Commercial Pilot

Airplane Single-Engine Land

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The salary pilots make is another thing I like. They make more money than they know what to do with. This is because most people think that flying a plane is dangerous, except pilots don't because they know how easy it is.

-- Essay on Growing Up to be a Pilot Allegedly Written by a Fifth Grader

You cannot get one nickel for commercial flying.

-- Inglis M. Uppercu, founder of Aeromarine West Indies Airways, 1923.

Training Materials

- Syllabus
- FAA Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25A)
- FAA Airplane Flying Handbook (FAA-H-8083-3A)
- FAA Aeronautical Chart User's Guide
- Current Federal Aviation Regulations (FAR)
- Current Aeronautical Information Manual (AIM)
- Commercial Practical Test Standards (FAA-S-8081-12C)
- Commercial Knowledge Exam Guide
- Commercial Oral Exam Guide
- Airplane Information Manual / Pilot's Operating Handbook (POH)
- Pilot Logbook
- Checklists
- Current Sectional Chart(s) and Terminal Area Chart(s)
- Current Airport / Facility Directory (AFD)
- Plotter
- E6-B
- VFR Kneeboard
- Flight bag
- Headset
- Foggles or hood

AOPA Flight Planner
http://www.aopa.org/flightplanning/flyq/

AOPA Air Safety Institute
http://www.aopa.org/asf

AOPA Medication Database
http://www.aopa.org/members/databases/medical/search_faa_meds.cfm

FAA Safety
http://www.faasafety.gov/

Aviation Safety Reporting System
http://asrs.arc.nasa.gov/

Useful Webpages

FAA Aircraft Handbooks
https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/

FAA Aviation Handbooks
https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/

FAA Aeronautical Information Manual
http://www.faa.gov/air_traffic/publications/

FAA Practical Test Standards
https://www.faa.gov/training_testing/testing/test_standards/

The GPO's Code of Federal Regulations Download Site
http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR

Gleim Publications (FAR / AIM, textbooks, knowledge exam guides, etc.)
http://www.gleim.com/aviation/

Aviation Supplies and Academics (FAR / AIM, oral and knowledge exam guides, etc.)
http://www.asa2fly.com

StudentPilot.com Forums
http://www.studentpilot.com

National Weather Service Aviation Weather Center
http://www.aviationweather.gov/adds/

NOAA Hazard Mapping System Fire and Smoke Product
http://www.ospo.noaa.gov/Products/land/hms.html

CSC DUATS (Weather and flight planning service)
http://www.duats.com

DTC DUAT (Weather and flight planning service)
http://www.duat.com

Lockheed Martin Flight Service
http://www.1800wxbrief.com/

Aircraft Owners and Pilots Association
http://www.aopa.org

AOPA Airports
http://www.aopa.org/airports/

Special Emphasis Areas

- Positive airplane control
- Positive exchange of flight controls
- Stall / spin awareness
- Collision avoidance
- Wake turbulence avoidance
- Land and Hold Short Operations (LAHSO)
- Runway incursion avoidance
- Controlled Flight into Terrain (CFIT)
- Aeronautical Decision Making (ADM) and risk management
- Wire-strike avoidance
- Checklist usage
- Temporary Flight Restrictions (TFR's)
- Special-use airspace
- Aviation security
- Single-pilot Resource Management (SRM)

Ground Lessons

You, Your Goals, and the Training Ahead

Objectives

The student and instructor should become familiar with each other, and the student should become familiar with the training process, training materials, and certification.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 1 (Introduction to Flying)
- FAR Part 61
  - §§ 23, 123, 125, 127, 129, 131, 133
- FAR Part 119; §1(a, e)
- AC 120-12A (Private Carriage vs. Common Carriage of Persons or Property)

Materials

- Training books
- FAR / AIM

Schedule

1 hour

Instructor Actions

Learn about the student, the student's previous aviation experience, and the student's aviation goals.

Discuss:

- ❑ Training materials.
- ❑ Medical certificates and their duration.
- ❑ The Commercial pilot certificate, its privileges, and its limitations.
- ❑ Logbooks and logging flight experience.
- ❑ Recent experience requirements and flight reviews.

Student Actions

Engage in a discussion with the instructor about his or her own expectations for the flight training process. The student should discuss his or her interests, any previous aviation experience, and any future aviation goals.

Completion Standards

The student should have a good, broad understanding of how the training will proceed, his or her own expectations for training, and what materials will be required for training.

The student should be comfortable with the instructor, be confident that the instructor understands his or her aviation goals, and be confident that the instructor is capable of helping the student achieve those goals.

Aeronautical Decision Making Review

Objectives

In this lesson the student will review strategies for identifying, analyzing, mitigating, and supervising aviation hazards, managing risk, maintaining situational awareness, and managing workload.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 17 (Aeronautical Decision Making)
- AC 60-22 (Aeronautical Decision Making)

Materials

- Whiteboard and markers

Schedule

1 hour

Instructor Actions

The instructor will present the student with some common scenarios he or she is likely to encounter. While discussing the scenarios with the student, the instructor will discuss the following topics with the student:

- ❑ Hazardous attitudes and how to mitigate them.
- ❑ Situational Awareness.
- ❑ The PAVE checklist.
- ❑ The IMSAFE checklist.
- ❑ Aircraft hazards.
- ❑ Environmental hazards.
- ❑ External pressures.
- ❑ Assessing risk with the CARE process.
- ❑ Analyzing risk with the TEAM process.
- ❑ The 5P checklist and the OODA loop process.
- ❑ Automatic decision making.
- ❑ Common pitfalls.
- ❑ Workload management.

Student Actions

The student will discuss the instructor's scenarios and apply Aeronautical Decision Making principles.

Completion Standards

The student will demonstrate ability to use the Aeronautical Decision Making process to analyze common scenarios and make reasonable decisions on how to handle the scenarios. The student will also demonstrate a deeper understanding of situational awareness and workload management through planning.

Flight Controls Review

Objectives

In this lesson, the student will review the primary and secondary flight controls.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 5 (Flight Controls)

Materials

- Whiteboard and markers
- Miniature airplane

Schedule

30 minutes

Instructor Actions

Discuss the following topics with the student:

- ❑ Ailerons use and types of ailerons.
- ❑ Adverse yaw.
- ❑ Elevator use and types of elevators.
- ❑ Effect of propeller wash on elevators.
- ❑ Rudder use.
- ❑ Flap use and types of flaps and leading-edge devices.
- ❑ Trim use and types of trim.
- ❑ Servo and anti-servo tabs.
- ❑ Ground adjustable tabs.
- ❑ Autopilot concepts.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss the use and different types of primary and secondary flight controls.

Aerodynamics Review

Objectives

In this lesson, the student will review aerodynamics, the forces acting on an airplane in flight, stalls, load factor, maneuvering speed, Vg diagrams, weight and balance concepts.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 3 (Principles of Flight)
  - Chapter 4 (Aerodynamics of Flight)
- AC 61-67C (Stall and Spin Awareness Training)
- NPR's Radiolab, "Loop the Loop" Episode
  - http://www.radiolab.org/story/159748-loop-loop/

Materials

- Whiteboard and markers
- Miniature airplane

Schedule

1 hour

Instructor Actions

Discuss the following topics with the student:

- ❑ Pressure, temperature, and density altitude.
- ❑ How airfoils produce lift.
- ❑ The four basic forces, types of drag, and the lift-to-drag ratio.
- ❑ Wing tip vortices, and how the ground affects airplane flight characteristics.
- ❑ Airplane axes, moment arms, center of gravity, and stability.
- ❑ How the four basic forces act on a maneuvering airplane.
- ❑ Stalls and spins.
- ❑ Propeller principles and the effect of propellers on flight.
- ❑ Load factors, maneuvering speed, Vg diagrams, weight and balance.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss the principles of flight and aerodynamics.

Aircraft Systems Review

Objectives

In this lesson, the student will review aircraft systems with an emphasis on complex airplane systems.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 6 (Aircraft Systems)
- Airplane Information Manual / Pilot's Operating Handbook
  - Section 7 (Airplane & Systems Descriptions)

Materials

- Whiteboard and markers
- Airplane Information Manual / Pilot's Operating Handbook
- An airplane similar to the training airplane with its cowling removed, if possible

Schedule

1 hour

Instructor Actions

Using an actual airplane, if possible, discuss the following topics with the student:

- ❑ Piston engine operation, detonation, and pre-ignition.
- ❑ Propeller design, fixed-pitch and constant-speed propellers.
- ❑ Carburetor principles, fuel / air mixture, and icing.
- ❑ Fuel injection, fuel system, and fuel grades.
- ❑ Ignition system.
- ❑ Oil, cooling, and exhaust systems.
- ❑ Electrical system.
- ❑ Hydraulic systems.
- ❑ Landing gear.
- ❑ Anti-ice and deicing systems.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss aircraft systems. The student will also have a better understanding of how to find systems information specific to the training airplane.

Flight Instruments Review

Objectives

In this lesson, the student will review the basic flight instruments, how they operate, and the errors inherent to their design.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 7 (Flight Instruments)

Materials

- Whiteboard and markers
- Toy gyroscope and miniature airplane
- A flight deck poster with appropriate instruments

Schedule

30 minutes

Instructor Actions

Discuss the following topics with the student:

- ❑ Pitot-static concepts.
- ❑ Altimeter operation, verification, environmental effects, and errors.
- ❑ Vertical speed indicator operation and verification.
- ❑ Airspeed indicator operation, verification, environmental effects, and errors.
- ❑ Air Data Computers.
- ❑ Gyroscope principles.
- ❑ Turn Coordinator operation and verification.
- ❑ Attitude indicator operation and verification.
- ❑ Heading indicator operation, verification, and errors.
- ❑ Altitude Heading and Reference Systems.
- ❑ The magnetic compass and compass errors.
- ❑ Using the outside air temperature gauge.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss the principles of flight instruments, their operation, and their errors.

Completion Standards

The student will be able to answer questions about and discuss general emergency procedures and know the immediate action items on the emergency checklists for the training airplane.

Emergency Procedures

Objectives

In this lesson the student will learn about general emergency procedures common to most airplanes and discuss emergency procedures specific to the training airplane.

References

- Airplane Flying Handbook
  - Chapter 16 (Emergency Procedures)
- Airplane Information Manual / Pilot's Operating Handbook
  - Section 3 (Emergency Procedures)
- Aeronautical Information Manual; Chapter 6 (Emergency Procedures)
- Checklists

Materials

- Whiteboard and markers.
- FAR / AIM
- Airplane Information Manual / Pilot's Operating Handbook
- Checklists

Schedule

30 minutes

Instructor Actions

The instructor will construct several urgent / distress situations and guide the student through the emergency procedures for handling the situations. While guiding the student, the instructor will discuss the following topics with the student:

- ❑ Psychological hazards to safely handling the situation.
- ❑ Pre-flight planning.
- ❑ Using ATC, emergency transponder code.
- ❑ Selecting terrain, planning the approach, and configuring the airplane.
- ❑ Special considerations for landing in trees, water, or snow.
- ❑ Engine failure just after takeoff and during cruise flight.
- ❑ In-flight fires.
- ❑ Flap and elevator failures.
- ❑ Landing gear failures.
- ❑ Electrical failures.
- ❑ Pitot-static failures.
- ❑ Door opening in flight.
- ❑ Inadvertent flight into IMC.

Student Actions

Answer questions related to the lesson topics and demonstrate knowledge of the immediate action items on the emergency checklists for the training airplane.

Aeromedical Factors Review

Objectives

In this lesson, the student will review the various aeromedical factors that can affect a pilot's ability to safely operation an airplane. Aeromedical factors range from hypoxia, to optical illusions, to the effects of drugs and alcohol.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 16 (Aeromedical Factors)
- Aeronautical Information Manual
  - Chapter 8 (Medical Facts for Pilots)
- AC 60-4A (Pilot's Spatial Disorientation)

Materials

- Whiteboard and markers
- FAR / AIM

Schedule

30 minutes

Instructor Actions

Discuss the following topics with the student:

- ❑ Types of hypoxia, their symptoms, treatment, and oxygen systems.
- ❑ Hyperventilation, its symptoms, and treatment.
- ❑ Middle-ear problems, sinus problems, and treatment.
- ❑ Vestibular, somatosensory, and visual systems.
- ❑ Leans, coriolis, graveyard spiral, somatogravic, inversion, and elevator illusions.
- ❑ Carbon Monoxide poisoning.
- ❑ Fatigue, dehydration, and heatstroke.
- ❑ Decompression sickness.
- ❑ Empty-field myopia, night vision, false horizon, and autokenesis.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss the various aeromedical factors that can affect the safety of a flight.

Airspace Review

Objectives

In this lesson, the student will sharpen his / her knowledge of the National Airspace System.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 14 (Airspace)
- FAR Parts 71 and 73
- FAR Part 91
  - §§ 126, 127, 129, 130, 131, 133, 135, 137, 138, 139, 141, 143, 155, 157
- Aeronautical Information Manual
  - Chapter 3 (Airspace)
- Sectional chart legend

Materials

- Sectional chart and AFD
- Airspace quick-reference card
- FAR / AIM

Schedule

30 minutes

Instructor Actions

Discuss the following topics with the student:

- ❑ Controlled airspace, uncontrolled airspace, and their purpose.
- ❑ Class A, B, C, D, E, G, and special-use airspace.
- ❑ Basic VFR weather minimums.
- ❑ Special VFR.
- ❑ Equipment requirements.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss the different airspace designations, their purpose, and their requirements. The student will also be able to discuss the role of Air Traffic Control in the National Airspace System.

Weather Theory Review

Objectives

In this lesson, the student will review the basics of how weather works.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 11 (Weather Theory)
- AC 00-6A (Aviation Weather for Pilots and Flight Operations Personnel)
- AC 00-24C (Thunderstorms)
- AC 00-54 (Pilot Windshear Guide)

Materials

- Whiteboard and markers

Schedule

1 hour

Instructor Actions

Discuss the following topics with the student:

- ❑ The atmosphere, circulation, the Coriolis Force, and surface friction.
- ❑ Atmospheric pressure.
- ❑ High pressure, low pressure, wind, convection, and turbulence.
- ❑ Isobars.
- ❑ Atmospheric stability, inversions, humidity, temperature / dew point.
- ❑ Methods and results of air saturation.
- ❑ Cloud types, and ceiling.
- ❑ Air masses and fronts.
- ❑ Wind shear.
- ❑ Thunderstorms, squall lines, tornadoes, icing, SLD, and hail.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss weather theory.

Airport Operations Review

Objectives

In this lesson, the student will review the information necessary for safe operations in the airport environment.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 13 (Airport Operations)
- FAR Part 91
  - §§ 111, 113, 117, 119, 121, 123, 125, 126, 127, 129, 130, 131
- Aeronautical Information Manual
  - Chapter 2 (Aeronautical Lighting and Other Airport Visual Aids)
  - Chapter 4, Section 3, Parts 1-5 (Airport Operations)
- AC 90-23F (Aircraft Wake Turbulence)
- AC 90-48C (Pilot's Role in Collision Avoidance)

Materials

- Whiteboard and markers
- Miniature airplane and runway
- Airport diagrams and signage / marking examples
- FAR / AIM

Schedule

30 minutes

Instructor Actions

Discuss the following topics with the student:

- ❑ Towered and non-towered airport operations.
- ❑ Sources of airport information.
- ❑ Airport signs and markings.
- ❑ Airport, approach, and glide path lighting.
- ❑ Traffic patterns, altitudes, spacing, and right-of-way.
- ❑ Wind direction indicators
- ❑ Air traffic control services.
- ❑ Wake turbulence, collision, and runway incursion avoidance.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss operations in the airport environment.

Weather Information Sources Review

Objectives

In this lesson, the student will review how to use Internet-, telephone-, and radio-based weather information sources.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 12 (Aviation Weather Services)
- AC 00-45G (Aviation Weather Services)
- Aeronautical Information Manual
  - Chapter 7 (Safety of Flight)

Materials

- Internet connection or printed briefing

Schedule

1 hour

Instructor Actions

The instructor will setup a typical cross-country scenario and guide the student through a standard briefing. While reading through the briefing with the student, the instructor will discuss the following topics with the student:

- ❑ ASOS, AWOS, ATIS.
- ❑ FSS, TIBS, DUATS, EFAS, HIWAS.
- ❑ Standard and abbreviated weather briefings.
- ❑ METAR's.
- ❑ PIREP's.
- ❑ TAF's.
- ❑ Area Forecasts (FA's).
- ❑ AIRMET's, SIGMET's, and Convective SIGMET's.
- ❑ Temperature and Winds Aloft Forecasts (FD's).
- ❑ Surface Analysis and Weather Depiction Charts.
- ❑ Radar Summary Charts.
- ❑ Significant Weather Prognostic Charts.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss how to use aviation weather information sources.

Weight & Balance Review

Objectives

In this lesson, the student will review the importance of weight and balance, as well as how to use the weight and balance data in the Pilot's Operating Handbook to safely operate the airplane.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 9 (Weight and Balance)
- Pilot's Operating Handbook
  - Section 6 (Weight and Balance)

Materials

- Whiteboard and markers
- Pilot's Operating Handbook
- Calculator
- Weight and balance worksheet

Schedule

30 minutes

Instructor Actions

The instructor will setup a typical cross-country scenario, guide the student through the weight and balance calculations, and discuss the following topics with the student:

- ❑ The center of gravity (CG).
- ❑ Where to find the CG limits and weight and balance data for an airplane.
- ❑ Adverse effects of operating overweight or outside CG limits.
- ❑ Weight and balance calculation concepts and methods.
- ❑ Accounting for fuel.
- ❑ Weight-shift and weight-addition/-subtraction.

Student Actions

- Answer questions related to the lesson topics.
- Demonstrate ability to work through weight and balance calculations.

Completion Standards

The student will be able to answer questions about and discuss the principles of weight and balance. The student will also know how to find weight and balance limitations and data for an airplane, and use that information to determine if an airplane has been safely loaded.

Navigation Review

Objectives

In this lesson, the student will review the different methods of navigation and the navigational aids available to pilots.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 15 (Navigation)

Materials

- Whiteboard and markers
- Sectional chart and AFD
- Plotter and E6-B
- Navigation log

Schedule

30 minutes

Instructor Actions

The instructor will setup a typical cross-country scenario and guide the student through developing a navigation plan. While working through the scenario, the instructor will discuss the following topics with the student:

- ❑ Sectional and terminal area charts.
- ❑ Latitude, longitude, and measurement of direction.
- ❑ Magnetic variance and deviation.
- ❑ Calculating wind correction and ground speed.
- ❑ Pilotage and dead reckoning.
- ❑ ADF navigation.
- ❑ VOR / DME navigation, identification, time / distance to station.
- ❑ GPS.

Student Actions

- Answer questions related to the lesson topics.
- Demonstrate ability to create a navigation plan.

Completion Standards

The student will be able to answer questions about and discuss using navigation charts and aids to develop a navigation plan.

Performance Review

Objectives

In this lesson, the student will review what factors affect the performance of an airplane, and how to use the airplane Pilot's Operating Handbook to determine take off, cruise, and landing performance.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 10 (Aircraft Performance)
- FAR Part 91
  - §§ 3, 103
- Airplane Information Manual / Pilot's Operating Handbook
  - Section 5 (Performance)

Materials

- Whiteboard and markers
- Airplane Information Manual / Pilot's Operating Handbook

Schedule

30 minutes

Instructor Actions

The instructor will setup a typical cross-country scenario and guide the student through determining take off, cruise, and landing performance. While working through the scenario, the instructor will discuss the following topics with the student:

- ❑ The atmosphere and the different types of altitude.
- ❑ How density altitude affects performance.
- ❑ Performance in straight and level flight.
- ❑ Climb performance.
- ❑ Determining take off, climb, range / endurance, and landing performance.
- ❑ Interpolating or rounding.

Student Actions

- Answer questions related to the lesson topics.
- Demonstrate ability to use performance data for planning.

Completion Standards

The student will be able to answer questions about and discuss the factors that affect the performance of an airplane. The student will also know how to find the performance data for an airplane and use that data for planning.

Night Operations

Objectives

In this lesson, the student will review the aeromedical factors related to night flying, and learn about the special equipment and operational considerations of night flying.

References

- Airplane Flying Handbook
  - Chapter 10 (Night Operations)
- FAR Part 91
  - §§ 155, 157, 205, 209

Materials

- Whiteboard and markers
- FAR / AIM

Schedule

30 minutes

Instructor Actions

Discuss the following topics with the student:

- ❑ Night vision, adapting, oxygen effects, scanning off center.
- ❑ Autokenesis, flicker vertigo, black-hole approaches, lighting illusions.
- ❑ Personal equipment.
- ❑ Airplane equipment.
- ❑ Pre-flight and planning considerations.
- ❑ Startup, taxiing, and run-up considerations.
- ❑ Navigation and flight into IMC considerations.
- ❑ Approach and landing considerations.
- ❑ Night emergency considerations.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to answer questions about and discuss the special aeromedical, equipment, and operational considerations of night flying.

Flight Planning Review

Objectives

In this lesson, the student will review all of the skills learned in the Airspace, Weight & Balance, Performance, and Navigation lessons to plan out a real cross-country flight. After planning the flight, the student will review filing flight plans and obtaining a briefing from a Flight Service Station.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 15 (Navigation)
- FAR Part 91
  - §§ 3, 103
- AC 61-84B (Role of Preflight Preparation)

Materials

- Whiteboard and markers
- Sectional chart and AFD
- Plotter and E6-B
- Telephone

Schedule

30 minutes

Instructor Actions

The instructor will review the student's flight plan and discuss the following topics with the student:

- ❑ Key checkpoints.
- ❑ Emergency and diversion considerations.
- ❑ Airspace considerations including special use airspace and TFR's.
- ❑ NOTAM's.
- ❑ Special airport considerations including LAHSO.
- ❑ Radio frequencies.
- ❑ Weight & balance.
- ❑ Performance considerations including runway length requirements.
- ❑ Fuel considerations.
- ❑ Weather considerations.
- ❑ Lost procedures and diversions.

Lost Procedures Review

Objectives

In this lesson, the student will review the common errors that lead to getting lost. The student will then learn about how to recover from getting lost.

References

- Pilots Handbook of Aeronautical Knowledge
  - Chapter 15 (Navigation)

Materials

- Whiteboard and markers
- Sectional chart
- AFD

Schedule

30 minutes

Instructor Actions

Discuss the following topics with the student:

- ❑ Common errors that lead to getting lost.
- ❑ Attitude and action.
- ❑ The Five C's.
- ❑ Information available to the pilot.
- ❑ Determining position with navigation facilities.
- ❑ Emergency frequency and transponder setting.

Student Actions

Answer questions related to the lesson topics.

Completion Standards

The student will be able to discuss the common errors that lead to getting lost, and how to avoid them, as well as how to recover from getting lost.

Student Actions

The student will have a cross-country flight plan completed before the lesson and discuss the flight plan with the instructor. The student will also review the procedures for activating a flight plan in the air, using flight following, and closing a flight plan. After discussing the flight plan and receiving the instructor's approval, the student will call Flight Service, obtain a standard briefing, and file a flight plan.

Completion Standards

The student will be able to develop a flight plan, understand how to file the flight plan and obtain a standard briefing, and understand how to use the flight plan en route.

Diversion Review

Objectives

In this lesson, the student will review how to quickly and safely divert to an alternate destination when the flight cannot be continued.

References

- Pilot's Handbook of Aeronautical Knowledge
  - Chapter 15 (Navigation)

Materials

- Sectional chart
- Plotter and E6-B

Schedule

30 minutes

Instructor Actions

The instructor will setup a typical cross-country scenario and guide the student through making quick measurements and calculations to quickly and safely divert to an alternate destination. The instructor will discuss the following topics with the student:

- ❑ Preparing for a diversion during pre-flight planning.
- ❑ Maintaining situational awareness during the flight.
- ❑ Recognizing a change that requires a diversion.
- ❑ Choosing a reasonable alternate.
- ❑ Shortcuts for quickly determining direction, distance, time, and fuel required for the diversion.
- ❑ Using all available tools.

Student Actions

- Answer questions related to the lesson topics.
- Demonstrate ability to quickly work through a diversion scenario.

Completion Standards

The student will be able to answer questions about and discuss how to plan ahead for a diversion, how to maintain situational awareness during the flight, how to quickly determine a reasonable alternate destination, and how to quickly and safely determine all of the necessary information to perform the diversion.

Flight Lessons

Normal and Crosswind Takeoffs

Objectives

- Review and improve normal and crosswind takeoff technique.
- Use airport, weather, and performance information.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 5 (Takeoffs and Departure Climbs)
- Airplane Information Manual / Pilot's Operating Handbook
- Checklists

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- Wake turbulence avoidance
- Runway incursion avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of normal and crosswind takeoffs. The student will review collision and wake turbulence avoidance.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (30 minutes)

The student will perform a normal, or crosswind takeoff, as appropriate, and pilot the airplane to a nearby airport. Along the way, the student and instructor will review previous lessons and discuss takeoffs at the nearby airport.

The student will perform several takeoffs at the nearby airport before returning to the training airport.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss airport, weather, and performance information sources.
- ❑ Discuss takeoff emergencies and rejected takeoff procedures.
- ❑ Discuss communication, clearances, and runway incursion avoidance.
- ❑ Discuss wake turbulence avoidance.
- ❑ Discuss normal and crosswind takeoff principles.
- ❑ Demonstrate ability to perform normal and crosswind takeoffs.
- ❑ Divide attention between airplane control and scanning for traffic at all times.
- ❑ Use checklists.
- ❑ Maintain V_Y + ____ / - ____ KIAS.
- ❑ **Commercial**: V_Y ±5 KIAS.

Common Normal Takeoff Mistakes

- Failure to clear the area before taxing onto the active runway.
- Abrupt use of the throttle.
- Failure to check engine instruments for signs of malfunction after applying takeoff power.
- Failure to anticipate the airplane's left turning tendency on initial acceleration.
- Overcorrecting for left turning tendency.
- Relying solely on the airspeed indicator rather than developed feel for indications of speed and airplane controllability during acceleration and lift-off.
- Failure to attain proper lift-off attitude.
- Inadequate compensation for torque / P-factor during initial climb resulting in a sideslip.
- Over-control of elevator during initial climb-out.
- Limiting scan to areas directly ahead of the airplane (pitch attitude and direction), resulting in allowing a wing (usually the left) to drop immediately after lift-off.
- Failure to attain / maintain best rate-of-climb airspeed (V_Y).
- Failure to employ the principles of attitude flying during climb-out, resulting in "chasing" the airspeed indicator.

Common Crosswind Takeoff Mistakes

- Failure to properly clear the area prior to taxing onto the active runway.
- Using less than full aileron pressure into the wind initially on the takeoff roll.
- Mechanical use of aileron control rather than sensing the need for varying aileron control input through feel for the airplane.
- Premature lift-off resulting in side-skipping.
- Excessive aileron input in the latter stage of the takeoff causing a steep bank into the wind at lift-off.
- Inadequate drift correction after lift-off.

Short-Field Takeoff

Objectives

- Review and improve short-field takeoff technique.
- Review safety before, during, and after takeoff.
- Review airport, weather, and airplane performance information usage.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 5 (Takeoffs and Departure Climbs)
- Airplane Information Manual / Pilot's Operating Handbook
- Checklists

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- Runway incursion avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of short-field takeoffs, and related topics.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (30 minutes)

The instructor will demonstrate a short-field takeoff when departing the training airport, and the student will pilot the airplane to a nearby airport. Along the way, the student and instructor will review previous lessons and discuss short-field takeoffs at the nearby airport.

The student will then perform several short-field takeoffs at the nearby airport before returning to the training airport.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Soft-Field Take-Off

Scenario

Many of the runways you will encounter are paved, but many are not. A "soft field" is any runway not constructed with asphalt or concrete. The most common soft fields are constructed with grass, dirt, or gravel. Soft fields could also be paved runways that are covered in snow, mud, or water. What might you do differently to takeoff safely from a soft field?

Objectives

- Learn about soft-field takeoff techniques.
- Review safety before, during, and after takeoff.
- Review airport, weather, and airplane performance information usage.
- Review ground effect.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 5 (Takeoffs and Departure Climbs)
- Airplane Information Manual / Pilot's Operating Handbook
- Checklists

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- Runway incursion avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of soft-field takeoffs, and related topics.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The instructor will demonstrate a soft-field takeoff when departing the training airport, and the student will pilot the airplane to a nearby airport. Along the way, the student and instructor will review previous lessons and discuss soft-field takeoffs at the nearby airport.

The student will then perform several soft-field takeoffs at the nearby airport before returning to the training airport.

Completion Standards

The student will:

- ❑ Review airport, weather, and performance information sources.
- ❑ Review takeoff emergencies and rejected takeoff procedures.
- ❑ Review communication, clearances, and runway incursion avoidance.
- ❑ Discuss short-field takeoff principles.
- ❑ Demonstrate ability to perform short-field takeoffs.
- ❑ Divide attention between airplane control and scanning for traffic at all times.
- ❑ Use checklists.
- ❑ Maintain V_X + ____ / - ____ KIAS until clear of 50' obstacle, then maintain V_Y + ____ / - ____ KIAS.
- ❑ **Commercial**: V_X +5 / -0 KIAS until clear of 50' obstacle, then V_Y ±5 KIAS.

Common Mistakes

- Failure to adequately clear the area.
- Failure to utilize all available runway / takeoff area.
- Failure to have the airplane properly trimmed prior to takeoff.
- Premature lift-off resulting in high drag.
- Holding the airplane on the ground with excessive forward-elevator pressure.
- Inadequate rotation resulting in excessive speed after lift-off.
- Inability to attain / maintain best angle-of-climb speed.
- Fixation on the airspeed indicator during initial climb.
- Premature retraction of landing gear and / or wing flaps.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

- ❑ Review airport, weather, and performance information sources.
- ❑ Review takeoff emergencies and rejected takeoff procedures.
- ❑ Review communication, clearances, and runway incursion avoidance.
- ❑ Discuss soft-field takeoff principles and safety considerations.
- ❑ Demonstrate ability to perform soft-field takeoffs.
- ❑ Divide attention between airplane control and scanning for traffic at all times.
- ❑ Use checklists.
- ❑ Maintain V_X + ____ / - ____ KIAS until clear of 50' obstacle, then maintain V_Y + ____ / - ____ KIAS.
- ❑ **Commercial**: V_X +5 / -0 KIAS until clear of 50' obstacle, then V_Y ±5 KIAS.

Common Mistakes

- Failure to adequately clear the area.
- Insufficient back elevator pressure during initial takeoff roll resulting in inadequate angle of attack.
- Failure to crosscheck engine instruments for indications of proper operation before applying power.
- Poor directional control.
- Abrupt and/or excessive elevator control while attempting to level off and accelerate after lift-off.
- Allowing the airplane to "mush" or settle resulting in an inadvertent touchdown after lift-off.
- Attempting to climb out of ground effect area before attaining sufficient climb speed.
- Failure to anticipate an increase in pitch attitude as the airplane climbs out of ground effect.

Slow Flight

Scenario

Let's fly to a nearby airport and, along the way, let's slow down to admire the scenery just as you might when flying with friends some day. But, wait, what happens as we slow the airplane down?

Objectives

- Get a feel for the airplane's flight characteristics at various airspeeds.
- See the relationship between visual references and instrument indications.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 4 (Slow Flight, Stalls, and Spins)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- ADM and risk management
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of slow flight, the expected changes flight characteristics, and stall awareness.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to the nearby airport. Along the way, the student will select a safe altitude and point out possible emergency landing areas. The instructor will then demonstrate flying the airplane at various airspeeds and highlight the changes in flight characteristics.

The instructor will recover from slow flight and configure the airplane for cruise. The student will then perform the fundamental flight maneuvers at various airspeeds including minimum controllable airspeed.

After a landing at the nearby airport, the student will have an opportunity for more practice.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Power-Off Stalls

Scenario

Slow flight provides a lot of insight into how an airplane handles just on the edge of stalling. A slow flight descent is just like a stabilized approach to a landing. Let's consider what might happen if you become distracted and pitch up or try to pitch up to extend your glide without adding power. How will the airplane react? How will you recover?

Objectives

- Learn to recognize an approaching power-off stall by the feel of the airplane.
- Learn to promptly and safely recover from an inadvertent stall.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 4 (Slow Flight, Stalls, and Spins)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- ADM and risk management
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of a power-off stall and the proper method for recovering from a power-off stall.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student will select a safe altitude and point out possible emergency landing areas. The instructor will then demonstrate how to recognize the conditions leading up to a power-off stall, how to recognize the stall, and how to recover.

Following the instructor's demonstration, the student will perform power-off stalls.

After landing at the nearby airport, the student will have the opportunity to practice more power-off stalls on the way back to the training airport.

Post Flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles of slow flight, the expected changes in flight characteristics, and stall awareness.
- ❑ Clear the area before performing the maneuver.
- ❑ Select an altitude no lower than 1,500' AGL for the maneuvers.
- ❑ Demonstrate ability to maintain positive control of the airplane during maneuvers at various airspeeds including minimum controllable airspeed.
- ❑ Demonstrate ability to divide attention between airplane control and scanning for traffic.
- ❑ Verify outside visual references with the instruments.
- ❑ Use trim to relieve control pressures.
- ❑ Maintain altitude ± ____', IAS ± ____ knots, bank ± ____°.
- ❑ **Commercial**: altitude ±50', heading ±10°, IAS +5 / -0 knots, bank ±5°

Common Errors

- Failure to adequately clear the area.
- Inadequate back-elevator pressure as power is reduced, resulting in altitude loss.
- Excessive back-elevator pressure as power is reduced, resulting in a climb, followed by a rapid reduction in airspeed and "mushing."
- Inadequate compensation for adverse yaw during turns.
- Fixation on the airspeed indicator.
- Failure to anticipate changes in lift as flaps are extended or retracted.
- Inadequate power management.
- Inability to adequately divide attention between airplane control and orientation.

Completion Standards

The student will:

- ❑ Discuss the principles of power-off stalls.
- ❑ Clear the area before performing the maneuver.
- ❑ Select an altitude that allows recovery from the stall no lower than 1,500' AGL.
- ❑ Demonstrate ability to setup for and safely induce a stall.
- ❑ Demonstrate ability recognize when the airplane is approaching a stall and when the airplane has fully stalled.
- ❑ Demonstrate ability to promptly and safely recover from the stall.
- ❑ Demonstrate ability to divide attention between airplane control and scanning for traffic.
- ❑ Maintain heading ± ____° or bank ± ____° (no more than 20°).
- ❑ **Commercial**: heading ±10° or bank ±5° (no more than 20°).

Common Errors

- Failure to adequately clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Over-reliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in an unintentional wing-low condition during entry.
- Excessive back-elevator pressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward-elevator pressure during recovery resulting in negative load on the wings.
- Excessive airspeed buildup during recovery.
- Failure to take timely action to prevent a full stall during the conduct of imminent stalls.

Power-On Stalls

Scenario

A power-off stall simulates an inadvertent stall during landing, but what about takeoff? Imagine you are climbing out after taking-off and you drop your pen. You lean back to reach for it behind you and inadvertently increase your pitch attitude. What might happen? How will you recover?

Objectives

- Learn to recognize an approaching power-on stall by the feel of the airplane.
- Learn to promptly and safely recover from an inadvertent stall.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 4 (Slow Flight, Stalls, and Spins)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- ADM and risk management
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of a power-on stall and the proper method for recovering from a power-on stall.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student will select a safe altitude and point out possible emergency landing areas. The instructor will then demonstrate how to recognize the conditions leading up to a power-on stall, how to recognize the stall, and how to recover.

Following the instructor's demonstration, the student will perform power-on stalls.

After landing at the nearby airport, the student will have the opportunity to practice more power-on stalls on the way back to the training airport.

Post Flight (15 minutes)

The student and instructor will review and assess the flight.

Demonstrated Stalls

Scenario

Power-on and power-off stalls demonstrate how the airplane stalls in the normal take off and landing scenarios respectively. As we know, however, a stall occurs whenever we force a wing to exceed its critical angle of attack. That means a stall can occur at any speed, during any maneuver. Let's explore some stalls that might surprise you.

Objectives

- Gain an understanding of secondary stalls, accelerated stalls, cross-control stalls, and elevator trim stalls.
- Experience these stalls and learn how to recognize the conditions under which they are likely to occur.
- Learn how to promptly and safely recover from these stalls.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 4 (Slow Flight, Stalls, and Spins)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- ADM and risk management
- Checklist usage

Pre-Flight (15 minutes)

The student will discuss the principles of secondary stalls, accelerated stalls, cross-control stalls, and elevator trim stalls.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hours)

The student will pilot the airplane to a nearby airport. Along the way, the student will select a safe altitude and point out possible emergency landing areas. The instructor will then demonstrate how to recognize the conditions leading up to each type of stall, how to recognize each type of stall, and how to recover from each type of stall.

The student will follow along, and discuss the stalls and their recovery techniques.

Post Flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles of power-on stalls.
- ❑ Clear the area before performing the maneuver.
- ❑ Select an altitude that allows recovery from the stall no lower than 1,500' AGL.
- ❑ Demonstrate ability to setup for and safely induce a stall.
- ❑ Demonstrate ability recognize when the airplane is approaching a stall and when the airplane has fully stalled.
- ❑ Demonstrate ability to promptly and safely recover from the stall.
- ❑ Demonstrate ability to divide attention between airplane control and scanning for traffic.
- ❑ Maintain heading ± ____° or bank ± ____° (no more than 20°).
- ❑ **Commercial**: heading ±10° or bank ±10° (no more than 20°).

Common Errors

- Failure to adequately clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Over-reliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in an unintentional wing-low condition during entry.
- Excessive back-elevator pressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward-elevator pressure during recovery resulting in negative load on the wings.
- Excessive airspeed buildup during recovery.
- Failure to take timely action to prevent a full stall during the conduct of imminent stalls.

Completion Standards

The student will:

- ❑ Discuss the principles of secondary stalls, accelerated stalls, cross-control stalls, and elevator trim stalls.
- ❑ Help clear the area before each maneuver and continue to scan for traffic throughout the maneuvers.
- ❑ Select an altitude that allows recovery from the stall no lower than 1,500' AGL.
- ❑ Follow along with each stall demonstration, and discuss the stalls and their recovery techniques.

Spins

Scenario

Despite your best efforts as a pilot, or because of your best efforts as an aerobatic pilot, you have found yourself in a spin. Regardless of how you ended up in a spin, how will you recover and establish level flight?

Objectives

- Learn the principles behind spins and spin recovery.
- Experience spins to understand the effects on spatial orientation.
- Learn how to interpret the instruments and recover to level flight.
- Learn the most common situations where unintentional spins may occur.
- Have fun! Your first spin might be scary, but you will gain a lot of confidence once you see how easy it is to recover.

References

- Airplane Flying Handbook
  - Chapter 4 (Slow Flight, Stalls, and Spins)
- Airplane Information Manual / Pilot's Operating Handbook

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- ADM and risk management

Pre-flight (15 minutes)

The student will discuss the principles and aerodynamics behind spins and spin recovery, as well as the most common situations where unintentional spins may occur.

The instructor will guide the student through the process of inducing a spin and explain what the student should expect to see when the spin occurs.

The student and instructor will review the airplane's information manual or Pilot's Operating Handbook to ensure that the airplane is approved, and under what conditions it is approved, for intentional spins.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane and select a safe altitude for conducting spins. The instructor will demonstrate the first spin and recovery, then allow the student to practice and entering and recovering from spins.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Normal and Crosswind Landings

Scenario

It is time to bring your bird back to the ground. It may be unfair, but your passengers will remember your landings more than anything else about flying with you. So, how can you leave your passengers with smiles?

Objectives

- Learn the fundamentals of normal and crosswind landings.
- Learn about safety in the pattern, during final approach, and after landing.
- Review airport, weather, and performance information.
- Review the go-around procedure.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 8 (Approaches and Landings)
- Airplane Information Manual / Pilot's Operating Handbook
- Checklists

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- Wake turbulence avoidance
- LAHSO
- Runway incursion avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of normal and crosswind landings, and review traffic pattern procedures, the go-around procedure, and collision and wake turbulence avoidance. The student and instructor will select a destination and discuss the traffic pattern procedures at the airport.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss, a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

Completion Standards

The student will:

- ❑ Discuss the principles behind spins and spin recovery.
- ❑ Select a sufficiently high altitude that allows recovery above 1,500' AGL.
- ❑ Clear the area before performing the maneuver, especially the area below the airplane.
- ❑ Demonstrate ability to quickly and safely recover from a spin.
- ❑ **Private / Commercial**: Be able to discuss the aerodynamic factors related to spins, common situations where unintentional spins may occur, and procedures for recovery from unintentional spins.

Common Mistakes

- Failure to adequately clear the area.
- Failure to apply full rudder pressure in the desired spin direction during entry.
- Failure to apply and maintain full up-elevator pressure during entry resulting in a spiral.
- Failure to achieve a fully stalled condition prior to spin entry.
- Failure to apply full rudder against the spin during recovery.
- Failure to neutralize the rudder during recovery after rotation stops resulting in a possible secondary spin.
- Slow and overly cautious control movements during recovery.
- Excessive back-elevator pressure after rotation stops resulting in a possible secondary spin.
- Insufficient back-elevator pressure during recovery resulting in excessive airspeed.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student and instructor will review the traffic pattern procedures at the destination and a plan for entering the pattern. The student will pilot the airplane into the pattern and make all appropriate radio calls.

The instructor will take over on downwind and demonstrate normal and crosswind landings. Following the instructor's demonstrations, the student will perform several normal and crosswind landings.

Along the way back to the training airport, the student and instructor will review the traffic pattern procedures at the training airport and a plan for entering the pattern. The student will pilot the airplane into the pattern and perform a normal or crosswind landing.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles of normal and crosswind landings.
- ❑ Review traffic pattern procedures, the go-around procedure, and collision and wake turbulence avoidance.
- ❑ Discuss airport, weather, and performance information.
- ❑ Perform landing checklist just before or while on downwind.
- ❑ Fly an appropriate traffic pattern and continuously scan for traffic above / below the pattern and on the ground.
- ❑ Stabilize the descent on final.
- ❑ Prepare for and recognize situations when a go-around is appropriate.
- ❑ Execute timely go-arounds when necessary.
- ❑ Touchdown on the centerline, longitudinally parallel, in the first 1/3 of the runway.
- ❑ Touchdown in a stall condition.
- ❑ Maintain altitude ± ____', IAS ± ____ knots.
- ❑ **Commercial**: altitude ±100', IAS ±10 knots in the pattern, published approach speed or $1.3 \times V_{SO}$ ±5 KIAS on final, touchdown within 200' beyond a specified point.

Common Normal Landing Mistakes

- Inadequate drift correction on the base leg.
- Overshooting or undershooting the turn onto final approach resulting in too steep or too shallow of a turn onto final.
- Flat or skidding turns from base leg to final approach as a result of overshooting or inadequate drift correction.
- Poor coordination during turn from base to final approach.
- Failure to complete the landing checklist in a timely manner.
- Unstable approach.
- Failure to adequately compensate for flap extension.
- Poor trim technique on final approach.
- Attempting to maintain altitude or reach the runway using elevator alone.
- Focusing too close to the airplane resulting in a high round out.
- Focusing too far from the airplane resulting in a low round out.
- Touching down prior to attaining proper landing attitude.
- Failure to hold sufficient back-elevator pressure after touchdown.
- Excessing braking after touchdown.

Common Crosswind Landing Mistakes

- Attempting to land in crosswinds that exceed the airplane's maximum demonstrated crosswind component.
- Inadequate compensation for wind drift on the turn from base leg to final approach resulting in undershooting or overshooting.
- Inadequate compensation for wind drift on final approach.
- Unstable approach.
- Failure to compensate for increased drag during sideslip result in excessive sink rate and/or low airspeed.
- Touchdown while drifting.
- Excessive airspeed on touchdown.
- Failure to apply appropriate flight control inputs during rollout.
- Failure to maintain directional control on rollout.
- Excessive braking.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student and instructor will review the traffic pattern procedures at the destination and a plan for entering the pattern. The student will pilot the airplane into the pattern and make all appropriate radio calls.

The instructor will take over on downwind and demonstrate a short-field landing. Following the instructor's demonstration, the student will perform several short-field landings.

Along the way back to the training airport, the student and instructor will review the traffic pattern procedures at the training airport and a plan for entering the pattern. The student will pilot the airplane into the pattern and perform a short-field landing.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles of short-field landings.
- ❑ Review LAHSO and the go-around procedure.
- ❑ Discuss airport, weather, and performance information.
- ❑ Perform landing checklist just before or while on downwind.
- ❑ Fly an appropriate traffic pattern and continuously scan for traffic above / below the pattern and on the ground.
- ❑ Stabilize the descent on final.
- ❑ Prepare for and recognize situations when a go-around is appropriate.
- ❑ Execute timely go-arounds when necessary.
- ❑ Touchdown on the centerline, longitudinally parallel, in the first 1/3 of the runway.
- ❑ Touchdown in a stall condition.
- ❑ Hold pitch attitude for aerodynamic braking.
- ❑ Use appropriate braking force.
- ❑ Maintain altitude ± ____', IAS ± ____ knots.
- ❑ **Commercial**: altitude ±100', IAS ±10 knots in the pattern, published approach speed or $1.3 \times V_{SO}$ ±5 KIAS on final, and touchdown within 100' beyond a specified point.

Short-Field Landing

Scenario

Short-field (and soft-field) landings are the bread and butter of backcountry pilots. Limiting yourself to larger airports, however, does not mean you will never need to use the short-field landing technique. Sometimes, airports close part of a runway due to construction, and, at airports with crossing runways, you may find yourself accepting a LAHSO clearance that requires a short-field landing. What might you do differently to land using minimal runway distance?

Objectives

- Learn the fundamentals of short-field landings.
- Review safety in the pattern, during final approach, and after landing.
- Review airport, weather, and airplane performance information usage.
- Review LAHSO and the go-around procedure.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 8 (Approaches and Landings)
- Airplane Information Manual / Pilot's Operating Handbook
- Checklists

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- Wake turbulence avoidance
- LAHSO
- Runway incursion avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles and safety considerations of short-field landings.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss, a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

Common Mistakes

- Failure to allow enough room on final to set up the approach necessitating an overly steep approach and high sink rate.
- Unstable approach.
- Undue delay initiating glide path corrections.
- Low airspeed on final resulting in an inability to flare properly and a hard landing.
- High airspeed resulting in floating on round out.
- Prematurely reducing power to idle on round out resulting in a hard landing.
- Touchdown with excessive airspeed.
- Excessive and/or unnecessary braking after touchdown.
- Failure to maintain directional control.

Soft-Field Landing

Scenario

Since there are airports with grass, dirt, or even gravel runways, it stands to reason you may find yourself not only taking off from such a runway but also landing on one. You may also land on a runway covered in snow or a flooded paved runway. What would you do differently to land safely on a soft-field runway?

Objectives

- Learn the fundamentals of soft-field landings.
- Review safety in the pattern, during final approach, and after landing.
- Review airport, weather, and airplane performance information usage.
- Review the go-around procedure.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 8 (Approaches and Landings)
- Airplane Information Manual / Pilot's Operating Handbook
- Checklists

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- Wake turbulence avoidance
- Runway incursion avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles and safety considerations of soft-field landings.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss, a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student and instructor will review the traffic pattern procedures at the destination and a plan for entering the pattern. The student will pilot the airplane into the pattern and make all appropriate radio calls.

Emergency Descent and Landing

Scenario

An in-flight fire is a rare event, but, if one happens, you need to get down on the ground immediately. What is the safest, quickest way to descend and setup for a forced landing?

Objectives

- Learn what situations warrant an emergency descent.
- Learn the emergency descent procedure recommended by the manufacturer.
- Learn the forced landing procedure recommended by the manufacturer.
- Learn to plan a safe forced landing.
- Develop a flow for handling an emergency descent and landing: ABCDEF.
- Have fun! Having fun now will keep you calm and confident in a real emergency.

References

- Airplane Flying Handbook
  - Chapter 16 (Emergency Procedures)
- Airplane Information Manual / Pilot's Operating Handbook

Special Emphasis Areas

- Positive airplane control
- Collision avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the typical in-flight emergencies that warrant an emergency descent to a forced landing, and review the emergency descent and forced landing procedures recommended by the training airplane's manufacturer.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the instructor will ask the student to quickly identify suitable emergency landing areas and quiz the student on memory items for typical emergencies. The instructor will then demonstrate a simulated emergency descent and approach to a forced landing.

Following the instructor's demonstration, the student will perform a simulated emergency descent and approach to landing.

The instructor will take over on downwind and demonstrate a soft-field landing. Following the instructor's demonstration, the student will perform several soft-field landings.

Along the way back to the training airport, the student and instructor will review the traffic pattern procedures at the training airport and a plan for entering the pattern. The student will pilot the airplane into the pattern and perform a soft-field landing.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles of soft-field landings.
- ❑ Discuss airport, weather, and performance information.
- ❑ Perform landing checklist just before or while on downwind.
- ❑ Fly an appropriate traffic pattern and continuously scan for traffic above / below the pattern and on the ground.
- ❑ Stabilize the descent on final.
- ❑ Prepare for and recognize situations when a go-around is appropriate.
- ❑ Execute timely go-arounds when necessary.
- ❑ Touchdown on the centerline, longitudinally parallel, in the first 1/3 of the runway.
- ❑ Touchdown with a nose-high attitude and maintain back-elevator pressure.
- ❑ Avoid using brakes.
- ❑ Maintain altitude ± ____', IAS ± ____ knots.
- ❑ **Commercial**: altitude ±100', IAS ±10 knots in the pattern, published approach speed or $1.3 \times V_{SO}$ ±5 KIAS on final.

Common Mistakes

- Excessive descent rate on final approach.
- Excessive airspeed on final approach.
- Unstable approach.
- Rounding out too high.
- Poor power management during round out and touchdown.
- Hard touchdown.
- Inadequate control of the airplane weight transfer from wings to wheels after touchdown.
- Allowing the nose wheel to fall to the runway after touchdown rather than controlling its descent.

After landing at the nearby airport, the student will have an opportunity to practice a simulated emergency descent and forced landing again on the way back to the training airport.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss in-flight emergencies that warrant an emergency descent and forced landing, as well as discuss the procedures recommended by the training airplane's manufacturer.
- ❑ Clear the area before performing the maneuver, especially the area below the airplane.
- ❑ Demonstrate ability to divide attention between airplane control, checklist usage, planning for the forced landing, and scanning for traffic.
- ❑ Demonstrate ability to remain clam and work through the ABCDEF flow.
- ❑ Demonstrate ability to safely execute the manufacturer's recommended emergency descent procedure while maintaining positive load factors on the airplane using 30° - 45° of bank.
- ❑ Demonstrate ability to plan a forced landing accounting for altitude, wind, terrain, and obstacles.
- ❑ Maintain recommended emergency descent speed ± ____ knots and maintain best glide speed during the forced landing ± ____ knots.
- ❑ **Commercial**: maintain emergency descent speed +0 / -10 knots, maintain best glide speed during the forced landing ±10 knots.

Common Mistakes

- Failure to adequately clear the area.
- Failure to maintain situational awareness before, during, and after the simulated emergency.
- Failure to remain calm and throughout the simulated emergency.
- Not using checklists or not adhering to the manufacturer's recommended procedure.
- Using too little or too much bank in the descent.
- Not maintaining positive load factors on the airplane.
- Inadequate planning for the forced landing.
- Inadequate airspeed control.

Steep Spirals

Scenario

Imagine you are cruising along on a long cross-country flight at 7,500'. Your engine begins to run rough, and then finally stops! You immediately configure the airplane for best glide while performing the memory items for an engine failure, and then spot a great field a few miles away. You immediately turn toward the field and finish your ABCDEF flow. You are way too high when you arrive at the field. How can you safely and quickly descend while ensuring you are still able to setup for a forced landing?

Objectives

- Learn to perform a constant-radius, constant-speed, descending turn.
- Use your knowledge of constant-distance turns around a point to plan ahead for wind correction.
- Remember airspeed control, load factor, and stall speed.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 9 (Performance Maneuvers)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles, aerodynamics, and purpose of steep spirals.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student will select a suitable point on the ground and a safe altitude. The instructor will then demonstrate a steep spiral over the point.

Following the instructor's demonstration, the student will perform a steep spiral.

After landing at the nearby airport, the student will have an opportunity to practice another steep spiral with a different reference point on the way back to the training airport.

Power-Off 180° Accuracy Landing

Scenario

You know to land straight ahead if your engine fails close to the ground on takeoff, but what would you do if your engine failed on downwind in the traffic pattern? You also know you can use a steep spiral to safely descend directly over an emergency field, but what do you do when you reach pattern altitude?

Objectives

- Learn to accurately predict the effects of wind on the airplane in a glide, thus allowing you to accurately predict glide distance.
- Learn to adjust the pattern as necessary to compensate for altitude.
- Learn to use forward slips or flaps as necessary to dissipate altitude in the glide.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 8 (Approaches and Landings)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- CFIT
- ADM and risk management
- Wire-strike avoidance
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles, aerodynamics, and purpose of the power-off, 180° accuracy approach and landing.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport and enter the traffic pattern. The instructor will take over on downwind and demonstrate a power-off 180° accuracy approach and landing. Following the instructor's demonstration, the student will perform several power-off 180° accuracy approaches and landings.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles, aerodynamics, and purpose of steep spirals.
- ❑ Clear the area before performing the maneuver, especially the area below the airplane.
- ❑ Select an altitude that allows for at least three 360° turns.
- ❑ Demonstrate ability to divide attention between airplane control, checklist usage, planning for the forced landing, and scanning for traffic.
- ❑ Demonstrate ability to remain clam and work through the ABCDEF flow.
- ❑ Demonstrate ability to quickly compensate for wind.
- ❑ Demonstrate ability to maintain best glide speed throughout the maneuver.
- ❑ Demonstrate ability to remain in a coordinated turn throughout the maneuver.
- ❑ Clear the engine during the maneuver.
- ❑ Use at least 30° and no more than 60° of bank.
- ❑ Maintain best glide speed ± ____ knots, rolls out toward object or specified heading ± ____°.
- ❑ **Commercial**: maintain best glide speed ±10 knots, rolls out toward object or specified heading ±10°.

Common Mistakes

- Failure to adequately clear the area.
- Failure to maintain constant airspeed.
- Poor coordination, resulting in skidding and / or slipping.
- Inadequate wind drift correction.
- Failure to coordinate the controls so that no increase / decrease in speed results when straight glide is resumed.
- Failure to scan for other traffic.
- Failure to maintain orientation.

Completion Standards

The student will:

- ❑ Discuss the principles, aerodynamics, and purpose of power-off 180° accuracy approaches and landings.
- ❑ Demonstrate ability to consider wind conditions and obstructions to choose an appropriate touchdown point.
- ❑ Demonstrate ability to plan the approach to glide to the runway.
- ❑ Maintain positive control of the airplane throughout the glide.
- ❑ Complete the appropriate checklists before beginning the maneuver and make all appropriate radio calls.
- ❑ Scan for traffic throughout the maneuver.
- ❑ Land within ____' beyond the chosen touchdown point.
- ❑ **Commercial**: Land within 200' beyond the chose touchdown point.

Common Mistakes

- Downwind leg too far from the runway / landing area.
- Overextension of downwind leg resulting from tailwind.
- Inadequate compensation for wind drift on base leg.
- Skidding turns in an effort to increase gliding distance.
- Failure to lower landing gear in retractable gear airplanes.
- Attempting to stretch the glide during undershoot.
- Premature flap extension / landing gear extension.
- Use of throttle to increase the glide instead of merely clearing the engine.
- Forcing the airplane onto the runway in order avoid overshoot.

Steep Turns

Scenario

Some day, you may find yourself flying down the Columbia River Gorge. It is a beautiful area, but a confined area. What would happen if you found yourself in the Gorge with relatively low clouds and you needed to reverse course? What is different about a steep turn versus a shallow or medium turn?

Objectives

- Learn the differences between a shallow, or medium turn, and a steep turn.
- Use your knowledge of maintaining airspeed, altitude, and bank with visual references to help you perform a tighter, faster level turn.
- Understand how the lift, load factor, and stall speed are affected by bank and pitch.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 9 (Performance Maneuvers)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- CFIT
- ADM and risk management
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles and aerodynamics of steep turns, review maneuvering speed, and review using outside visual references to maintain a level turn.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the instructor will demonstrate how a steep bank angle affects bank tendency and lift. The student will select a safe altitude and point out possible emergency landing areas. The instructor will then demonstrate performing steep, 360° turns in both directions.

Following the instructor's demonstration, the student will perform steep turns in both directions.

After landing at the nearby airport, the student will have the opportunity to practice more steep turns on the way back to the training airport.

Chandelles

Scenario

The Willamette Valley can get pretty cloudy and there may be times where you find a hole in the clouds that is pretty big, but not quite big enough to climb through while flying straight ahead. How would go about climbing through that hole in the clouds?

Objectives

- Learn the fundamentals and purpose of chandelles.
- Use your knowledge of slow flight to plan for, and compensate for, the rapidly changing flight characteristics.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 9 (Performance Maneuvers)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- CFIT
- ADM and risk management
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles and aerodynamics of a chandelle.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student will locate a suitable area and point out possible emergency landing areas. The instructor will then demonstrate chandelles in both directions and highlight the changes in flight characteristics.

Following the instructor's demonstration, the student will perform chandelles in both directions.

After landing at the nearby airport, the student will have the opportunity to practice more chandelles on the way back to the training airport.

Post Flight (15 minutes)

The student and instructor will review and assess the flight.

Post Flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles and aerodynamics of steep turns.
- ❑ Clear the area before each maneuver and continue to scan for traffic during the maneuvers.
- ❑ Select an altitude no lower than 1,500' AGL.
- ❑ Configure the airplane for no greater than V_A.
- ❑ Choose a visual reference and note initial heading.
- ❑ Anticipate the need for an increase in power and rudder use.
- ❑ Demonstrate ability to maintain altitude, airspeed, and the proper bank angle throughout steep turns in both directions.
- ❑ Anticipate the rollout and end each turn on the selected initial heading.
- ❑ Maintain altitude ± ____', IAS ± ____ knots, ____° ± ____° bank, and roll out on the initial heading ± ____°.
- ❑ **Commercial**: altitude ±100', IAS ±10 knots, 50° ±5° bank, and roll out on initial heading ±10°.

Common Errors

- Failure to adequately clear the area.
- Excessive pitch change during entry or recovery.
- Attempts to start recovery prematurely.
- Failure to stop the turn on a precise heading.
- Excessive rudder during recovery, resulting in skidding.
- Inadequate power management.
- Inadequate airspeed control.
- Poor coordination.
- Gaining altitude in right turns and/or losing altitude in left turns.
- Failure to maintain constant bank angle.
- Disorientation.
- Attempting to perform the maneuver by instrument reference rather than visual reference.
- Failure to scan for other traffic during the maneuver.

Completion Standards

The student will:

- ❑ Discuss the principles and aerodynamics of chandelles.
- ❑ Clear the area before each maneuver and continue to scan for traffic during the maneuvers.
- ❑ Select an altitude no lower than 1,500' AGL, and appropriate airspeed.
- ❑ Choose a visual reference and note initial heading.
- ❑ Smoothly change bank and pitch and maintain positive control of the airplane.
- ❑ Use correct bank and pitch attitudes.
- ❑ Anticipate changes in flight characteristics.
- ❑ Roll out at 180° from initial heading ± ____° just above stall speed and without losing any altitude.
- ❑ **Commercial**: roll out at 180° from initial heading ±10° just above stall speed and without losing any altitude.

Common Mistakes

- Failure to adequately clear the area.
- Too shallow an initial bank, resulting in a stall.
- Too steep an initial bank, resulting in failure to gain maximum performance.
- Allowing the actual bank to increase after establishing initial bank angle.
- Failure to start the recovery at the 90° point in the turn.
- Allowing the pitch attitude to increase as the bank is rolled out during the second 90° of turn.
- Leveling the wings before the 180° point is reached.
- Nose low on recovery, resulting in too much airspeed.
- Control roughness.
- Poor coordination (slipping or skidding).
- Stalling at any point during the maneuver.
- Execution of a steep turn instead of a climbing maneuver.
- Failure to scan for other aircraft.
- Attempting to perform the maneuver by instrument reference rather than visual reference.

8's on Pylons

Scenario

When you flew Turns Around a Point, the primary goal was to maintain a constant distance from the point of interest. Maintaining that constant distance requires constantly changing bank. This is fine if you have passengers that are only trying to take some pictures. However, if you had a film crew on board trying to shoot video of, say, a heard of grazing animals, all of that bank will ruin their video. How would you maintain a constant line of sight instead of a constant distance?

Objectives

- Learn about pivotal altitude.
- Master your ability to maintain coordinated flight and maintain situational awareness with little or no instrument reference.
- Master your ability to use outside visual references to judge pitch and bank while scanning for traffic and cross-referencing instruments.
- Have fun!

References

- Airplane Flying Handbook
  - Chapter 6 (Ground Reference Maneuvers)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- CFIT
- ADM and risk management
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles of pivotal altitude and 8's on Pylons.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student will choose points on the ground to use as pylons and point out possible emergency landing areas. The instructor will then demonstrate 8's on Pylons.

Following the instructor's demonstration, the student will perform 8's on Pylons.

After landing at the nearby airport, the student will have the opportunity to practice more 8's on Pylons on the way back to the training airport.

Lazy 8's

Scenario

The Lazy 8, unlike chandelles or steep turns, has no direct practical purpose. To perform a Lazy 8, however, the pilot must demonstrate mastery of the airplane. The Lazy 8 is the intersection of everything you have learned so far. So, the indirect practical benefit is that you demonstrate your ability divide attention and to understand, plan for, and anticipate changes in flight characteristics wind, density altitude, etc.

Objectives

- Bring together all of the elements you have learned so far to perform a deceptively complex maneuver.
- Master your understanding of and ability to compensate for the rapidly changing flight characteristics.
- Master your ability to use outside visual references to judge pitch and bank while scanning for traffic and cross-referencing instruments.
- The Lazy 8 may sound daunting, but it is actually a very dynamic and exciting maneuver. Do not let it worry you; just have fun with it!

References

- Airplane Flying Handbook
  - Chapter 9 (Performance Maneuvers)

Special Emphasis Areas

- Positive airplane control
- Stall / spin awareness
- Collision avoidance
- CFIT
- ADM and risk management
- Checklist usage

Pre-flight (15 minutes)

The student will discuss the principles and aerodynamics of a Lazy 8.

The student will perform a preflight inspection of the airplane. The instructor and student will discuss a destination, possible hazards to the flight, the weather conditions, local procedures, communications procedures, and the PIC role.

In Flight (1 hour)

The student will pilot the airplane to a nearby airport. Along the way, the student will locate a suitable area and point possible emergency landing areas. The instructor will then demonstrate Lazy 8's and highlight the changes in flight characteristics.

Following the instructor's demonstration, the student will perform Lazy 8's.

After landing at the nearby airport, the student will have the opportunity to practice more Lazy 8's on the way back to the training airport.

Post-flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles of pivotal altitude and 8's on Pylons.
- ❑ Select appropriate pylons based on separation and wind direction.
- ❑ Clear the area before each maneuver and continue to scan for traffic during the maneuvers.
- ❑ Select an appropriate airspeed and altitude.
- ❑ Use between 30° and 40° of bank and adjust altitude as necessary to keep the pylon on the reference line.
- ❑ Avoid slips and skids.

Common Mistakes

- Failure to adequately clear the area.
- Skidding or slipping in turns (whether trying to hold the pylon with rudder or not).
- Excessive gain or loss of altitude.
- Over concentration on the pylon and failure to observe traffic.
- Poor choice of pylons.
- Not entering the pylon turns into the wind.
- Failure to assume a heading when flying between pylons that will compensate sufficiently for drift.
- Failure to time the bank so that the turn entry is completed with the pylon in position.
- Abrupt control usage.
- Inability to select pivotal altitude.

Post Flight (15 minutes)

The student and instructor will review and assess the flight.

Completion Standards

The student will:

- ❑ Discuss the principles and aerodynamics of Lazy 8's.
- ❑ Clear the area before each maneuver and continue to scan for traffic during the maneuvers.
- ❑ Select an altitude no lower than 1,500' AGL, and appropriate airspeed.
- ❑ Choose visual references and note initial reciprocal headings.
- ❑ Smoothly change bank and pitch and maintain positive control of the airplane.
- ❑ Use correct bank and pitch attitudes.
- ❑ Anticipate changes in flight characteristics.
- ❑ Achieves: 30° bank at steepest point, entry altitude ± ____', entry IAS ± ____ knots, and reciprocal heading ± ____° on roll out at 180° point.
- ❑ **Commercial**: 30° bank at steepest point, entry altitude ±100', entry IAS ±10 knots, and reciprocal heading ±10° on roll out at 180° point.

Common Mistakes

- Failure to adequately clear the area.
- Using the nose, or top of engine cowl, instead of the true longitudinal axis resulting in asymmetric loops.
- Watching the airplane instead of the reference points.
- Inadequate planning, resulting in the peaks of the loops both above and below the horizon not occurring at the proper points.
- Control roughness, usually caused by attempts to counteract poor planning.
- Persistent gain or loss of altitude with the completion of each eight.
- Attempting to perform the maneuver rhythmically, resulting in poor pattern symmetry.
- Allowing the airplane to "fall" out of the tops of the loops rather than flying the airplane through the maneuver.
- Slipping and/or skidding.
- Failure to scan for other traffic.