

# Fly a Perfect Pattern

Stable to Touchdown

Fully Configured

Pre-Landing Complete

Perfectly Parallel to Runway

Exactly 800 or 1000 feet AGL

Half-Mile Distance

Perpendicular to Runway



Normal  
Difficulty



Safety  
Crew

*Sometimes an exercise is just about the endless pursuit of perfection in the most mundane things. Can you fly a “perfect” pattern? (And we really do mean, “perfect.”)*

Passengers judge your ability as a pilot by the quality of your landings. And, be honest, so do you.

What passengers never notice is how precisely you fly the departure, crosswind, downwind, base, and final approach. But you notice, and you can strive for as close to perfect as possible. Prove to yourself that you’re a master. Fly the perfect pattern.

## Before Takeoff

Start with a good pre-takeoff briefing. This includes normal items such as discussing what will happen in an emergency, but should also include what your safety pilot will look for as you depart.

When takeoff power is applied, ensure you have maximum available power. Propeller RPM, manifold pressure(s), engine tempera-

tures, oil temperature(s), oil pressure(s), and fuel flow(s) should all be as expected for your equipment. A properly executed takeoff is one component of the perfect pattern.

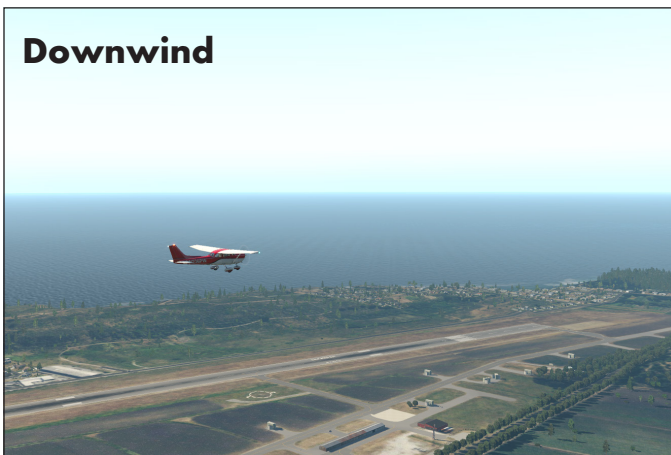
## Maintain that Track on Departure

Scoring your departure should start with the roll on the runway itself. As you accelerate toward liftoff, the nose should precisely track along the runway centerline. If there’s a crosswind, account for it. There should be no side loading or weather vaning while any wheels are still on the ground.

Lift off at the proper liftoff speed and establish an attitude to fly your target climb speed, most likely  $V_x$  or  $V_y$ . Now you must account for crosswind, so adjust your heading as needed to track the extended runway

### SAFETY NET

- Sacrifice the perfect pattern if needed for separation or safety.
- ...that, and all the normal cautions when airplanes converge in a single place.



*Mundane, you say? That's exactly why it's a great exercise. A pattern is good enough when flown within 100 feet and 10 knots, but it's better to 20 feet and two knots. And the rest of your flying will be better as well.*

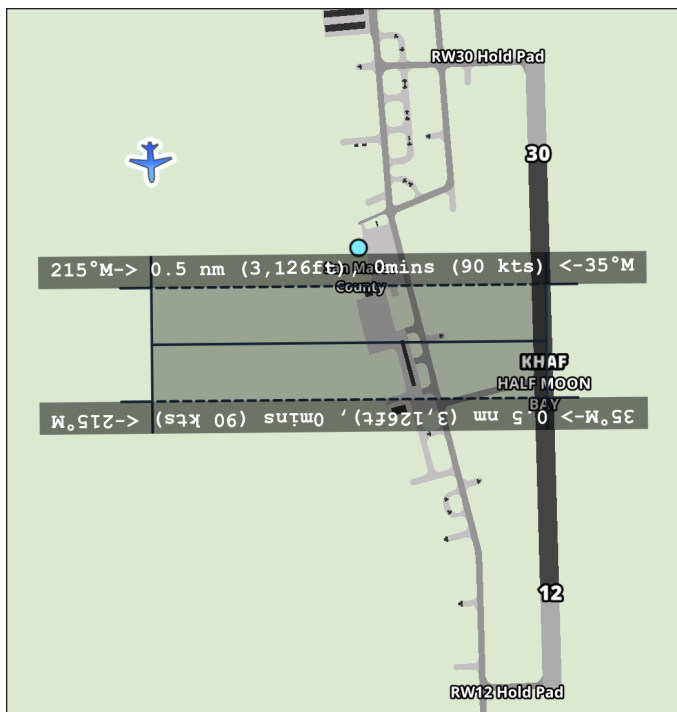
centerline. Your score for alignment on departure includes both the nose alignment on the runway before rotation, and ground track along the extended centerline until you turn crosswind.

### Mind the Speeds on Crosswind

The AIM recommends turning to crosswind at 700 feet AGL, so use that unless local procedures dictate otherwise. Make this coordinated turn to crosswind

as you continue to fly airspeed precisely. Keep the slip/skid ball centered throughout your climb. Aim for precision—nay, perfection—on this departure leg and the ones yet to come.

On crosswind, adjust your heading to fly a ground track exactly perpendicular to the runway. Maintain your target speed. That might mean a transition from  $V_x$  to  $V_y$  somewhere in this climb. It might mean transitioning to your downwind speed



before actually turning downwind if your airplane has a strong climb rate. Do what's needed to draw crisp, perfect lines in the sky.

### Nail the Distances on Downwind

When it's time to turn downwind, do it so you roll out exactly at the desired distance from the runway.

*Not sure if you're flying exactly half a mile from the runway? If you have an EFB tool such as ForeFlight on board, have your right-seater measure it.*

It's about half a mile for most light GA airplanes. This is closer than most pilots fly, but it's the standard. At least have a number in mind because it's part of your score. Whatever that number is, continuously monitor the turn, adjusting bank angle (and therefore turn rate) as needed to establish that distance, and maintain a track parallel to the runway. Adjusting the bank angle to seamlessly join the downwind leg isn't cheating. It's good airmanship. Fixing an overshoot or undershoot after the fact is what you're trying to avoid.

On downwind, level the airplane at pattern altitude (probably 800 or 1000 feet AGL) without an overshoot or early level-off. Maintain the downwind ground track and speed appropriate for your airplane. You get a bonus nod toward perfection for conducting a flow or pre-landing checklist on the downwind.

The standard touchdown zone or target is a point 1000 feet beyond the threshold or one third of the way down the runway, whichever is shorter. Abeam this point, transition to descent with flaps and gear as applicable.

### PUMP IT UP: DO IT STEEP AND BLIND

Some aviation pundits feel that loss of control in the pattern, especially in the turn from base to final, can be eliminated by replacing the squared-off turns with a continuous turn from downwind to final approach.

Give it a try by flying the perfect pattern until the abeam position. From there, make a continuous turn at a constant rate of descent from downwind to final approach, so that you roll out on short final in time to make the decision to land or go-around—but this time you'll be about 150 feet AGL. Your decision is still based on being on speed, in configuration, on glidepath, and aligned with the runway centerline. It just happens much lower as a result of the continuous turn. At this altitude, it's even more critical to go around if anything is out of spec.

To hit that decision point, evaluate your progress at 90 degrees through this 180-degree turn. You should be about 600 feet AGL with airspeed slowing on a trend toward your short-final speed,

and ready to put the flaps into the landing configuration.

It's critical you watch for obstacles—don't try this at night or in low visibility. It helps to fly a steeper, low-power descent, closer to the airport when you fly this pattern. Also know when you're inside the protected width of any PAPI or VASI. It's usually 10 degrees right and left of runway centerline. Remember that you'll have a constantly changing headwind and crosswind component, so adjust your bank angle to maintain a constant radius turn over the ground.

Is a continuously turning approach less vulnerable to a stall-spin accident? Can you still see traffic coming straight in? Is obstacle clearance compromised? Decide for yourself.



**Normal**

**Difficulty**



**Safety**

**Crew**

The perfect pattern means flying exact airspeeds throughout the descent. Some pilots like different airspeeds on the last part of downwind, then base, and then final. Often these accompany changes in flap settings. Some pilots fly a single speed and flap setting until landing is assured on final.

Whatever you do, your score depends on hitting the targets smoothly and maintaining them precisely until the next change. Ideally, you'll fly a constant rate of descent all the way from downwind to the landing flare.

### Set Up the Big Score on Base

When the touchdown zone is 45 degrees behind you, turn to base leg, adjusting heading as needed to fly precisely perpendicular to the runway as you descend.

It's important to scan for traffic throughout the entire pattern, but it's especially important while you're on base leg. The majority of midair collisions occur on final approach below 400 feet AGL, with one airplane on final overtaking another. On base leg, it's natural for your attention to be focused on the runway. Look away from the airport for airplanes on an extended downwind. Look across the final approach course for anyone coming in from the wrong direction on the opposite base leg from you. It happens.

### Allow No Latitude on Final

Time your turn to final approach to roll out precisely aligned with the centerline. Again, adjusting your rate of turn is fair game. Overshoots or undershoots are poor work, and thus they ding your score.

After completing the turn to final, you're in the only part of the pattern where it's acceptable to have the slip/skid ball out of center to compensate for crosswinds. It's up to you when this transition should occur.

On final, you should be on speed, in configuration (landing flaps and gear down), on glide path to your touchdown zone with a steady rate of descent, and aligned with the runway centerline. At 400 feet AGL, evaluate these criteria. If you don't meet all of these, go around. Attaining all targets on final ap-

## SCORECARD

Scoring for the perfect pattern is based on the five parts: Departure, Crosswind, Downwind, Base, and Final. There's no score for the landing, but you can score that as well. It's said that a perfect landing comes from a perfect approach, so a high score here should yield some good results.

**Departure**—Climb at  $V_x$  or  $V_y$ , turn at 700' AGL, track extended runway centerline:  
1: -0/+5 knots,  $\pm 5^\circ$  track, turn  $\pm 20^\circ$   
0: Exceed any of the above

**Crosswind**— $V_y$  to pattern altitude, track perpendicular to runway:  
1:  $\pm 5$  knots,  $\pm 5^\circ$  track  
0: Exceed any of the above

**Downwind**—Pattern airspeed & altitude, desired distance from runway:  
1:  $\pm 5$  knots,  $\pm 20'$ ,  $\pm \frac{1}{8}$  mile  
0: Exceed any of the above

**Base**—Descent airspeed, vertical speed, track perpendicular to runway:  
1:  $\pm 5$  knots,  $\pm 100$  fpm,  $\pm 5^\circ$  track  
0: Exceed any of the above

**Final**—Join final, then from 400' AGL to flare on airspeed, alignment, vertical path:  
1: -0/+5 knots,  $\pm 5^\circ$ , on glidepath  
0: Exceed any of the above, or overshoot final

**Total Score for Fly a Perfect Pattern:**

proach and going around before entering the flare are the most important takeaways from this exercise. Use this philosophy on every landing.

If they're on track, have your safety pilot note them for scoring (just as that person should have been scoring all previous sections) and continue for a landing. Your safety pilot may score the landing separately if you wish.

A flight tracking program, like ForeFlight or CloudAhoy, that can record these patterns helps scoring and, more importantly, debriefing your patterns.