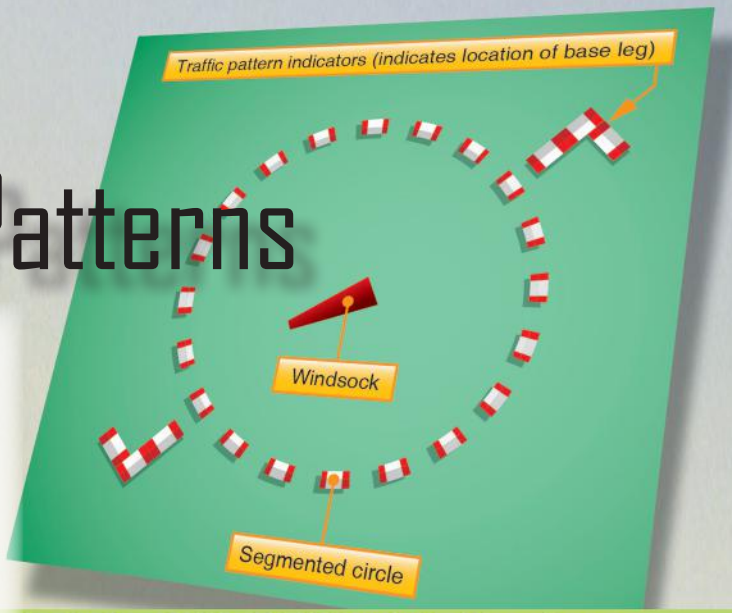
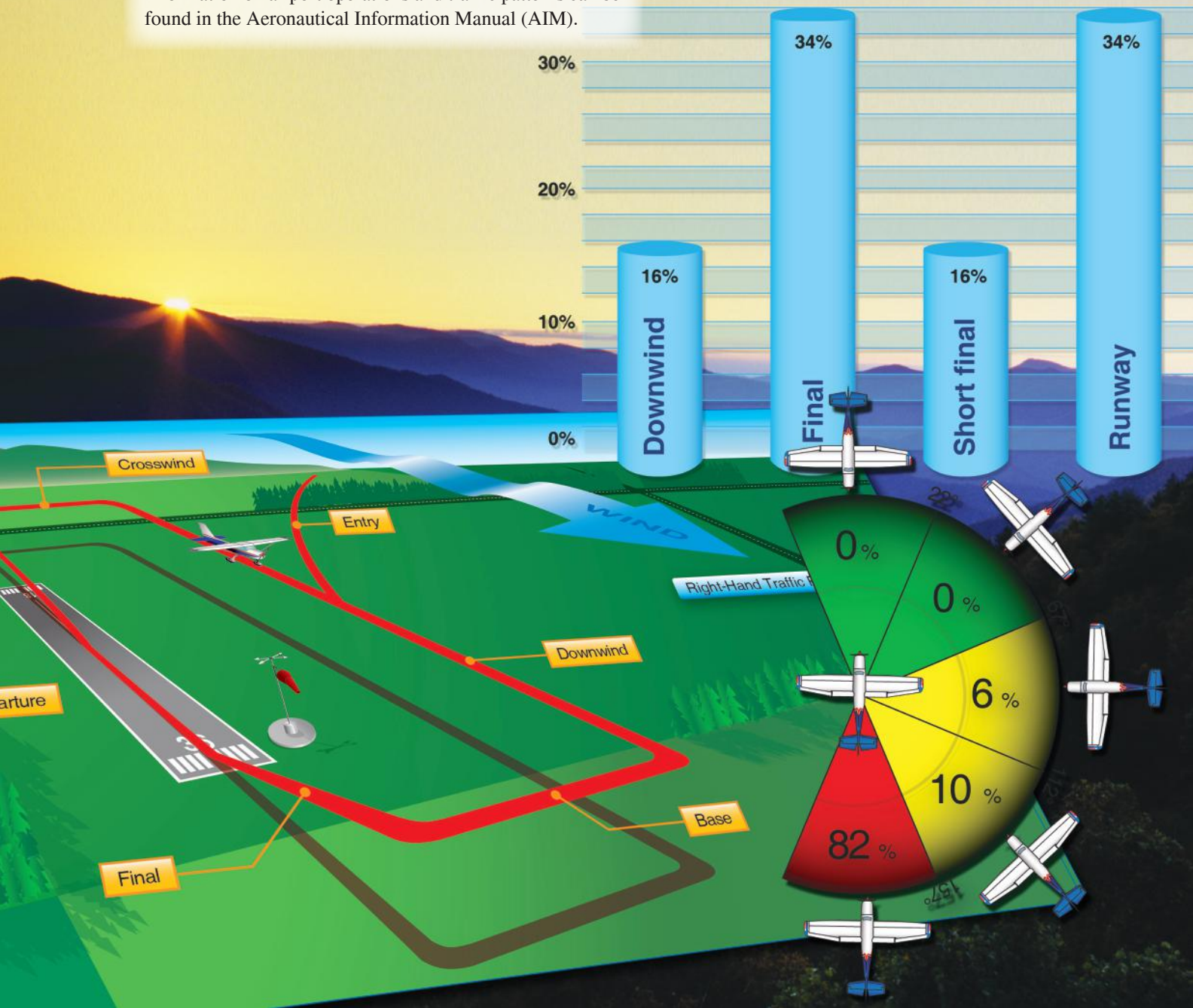
Chapter 7

Airport Traffic Patterns



Introduction

Airport traffic patterns are developed to ensure that air traffic is flown into and out of an airport safely. Each airport traffic pattern is established based on the local conditions, including the direction and placement of the pattern, the altitude at which it is to be flown, and the procedures for entering and exiting the pattern. It is imperative that pilots are taught correct traffic pattern procedures and exercise constant vigilance in the vicinity of airports when entering and exiting the traffic pattern. Information regarding the procedures for a specific airport can be found in the Chart Supplements. Additional information on airport operations and traffic patterns can be found in the Aeronautical Information Manual (AIM).



Airport Traffic Patterns and Operations

Just as roads and streets are essential for operating automobiles, airports or airstrips are essential for operating airplanes. Every flight begins and ends at an airport or other suitable landing field; therefore, it is essential that pilots learn the traffic rules, traffic procedures, and traffic pattern layouts that may be in use at various airports.

When an automobile is driven on congested city streets, it can be brought to a stop to give way to conflicting traffic; however, an airplane can only speed up, climb, descend, and be slowed down. Consequently, traffic patterns and traffic control procedures have been established for use at airports. Traffic patterns provide procedures for takeoffs, departures, arrivals, and landings. The exact nature of each airport traffic pattern is dependent on the runway in use, wind conditions (which determine the runway in use), obstructions, and other factors.

Control towers and radar facilities provide a means of adjusting the flow of arriving and departing aircraft and render assistance to pilots in busy terminal areas. Airport lighting and runway marking systems are used frequently to alert pilots to abnormal conditions and hazards so arrivals and departures can be made safely.

Airports vary in complexity from small grass or sod strips to major terminals with paved runways and taxiways. Regardless of the type of airport, a pilot must know and abide by the rules and general operating procedures applicable to the airport being used. The objective is to keep air traffic moving with maximum safety and efficiency. Information on traffic patterns and operating procedures for an airport is documented in the Chart Supplements, as well as visual markings on the airport itself. The use of any traffic pattern, service, or procedure does not diminish the pilot's responsibility to see and avoid other aircraft during flight.

Standard Airport Traffic Patterns

To assure that air traffic flows into and out of an airport in an orderly manner, an airport traffic pattern is established based on the local conditions, to include the direction and altitude of the pattern and the procedures for entering and leaving the pattern. Unless the airport displays approved visual markings indicating that turns should be made to the right, the pilot should make all turns in the pattern to the left.

When operating at an airport with an operating control tower, the pilot receives a clearance to approach or depart, as well as pertinent information about the traffic pattern by radio. If there is not a control tower, it is the pilot's responsibility to determine the direction of the traffic pattern, to comply with the appropriate traffic rules, and to display common courtesy toward other pilots operating in the area.

A pilot is not expected to have extensive knowledge of all traffic patterns at all airports, but if the pilot is familiar with the basic rectangular pattern, it is easy to make proper approaches and departures from most airports, regardless of whether or not they have control towers. At airports with operating control towers, the tower operator can instruct pilots to enter the traffic pattern at any point or to make a straight-in approach without flying the usual rectangular pattern. Many other deviations are possible if the tower operator and the pilot work together in an effort to keep traffic moving smoothly. Jets or heavy airplanes will frequently fly wider and/or higher patterns than lighter airplanes, and in many cases, will make a straight-in approach for landing.

Compliance with the basic rectangular traffic pattern reduces the possibility of conflicts at airports without an operating control tower. It is imperative that a pilot form the habit of exercising constant vigilance in the vicinity of airports even when the air traffic appears to be light. Midair collisions usually occur on clear days with unlimited visibility. Never assume you have found all of the air traffic and stop scanning.

Figure 7-1 shows a standard rectangular traffic pattern. The traffic pattern altitude is usually 1,000 feet above the elevation of the airport surface. The use of a common altitude at a given airport is the key factor in minimizing the risk of collisions at airports without operating control towers.

When operating in the traffic pattern at an airport without an operating control tower, the pilot should maintain an airspeed of no more than 200 knots (230 miles per hour (mph)) as required by Title 14 of the Code of Federal Regulations (14 CFR) part 91. In any case, the pilot should adjust the airspeed, when necessary, so that it is compatible with the airspeed of the other airplanes in the pattern.

When entering the traffic pattern at an airport without an operating control tower, inbound pilots are expected to observe other aircraft already in the pattern and to conform to the traffic pattern in use. If there are no other aircraft present, the pilot should check traffic indicators on the ground and wind indicators to determine which runway and traffic pattern direction to use. *[Figure 7-2]* Many airports have L-shaped traffic pattern indicators displayed with a segmented circle adjacent to the runway. The short member of the L shows the direction in which the traffic pattern turns are made when using the runway parallel to the long member. The pilot should check the indicators from a distance or altitude well away from any other airplanes that may be flying in the traffic pattern. Upon identifying the proper traffic pattern, the pilot should enter into the traffic pattern at a point well clear of the other airplanes.

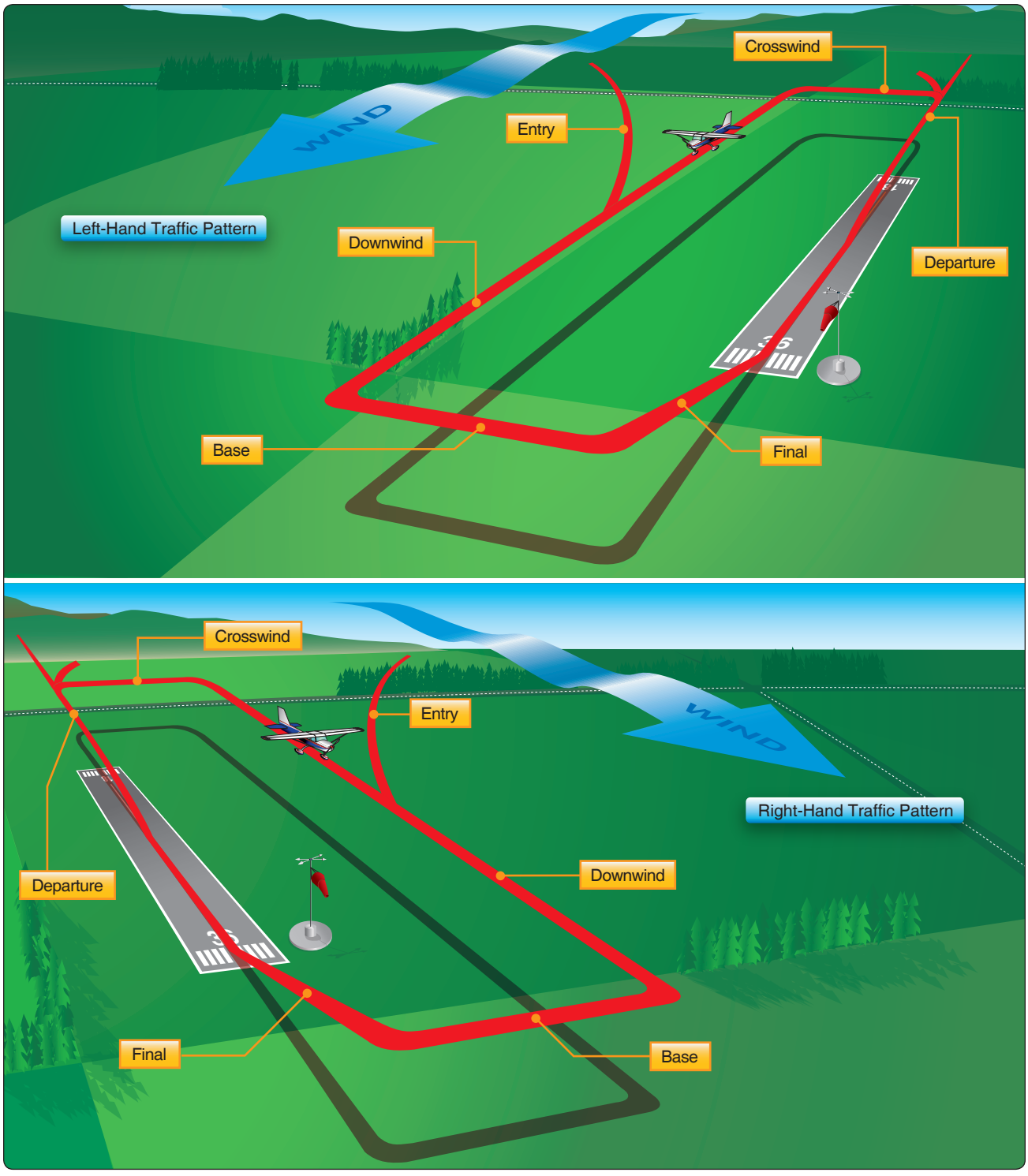


Figure 7-1. *Traffic patterns.*

When approaching an airport for landing, the traffic pattern is normally entered at a 45° angle to the downwind leg, headed toward a point abeam the midpoint of the runway to be used for landing. When arriving, the pilot should be aware of the proper traffic pattern altitude before entering the pattern and remain clear of the traffic flow until established on the entry leg. Entries into traffic patterns while descending create specific collision hazards and should always be avoided.

The pilot should ensure that the entry leg is of sufficient length to provide a clear view of the entire traffic pattern

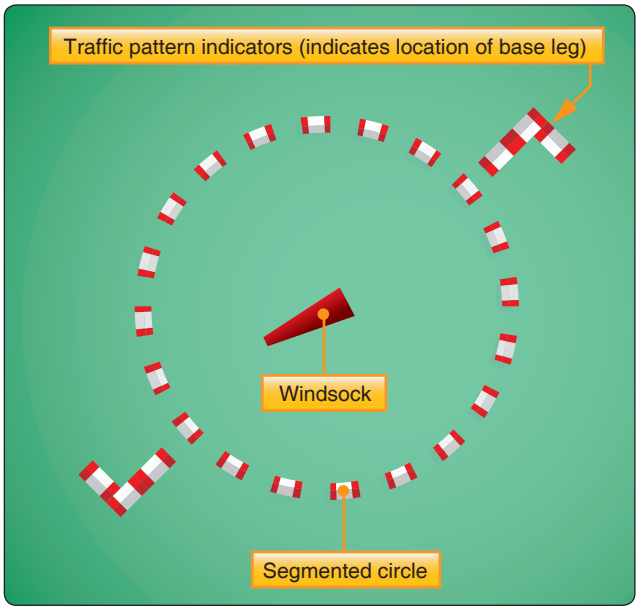


Figure 7-2. *Traffic pattern indicators.*

and to allow adequate time for planning the intended path in the pattern and the landing approach.

The downwind leg is a course flown parallel to the landing runway, but in a direction opposite to the intended landing direction. This leg is flown approximately ½ to 1 mile out from the landing runway and at the specified traffic pattern altitude. When flying on the downwind leg, the pilot should complete all before landing checks and extend the landing gear if the airplane is equipped with retractable landing gear. Pattern altitude is maintained until at least abeam the approach end of the landing runway. At this point, the pilot should reduce power and begin a descent. The pilot should continue the downwind leg past a point abeam the approach end of the runway to a point approximately 45° from the approach end of the runway, and make a medium bank turn onto the base leg. Pilots should consider tailwinds and not descend too much on the downwind, so as to have a very low base leg altitude.

The base leg is the transitional part of the traffic pattern between the downwind leg and the final approach leg. Depending on the wind condition, the pilot should establish the base leg at a sufficient distance from the approach end of the landing runway to permit a gradual descent to the intended touchdown point. The ground track of the airplane while on the base leg is perpendicular to the extended centerline of the landing runway, although the longitudinal axis of the airplane may not be aligned with the ground track when it is necessary to turn into the wind to counteract drift. While on the base leg, the pilot must ensure, before turning onto the final approach, that there is no danger of colliding with another aircraft that is already established on the final approach. Pilots must not attempt an overly steep turn to final, especially uncoordinated! If in doubt, go around.

The final approach leg is a descending flightpath starting from the completion of the base-to-final turn and extending to the point of touchdown. This is probably the most important leg of the entire pattern, because of the sound judgment and precision required to accurately control the airspeed and descent angle while approaching the intended touchdown point.

14 CFR part 91, states that aircraft, while on final approach to land or while landing, have the right-of-way over other aircraft in flight or operating on the surface. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right-of-way. Pilots should not take advantage of this rule to cut in front of another aircraft that is on final approach to land or to overtake that aircraft.

The upwind leg is a course flown parallel to the landing runway in the same direction as landing traffic. The upwind leg is flown at controlled airports and after go-arounds.

When necessary, the upwind leg is the part of the traffic pattern in which the pilot will transition from the final approach to the climb altitude to initiate a go-around. When a safe altitude is attained, the pilot should commence a shallow bank turn to the upwind side of the airport. This allows better visibility of the runway for departing aircraft.

The departure leg of the rectangular pattern is a straight course aligned with, and leading from, the takeoff runway. This leg begins at the point the airplane leaves the ground and continues until the pilot begins the 90° turn onto the crosswind leg.

On the departure leg after takeoff, the pilot should continue climbing straight ahead and, if remaining in the traffic pattern, commence a turn to the crosswind leg beyond the departure end of the runway within 300 feet of the traffic pattern altitude. If departing the traffic pattern, the pilot should continue straight out or exit with a 45° turn (to the left when in a left-hand traffic pattern; to the right when in a right-hand traffic pattern) beyond the departure end of the runway after reaching the traffic pattern altitude.

The crosswind leg is the part of the rectangular pattern that is horizontally perpendicular to the extended centerline of the takeoff runway. The pilot should enter the crosswind leg by making approximately a 90° turn from the upwind leg. The pilot should continue on the crosswind leg, to the downwind leg position.

Since in most cases the takeoff is made into the wind, the wind will now be approximately perpendicular to the airplane's flightpath. As a result, the pilot should turn or head the airplane slightly into the wind while on the crosswind leg to maintain a ground track that is perpendicular to the runway centerline extension.

Non-Towered Airports

Non towered airports traffic patterns are always entered at pattern altitude. How you enter the pattern depends upon the direction of arrival. The preferred method for entering from the downwind leg side of the pattern is to approach the pattern on a course 45° to the downwind leg and join the pattern at midfield.

There are several ways to enter the pattern if you are coming from the upwind legs side of the airport. One method of entry from the opposite side of the pattern is to announce your intentions and cross over midfield at least 500 feet above pattern altitude (normally 1,500 feet AGL.) However, if large or turbine aircraft operate at your airport, it is best to remain 2,000 feet AGL so you're not in conflict with their traffic pattern. When well clear of the pattern—approximately 2 miles—scan carefully for traffic, descend to pattern altitude, then turn right to enter at 45° to the downwind leg at midfield. *[Figure 7-4A]* An alternate method is to enter on a midfield crosswind at pattern altitude, carefully scan for traffic, announce your intentions and then turned down downwind. *[Figure 7-4B]* This technique should not be used if the pattern is busy.

Always remember to give way to aircraft on the preferred 45° entry and to aircraft already established on downwind. In either case, it is vital to announce your intentions, and remember to scan outside. Before joining the downwind leg, adjust your course or speed to blend into the traffic. Adjust power on the downwind leg, or sooner, to fit into the flow of traffic. Avoid flying too fast or too slow. Speeds recommended by the airplane manufacturer should be used. They will generally fall between 70 to 80 knots for fixed-gear singles, and 80 to 90 knots for high-performance retractable.

Safety Considerations

According to the National Transportation Safety Board (NTSB), the most probable cause of mid-air collisions is the pilot failing to see and avoid other aircraft. When in the traffic, pilots must continue to scan for other aircraft and check blind spots caused by fixed aircraft structures,

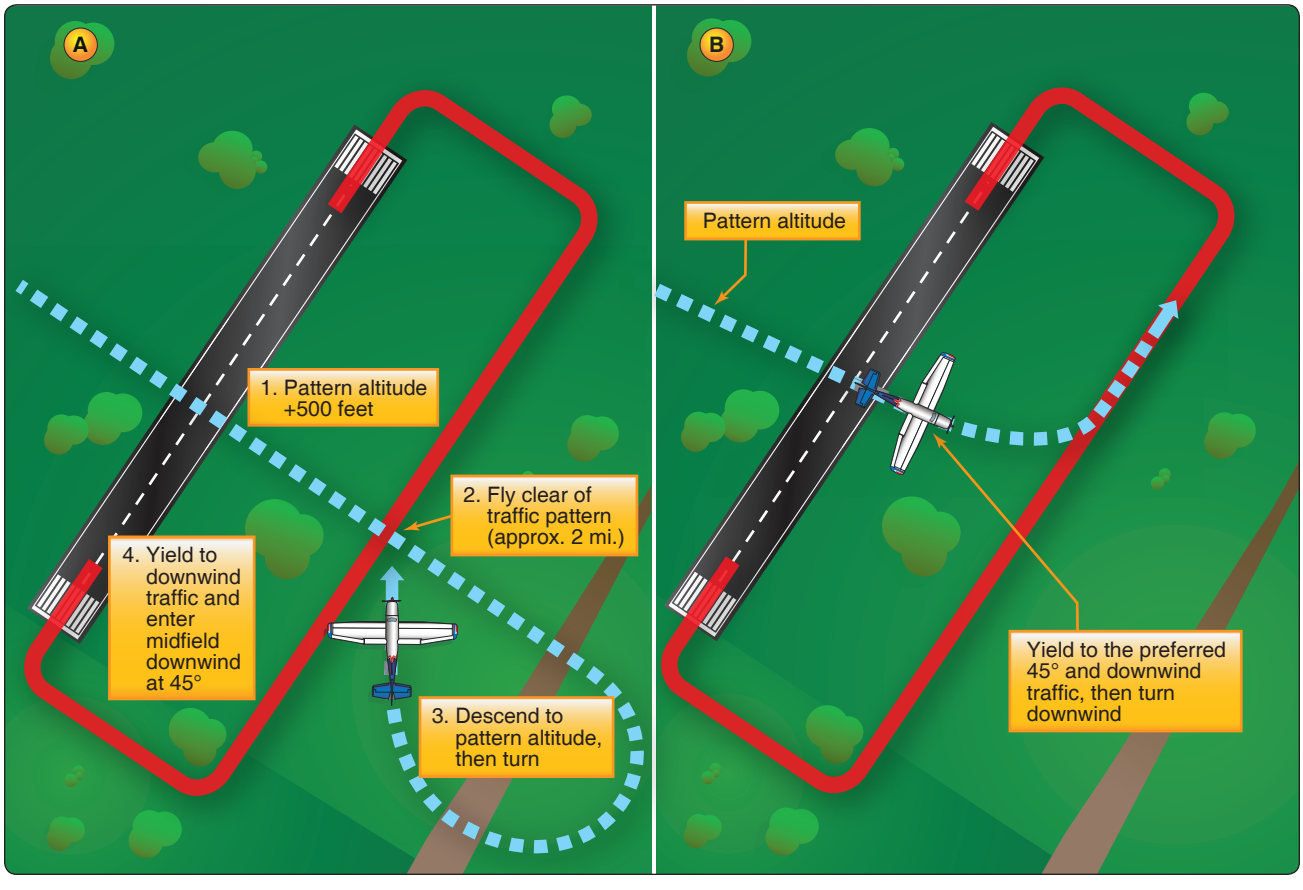


Figure 7-4. *Preferred entry from upwind leg side of airport (A). Alternate midfield entry from upwind leg side of airport (B).*

such as doorposts and wings. High-wing airplanes have restricted visibility above while low-wing airplanes have limited visibility below. The worst-case scenario is a low-wing airplane flying above a high-wing airplane. Banking from time to time can uncover blind spots. The pilot should also occasionally look to the rear of the airplane to check for other aircraft. *Figure 7-5* depicts the greatest threat area for mid-air collisions in the traffic pattern. Listed below are important facts regarding mid-air collisions:

- Mid-air collisions generally occur during daylight hours; 56 percent of the accidents occur in the afternoon, 32 percent occur in the morning, and 2 percent occur at night, dusk, or dawn.
- Most mid-air collisions occur under good visibility.
- A mid-air collision is most likely to occur between two aircraft going in the same direction.
- The majority of pilots involved in mid-air collisions are not on a flight plan.
- Nearly all accidents occur at or near uncontrolled airports and at altitudes below 1,000 feet.
- Pilots of all experience levels are involved in mid-air collisions.

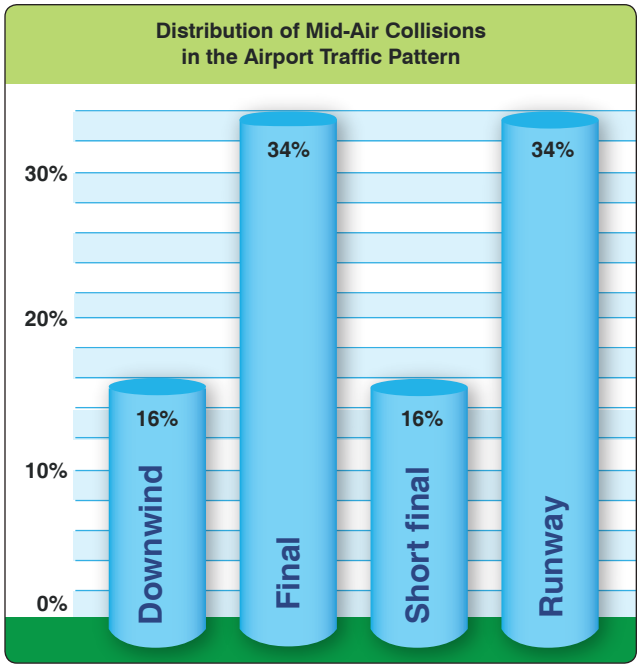


Figure 7-5. *Location distribution of mid-air collisions in the airport traffic pattern.*

The following are some important procedures that all pilots should be follow when flying in a traffic pattern or in the vicinity of an airport.

- Tune and verify radio frequencies before entering the airport traffic area.
- Report your position 10 miles out and listen for reports from other inbound traffic.
- Report when you are entering downwind, turning downwind to base, and base to final. This is a good practice at a non-towered airport.
- Descend to traffic pattern altitude before entering the pattern.
- Maintain a constant visual scan for other aircraft.
- Tune and monitor the correct Common Traffic Advisory Frequency (CTAF) frequency.
- Be aware that there may be aircraft in the pattern without radios.
- Use exterior lights to improve the chances of being seen.

Chapter Summary

The volume of traffic at an airport can create a hazardous environment. Airport traffic patterns are procedures that improve the flow of traffic at an airport and when properly executed enhance safety. Most reported mid-air collisions occur during the final or short final approach leg of the airport traffic pattern.