

# Task VI.B: Traffic Patterns

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## Lesson Overview

### Objective

- To familiarize the student with operation in an airport traffic pattern.
- To familiarize the student with standard and right traffic patterns.

### Reference

Airplane Flying Handbook - Chapter 7

### Key Elements

1. Entry Procedures
2. Communication
3. Orientation

### Elements

1. The Pattern
2. Controlled Field
3. Uncontrolled Field
4. Orientation to the Runway
5. Checklists
6. Establishing Final Approach
7. Maintaining Proper Spacing
8. Wind Shear and Wake Turbulence

# Equipment

- White board
- Markers
- References
- iPad

# Schedule

1. Discuss objectives
2. Review material
3. Development
4. Conclusion

# Instructor Actions

1. Discuss lesson objectives
2. Present lecture
3. Questions
4. Homework

# Student Actions

- Participate in discussion
- Take notes

# Completion Standards

The student understands the rules and elements to a proper traffic pattern and is comfortable arriving and departing from a controlled or uncontrolled field.

# Instructor Notes

## Attention

In order to leave or land we're going to have to use the traffic pattern, It pays to know the "rules of the road".

## Overview

Review Objectives and Elements/Key ideas

## **What**

Traffic Patterns involve the rules, procedures involved with flying a correct traffic pattern.

## **Why**

Every flight begins and ends at an airport or other suitable landing area. For that reason, it is essential that the pilot learn the traffic rules, procedures, and pattern layouts that may be in use at various airports.

# **Lesson Details**

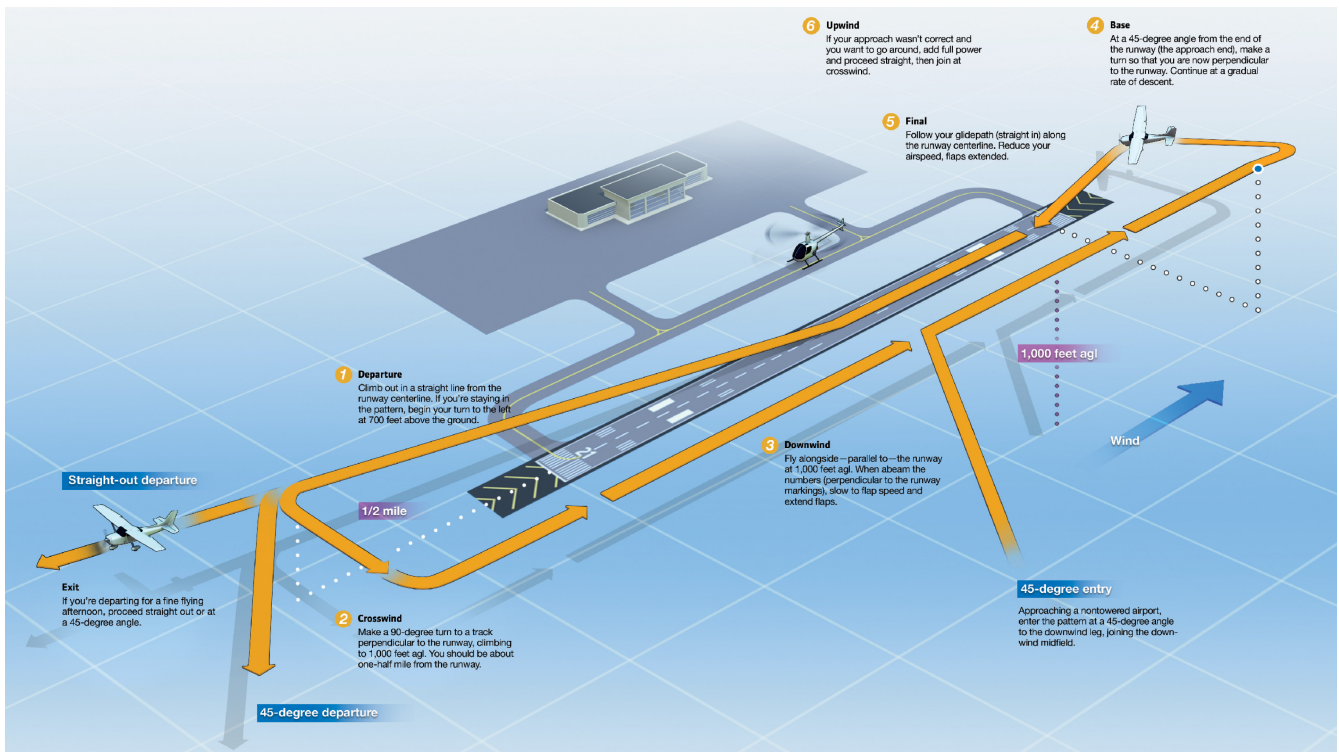
To maintain a safe flow of traffic, there are standardized rules of the road which are commonly referred to as the traffic pattern. Imagine the insanity that would ensue if we didn't have standardized rules for traffic flow!

The normal flow can be different at controlled versus uncontrolled fields. At a controlled field the pilot receives a clearance from ATC to approach/depart the airport, and any pertinent pattern information. At an uncontrolled field it is up to the pilot to discern the traffic direction and comply with the appropriate rules. Once a pilot is familiar with the basic traditional rectangular traffic pattern operations at most airports will be easy.

## **The Basics**

The standard traffic pattern is commonly flown at 1000 feet AGL, but the chart supplement will tell if a given airport has a nonstandard pattern altitude, and if so what that altitude may be. It is this common agreed upon altitude which is the key factor in minimizing collisions at uncontrolled airports.

Unless indicated otherwise (in the chart supplement, from the tower controller, by airport markings, etc.), all turns are to the left. Banks in the pattern should be no greater than 30°, and rudder should be used to coordinate the turns.



## Airport

### Pattern Legs

The standard rectangular pattern is broken into a number of named legs. The Upwind Leg is a leg flown parallel to the departure leg, in the same direction as the runway heading.

The **Departure Leg** is the leg flown straight out from the departure end of the runway, leading to the crosswind leg. Some refer to this as the upwind leg, but that leads to a degree of confusion, and the preference is to identify this separately, even though it is also flown in the upwind direction.

The **Crosswind Leg** is the transition from the upwind or departure leg to the downwind leg. It is perpendicular to the upwind or departure leg (i.e. a 90° turn). Fly the crosswind leg approximately 1/2 to 1 mile from the runway.

The **Downwind Leg** is flown parallel to the runway of intended landing, but in a direction opposite from the intended landing direction. For example, if landing on runway 3 the downwind leg is flown on a heading of 210° in no-wind conditions. All of the before-landing checks are normally performed on downwind. The initial descent to land is started on downwind abeam the intended touchdown point.

The downwind leg normally continues to a point approximately 45° off the intended landing point past the approach end of the runway. The turn to the base leg is started at the end of the downwind leg, but this point can be adjusted to address wind, traffic, or other situations that might require adjustment.

The **Base Leg** is the transition from the downwind leg to the final leg, and is flown perpendicular to the extended centerline. The heading is 90° off of runway heading in no-wind conditions. The descent continues on the base leg with adjustments to pitch and power as necessary to maintain airspeed and aim point. Begin the turn off of the base leg such that the aircraft ends up established on the extended centerline of the runway.

The **Final Leg** is the final descent of the approach, aligned with the landing runway. Adjust the turn from base in order to center the aircraft on the runway. Crab or slip the aircraft as needed to maintain a ground track over the extended centerline, and adjust pitch/power as needed to maintain the desired glideslope and aim point.

## Departing the Pattern

When departing climb out on the departure leg, and if remaining in the pattern turn to the crosswind leg past the departure end of the runway and with 300 feet of pattern altitude. If departing, continue straight out or with a 45° turn to the left (or right, for a right pattern).

The goal is to fly a rectangular pattern regardless of the wind direction. Therefore in other than no-wind conditions the aircraft will have to be crabbed into the wind as needed to maintain the desired ground track. The pilot has to maintain an awareness of the wind and adjust heading as needed.

Visual references are helpful in maintaining ground track. On the departure leg glance behind briefly to ensure the runway heading is being maintained. On the crosswind leg use the runway as a reference, and correct for any drift to or from the runway. On the downwind leg place the runway at a point on the leading edge of the wing and adjust as needed. On the final leg maintain the centerline, crabbing as needed to correct for the wind.

Familiar airports may have well known visual reference points for the pattern. However, it is important to teach references that can be carried from airport to airport.

## Common Errors

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- Failure to maintain proper altitude or airspeed control
- Failure to correct for wind drift

## Pattern at a Controlled Field

The pilot receives, via the radio, a clearance to approach/depart as well as any pertinent information about the pattern. ATC will specify pattern entry and departure procedures, and during the pattern the controller may make adjustments as needed for other traffic, spacing, or other considerations. Controller instructions must be honored, if possible. It can be necessary to divide the pilot's attention to address flying the plane, collision avoidance, checklists, and communications.

## Pattern at an Uncontrolled Field

The first issue in flying the pattern at an uncontrolled field is regarding communications. There are generally two ways to communicate intentions. One is communicating with a Flight Service Station (FSS) and getting advisories. It should be noted that FSSs are becoming vanishingly rare these days. If used it should be understood that they are not controllers, but simply provide information regarding conditions. Inbound aircraft should contact the FSS approximately 10 miles out, state their altitude, aircraft type, location, and intention. Departing aircraft should transmit their tail number, type of flight, destination, services desired, and anything else applicable.

The other means of communicating intention is via the Common Traffic Advisory Frequency (CTAF). These are self-announce broadcasts intended for all traffic in the area. The CTAF should also be monitored for other aircraft broadcasts to maintain situational awareness. The following chart helps identify what facilities to use, and when/how to use them.

## **Arriving and Departing**

When arriving pay careful attention to other traffic in the area. Conform to the prevailing traffic pattern. If there are no other aircraft in the pattern use other traffic indicators and wind to determine the pattern to use. If the airport has a "segmented circle" not the short part of the "L" in the circle indicates the direction of turn. Note, also, that the pattern direction is to be found on sectional charts and in the chart supplement.

Be sure to know which runway is in use, and confirm the runway number with the heading indicator.

Once the pattern direction is determined proceed to a point well clear of the pattern before descending. Never descend into the pattern, as this risks collision. Enter the pattern in level flight at pattern altitude at a 45° angle to the downwind leg abeam the runway midpoint.

When arriving from the side of the airport opposite the downwind leg, there are two recommended ways to enter the pattern. One is to cross over the runway, midfield, and at least 500 feet above the pattern altitude. Execute a teardrop descent to the pattern altitude when well outside the pattern, and re-enter on a 45° heading. The other alternative is to enter on a midfield crosswind, at pattern altitude. This gives the pilot a good chance to observe traffic and slot the aircraft into the flow with adequate spacing.

When departing monitor the radio for traffic in the area, announce your intentions, and clear the area aggressively prior to takeoff and on departure.

Always use checklists, and prior to entering the pattern ensure the before landing checklist is complete. Run through the checklist again on final to validate that all checks have been performed.

The turn to final should be no closer than 1/4 mile at an altitude appropriate for the glide slope desired. The glide slope defined by a standard VASI/PAPI is 3°, which means that the aircraft will descend 300 feet for every mile flown. This is the normal glide slope for an instrument approach, which is generally flown with power. It may or may not be appropriate for landing out of a standard rectangular pattern with some light aircraft. Choose a glide slope which is appropriate for the aircraft and situation.

## **Maintain Spacing**

In the pattern the other traffic must be observed, and adequate separation must be maintained. When on downwind delay the turn to base until another aircraft on final has passed abeam the aircraft. This should provide comfortable spacing for aircraft of similar speeds.

At a controlled field the controller may request/advise certain maneuvers to provide adequate spacing, but ultimately the PIC is the responsible party. This is true whether at a controlled or uncontrolled field!

## Wind Shear and Wake Turbulence

The best way to deal with wind shear is to avoid it. For instance, don't fly near thunderstorms which are common sources of wind shear. If there is a possibility of wind shear during the approach use a bit more power, and a somewhat higher airspeed than usual. Also stay as high as feasible until necessary to land. Go around at the first sign of an unexpected airspeed or pitch change.

Wake turbulence is most common when following heavier aircraft (i.e. jets). When landing touch down prior to a jets takeoff point, and stay above and land beyond an arriving jets touchdown point. On takeoff lift off prior to and stay above a jets takeoff point, and after an arriving jets touchdown point. The shorthand rule of thumb is that the zone along the runway where the large aircraft has the wheels on the ground is generally "safe", but where it is in the air and the wings are generating lift, it is "unsafe".

## Common Errors

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1. Failure to comply with traffic pattern instructions, procedures, and rules
2. Improper correction for wind drift
3. Inadequate spacing from other traffic
4. Poor altitude or airspeed control

## Conclusion

Every successful flight begins and ends at an airport or other suitable landing area, making patterns very important.

## ACS Requirements

To determine that the applicant:

1. Exhibits instructional knowledge of the elements of traffic patterns by describing:
  - a. Operations at airports and seaplane bases with and without operating control towers.
  - b. Adherence to traffic pattern procedures, instructions, and rules.
  - c. How to maintain proper spacing from other traffic.
  - d. How to maintain the desired ground track.
  - e. Wind shear and wake turbulence avoidance procedures.
  - f. Orientation with the runway or landing area in use.
  - g. How to establish a final approach at an appropriate distance from the runway or landing area.
  - h. Use of checklist.

2. Exhibits instructional knowledge of common errors related to traffic patterns by describing:
  - a. Failure to comply with traffic pattern instructions, procedures, and rules.
  - b. Improper correction for wind drift.
  - c. Inadequate spacing from other traffic.
  - d. Poor altitude or airspeed control.
3. Demonstrates and simultaneously explains traffic patterns from an instructional standpoint.
4. Analyzes and corrects simulated common errors related to traffic patterns.