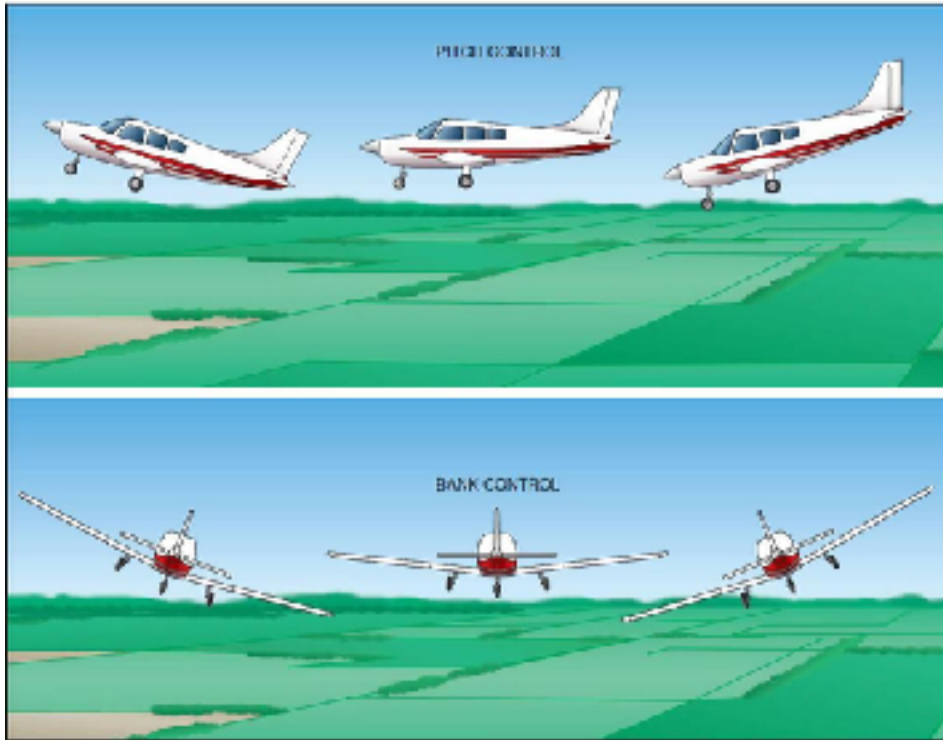


Lesson 2: Fundamental Flight Maneuvers

This lesson introduces fundamental flight maneuvers and reviews the functions of instruments and cockpit controls.



Scenario

In this lesson, at this early stage of flight training, there's no need to concoct an elaborate scenario with a detailed decision tree. To help you start thinking like a pilot, it's sufficient to assume that you're taking a friend on a short sightseeing flight down the Chester River in the area around MD. You need to maneuver the airplane to enjoy the scenery, but you also must keep passengers in mind. Fly smoothly at a safe altitude and leave aggressive maneuvers, such as steep turns, for another day.

Objectives

The primary goal of this flight is practicing the four fundamental flight maneuvers:

- Straight-and-level
- Turns
- Climbs
- Descents

During the flight you should also:

- Review and practice the operation of cockpit controls and instruments.
- Practice looking around as you fly, especially looking left and right to clear the area before you begin turns.
- Use the features in X-Plane or FSX to minimize or hide the instrument panel.
- Practice using the natural horizon and other visual cues, not the gauges on the instrument panel, to control the airplane.

You can also practice identifying landmarks that you can use as checkpoints when you begin navigating on your own. Objects that look familiar at ground level may be hard to identify from the air, and it's important to learn which features make good checkpoints. Especially in a simulation, it's often best to use landmarks like major rivers, coastlines, and big lakes with distinctive shapes (see Figure 15-1). The Pilot's Handbook of Aeronautical Knowledge offers the following advice:

Appropriate checkpoints ... should be easy-to-locate points such as large towns, large lakes and rivers, or combinations of recognizable points such as towns with an airport, towns with a network of highways, and railroads entering and departing.

Pilot's Handbook of Aeronautical Knowledge (p. 15-19)

Finally, it's never too early to learn about collision avoidance and to practice techniques for seeing and avoiding other aircraft.

Completion Standards



The detailed goals for this lesson are outlined in the table at the end of this chapter. In general, before you move on to the next lesson, you should:

- Understand the fundamentals of the basic flight maneuvers.
- Be able to use buttons and switches on the flight yoke or joystick to look around and to adjust the throttle and elevator trim.
- Be able to use the mouse to move the heading bug and other key cockpit controls.
- Know how to hide or dim the instrument panel to enhance the view of the outside world.

The practical test standards for private pilots set the following benchmarks for most flight maneuvers:

- **Altitude:** Maintain within ± 100 feet
- **Airspeed:** Maintain within ± 10 knots
- **Bank angle:** Establish and maintain within $\pm 5^\circ$
- **Heading:** Maintain within $\pm 10^\circ$, or when turning, roll out within $\pm 10^\circ$ of the intended heading

You don't have to meet those standards at this point in your training, but you should strive to achieve them as you practice."

References and Resources

To prepare for this lesson, review the following references and resources.

Title	Chapter/Section	Topic/Notes
Pilot's Handbook of Aeronautical Knowledge	Chapter 4, "Aerodynamics of Flight"	Aerodynamic Forces in Flight Maneuvers (pp. 4–19)
	Chapter 13, "Airport Operations"	Collision Avoidance (pp. 13–17)
	Chapter 16, "Aeromedical Factors"	Motion Sickness (pp. 16–11) and Vision in Flight (pp. 16–17)
	Chapter 17, "Aeronautical Decision-Making"	Situational Awareness (pp. 17–23)
Airplane Flying Handbook	Chapter 3, "Basic Flight Maneuvers"	Review all topics (pp. 3-1–3-19)
Sport Pilot Practical Test Standards	Introduction	General Information and Practical Test Standards Concept
AOPA ASI Safety Advisor Collision Avoidance		

Preflight Briefing

In the generic FITS private pilot syllabus, this lesson utilizes a flight training device. As in Lesson 1 of this book, the Situation (X-Plane) or Microsoft Flight Simulator for this scenario begins in the air; assume your instructor has guided you to the practice area. You don't need to take off or land.

The flight begins on runway 16 at Essex Skypark. Perform a normal takeoff and climb to 3000 feet. (Don't bust the class B) Once at altitude, turn on autopilot (if installed) and use the heading bug to make the first few turns and observe both the natural horizon and primary flight instruments as the airplane turns. Try to correlate the outside and instrument panel views, and then use similar bank and pitch angles when you begin maneuvering the airplane on your own.

Proceed on course to Rock Hall, turn south, and descend to 1,000 feet to the mouth of the Chester River. Once at the river, follow it to the end. At the end, perform a climbing right turn and return to the airport; landing is optional.

Take as much time as you like and stop the flight when you're confident you've met the objectives. Don't worry about returning to an airport and landing.

Location and Weather

The lesson begins on the runway Essex, MD (W48), as shown in Figure 15-2. It's a beautiful day for sightseeing. ***Fly the scenario multiple times starting with no wind or clouds, then add winds, clouds and change visibility so the learner sees the effect weather makes.***



Tips

Here are a few suggestions to help you get the most from this lesson:

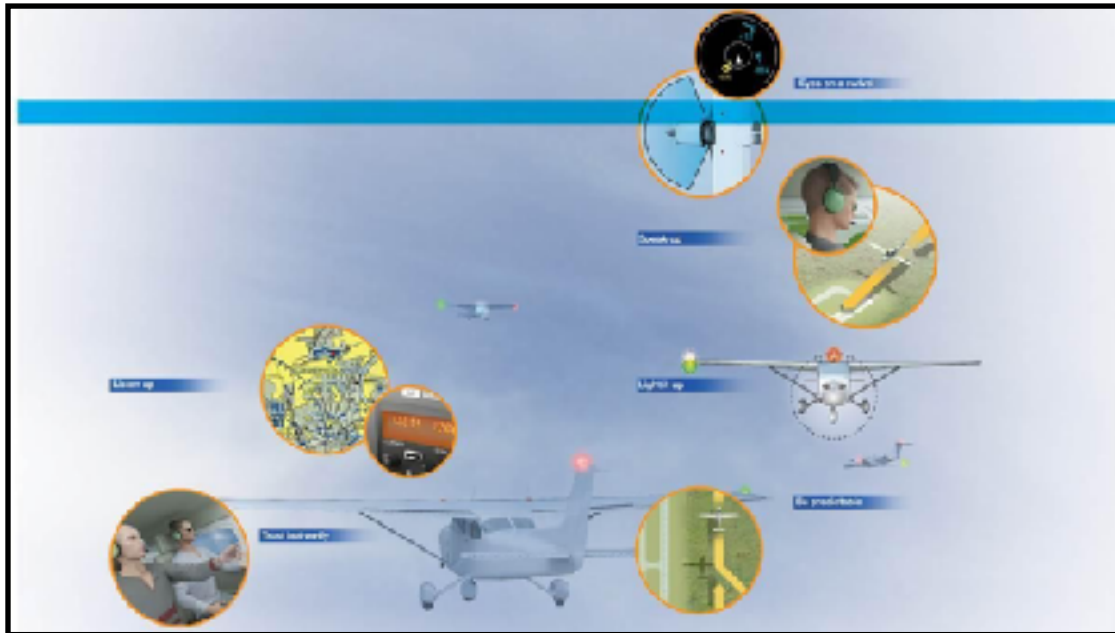
- Shrink or hide the instrument panel for most of this flight. Use the natural horizon to help you develop a feel for the controls.
- Frequently compare the view from the cockpit with the interactive map in your simulation. Cross-checking will help you learn how the simulated scenery compares to important features on the map.
- Review the area around Baltimore/Essex on the Washington sectional chart (available as a PDF file at this book's website or online at <http://SkyVector.com>) and compare key features on the chart with the scenery in your simulation.
- Use a light touch on the controls and practice applying the configuration tables in Chapter 12 of this book to help you fly precisely and smoothly.

Aeronautical Decision Making

This is a typical local flight; but challenges can arise even on short trips. For example, your passengers might feel airsick. How can you assist them without losing control of the airplane or becoming so distracted that you wander off the intended flight path and get lost? Here are some suggestions:

- Tell your passengers where to find airsickness bags - did you make sure to bring some along?
- Given what you've learned about the autopilot, could you use it to help stabilize the aircraft?
- Shrink or hide the instrument panel to focus on the outside view. You'll fly more smoothly.
- Enlist the help of passengers in spotting and announcing other airplanes in the vicinity (see Figure 15-3)
- Encouraging passengers to enjoy the view, not the details of the instrument panel, reduces the likelihood of airsickness.

Figure 15-3: Collision Avoidance, a Safety Advisor from AOPA ASI



Objectives and Desired Outcome

Scenario Activities	Scenario Activities	Desired Out-come
Practice using basic flight and cockpit controls	Use the mouse to operate controls	Practice/Perform
	Use the yoke or joystick controls to adjust the throttle and elevator trim.	Practice/Perform
Use the features of the simulator to change view	Use the yoke or joystick buttons to look around	Practice/Perform
	Use the view features to shrink and hide the instrument panel	Practice/Perform
Practice the fundamentals flight maneuvers	Straight and level	Practice
	Trim	Practice
	Climbs	Practice
	Decent	Practice
Practice identifying landmarks		Practice