kill switch to check its operation
 - g. Layout the wing into the wind
 - i. Visual inspection of the canopy, lines and risers
 - ii. Check that lines are not tangled and risers are clear
 - iii. Check for objects inside the wing
 - iv. Check for tears and holes in the fabric
 - v. Check trimmers are set correctly
 - h. Attach accessories
 - i. Helmet, radio, camera, GPS, etc.
 - ii. Check battery level and operation of accessories
 - iii. Reserve Parachute (if necessary)
 - (1) Check that reserve container is secured to the harness
 - (2) Check that bridles are routed properly and securely connected to harness
 - (3) Check that the speed system (if attached) will not interfere with reserve
 - (4) Check reserve pins and that velcro is not 'locked'
 - (5) Check that reserve handle is secure
 - (6) Check that hook-knife is secure and reachable
 - i. Turn motor master kill switch to "On"
 - j. Decide on a forward or reverse launch
 - k. If wheel launching, attach risers to harness
 - l. Get into harness and attach all straps and buckles
 - m. If foot launching, stand up and attach risers to harness
 - n. Final check before launch
 - i. Check windsock
 - ii. Check that radio, camera, etc. are strapped to harness
 - iii. Check fuel level and fuel cap is installed
 - iv. Check that the reserve parachute is correctly installed (if necessary)

- v. Check that risers are attached correctly
 - vi. Check radio operation (if necessary); radio on, correct frequency, and volume
 - vii. Check that helmet strap is secure
 - viii. Check that harness straps are secure
 - ix. Check that throttle cable is free and functions correctly
 - x. Check that brake controls are in hands without tangles
 - xi. Look for lines lying across your feet
 - xii. Check for other pilots on the ground and in the air
 - xiii. Go over flight plans in case of an engine out or emergency
2. Launch
- a. Start motor and warm it up
 - b. Check windsock
 - c. Inflate wing
 - i. Check wing is nicely overhead
 - ii. If possible, check lines are all free
 - iii. If possible, check brakes are not tangled
 - d. Stay headed into wind
 - e. Keep kiting the wing during entire launch sequence
 - i. Do not leave ground if wing is penduluming
 - f. If footlaunching, keep feet down and moving until airborne
3. Flight
- a. If using a reserve, check handle
 - b. Always plan for an emergency landing
 - i. Constantly search for landing areas
 - ii. Constantly keep a reference for wind direction
 - iii. Fly down wind with enough altitude to safely turn and land into the wind
 - c. Look out for other pilots, power lines, and obstructions
 - d. Always look before you turn, climb or descend
 - e. If flying a loud motor, stay away from people and animals
 - f. If you have a problem (such as tangled lines or motor is not operating correctly)
 - i. Continue to fly the PPG
 - ii. Stay calm, do not panic
 - iii. Make preparations to land and correct the problem
4. Landing
- a. Look for wind direction (windsock)
 - b. Look for obstacles on the landing area
 - c. Head into the wind
 - d. If footlaunching, lower feet into landing position
 - e. Reduce prop rotation or kill engine
 - f. Flare within a few feet of ground
 - g. Bring wing down by pulling brakes
 - h. If footlaunching, turn around to face wing
 - i. Detach wing from harness
 - j. Remove helmet
 - k. Unbuckle from harness and step away from PPG
 - l. Turn motor master kill switch to "Off"
 - m. Check to make sure for anything that needs to be stowed (cameras, radios)
5. Postflight
- a. Pack up wing
 - i. Be sure wing is dry
 - ii. Isolate risers from lines to prevent tangles
 - iii. Inspect wing for debris in the lines, cells, and wing bag
 - iv. Turn motor master kill switch to "Off"
 - b. If flying alone, contact the person you told about your flight plans
 - c. Detach motor from wheels (if necessary)
 - d. Check over motor
 - i. Check motor master kill switch is set "Off"
 - ii. Clean as necessary
 - iii. Check all bolts, carabiners, cables, velcro straps are good
 - iv. Check belt tension
 - v. Check for cracks on exhaust, frame, and motor
 - vi. Check for any unusual leaking
 - e. Check over wheels (if necessary)
 - i. Clean as necessary
 - ii. Check all bolts, carabiners, cables, velcro straps are good
 - iii. Check for cracks on frame
 - f. Check wheels and bearings are in good shape
 - g. Pack up motor
 - i. Check motor master kill switch is set "Off"
 - h. Pack up wheels (if necessary)
 - i. Pack up accessories
 - i. Be sure all accessories are turned off

- j. Pack up windsock
- k. Pack away fuel and tools
- l. Pick up any garbage and leave site cleaner than you found it
- m. Double check you did not leave anything behind

Quick Check Before Launch - Toe to Head and Out

This approach starts from the bottom up, with your toes all the way up your body to your head and out to your arms.

- 1 Check shoelaces are tied
- 2 Check leg straps are secured
- 3 Check center strap is secured
- 4 Check reserve strap (if necessary)
- 5 Check throttle cable is free and secure
- 6 Check brakes are in correct hands
- 7 Check brakes are free of tangles
- 8 Check carabiners are locked
- 9 Check helmet is secured
- 10** Check ear protection is on

Appendix F: F.A.A. Part 103, Ultralight Vehicles

Subpart A-General

- 103.1 Applicability
- 103.3 Inspection requirements
- 103.5 Waivers
- 103.7 Certification and registration

Subpart B-Operating Rules

- 103.9 Hazardous operations
- 103.11 Daylight operations
- 103.13 Operation near aircraft; right-of-way rules
- 103.15 Operations over congested areas
- 103.17 Operations in certain airspace
- 103.19 Operations in prohibited or restricted areas
- 103.20 Flight Restrictions in the Proximity of Certain Areas Designated by Notice to Airmen
- 103.21 Visual reference with the surface
- 103.23 Flight visibility and cloud clearance requirements

Authority

Secs. 307, 313(a), 601(a), 602, and 603, Federal Aviation Act of 1958 (49 U.S.C. 1348, 1354(a), 1421(a), 1422, and 1423); sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)). Source: Docket No. 21631, 47 FR 38776, Sept. 2, 1982, unless otherwise noted.

Subpart A-General

103.1 Applicability

This part prescribes rules governing the operation of ultralight vehicles in the United States. For the purposes of this part, an ultralight vehicle is a vehicle that:

- (a) Is used or intended to be used for manned operation in the air by a single occupant;
- (b) Is used or intended to be used for recreation or sport purposes only;
- (c) Does not have any U.S. or foreign airworthiness certificate; and
- (d) If unpowered, weighs less than 155 pounds; or
- (e) If powered:
 - (1) Weighs less than 254 pounds empty weight, excluding floats and safety devices which are intended for deployment in a potentially catastrophic situation;
 - (2) Has a fuel capacity not exceeding 5 U.S. gallons;
 - (3) Is not capable of more than 55 knots calibrated airspeed at full power in level flight; and
 - (4) Has a power-off stall speed which does not exceed 24 knots calibrated airspeed.

103.3 Inspection requirements

- (a) Any person operating an ultralight vehicle under this part shall, upon request, allow the Administrator, or his designee, to inspect the vehicle to determine the applicability of this part.
- (b) The pilot or operator of an ultralight vehicle must, upon request of the Administrator, furnish satisfactory evidence that the vehicle is subject only to the provisions of this part.

103.5 Waivers

No person may conduct operations that require a deviation from this part except under a written waiver issued by the Administrator.

103.7 Certification and registration

- (a) Notwithstanding any other section pertaining to certification of aircraft or their parts or equipment, ultralight vehicles and their component parts and equipment are not required to meet the airworthiness certification standards specified for aircraft or to have certificates of airworthiness.
- (b) Notwithstanding any other section pertaining to airman certification, operators of ultralight vehicles are not required to meet any aeronautical knowledge, age, or experience requirements to operate those vehicles or to have airman or medical certificates.
- (c) Notwithstanding any other section pertaining to registration and marking of aircraft, ultralight vehicles are not required to be registered or to bear markings of any type.

Subpart B-Operating Rules

103.9 Hazardous operations

- (a) No person may operate any ultralight vehicle in a manner that creates a hazard to other persons or property.
- (b) No person may allow an object to be dropped from an ultralight vehicle if such action creates a hazard to other persons or property.

103.11 Daylight operations

- (a) No person may operate an ultralight vehicle except between the hours of sunrise and sunset.
- (b) Notwithstanding paragraph (a) of this section, ultralight vehicles may be operated during the twilight periods 30 minutes before official sunrise and 30 minutes after official sunset or, in Alaska, during the period of civil twilight as defined in the Air Almanac, if:
 - (1) The vehicle is equipped with an operating anticollision light visible for at least 3 statute miles; and
 - (2) All operations are conducted in uncontrolled airspace.

103.13 Operation near aircraft; right-of-way rules

(a) Each person operating an ultralight vehicle shall maintain vigilance so as to see and avoid aircraft and shall yield the right-of-way to all aircraft.

(b) No person may operate an ultralight vehicle in a manner that creates a collision hazard with respect to any aircraft.

(c) Powered ultralights shall yield the right-of-way to unpowered ultralights.

103.15 Operations over congested areas

No person may operate an ultralight vehicle over any congested area of a city, town, or settlement, or over any open air assembly of persons.

103.17 Operations in certain airspace

No person may operate an ultralight vehicle within Class A, Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless that person has prior authorization from the ATC facility having jurisdiction over that airspace.

103.19 Operations in prohibited or restricted areas

No person may operate an ultralight vehicle in prohibited or restricted areas unless that person has permission from the using or controlling agency, as appropriate.

103.20 Flight Restrictions in the Proximity of Certain Areas Designated by Notice to Airmen

No person may operate an ultralight vehicle in areas designated in a Notice to Airmen under 91.141 or 91.143 of this chapter, unless authorized by ATC.

Notice: Effective October 11, 2001, 103.20 is amended as follows (per Federal Register page 66 FR 47378):

No person may operate an ultralight vehicle in areas designated in a Notice to Airmen under § 91.137, § 91.138, § 91.141, § 91.143 or § 91.145 of this chapter, unless authorized by:

(a) Air Traffic Control (ATC); or

(b) A Flight Standards Certificate of Waiver or Authorization issued for the demonstration or event.

103.21 Visual reference with the surface

No person may operate an ultralight vehicle except by visual reference with the surface.

103.23 Flight visibility and cloud clearance requirements

No person may operate an ultralight vehicle when the flight visibility or distance from clouds is less than that in the table found below. All operations in Class A, Class B, Class C, and Class D airspace or Class E airspace designated for an airport must receive prior ATC authorization as required in 103.17 of this part.

| <i>Airspace</i> | <i>Flight Visibility</i> | <i>Distance From Clouds</i> |
|--|--------------------------|---|
| Class A | Not applicable | Not applicable |
| Class B | 3 statute miles | Clear of clouds |
| Class C | 3 statute miles | 500 feet below 1,000 feet above 2,000 feet horizontal |
| Class D | 3 statute miles | 500 feet below 1,000 feet above 2,000 feet horizontal |
| Class E - Less than 10,000 feet MSL | 3 statute miles | 500 feet below 1,000 feet above 2,000 feet horizontal |
| Class E - At or above 10,000 feet MSL | 5 statute miles | 1,000 feet below 1,000 feet above 1 statute mile horizontal |
| Class G- 1,200 feet or less above the surface (regardless of MSL altitude) | 1 statute mile | Clear of clouds |
| Class G - More than 1,200 feet above the surface but less than 10,000 feet MSL | 1 statute mile | 500 feet below 1,000 feet above 2,000 feet horizontal |
| Class G - More than 1,200 feet above the surface and at or above 10,000 feet MSL | 5 statute miles | 1,000 feet below 1,000 feet above 1 statute mile horizontal |