

## GPA.... Ground Proximity Awareness

GPA training is very important as it enhances a pilot's ability to land in crosswinds and helps pilots land more safely and softly. Student pilots must master GPA training prior to learning how to land.

### Prerequisites:

Before you begin GPA training the pilot must master some of the basics. The data below is based on a BRM Aero Bristell LSA.

- First: Master flying at minimum controllable airspeed of 45 knots at 3000 feet with 30 degrees of flaps. (When the tower says, "Extend your downwind for traffic", the pilot will be comfortable flying at 55 KIAS with full flaps and about 4500 RPM) This technique will help the pilot stay close to the airport.
- Second: Discuss adverse yaw and PIO (pilot induced oscillations) and the importance of using rudder and aileron together. When flying in turbulence, picking up a dropped wing with coordinated flight will make the turbulence less uncomfortable.
- Third: Learn how to mush. (Read Stick and Rudder, by Wolfgang Langewiesche) Mushing can help you lose altitude in preparation for landing. Mushing prior to slipping will make your slips more effective as the engine RPM will lower substantially in an LSA, especially at 50 KIAS. Any approach speed below the best glide speed of 62 KIAS will cause the airplane to mush and the engine to operate at a lower RPM. The lightweight props that are installed in LSA's will not slow down until the airspeed is reduced. Slowing to 50 KIAS and lowering the nose before entering a slip will make the slips more effective as the prop speed will be hundreds of RPM less as you enter the slip. More about mushing...when low on fuel, a full slip can cause the fuel to stop flowing and the engine to quit. This does not happen when mushing as the plane remains in a level attitude.
- Fourth: Master slipping. This includes slips with full rudder deflection and slips along a road. The pilot must be able to come out of the slip with his airspeed within 5 knots of the proper approach speed. The slips will be more effective if the pilot mushes prior to entering the slip due to lowered RPM.

After becoming competent in mushing and slipping, you are ready for GPA training.

## GPA TRAINING in an LSA (add 6 knots for a C152 and C172)

### THE TAKE OFF:

Taxi with the controls properly positioned.

Set the elevator trim for slightly up.

Begin the takeoff roll with the ailerons fully deflected into the wind.

Use ailerons as necessary for the remainder of the takeoff.

Hold the brakes, add full power, verify RPM is at least 5000 RPM, release brakes.

Apply right rudder.

Let the plane accelerate until you feel the nose wheel coming off the ground and then release some back pressure. When the plane is ready, it will leave the ground smoothly. Let the nose rise until you are in a slightly high nose attitude. As you accelerate, the nose up attitude will increase, release some of the back pressure so the slight up nose attitude remains constant. The indicated airspeed at liftoff should be between 45 and 55 knots, but do not look. Ask your CFI what the speed was when the plane left the ground, so you get an idea of what the speed is at liftoff. Accelerate within ground effect to  $V_y$ , best rate of climb speed of 75 knots. Do not let the plane become airborne at too slow a speed, as you need plenty of airflow across the controls to fight any gust that may occur.

Now that you are climbing:

“YOU MUST SEE OVER THE NOSE”

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When outside temperature exceeds 90 degrees monitor your CHT during climb out. If temperatures get into the top of the yellow, you need to lower the nose to add speed and help cool the engine. If you lower the nose and temperatures are still in the top of the yellow, you can reduce power by 200 rpm to assist in bringing down high oil/coolant temperatures. (In the old days when we flew planes with Lycoming or Continental engines, you would never reduce throttle as full throttle added extra fuel for cooling) It is fine to reduce power for cooling purposes on a Rotax Engine. By the way, I have never had to do this. Lowering the nose and adding some speed has always kept the temps out of the red.

At 700 feet AGL (Above Ground Level), remove the 10 degrees of takeoff flaps and lower the nose slightly. Make a left turn onto the crosswind leg. At 900 feet AGL start your turn onto the downwind at leg. Reduce power to 3900 RPM (LSA) and lower the nose for level flight at 1000 feet AGL. (Hot and heavy-4000 RPM) (cool and light-3800RPM) After 5 seconds, if the airspeed is 75 KIAS ( $V_{fe}$ ), Velocity Flap Extension, add 10 degrees of flap. If the airspeed is above 75 KIAS close the throttle, add 10 degrees of flaps, and return the throttle to half.

Fly the downwind leg at about 75 KIAS and adjust your heading to correct for crosswinds. The turn to crosswind should be less than 90 degrees and the turn onto

downwind should be less than 90 degrees. Verify you are not getting closer to the runway on downwind leg.

Abeam the numbers, reduce power by 200 RPM and begin a slight descent. Retrim the aircraft for hands off flight. Bring flaps to 20 degrees and retrim the plane again for hands off flight and 70 KIAS.

When the runway numbers are between the nose and the tail, lower the nose, make a 90 degree left turn and make another 200 RPM power reduction. Retrim the plane for 65 KIAS. Make a heading correction to adjust for crosswind.

Ask myself:

“Am I too high, am I too low, or am I just right...Do something!!!”

You are just right if you will be at 500 feet AGL when you turn onto the final leg.

After turning final, reduce the throttle by 200 RPM and retrim 60 KIAS power on glide.

You will need less power if lightly loaded on a cold day and more power when heavily loaded on a hot day. On an average 70-degree day, 3500 RPM on final is good.

At 300'AGL the pilot should no longer mush, slip, or make flap changes.

AT 200' AGL you have reached the DeFined Go Around Point. (DFGAP)

- Go around if not lined up with the centerline or speed is not 60 KIAS +5/-5 at 200 AGL.
- Continue the descent until you are the height of a truck.
- Increase throttle to 4000 RPM.

(New students will not go below 100 feet until their fingernails pink up showing they are relaxed. Then 50 feet and then lower until they can level at the height of a truck)

GPA Training now begins.

1. With 4000 RPM, fly down the runway at an altitude of 10 feet at normal approach speed (65-70 knots) in a crab to compensate for wind.
2. Initiate the go-around with 2000 feet of runway remaining in an LSA, 3000 feet remaining in C152/C172.
3. AT 700 feet, remove the flaps.
4. Repeat the approach and fly over the right edge of the runway and make a gentle turn to fly down the runway centerline. Make a shallow bank turn and fly down the left side of the runway. Repeat this exercise until the student is comfortable making shallow banked turns close to the ground and above the runway.

When the student is comfortable doing the previous exercise, on the next approach, transition to level flight at the height of a car and set the power to

3500 RPM. **YOU HAVE REACHED THE EYE TRANSITIONS POINT. (ETP)** The student will look down the runway and then focus on the tree line at the end of the runway. Your focus will be the end of the runway for the remainder of the landing exercise until your go-around. The student will repeat this exercise until he/she relaxes,

and their fingernails turn pink. Initiate the go-around with 2000 feet of runway remaining.

5. Repeat the power on approaches to 5 feet with a level off and eye transitions point. When the student transitions their eyes, they are to look at the centerline from in front of the center of the nose, then down the runway until they are focused on the end of the runway. As the plane slows down it will begin to settle closer to the ground. The student is instructed to slowly add continuing back pressure as needed to keep the plane in a slight high nose up attitude with the end of the runway sitting on top of the center of the cowling. The student will use a side slip to remove the crab and control the elevator **while the CFI works the throttle.**
6. When the student's fingernails turn pink, he/she is ready to fly at a lower altitude.
7. On the next power on glide round out at 5 feet and then continue a descent until 1-3 feet. The CFI will be operating the throttle for this exercise. The student will focus their eyes down the centerline and then to the end of the runway.
8. The CFI will control the throttle between 3300-3500 RPM and assist the student with his flight very close to the runway in the perfect landing attitude. The flaps should be set at 20 degrees, the airspeed should be about 55 knots, and an aileron should be set into the crosswind and the opposite rudder should be applied. The student will get to see this perfect landing attitude for over 30 seconds so they can cement the view in their brain.
9. When the crosswind gusts subside, CFI reduces power and the aircraft lands on the upwind wheel with some power remaining.
10. When the student can maintain the landing attitude very close to the runway for 2000 feet, he/she is ready to operate the throttle on the next approach.

**GPA produces pilots that have superior landing schools, especially during crosswinds, because they get to see the perfect landing attitude for over 30 seconds. Other schools teach power off landings and the student gets to see the perfect landing attitude for only 2 seconds. It is no wonder other schools damage their planes and produce pilots with poor crosswind landing skills.**

11. After several successful 1-3 feet runway fly downs, the student is ready to attempt a power on crosswind landing. The student will make a power on approach to the 5 foot (ETP) and fly level above the runway. The student will make a very small power reduction while focusing his/her eyes down the centerline and to the end of the runway. The student will hold the landing attitude with the end

of the runway appearing on top of the center of the cowling. The plane will eventually slow down and contact the runway. After the wheels are on the ground, the student will close the throttle and reduce some back pressure. The nose wheel should remain slightly off the ground.

12. **Repeat this exercise with the airspeed covered until the student is relaxed landing without looking at the airspeed.**
13. The student is now ready to begin normal landings.
14. To earn his/her challenge coin, the student must make a power on landing on the back of the main wheels (upwind wheel first) within 400 feet of the desired touchdown spot as per the private pilot PTS. Hold the nose wheel slightly off the ground and after excess landing speed has dissipated, initiate a go around. Directional control along the centerline must be maintained throughout the entire process. The student must be aware of his/her angle of attack as they add power. When applying full throttle for the go around, the student must assure that the nose does not pitch up too high. They should accelerate in ground effect until reaching  $V_y$ , best rate of climb speed, of 75 KIAS.
15. After the student masters GPA style of power on landings, the CFI will give them a series of emergency landing simulations on downwind, base, and final so they learn how to land without power and with and without flaps and with the air speed indicator and entire panel covered.

When the student can land within 400 feet of the desired touchdown point, on the main wheels, on the centerline, with no crab or side drift, while holding the nose wheel off the ground until excess speed subsides, and then perform a go-around without letting the nose get too high, he/she has graduated GPA training and has earned a Bristell "The Art of Defying Gravity" challenge coin.



The student is now ready to work on normal landings, no flap and full flap landings in preparation for solo. It generally takes 30 or 40 approaches for most students to master the GPA technique. Solo may not occur until about 30 hours. Using this technique has almost eliminated our student drop out ratio as our students are confident they can land with a crosswind.

Additional landing and defined Go-around point (DFGAP) tips.

1. You will not mush, slip, or change flaps below 300 feet (AGL). Your approach must be stabilized by 300 feet AGL.
2. If your approach is not stabilized with a speed of 60 knots ( +5/-5) and you are not lined up with the centerline at 200 feet AGL, initiate a go-around. This is the DF GAP or Defined Go Around Point.
3. Make every landing to PTS standards and go around if the wheels are not down within 400 feet of the desired landing spot (DLS). At large airports with long runways, the DLS will be 1000 feet past the threshold where the VASI is located and by the 1000-foot big white markings.
4. On calm days, the LSA will float and be difficult to get down, so use full flaps and 55 knots. If the airport has a clear approach, use the normal 60 knots, and aim 100 yards short of the runway.
5. While practicing normal landings, the student should not get the privilege of practicing a touch and go if the nose wheel touches the ground.
6. Every landing should end with the ailerons fully deflected in the direction of the crosswind, even when the wind velocity is only a few knots.
7. If you want maximum results, all landings will be to a full stop with a taxi back, especially if your student wants to become a commercial pilot.

LSA Important Tips:

- Make sure you have at least 45/55 knots before becoming airborne or better yet, do not look at the airspeed and follow my take off protocol mentioned earlier.
- On calm days aim 100 yards short of the runway if using 60 KIAS approach speed. If there is an obstacle preventing you from aiming 100 yards before the runway, you will need 55 KIAS speed in order not to float 1000 feet down the runway.

After pilots can make consistently soft safe landings, a towel will be placed over the glareshield and take offs and landings will be made without any reference to the instruments. This will build pilot confidence and prepare them if they need to land without instrument reference due to a bug in the pitot tube.

If you would like to know more about mushing, read Wolfgang Langewiesche's book "Stick and Rudder". Fly with your CFI once per year, preferably on a day with a crosswind and update your Personal Limitations Checklist.

Recommended You Tube Videos

1. Paul Hamilton...Learn to Fly a fixed wing light-sport aircraft.
2. UND...C172 Normal Approach and Landing

You can download a free copy of the Personal Limitation Checklist at [www.thelandingdoctor.com](http://www.thelandingdoctor.com)

"Happy Flying"      Lou Mancuso CFI 1613084      "The Landing Doctor"