

Flying The Traffic Pattern

By Robert Ferraro

Skill Level: Basic

Now that you've mastered a number of basic and intermediate flying skills, it's time to put them all to the test in the exercise that combines them all — Flying The Traffic Pattern.

In this Flight Instructor lesson, you're going to learn about what is known in the USA as a traffic pattern and in Australia as a circuit. In its simplest sense the traffic pattern (circuit) is a rectangular flight path around the airport, usually to the left of the runway (counter-clockwise), with the longer legs flown parallel with the runway.

You're then going to take the controls using Microsoft Flight Simulator 95 (or V5.1) to fly some patterns yourself. It will then become apparent just how well you fly the simulator and whether you need to improve those skills or are ready to look ahead for more challenging flying lessons with the simulator.

Why The Traffic Pattern?

The traffic pattern was established for two reasons:

1. To maintain an orderly flow of air traffic for aircraft approaching and landing at an airport and also to departing aircraft.
2. During pilot training as a means to consolidate all the preliminary skills a pilot has acquired to date.

In traffic pattern/circuit training the pilot performs take-offs and landings in quick succession by taking off, flying the pattern and then making a touch and go landing. Traffic pattern training is hard work and utilises all the basic flying manoeuvres you learned in earlier lessons: take-offs, climbs, turns, climbing turns, descents, descending turns, straight and level and landings — all in the space of around 6-8 minutes. The challenge of traffic pattern training is to fly as precise (and efficient) a pattern as possible.

Other times the traffic pattern is used in pilot training is:

- Part of the training for the purpose of obtaining an endorsement on a new aircraft the pilot wishes to fly.
- To practice certain types of landings e.g. short field landings, flapless landings and glide approaches.

Traffic patterns are usually flown at smaller general aviation airports because it is these types of airports that require this type of sequencing. At larger international airports jet aircraft are usually on instrument or visual approaches from farther distances therefore the typical pattern like the ones we are going to fly today aren't commonly used. On occasion, you may just see a Cessna 172 on a training flight doing a typical traffic pattern at an international airport.

The Anatomy Of The Traffic Pattern

Let's now take a look at the traffic pattern in 3D space and the terminology used. Refer to the diagram on the top of the right hand page.

The traffic pattern is usually flown to the left (counter-clockwise) as a rectangular pattern. It is flown at 1,000 feet Above

Ground Level (AGL).

The traffic pattern has five legs:

Upwind: This is the leg flown immediately after takeoff. The pilot is in the climb out and maintains runway heading. Then at 500 feet AGL, he makes a 90° climbing left turn onto:

Crosswind: The pilot continues climbing at a heading 90° left of runway heading to 1000 ft AGL he then makes a 90° left turn onto:

Downwind: At this point he is flying straight and level at 1000 ft AGL (± 50 ft) heading parallel to and in the opposite direction of runway heading. During this leg he makes his pre-landing checks and reports to air traffic controllers that he is downwind and states his intentions. He then slows the aircraft and simultaneously begins a descent and makes a 90° left turn onto:

Base: The pilot is now in a steady descent, at approach speed, and in an approach configuration. Only one more turn to go to establish himself onto:

Final: On this leg the pilot is approaching the runway for a landing. He is in a steady descent and is setting himself up for a safe landing.

Let's Do It!

We're now going to fly a traffic pattern using Microsoft Flight Simulator 95 or V5.1 at where else but Meigs Field. We're going to do a left hand pattern on Runway 36. Due to the close proximity of Chicago's towering skyscrapers in the real world we would not be permitted to do this but in our virtual Flight Simulator world we can. We're also going to do the pattern in zero wind conditions. With wind certain adjustments to heading need to be made and it does make the pattern more difficult to fly. That's the beauty of flight sims, you can learn things in ideal conditions i.e. zero wind. It makes the theory much easier to understand.

A joystick is essential for this lesson as you want to have complete control of your aircraft and want it to respond immediately and accurately to your inputs.

Some important things to remember when flying a pattern:

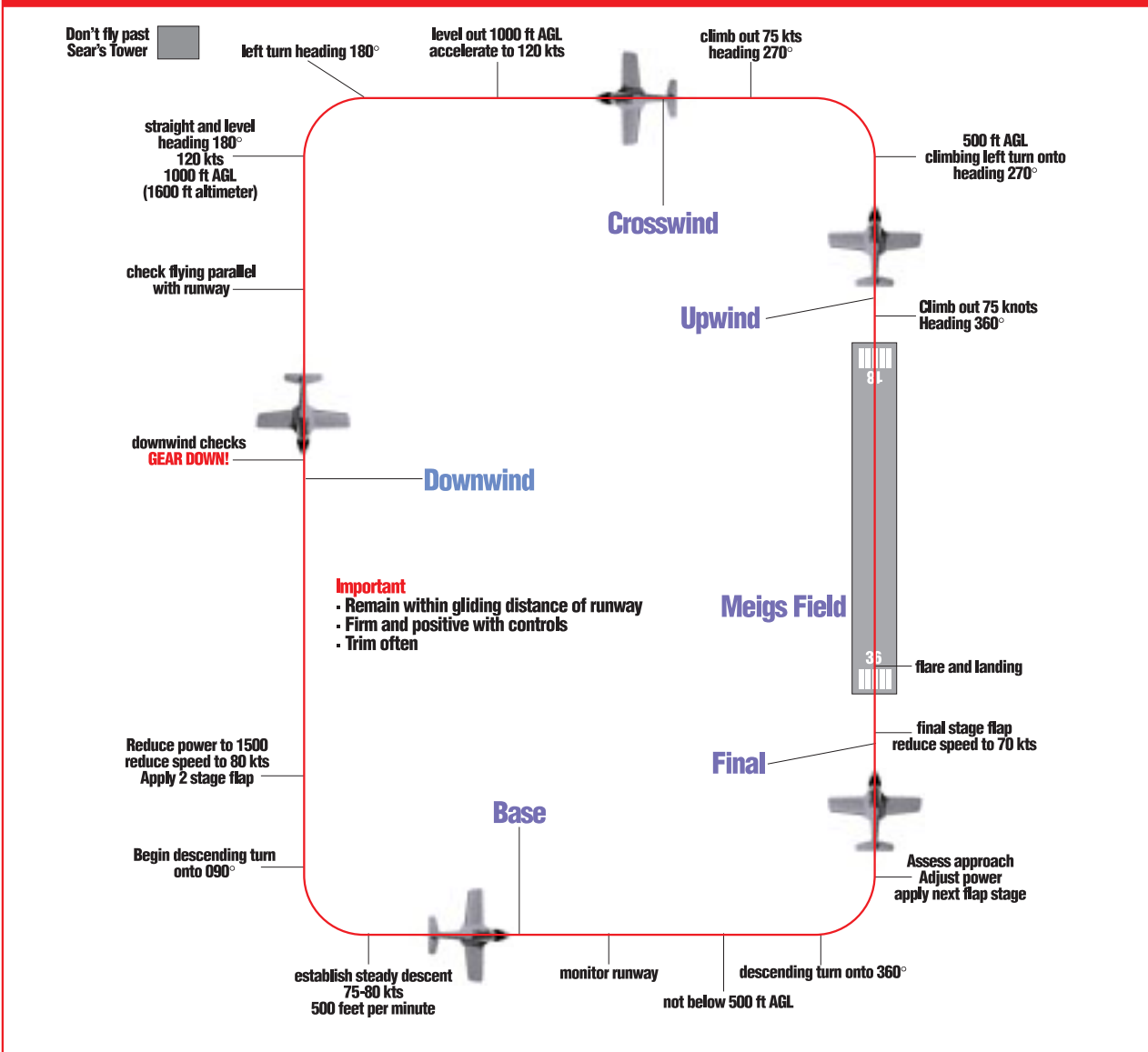
1. **Keep the pattern tight** i.e. fly the pattern close to the airport. You want to be in a position so that in the event that you were to have an engine failure in the pattern, you could safely glide to the runway.
2. **Keep it accurate and consistent.** Use all the skills that you have learned properly. Make you climb outs at best rate, make your climbing turns rate one turns and on your downwind leg keep it straight and level at 1000 ft AGL (± 50 ft).
3. **Be positive with your control inputs.** A lot of things are going to happen out there and happen quickly. There is no room for anything less than positivity with your control inputs. When it's time to turn onto the next leg enter your



The Anatomy Of A Traffic Pattern



Flying The Traffic Pattern At Meigs



turn properly and when it's time to lower your nose for straight and level, then lower your nose and establish your attitude. Also be positive on the trim. You want to trim the aircraft as quickly as possible on each leg so you won't be fighting the aircraft when it's time to concentrate on other things.

4. **Picture yourself in 3D space.** Be aware of your position in the pattern at all times
5. **Maintain safe separation in the pattern** and keep a look out for other traffic. Remember in FS95 you can crash into dynamic scenery!

So load up your Flight Simulator (95 or V5.1) and position yourself at runway 36 at Meigs. Ensure that your winds are set to zero.

In a moment you're going to take off and fly our traffic pattern. Firstly, read the briefing for each leg then fly the leg and pause your simulator before flying the next leg.

Meigs is at 587 Above Mean Sea Level (MSL) and our pattern is flown 1000 AGL. So this means that you are going to fly the pattern at 1600 feet MSL on your altimeter.

Take-off and Upwind

Briefing: The upwind leg is the first leg you're going to fly after take-off. On the upwind leg, you will climb out at best rate of climb i.e. 75 knots in the Cessna 182 and importantly you're going to maintain runway heading of 360°. You will continue your climb to 500 ft AGL (1100 ft on your altimeter). It is important to maintain best rate of climb because this way you will arrive at 500 feet at a distance from the runway that will keep you in a tight circuit.

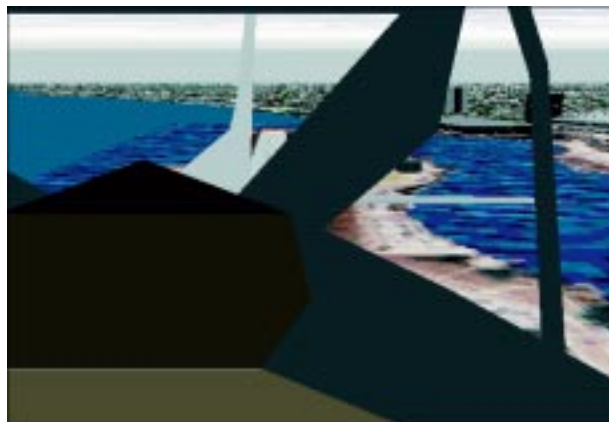
Your Aircraft: Now gently apply full power and take off. Maintain runway heading with your rudders. At 70 knots pull back on the stick and rotate. Check for positive rate of climb. When you lose sight of the end of the runway, raise your gear. Then slightly lower your nose for a 75 knot climb out. Trim for this. This will give you best rate of climb. Continue your climb, maintain heading 360°. At 300 feet above the runway (900 altimeter), look behind you to ensure that you are maintaining alignment with the runway. Continue climbing and when you get to 500 feet pause the simulator.

Crosswind

Briefing: At 500 feet AGL (1100 feet altimeter) you are going to turn left heading 270° onto the crosswind leg. In the crosswind leg you continue your climb to pattern altitude. Again, it is important that you maintain 75 knots and maintain your heading accurately. It is a good idea during this leg to look behind your aircraft to check your position relative to the end of the runway. You want to remain perpendicular to your previous leg and not fly too far out. Reaching 1000 feet AGL indicates the completion of this leg. This manoeuvre is quite challenging as you need to quickly level out, establish and trim for straight and level flight and immediately turn onto downwind. This is where you need to be positive with your handling of the aircraft.

Your Aircraft: So get ready to turn onto crosswind. In a climbing turn you should not turn at a rate greater than rate one. If you bank at an angle approximately 15° to the horizon this will give you a rate one turn. So gently but positively make a left turn onto a heading of 270°. Maintain 75 knots in the climb. Keep an eye on your altimeter (and on Sear's Tower ahead. If you hit it then you've gone too far). Now watch for 1600 feet on the altimeter. This indicates 1000 feet AGL. A lot is about to happen.

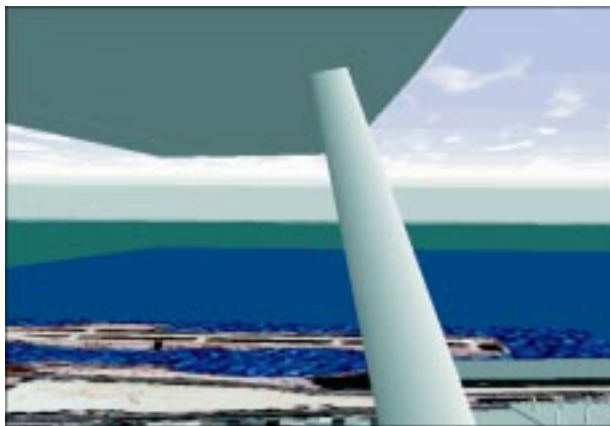
In just a few seconds, you're going to level out at 1000 feet AGL, accelerate your aircraft, reduce your power, trim for



During the upwind leg, look behind to ensure runway alignment



Turn onto downwind heading 180 degrees, 120 knots, 1000 ft AGL. Power setting should be around 2300. Note the 30 degree angle of bank.



On downwind, look left to determine alignment parallel to runway. When the runway disappears from this screen you're ready to turn base

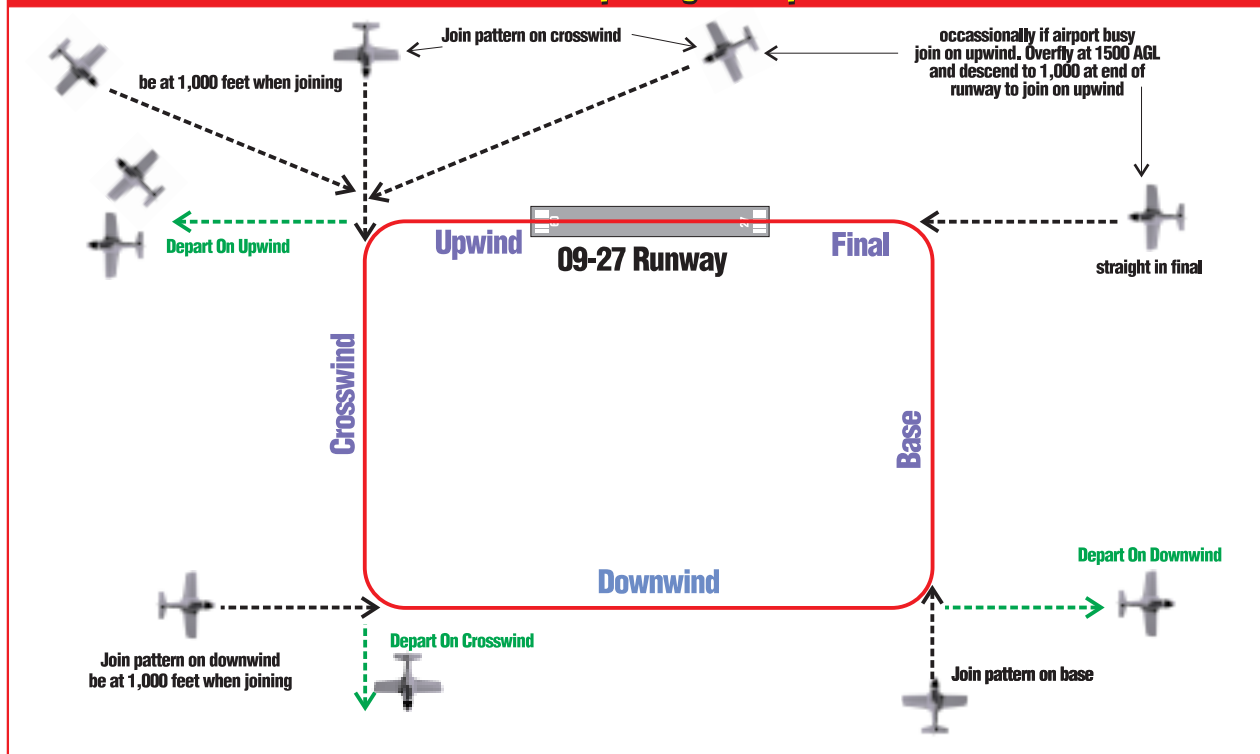
straight and level then turn 90° to the left onto downwind (heading 180°).

Still on crosswind, when you reach 1000 feet AGL (1600 ft altimeter) firmly lower your nose to straight and level attitude. Now, allow your aircraft to accelerate to 120 knots. Then pull back the throttle to around 2300 this will maintain about 120 knots and then trim the aircraft so that it keeps straight and level flight. Pause the simulator.

Downwind

Briefing: Okay, on this leg you're going to fly straight and

Approaching An Airport And Joining the Pattern And Also Departing An Airport



level at 1000 feet AGL (1600 ft altimeter) at 120 knots heading 180°. You should be at a distance from the runway that will enable you to reach the field should you have an engine failure. You're also going to do your pre-landing checks (including lowering your landing gear) and report downwind to the controllers. You're travelling pretty fast and this leg is over pretty quickly. The importance of trimming properly at the end of crosswind becomes apparent here as you must maintain 1000 feet AGL ± 50 feet without fighting the aircraft. If there were any slower aircraft in front of you, you would have to fly this leg slower. A lot happens at the end of this leg. You're going to slow down the aircraft, apply flap, begin a descent and turn onto base all at the same time.

Your Aircraft: So you've just completed crosswind. Now turn left heading 180°. You're straight and level now so you've got the lift required to safely make a rate two turn i.e. 30 degrees angle of bank. Firmly establish your heading and check your altitude - 1600 feet on the altimeter. Look out to the left at the runway. You should be tracking parallel to it. Halfway down the runway it's time for your pre-landing checks. In real life you would go through a whole list of safety checks but our most important one in flight simulator is gear down. So lower your gear. The aircraft trim changes and the aircraft begins to slow and descend slowly. Raise your nose slightly to maintain altitude and trim for this new attitude. Maintain 180° and switch your view periodically to your left wing. Just after the end of the runway moves out of your left wing view, you're ready to turn base. After completing this leg, pause the simulator.

Base

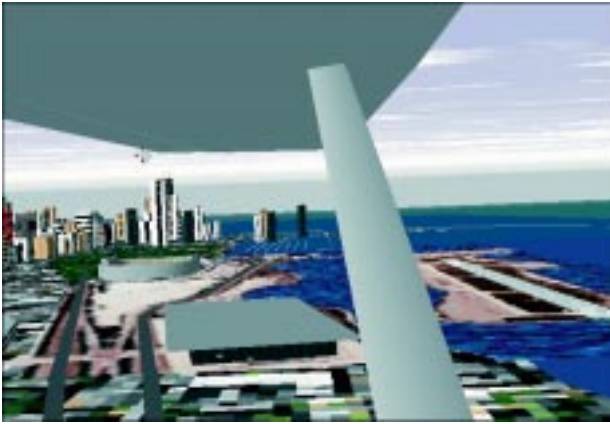
Briefing: In setting up for and turning base, you'll work just as hard as you did when you completed crosswind. You are go-

ing to pull back the power to slow down the aircraft, apply flap, begin a descent and turn virtually all at the same time. It requires co-ordination and very positive control input. The rest of your base leg will be a steady 80 knot descent before you turn onto final. When you get good at this you will learn to judge your glide so that you are in a position to turn onto final at an altitude that is not less than 500 feet AGL.

Your Aircraft: When you've completed your downwind pull back the power to 1500. Keep the nose up and allow the aircraft to slow to 100 knots. Now apply two stages of flap and the aircraft slows even more. Keep the nose up to let the airspeed to bleed off to 80 knots. Now turn left heading 090° rate two turn. You'll begin descending during your turn. When you've completed your turn and are established on 090° heading you'll be descending because your power is at 1500 and your attitude is set for 80 knots airspeed. This automatically places the aircraft in around a 500 feet per minute descent. Adjust and trim accordingly to maintain 75-80 knots airspeed and prepare for your turn onto final. Pause the simulator then prepare for your turn onto final.

Final

Briefing: Turning final is always tricky on 2 dimensional screens. Real world 3D depth, as well as the ability to turn your head, is required to judge the turn onto final. The picture at the top of the next page is a good indicator of the runway position relative to your left wing view for which a rate two turn will roll you out on final. The turn onto final must not be made below 500 feet AGL (or 1100 altimeter in this exercise). When established on final you want to be on the glideslope and with a power and attitude setting that requires minimal input. You want to fly the aircraft right onto the numbers.



When you have this view out your left wing during base, you're ready to swing it round onto final.

On final, the trick is to keep the runway threshold in the same position on your windscreen. If you do that you are aiming and will touch down right on that point. If descending too fast apply power to reduce your rate of descent and if you are too high reduce power accordingly. Keep your hand on the throttle and keep that threshold on the same spot on your windscreen. Fine tune your power to keep that bird on the imaginary piece of string extending out from the runway.

At this point you should also make fine rudder inputs to maintain runway alignment.

In an approach that's been well set-up, the pilot is feeling very relaxed and comfortable yet at the same time focused on that runway threshold. The engine is quieter, the aircraft is flying slower and all at the same time flying positively down the approach slope. His peripheral vision is constantly giving him a picture of his aircraft in 3D space relative to the end of the runway he is aiming for.

Your Aircraft: When your left wing view is like the one shown in the diagram you're ready for your turn onto final. If you appear to be descending below 500 feet AGL on base then apply power to stop your descent. So not below 500 feet begin a rate two turn onto a heading of 360°. The runway should be right on the nose. Slow the aircraft to 75 knots by reducing the power a bit and keeping the nose up and applying another stage of flap. Note the position of the piano keys on your windscreen. Now assess your position in the approach. If you're too high, reduce power, if you're too low apply power. Continue until you're satisfied that you are on the correct glideslope. Then re-adjust your power to maintain about a 500 feet per minute descent rate and keep the power there. You should feel comfortable that you're flying towards the piano keys. ATC clears you to land, so at 300 feet apply full flap. Your aircraft will want to balloon a bit so keep a bit of forward pressure on the controls so that your rate of descent doesn't decrease. Your aircraft will slow to 70 knots. Don't let it get below this speed. Check again that your gear is down and continue flying towards that threshold. You should fly over the threshold at 50 feet. Keep flying and as you've learnt previously when just above the ground pull back the power to idle and flare the aircraft for a gently touch-down.

There's your traffic pattern/circuit.

Touch-And-Go

Often when doing pattern work, pilots will do touch-and-go landings. That means that when they land, they continue their roll, retract flap and apply full power for another take off and

circuit. This lets them fly pattern after pattern. I suggest that you do some touch-and-go pattern work whenever you can to practice your aircraft handling in a high workload environment. It will improve your overall aircraft handling and at the same time make you sweat a bit!

Traffic Sequencing

Understanding the traffic pattern can help you plan and make the appropriate approach to any airport you're flying to. Study the diagram on page 49 to help you join the pattern on the appropriate leg regardless of the direction from which you're approaching the airport. The important point to remember is that you should be established at 1000 feet AGL when you enter the pattern.

Let's Re-Cap

1. Traffic Patterns/Circuits are used for traffic sequencing and for high workload training.
2. A traffic pattern has five legs: Upwind, Crosswind, Downwind, Base and Final.
3. Traffic patterns are generally flown to the left and at 1,000 AGL.
4. Keep your patterns tight for safety reasons
5. Be firm and positive in your aircraft handling and work fast
6. Your final approach to landing should be comfortable. Your mental state on final and the outcome of your landing is often determined by how well you did on your previous legs.
7. Practice traffic patterns/circuits whenever you can. They improve your flying and a good way of getting proficient on an aircraft type.
8. When approaching an airport from any direction, use the traffic pattern to choose the appropriate leg to set-up your approach for a landing.

Tip: When practicing your patterns, use Flight Simulator's flight analysis track plotting to plot your flight. →

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