

# Traffic Patterns

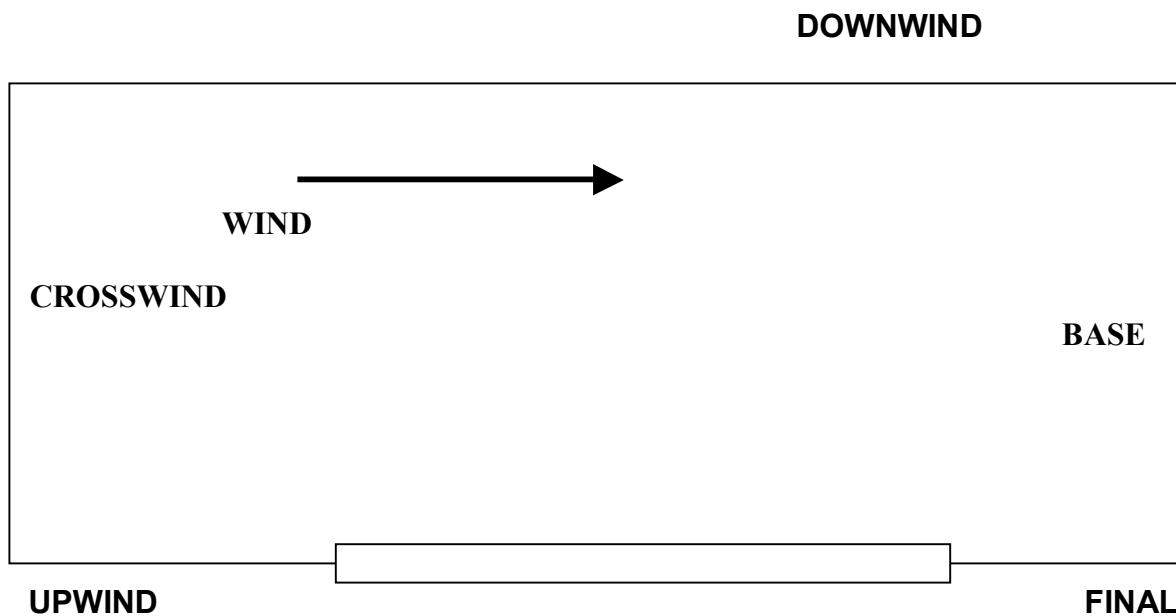
**Normal Landings:** Now that you know how to fly an aircraft, it is time to learn how to land. Landing is not that difficult if you just keep a few things in mind. First, you will use two things as points of reference, both at different times.

1. Use the numbers on the runway as your main reference when you are in the traffic pattern and on final approach.
2. Use the very far end of the runway once you are on very short final.

You will discover when to switch between the two. Remember that a good landing is preceded by a good approach. This means that you must come in at a constant descent rate and constant airspeed. If you have a strong wind, add 10% of the headwind component to the final approach speed. For example, if the wind is coming directly down the runway in the opposite direction of the aircraft, and the wind speed is 20 knots, you want to add two knots to the final approach speed.

**Traffic Pattern:** The traffic pattern is a rectangle around the runway of the airport. It is the desired ground track around the runway at a specified altitude. The altitude is normally 1,000 AGL. In the case of Falcon Field, the TPA (traffic pattern altitude) is 700 AGL. The TPA is listed in a book called the Airport Facilities Directory.

There are four parts to the traffic pattern: **upwind, crosswind, downwind, and base.** The traffic pattern is just a rectangular course with names for each part.



**Upwind:** The upwind segment is the part where the aircraft is flying directly into the wind.

**Crosswind:** The crosswind segment is the part of the traffic pattern where the aircraft is perpendicular to the wind.

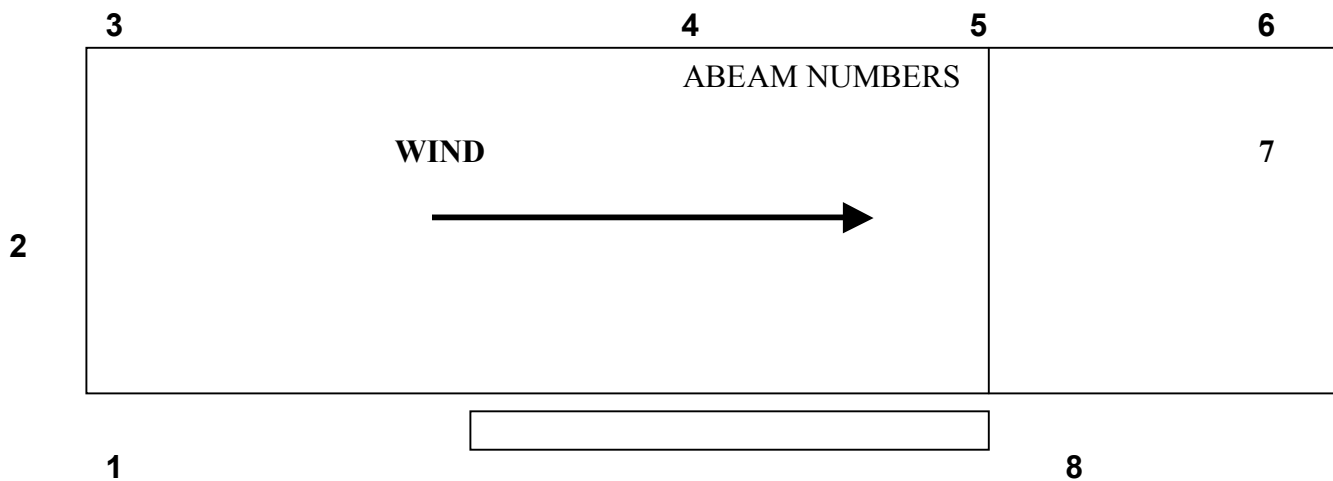
**Downwind:** Downwind is the part of the traffic pattern where the wind is directly behind the aircraft.

**Base:** This part of the traffic pattern is also perpendicular to the aircraft as you start a descent toward the runway.

**Final:** This is the final approach to the runway.

**No-Wind Situation:** First, I will discuss a normal traffic pattern in a no-wind situation. In the no-wind situation, the heading of the aircraft will be the imaginary line on the ground. I will describe the complete traffic pattern and then go over how to land.

The first thing we will do is takeoff. Once the aircraft is off the ground, we want to climb up to at least 500 feet above the ground. We will make a 90-degree turn to the right (or left, depending on what runway we takeoff from). There are procedures for the traffic pattern also. I have numbered the places in the traffic pattern where you need to perform checks.



1. On upwind you want to climb out at  $V_y$  or CLIMB ATTITUDE Make sure you are on the extended centerline of the runway. In order to do this, pick a point far away that is on the extended centerline. Fly straight at this point, just like we do when we are cruising. Normally, you would turn crosswind 500 below traffic-pattern altitude.

2. Continue to climb until you get to traffic-pattern altitude. As in the rectangular course, you want your ground track to be perpendicular to the runway heading. We are in a no-wind situation, so it will be 90 degrees to the right of the runway heading. Just like upwind, pick a point far away and fly straight at it. You don't want to be looking inside the aircraft.

3. Turn downwind when the distance between the aircraft and the runway is about 1/2 a mile. When you reach altitude, level off. Bring the power back to 2100 RPM (depending on the aircraft). You don't need to look at the tachometer at this point. Remember, the aircraft was trimmed for your climb speed. Your desired downwind speed will be close to this speed. The plane will pitch for that airspeed as you bring the power back. Just bring the power back until the nose of the aircraft is level (level attitude). You will find that your airspeed should be about the same as your climb speed. This should

be about your desired downwind airspeed. Remember that you don't want to gain a lot of airspeed on the downwind. The wind is behind you when you have wind, so your groundspeed is increasing. If you push the nose forward and then wait to bring your power back, you are going to be fighting the plane because you will be gaining airspeed. Then you are going to be trimming. If you just have the plane trimmed in your climb and then bring your power back until the nose goes to level attitude, the plane will still be trimmed for you. This will be less work. Minimize your workload.

4. Once the aircraft is set up and trimmed the way you want it, perform the following check:

1. **Fuel:** On

2. **Flaps:** Up

3. **Mixture:** Rich

4. **Power:** Set 2100 RPM (It should be pretty close to this, depending on the plane you are in.)

5. **Carburetor Heat:** On

6. **Magnetos:** Check on both

7. **Primer:** Locked

5. **Abeam the Numbers:** At this point, your main reference is the numbers on the end of the runway. Bring the power back until the nose is just below the horizon (descent attitude), and add ten degrees flaps. Don't go for the trim right way. If you had the plane trimmed on downwind, you shouldn't have to keep re-trimming. Once you get to descent attitude, hold it there and wait a few seconds. You will find that once the airspeed stabilizes, it should be pretty close to being trimmed, also.

1. **Power:** Back to descent to landing power

2. **Descent attitude**

3. **Flaps:** First ten degrees

6. **At 45-Degree Point Turn Base.** This will be a 90-degree turn. While you are in the turn, add the next ten degrees of flaps. Maintain the same pitch attitude. Once you roll out the turn, your airspeed should be about five knots slower. Watch the numbers to let you know if you are high or low on the glide slope.

If the numbers start going under the plane, you are getting high. If the numbers start going away from the plane, you are getting low. I always have my students say, "**High, low, fast, or slow,**" then make the correction.

7, Continue watching the numbers. If the numbers appear to move away from you, you are getting low, so make a correction. If the numbers appear to move beneath the aircraft, you are getting high.

8, Turn final approach and maintain your pitch and power setting. Don't change power unless it is absolutely necessary. Fly the plane right down to the runway. On short final, add the last ten degrees of flaps. Now, you should be at your final approach airspeed. Remember not to add the final ten degrees of flaps until you have the runway made without power.

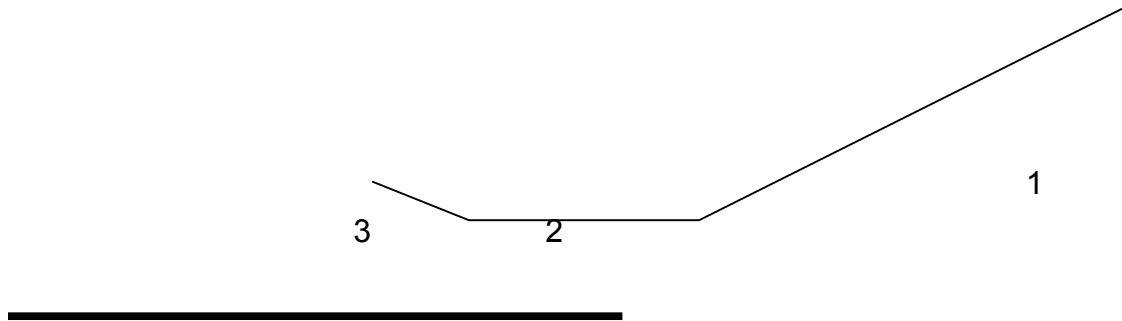
**Landing,** There are three phases to landing an aircraft: final approach, level off, and flare.

**1, Final Approach:** Final approach is the most important part of the landing because you must have several factors under control to have a good landing. First, establish the airspeed. If you don't have the airspeed under control, you will be wrestling with the airplane the rest of the way down. If you set everything up on downwind and watched the numbers on the runway, you should be pretty close.

Next, check the glide slope. If you are high, then you need to reduce some power to increase your descent rate. At this point, make sure you don't change the airspeed. The plane should be trimmed so power will control your altitude at this point. Use a combination of both pitch and power to have the aircraft in the configuration you want it to be in.

**2. Level Off:** The next part of the landing is the level off. This is also known as the transition between final approach and the landing. In this phase, you want to level the aircraft off and begin to bleed the airspeed off. Remember that you are in ground effect, and the drag is much less. The aircraft will tend to float, so make very small control movements. When you cross the numbers, look at the end of the runway and begin your transition from descent attitude to nose-level attitude. Maintain nose-level attitude until you start to feel the plane fall out from under you.

**3. Flare:** This is the final step in landing. This is when you transition the aircraft from a level attitude to the nose-up attitude, or the takeoff attitude (climb attitude). Remember that the aircraft is going to takeoff at the same attitude that it will land at. You need to constantly increase the backpressure because the effectiveness of the controls decreases as the airspeed decreases. If you hold the nose of the aircraft on the end of the runway, you will find that the aircraft will land perfectly. That is the line of sight between your eye and the very end of the runway. Now, put the nose on it. This should be just about climb attitude.



1. This is your final approach. This is when you should make sure that your airspeed is under control and that your descent is on the glide slope.

2. The level off is where you begin to bleed off airspeed so you can land the aircraft. Change your focus when you cross over the numbers of the runway.

3. The flare is when you will return to the takeoff attitude to land the plane. Hold the nose wheel off the runway as long as possible. If you let the nose wheel hit the runway as soon as the main wheels touch, the landing will still seem to be a little hard. If you hold the nose wheel off until it gently settles, the landing will be very smooth.

Another thing I will have the student do is continue holding the nose off the runway. Just play a little game with yourself: don't let the nose wheel touch. You will find your landings are a lot smoother.

You should also try reducing the power when you get on short final. Just call out to yourself, "100 RPM (back) trim. 100 RPM, trim. 100 RPM, trim." If you are doing touch and gos, remember that you will have a lot of nose up trim, so before you go, give the trim a few turns of nose-down trim.

**Putting It All Together:** Once you have the three individual steps down, you can make the three steps into one constant motion. The perfect landing will be when you have the power at idle and the wheels touch the ground at the same time.

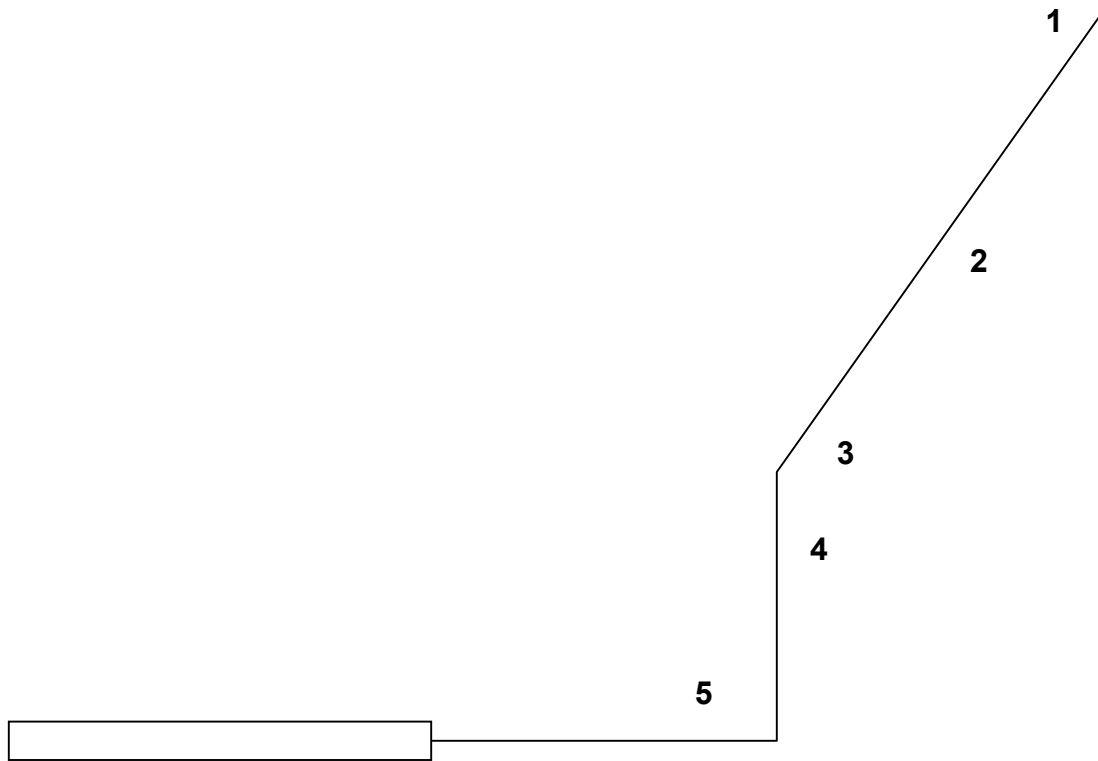
**Flying into an Airport:** On the change from cruise to landing, we have to accurately bring the aircraft down many thousand feet. One common error many pilots make is too many power changes. Over the years, I have talked to many mechanics. They all say to expect an engine failure when you make a power reduction. So I teach and follow a simple rule: If you bring the power back, you have lost it. I abide by this rule, except I allow 100 RPM only as a last resort so if you bring your power back to 1500 RPM, then you can't go back to 1600 RPM.

Now that you have flown for a little while, you should be able to judge your descent path to the runway without massive changes in power. It is important to remember that every time you change the power setting, you risk losing the engine. Therefore, minimize the power changes. Next, make them as small as possible. Avoid the 500-RPM drop on final. I have given you an outline of what to do. Now the question is how to do it.

As I have stated above, you want to make your initial power reduction when you see the airport begin to move. Do this just as if you use the numbers. Once the airport begins to move beneath the aircraft, reduce the power until the airport is still. At this point, you should be accounting for the wind. Now you have the descent rate of the aircraft set up. Keep this pitch attitude all the way to the runway. Notice that it will be just below the horizon, just like I have taught you in the past lessons. If the airport begins to move, you will have to correct accordingly.

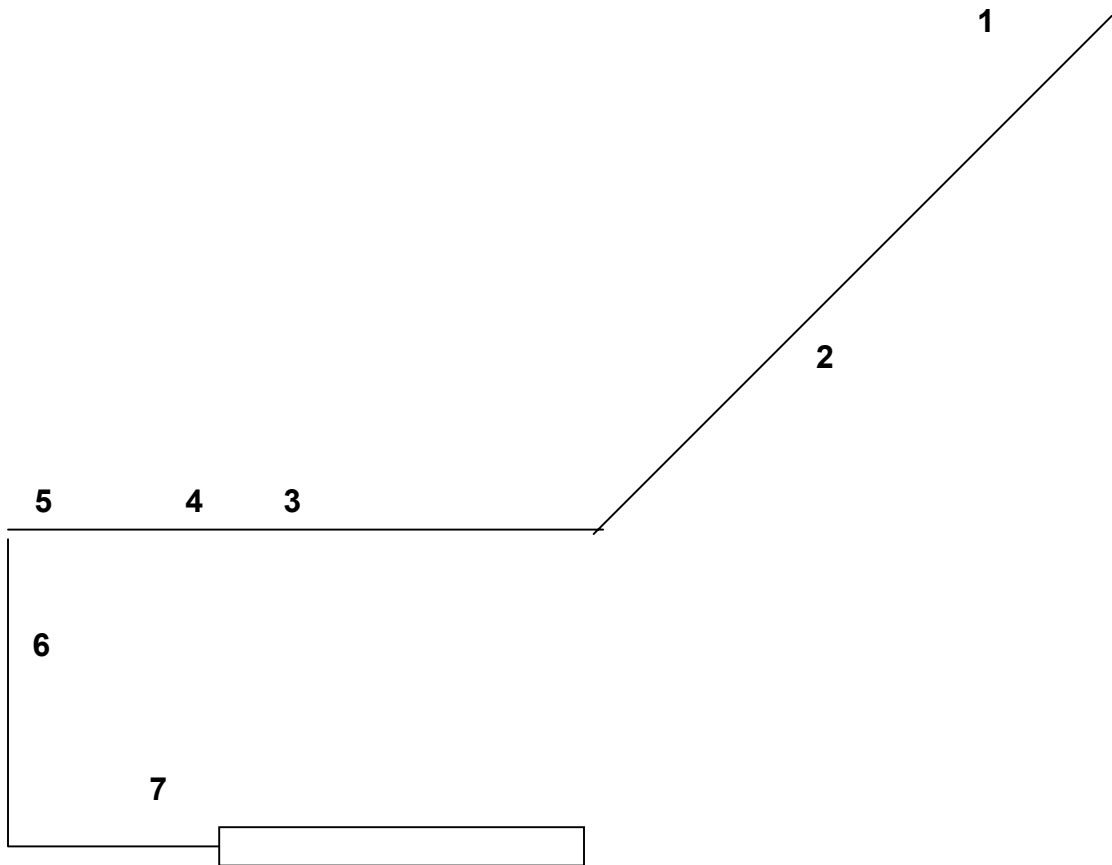
The next thing I want you to do is to start thinking ahead. If the control tower tells you to enter right base, you need to remember what the configuration of base is. In our case, it will be approximately 1500 RPM and 20 degrees flaps. Therefore, you need to think ahead to get the aircraft set up. There are two ways to do this. Bring the power back to 1500 RPM and add ten degrees flaps a little early, or set everything up right when you enter the base leg. Either is acceptable. I prefer to slowly bring the power back about 100 RPM at a time and retrim the aircraft for the constant pitch attitude I need. Once this is done, enter base, bring the power back, and add 20 degrees flaps. If you do this, you will find it is easier to fly more complex aircraft when you get to them.

1. Wait for the airport to begin to move beneath the aircraft, then bring power back until airport stops moving.
2. Maintain constant pitch. Watch RPM, and bring power back to keep the airport from moving.
3. Get set up on base, 1500 RPM, 20 degrees flaps, and watch the numbers. Adjust flight path accordingly.
4. Watch the numbers, adjust flight path, and maintain pitch attitude. Airspeed should be 70 KIAS.
5. Final approach: 65 KIAS and 30 degrees flaps only when you can make runway without power.

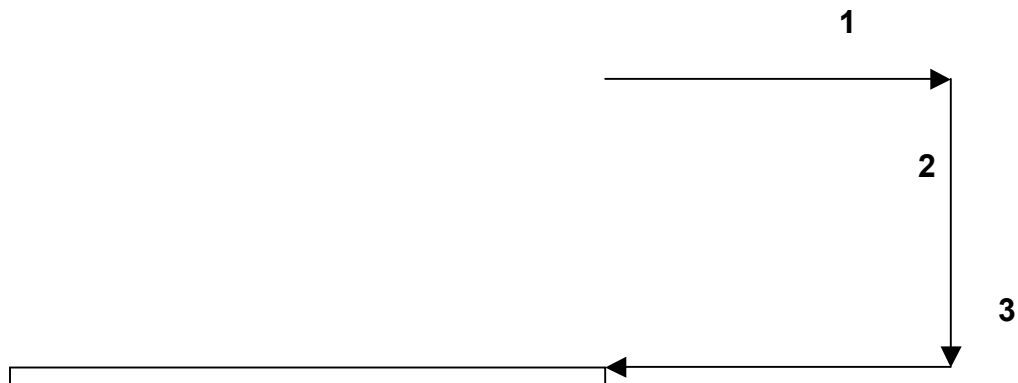


**Downwind Entry:** If the tower tells you to enter a 45-degree leg and then report downwind, you need to think ahead. On the downwind leg, you want a power setting of about 2100 RPM and airspeed of 80 KIAS. Maintain your cruise descent until you are ready to enter the downwind leg. At this point, all you have to do is raise the nose of the aircraft until it is level with the horizon to slow the aircraft down. The power setting on the cruise descent is about 2100 RPM, so you should not have to touch it until you are abeam the numbers on the runway. Now, complete the traffic pattern as normal.

1. When the airport appears to move beneath the aircraft, bring the power back until the airport does not move and the nose is just below the horizon. Perform the descent checklist.
2. When you approach the traffic pattern, maintain altitude.
3. Abeam the threshold, bring power back until nose is just below the horizon. Bring in the first ten degrees of flaps, and trim aircraft.
4. Check pitch, attitude, and airspeed.
5. Turn base and add the next ten degrees of flaps.
6. Use the numbers as primary reference.
7. Use flaps as needed when runway is made.



**Power-Off Glides:** When we are practicing landings, I will pull the power off when we are abeam the numbers of the runway. The key to the power-off glide is to remember the two-descent rate we talked about in lesson #5. In this case, the descent rate of the aircraft is determined by the glide speed of the aircraft. Once the power is pulled, get to the glide speed as quickly as possible.



1. When the aircraft is abeam the numbers I will pull the power to idle. At this point, add the first ten degrees of flaps and get the nose of the aircraft just below the horizon. Continue to use pitch to maintain the proper glide speed.

2. When you turn to base, add the next ten degrees of flaps just as you normally would. While you are on base, watch the numbers of the runway. You will need to correct the glide path in order to keep on the desired glide slope.

3. Once the runway is made, add the last ten degrees of flaps, and land the aircraft as you normally would.

**Accuracy Landings:** The accuracy landing is important for the emergency procedures lesson. We will go over them a little bit. They are the same as the power-off glide, except we want to land at a specific point on the runway. The key is to pick your landing spot and adjust your flight path accordingly. This is why you want to learn to land watching the numbers.