ASG Soaring Safety Subjects

Air Sailing, inc.
RENO, NEVADA

Landing Tips

The following are a compilation of suggestions that came from multiple sources. Consider them as food-for-thought. Is there anything here that might improve your flying?

Planning

Landing requires some planning and decision making. At ASG we have three (3) useable runways for a total of twelve (12) possible landing patterns. Which is best? Considerations include recently landed gliders, retrieving golf carts, other gliders in the pattern who also need to land, staging gliders, and tow plane launch operations. All of these are part of the "**L**ook" in RUFSTA**L**

Windsock

Also part of the "Look" in RUFSTAL is checking the wind. Arrive at the gliderport with sufficient time and altitude to study the windsock and tetrahedron. Ensure you have selected the correct runway. That radio call you heard 15 minutes ago ("winds favor runway XX") may no longer be valid.

Landing Gear

Consider lowering your gear earlier rather than later. There is no reason for this to wait until the last moment.
Your downwind radio call should include "Gear is down". This is a self protection act that is common at Air Sailing. It gives others a chance to remind you to lower your gear in case you forget.

Pre-Landing Checklist

Your Pre-Landing checklist should be memorized. This will allow you to keep your eyes outside the cockpit during this critical phase of flight.
Your Pre-Landing checklist should be completed before reaching the IP. Once past the IP things happen quickly and the pilot should only be thinking about the landing.

Airbrakes

The "A" in RUFSTAL is for Airbrakes. Notice that by the time you get to "A" your Flaps and Landing gear have already been managed. The Airbrakes are the last duty your left hand needs to perform. Consider leaving it there and not removing it. This avoids the possibility of grabbing the wrong handle later on. Every year there are mishaps where gliders overfly the runway while observers watch the landing gear frantically moving up and down.

Turns

Turns should be done at 30 – 45 degrees of bank. Turns shallower than this suggest that your patterns are too wide.
During your turns you should focus on only two things: Airspeed and Yaw String.
Every year there are many landing accidents that can be traced to one of these metrics getting out of control. The other landing considerations should be addressed before or after the turn.

Airspeed: (Vstall)(1.5) + ½(wind) This is minimum.

Yaw String: Unless you are intentionally performing a slip (never a skid), the Yaw Sting should be centered.

Spoilers

In your glider "closing spoilers" is the equivalent of "adding power" to extend your glider path. The only way to correct for a "below glide slope" condition (other than altering ground path) is to close spoilers and the only way you can do that is to have spoilers to close. If you find yourself coming down final with 1" of spoilers you are doing it wrong! The Base and Final legs, and perhaps the last part of Downwind, should be flown with an average of ½ spoilers; a glide slope of ~ 10:1 -12:1.

Altimeter and Variometer

You should use the altimeter to achieve an IP crossing height of ~ 1,000' AGL (pattern altitude).
If needed, come in high and use spoilers or even a 360 turn, to cross the IP at the desired altitude. From this point on you should use visual angles and not the altimeter to gage height. A possible exception to this is to monitor the Variometer between the IP and the base turn. At Air Sailing it is not uncommon to encounter lift while landing and thus requiring a more aggressive use of the spoilers.

Landing Flare

A proper landing flare involves some amount of time with the glider flying parallel to the ground at a height of only 2 -3 feet. During this time the airspeed decays until the glider stops flying. Every year many gliders are damaged because their pilots failed to perform this maneuver. They make the mistake of losing their airspeed too high, "dropping" it in and making a "hard landing".

High Wind Landings

High winds make it even more important to check the windsock and pick the right runway. Remember to calculate the proper approach speed (Vappr). The effect of the increased approach speed plus the tailwind on downwind yields a downwind ground speed that can be very disturbing to the uninitiated. The impulse is to reduce airspeed and extend the downwind leg, both of which are wrong. The base turn should be done early, not at the 45 degree point as most of us were taught. Be prepared for the large crab angles that may need to be flown, especially on Base. Also be prepared for the surprising loss of groundspeed when you turn final. If you pass thru significant wind shear on final be prepared to close spoilers (regain glide slope) and lower your nose (regain airspeed). It is better to plan your glide slope to cross the threshold too high than too low. Do the math. If you are landing into a 15+ knot wind and cross the threshold at 500 feet and then apply full spoilers; it is mathematically impossible for you to overrun any of our long runways.

Wind Calculations

Landings in high winds can be tricky and it is important to calculate the correct approach speed and to know the crosswind component. Here's how it's done.

The target approach speed (Vappr) is calculated by this formula:

Vappr = 1.5(Vstall) + ½(Wind) + (Gust Factor)

1.5(Vstall) This provides the proper speed safety margin above stall.
This number will be close to the no wind best L/D.
Some gliders denote this with a yellow triangle on the airspeed indicator.

½(Wind) If there is wind, this factor puts you further forward on the Polar curve (better L/D) and results in a glide slope and ground speed which are closer to "normal".
½ (Wind) is minimum; some CFIGs recommend adding the full amount of wind.

(Gust Factor) By definition, gusts come and go.
The "Gust Factor" is the difference between the steady state winds and the peak winds. You need to add 100% of the Gust Factor so that when the gust stops you still have sufficient airspeed.

Example: Vstall = 38 Kts
Winds are 12G20 (12 gusting to 20)
Gust Factor = 20-12 = 8 Kts
Vappr = 1.5(Vstall) + ½(Wind) + (Gust Factor)
Vappr = 1.5(38) + ½(12) + (8)
Vappr = 71 Kts

Cross winds are calculated by first estimating an "effective" wind and then accounting for the angular difference between the runway and the wind. The effective wind is the steady state wind plus ½(Gust Factor). In this case you want to average out the gusts. The relationship between the cross wind component and the effective wind is the sin of the angular difference which can be approximated by dividing the angular difference by 60.

Example: Winds are 45 degrees to the runway at 12G20
Wsteady state = 12 Kts
Gust Factor = 20-12 = 8 Kts
Weffective = Wsteady state + ½ Gust Factor
Weffective = 12 + ½ (8)
Weffective = 16
Cross Wind = 16 *(45/60) ~ 12 Kts

Example: This is a real world example!
You are returning to Air Sailing at the end of the day the winds are strong. The wind sock is straight out and flapping. Winds are estimated to be 240@18G22 Kts
You are obviously landing on R21.
Can you make this landing safely?

Vappr = 1.5(Vstall) +1/2 (Wind) + Gusts
Vappr = 1.5(38) + ½ (18) + 4
Vappr = 70 Kts OK! Your glider can fly this fast.

X-Wind = [18 + ½(22-18)][(240-210)/60]
X-Wind = [20] [30/60]
X-Wind = 10 Kts OK! This is within the capability of most gliders.

What is your sight picture on downwind?
At 1,000' AGL your wind speed will be higher, say maybe 22 Kts.
AS = 70 Kts
GS = 70 + 22 = 92 Kts

Be prepared to see the ground "fly" by on downwind.
Remember to turn base shortly after you pass the end of the runway.
Be prepared for the large crab angle on base (~ 16 degrees).
Be prepared for the sudden drop in GS on final (GS = 70-18 = 52 Kts; down from 92).
Your approach angle will be steeper than normal.

END