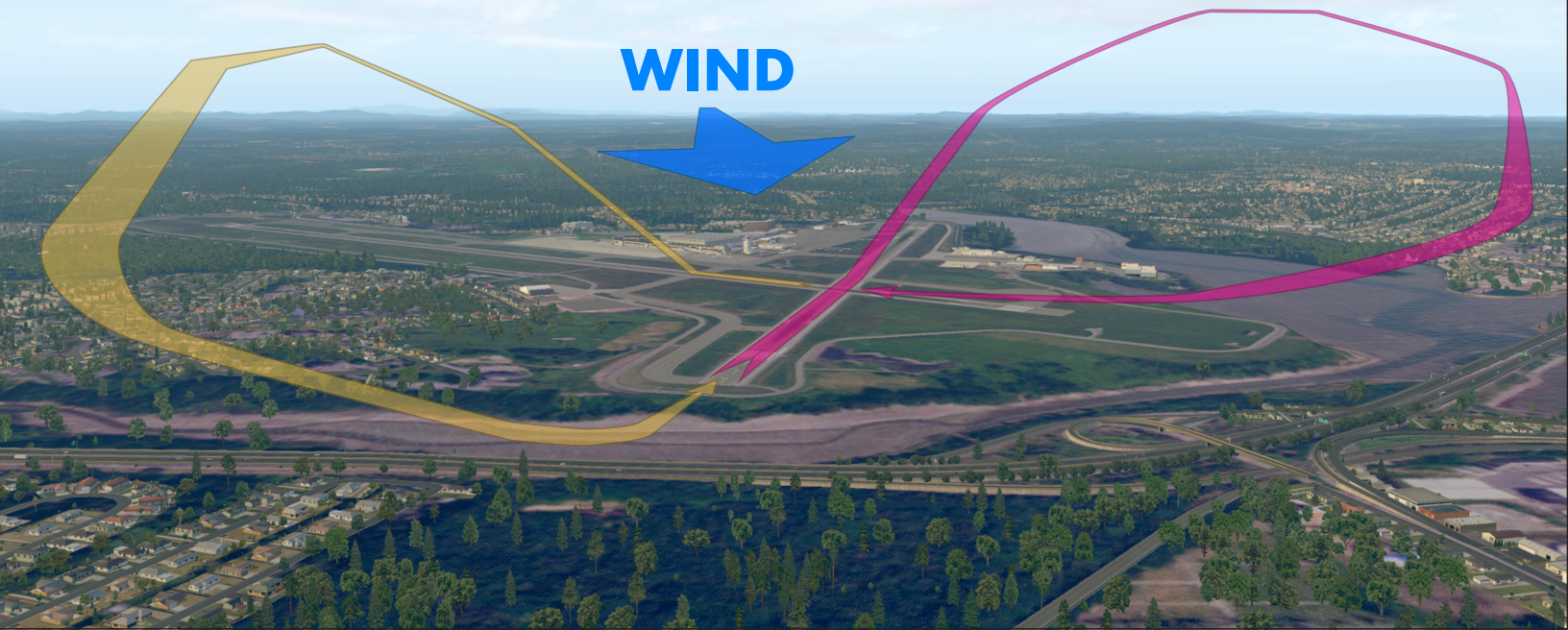


## Figure 8s on Crossing Runways



*An alternating pattern of right and left traffic means constantly changing turn directions and crosswind corrections.*

Consistent landings come from consistent approaches. That's why every student practices circuits around the airport traffic area seeking that elusive "perfect pattern" (page 14). Landings in the real world, however, can start from almost any position and only give you one shot to correct for winds, timing, visual illusions, and last-minute demands from Tower. Figure 8s bring that variability into pattern practice.

### Find the Right Airport and Ask Nicely

Find an airport with "X"- or "V"-shaped crossing runways on a day with some decent winds. Ideally, the winds will create a quartering headwind for two of the runways, but this exercise will work with

a headwind for one runway and hefty crosswind for the other. This exercise is best done at a towered airport where both right and left traffic are available for any runway.

You'll have to be crystal clear about what you want. This is usually best done by first telling Tower you have, "an unusual request." Then explain it in plain English: "Request closed pattern, departing Runway 36, turning right downwind for Runway 29 for a touch-and-go Runway 29, and then turning left downwind for Runway 36 for a touch-and-go Runway 36. We'd like to keep doing that figure 8 pattern in closed traffic."

Clearly, you wouldn't try this at some busy Class C airport during the morning commuter push, but you absolutely can request this during quiet times.



**SAFETY NET**

- A towered airport may be required for right traffic and ensuring aircraft separation.
- Conducting at a non-towered airport should be considered elevated risk.
- Consider leaving landing gear extended in retractable-gear airplane.
- Airplane may not reach pattern altitude on downwind leg; be on guard for obstructions and traffic.

Controllers relish a challenge just as much as you do. After a moment for them to visualize what you're asking, it's likely to be approved if airport traffic is light.

It's possible to do this at a non-towered airport if no one else is around and one of the runways just happens to have right traffic. You can also modify the 8s for left traffic on both truncated patterns. Right traffic for one of them is just more fun and challenging. If you're at a non-towered airport, pause the 8s if someone enters the pattern—unless they're friends of yours flying the same challenge.

### Start with a Normal Takeoff

Depart from one runway with a normal takeoff and climb. This means you're climbing toward the downwind leg of the crossing runway. Visualize where that downwind leg would be, and time a turn so that instead of turning crosswind for the runway you departed, you join a downwind for the crossing runway. You'll almost certainly still be climbing for pattern altitude, so keep climbing.

Approaching the abeam position, pick a spot on that landing runway where your wheels will touch the ground. Pick an appropriate aiming target to achieve that touchdown point.

If you reach pattern altitude before you reach the abeam position for your new landing runway, level off and continue to fly a normal downwind, base, and final for the new landing runway. If you reach the abeam position before you reach pattern altitude, level off to hold that altitude as you reconfigure your combination of power, flaps, and gear for landing. Hold altitude as you follow the landing pattern until rejoining what would be a normal pattern altitude so you can descend on a normal base and final.



## SCORECARD

Because normalization is the goal, you must visualize where you want to be in next few minutes. Scoring for Figure 8s centers on how well you hit those targets without after-the-fact corrections.

If your runway configuration allows, you can also try to reach pattern altitude exactly at the abeam point. If you can't climb that high, see how high you can before reaching abeam.

Score each circuit you make.

Join downwind without overshoot or undershoot:

1: No corrections

0: Must correct alignment

Maintain constant distance from landing runway on downwind:

1: Straight track over the ground

0: Weaving track over the ground

Join final without overshoot or undershoot:

1: Roll out exactly aligned with final

0: Must correct to align with final

Have wheels contact on touchdown target:

1: 0–100' beyond

0: >100', or -0' short

Touch down gently:

1: No shock

0: Bounce or jolt of any kind

Total Score for Figure 8s:

Make a touch-and-go (or stop-and-go) before climbing and visualizing the downwind for your original runway. Turn to what's now an opposite-direction pattern and intercept the downwind leg for that runway as you continue to climb. This side of the

*Depending on the climb rate of your airplane, you might still be climbing at the abeam position. If so, hold that altitude until you reach the point where you'd normally be that high descending to land.*



## SEE IT IN THE SIM

Location: Portland Jetport, Portland, ME (KPWM), right traffic Runway 29 and left traffic Runway 36.  
Conditions: Fair skies, winds 330 @ 15 at the surface and 330 @ 30 by 2000 feet AGL.



figure is just like the first one except the pattern is in the opposite direction and different wind corrections are required. Land on the original runway. Repeat at will.



Depending on the runway configuration and the winds, you may want to make your climbs at  $V_x$  instead of  $V_y$  to get higher before you have to switch gears and start your descent to landing. We rarely do extended  $V_x$  climbs, so that's a bonus challenge with this exercise. Each combination of runway configuration and wind makes for a different pattern. You might try this at an airport with a southeast wind one day and find it a no-brainer, then try it at the same airport with a northwest wind on opposite runways and suddenly have your hands full.

You can make any Figure 8 practice more challenging by making all landings power off as soon as you are abeam the numbers, or doing it at night. Note that these will elevate the risk. Try this in daylight with as normal a pattern as practical first. Modifications of this exercise can work with other runway configurations, so use your creativity. You can even fly cloverleaves in some situations (“Pump It Up: Cloverleaves with Crosswinds,” page 9).

## An Antidote for Complacency

Figure 8s create a constantly changing environment for pattern direction and crosswind correction. It's much harder to get into a routine set of actions, performed at certain positions without thinking. Figure 8s are best when you strive to fly each leg tracking precisely over the ground as appropriate. Unless the runways are at right angles, you have turns of greater and less than the normal 90-degrees whenever you switch patterns. This works your visualization skills picturing your next position over the ground and vertically in the pattern.

*Visualization is essential. Picture the oncoming wind and adjust to maintain ground tracks parallel or perpendicular to the runways. Also think about how that wind will affect your turn radius as you transition from the upwind of one runway directly into the downwind of the other. That radius increases as your ground speed increases.*

## PUMP IT UP: CLOVERLEAFS WITH CROSSWINDS

Another pattern on crossing runways would be a cloverleaf. In this case, you're flying four different truncated patterns, each one with a new crosswind component and total distance from rotation to the abeam position.

This is certainly possible in the real world with light winds, but you'd be harder pressed to convince a tower and even more of a rogue agent trying to explain it on CTAF. If there are real winds, two of the landings will have quartering tailwinds (unless one has a direct tailwind). For these reasons, this exercise is best done in a simulator only.

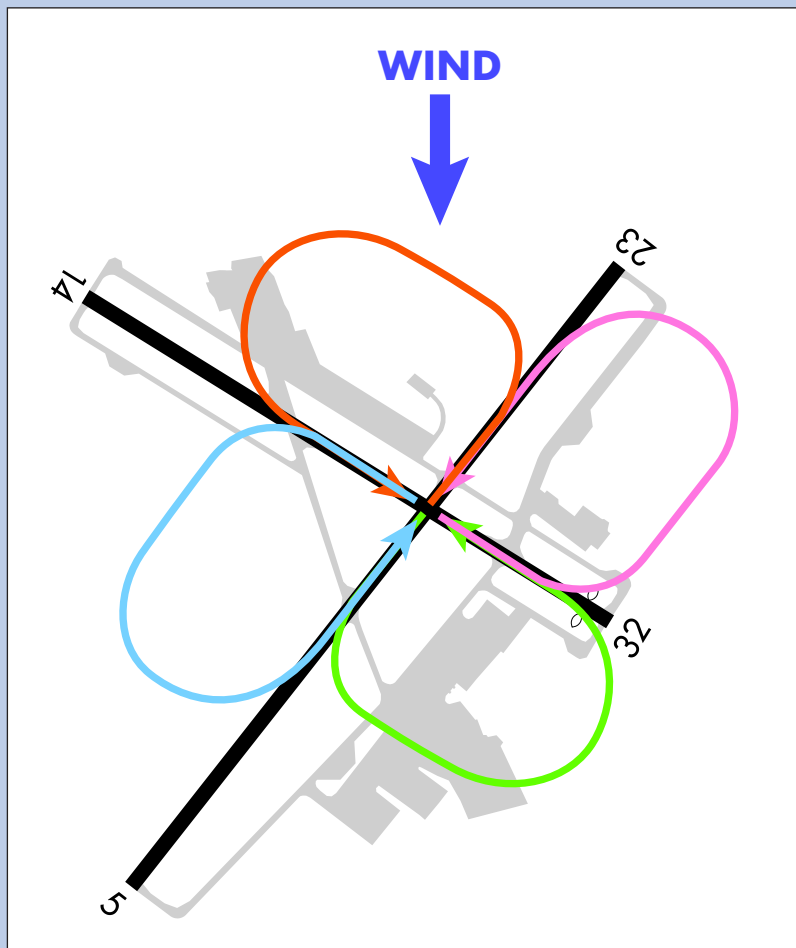
Doing it in a sim allows for a bit more flexibility and challenge. The tailwind landing is one factor. Another comes from making your touchdown point right at the nexus of the two runways. After each touch-and-go with the wheels contacting ground right where the runways cross, climb at  $V_x$  to 400 feet AGL, then turn 90 degrees left and climb at  $V_y$  to 800 feet AGL.



**Difficulty**



**Crew**



Regardless of where you are relative to the actual end of the runway when you reach 800 feet, pull the power to idle and make a 180-degree turn for a power-off touchdown as close to the crossing point of the runways as you can. It's sort of like Chandelles crossed with Power-Off 180s, capped by touch-and-goes.

The moment you touch down, add full power, pitch up, adjust flaps, and climb at  $V_x$  again for the next one. Because it's the sim and it's a cheap repair if you land gear-up, try it in a retractable-gear airplane just to increase the task load.

Unless you found an airport with runways exactly 90 degrees to each other, some turns will be steep and others shallow. The changing crosswind component for each loop requires heading adjustments and messing with your ground speed. It may take several circuits to get something you're proud of.

Flight from unusual positions, such as low on the downwind, works your ability to normalize. Normalizing means adjusting your procedures to transition from a non-standard position to one where the remainder of the task is simply normal procedure.

An example might be a straight-in landing to a towered airport where ATC asks you to, "maintain best forward speed on final." You'll fly a long straight

in and fly faster than normal. But at some point, you must slow down. A good target is slowing just early enough so the last 500 feet of the approach is at your normal final approach speed in a normal configuration.

Figure 8s are fun any time, but they're a terrific exercise when preparing for a VFR checkride, or for a Flight Review.