

# Liberty<sub>XL2</sub>



## MANEUVERS GUIDE

**Liberty**  
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**Normal/Crosswind Takeoff and Climb**  
Airplane Flying Handbook FAA-H-8083-3

1. Complete the runup and before takeoff checklist.
2. Flaps and trim should be set for 20°.
3. Taxi the aircraft onto the runway, align the aircraft with the runway centerline, and apply crosswind correction with the stick, if necessary.
4. Release the finger brakes, and apply full takeoff power with the throttle.
5. Check the HSA WOT Annunciator is illuminated.
6. Maintain the runway centerline by applying rudder pressure as needed.
7. Verify all engine instruments are within limits.
8. As airspeed increases, adjust crosswind correction, as necessary.
9. At rotation speed of 55 knots, apply backpressure on the control stick for liftoff.
10. Establish a pitch attitude to achieve best rate of climb, 80 knots.
11. Retract flaps after reaching 80 knots and a safe altitude, determined at the pilot's discretion.
12. Maintain proper crosswind correction throughout the takeoff and climb.
13. If remaining in the traffic pattern, level off at pattern altitude, adjust the throttle for approximately 2300 RPM, and establish an airspeed of 95 knots. Pitch trim adjustments may be necessary.
14. Perform the climb and/or cruise checklists.

**Completion Standards:**

- **Private Pilot PTS Area of Operation IV, Task A**
- **Commercial Pilot PTS Area of Operation IV, Task A**



**Normal/Crosswind Approach and Landing**  
Airplane Flying Handbook FAA-H-8083-3

1. Complete the descent and before landing checklists.
2. Establish pattern altitude, 95 knots, and 2300 RPM.
3. When abeam the point of landing on downwind, reduce power to approximately 1500 RPM and reduce speed to 80 knots.
4. Set flaps to 20° and establish approximately a 500 foot per minute descent. Pitch trim adjustments may be necessary.
5. Once on base leg reduce airspeed to 75 knots. Adjust power as necessary.
6. Turning final, add full flaps (30°) and maintain 70 knots on final. Approximately 200 RPM will need to be added when applying full flaps to maintain glide path and speed, and pitch attitude should be approximately 5° down.
7. Apply crosswind correction if needed to align the airplane with the runway centerline.
8. Adjust power, pitch, and trim as necessary to control airspeed and rate of descent.
9. Reduce power to idle for touchdown, and touchdown at stall speed with the main wheels first.
10. Maintain crosswind correction as necessary and aircraft alignment with the centerline.
11. Apply appropriate brake pressure to slow the airplane and turn onto the desired taxiway.
12. Perform the after landing checklist.

**Completion Standards:**

- Private Pilot PTS Area of Operation IV, Task B
- Commercial Pilot PTS Area of Operation IV, Task B



**Soft Field Takeoff and Climb**  
Airplane Flying Handbook FAA-H-8083-3

1. Complete the runup and before takeoff checklist.
2. Flaps and trim should be set for 20°.
3. Apply full backpressure on the stick to reduce the weight on the nose wheel and minimize the use of brakes while taxiing the aircraft onto the runway. Align the aircraft with the runway centerline and apply crosswind correction with the stick, if necessary.
4. Apply full takeoff power with the throttle.
5. Check the HSA WOT Annunciator is illuminated.
6. Maintain the runway centerline by applying rudder pressure as needed.
7. Verify all engine instruments are within limits.
8. As airspeed increases, adjust crosswind correction, as necessary.
9. As the nose wheel lifts off the ground, adjust backpressure on the stick to allow the airplane to accelerate and remain in ground effect.
10. Accelerate to 70 knots while remaining in ground effect.
11. Upon reaching 70 knots, adjust pitch to begin climb out.
12. Maintain  $V_x$ , 70 knots, in the climb attitude until obstacles are cleared, if any.
13. When obstacles are cleared, accelerate to  $V_y$  (80 knots) and retract flaps at a safe altitude.
14. Perform the climb and/or cruise checklists.

**Completion Standards:**

- **Private Pilot PTS Area of Operation IV, Task C**
- **Commercial Pilot PTS Area of Operation IV, Task C**



## **Soft Field Approach and Landing**

Airplane Flying Handbook FAA-H-8083-3

1. Complete the descent and before landing checklists.
2. Establish pattern altitude, 95 knots, and 2300 RPM.
3. When abeam the point of landing on downwind, reduce power to approximately 1500 RPM and reduce speed to 80 knots.
4. Set flaps to 20° and establish approximately a 500 foot per minute descent. Pitch trim adjustments may be necessary.
5. Once on base leg reduce airspeed to 75 knots. Adjust power as necessary.
6. Turning final, add full flaps (30°) and maintain 70 knots on final. Approximately 200 RPM will need to be added when applying full flaps to maintain glide path and speed, and pitch attitude should be approximately 5° down.
7. Apply crosswind correction if needed to align the airplane with the runway centerline.
8. Adjust power, pitch, and trim as necessary to control airspeed and rate of descent so as to touchdown as soft as possible on the main gear.
9. Touch down with a small amount of power to assist in keeping the nose wheel off the ground as long as possible. Maintain backpressure on the stick to allow the nose wheel to touch down softly.
10. Maintain crosswind correction as necessary and aircraft alignment with the centerline.
11. Perform the after landing checklist.

### **Completion Standards:**

- **Private Pilot PTS Area of Operation IV, Task D**
- **Commercial Pilot PTS Area of Operation IV, Task D**



**Short Field Takeoff and Climb**  
Airplane Flying Handbook FAA-H-8083-3

1. Complete the runup and before takeoff checklist.
2. Flaps and trim should be set for 20°.
3. Taxi the aircraft onto the runway, utilizing the maximum available takeoff area, and align the aircraft with the runway centerline. Apply crosswind correction with the stick, if necessary.
4. Apply the brakes to keep the aircraft from moving on the runway.
5. Apply takeoff power while maintaining brake pressure to prevent the airplane from moving.
6. Check the HSA WOT Annunciator is illuminated.
7. Once takeoff power is achieved, verify all engine instruments are within limits and release the brakes.
8. As airspeed increases, adjust crosswind correction, as necessary.
9. At rotation speed of 55 knots, apply backpressure on the control stick for liftoff.
10. Adjust pitch attitude to establish  $V_x$ , 70 knots.
11. Maintain 70 knots until any obstacles are cleared.
12. When obstacles are cleared, accelerate to  $V_y$  (80 knots) and retract flaps at a safe altitude.
13. Perform the climb and/or cruise checklists.

**Completion Standards:**

- **Private Pilot PTS Area of Operation IV, Task E**
- **Commercial Pilot PTS Area of Operation IV, Task E**



**Short Field Approach and Landing**  
Airplane Flying Handbook FAA-H-8083-3

1. Complete the descent and before landing checklists.
2. Establish pattern altitude, 95 knots, and 2300 RPM.
3. When abeam the point of landing on downwind, reduce power to approximately 1500 RPM and reduce speed to 70 knots for a steep approach. Pick a touchdown point on the runway.
4. Set flaps to 20° and establish approximately a 500 foot per minute descent. Pitch trim adjustments may be necessary.
5. Once on base leg, set flaps to 30° and maintain 70 knots. Adjust power as necessary.
6. Maintain 60 knots on final. Increase power approximately 100 RPM to maintain the proper glide path and speed.
7. Apply crosswind correction if needed to align the airplane with the runway centerline.
8. Adjust power, pitch, and trim as necessary to control airspeed and rate of descent.
9. Touch down with the main wheels first and the throttle at idle. Maintain the runway centerline and apply crosswind correction as necessary.
10. Apply maximum braking as to stop the airplane in the shortest distance possible consistent with safety.
11. Perform the after landing checklist.

**Completion Standards:**

- **Private Pilot PTS Area of Operation IV, Task F**
- **Commercial Pilot PTS Area of Operation IV, Task F**



**Forward Slip to a Landing**  
Airplane Flying Handbook FAA-H-8083-3

1. Establish the slipping attitude at the point from which a landing can be made. Use full flaps, power at idle, and 65 knots. (Normal approach speed with full flaps is 70 knots.)
2. Lower a wing and apply opposite rudder to maintain a straight track on the runway centerline. If there is a crosswind, lower the same wing that would be lowered in a normal crosswind landing.
3. Maintain the desired ground track and 65 knots.
4. When ready to touch down, be sure to make smooth, timely, and the correct control application during the recovery from the slip, the roundout, and the touchdown.
5. Touchdown at approximate stalling speed at or within 400 feet beyond a specified point, with no side drift. Keep the airplane aligned with and over the runway centerline.
6. Maintain crosswind correction as necessary.
7. Perform the after landing checklist.

**Completion Standards:**

- **Private Pilot PTS Area of Operation IV, Task K**



**Go-Around/Rejected Landing**  
Airplane Flying Handbook FAA-H-8083-3

1. Make sure a timely decision is made to discontinue the approach to landing.
2. Once the decision to go around is made, apply takeoff power and pitch for  $V_y$ , 80 knots.
3. Retract the flaps to  $20^\circ$  once a positive rate of climb is established and  $V_x$ , 70 knots, is attained.
4. Maneuver to the side of the runway to clear and avoid conflicting traffic.
5. Retract the flaps to  $0^\circ$  upon reaching  $V_y$ , 80 knots.
6. Maintain directional control and proper wind-drift correction throughout the climb.
7. Perform the climb and/or cruise checklists.

**Completion Standards:**

- **Private Pilot PTS Area of Operation IV, Task L**
- **Commercial Pilot PTS Area of Operation IV, Task L**



### **Straight-and-level Flight (Flight at Cruise)**

Airplane Flying Handbook FAA-H-8083-3

1. Level off at the desired altitude.
2. Reduce the pitch attitude to allow the airplane to accelerate to the desired airspeed.
3. Reduce the throttle to approximately 2400 RPM. Never cruise at full throttle (WOT illuminated). This will prevent engine fuel flow optimization and significantly reduce range.
4. Maintain level flight by cross-checking and interpreting the instruments, making adjustments to pitch, bank, and power, as necessary.
5. Adjust pitch trim as necessary.
6. Verify the fuel boost pump mode switch is in the auto position.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation IX, Task A**
- **Instrument Pilot PTS Area of Operation IV, Task A**



### **Constant Airspeed Climbs**

Airplane Flying Handbook FAA-H-8083-3  
Instrument Flying Handbook FAA-H-8083-15

1. Advance the throttle to full forward.
2. Check the HSA WOT annunciator is illuminated.
3. Pitch the aircraft for the desired airspeed. Normal climbs are made with 0° flaps, full throttle, and 80-85 knots.
4. Maintain the climb by cross-checking and interpreting the instruments, making adjustments to pitch, bank, and power, as necessary.
5. Adjust pitch trim as necessary.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation IX, Task B**
- **Instrument Pilot PTS Area of Operation IV, Task C**



### **Constant Airspeed Descents**

Airplane Flying Handbook FAA-H-8083-3  
Instrument Flying Handbook FAA-H-8083-15

1. Reduce the throttle to the desired power setting.
2. Pitch the aircraft for the desired airspeed.
3. Maintain the descent by cross-checking and interpreting the instruments, making adjustments to pitch, bank, and power, as necessary.
4. Adjust pitch trim as necessary.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation IX, Task C**
- **Instrument Pilot PTS Area of Operation IV, Task C**



### **Steep Turns**

Airplane Flying Handbook FAA-H-8083-3  
Instrument Flying Handbook FAA-H-8083-15

1. Select a safe maneuvering altitude to perform the maneuver.
2. Perform clearing turns to clear the maneuvering area.
3. Pick a visual reference point outside the airplane to assist in rollout of the maneuver.
4. Establish maneuvering speed. Va=100 knots at 1653 pounds, 94 knots at 1450 pounds.
5. Roll into a coordinated 360° turn and maintain a 45° or 50° bank, depending on private or commercial pilot standards.
6. While rolling through 30° bank, increase backpressure on the stick. It may also be necessary to increase power to maintain the selected altitude and the correct maneuvering speed.
7. Rollout should be initiated prior to reaching the selected visual reference point and entry heading.
8. During rollout, it may be necessary to reduce power and backpressure to maintain the desired altitude and airspeed.
9. Be sure to divide attention between airplane control and orientation.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation V**
- **Commercial Pilot PTS Area of Operation V, Task A**
- **Instrument Pilot PTS Area of Operation IV, Task F**



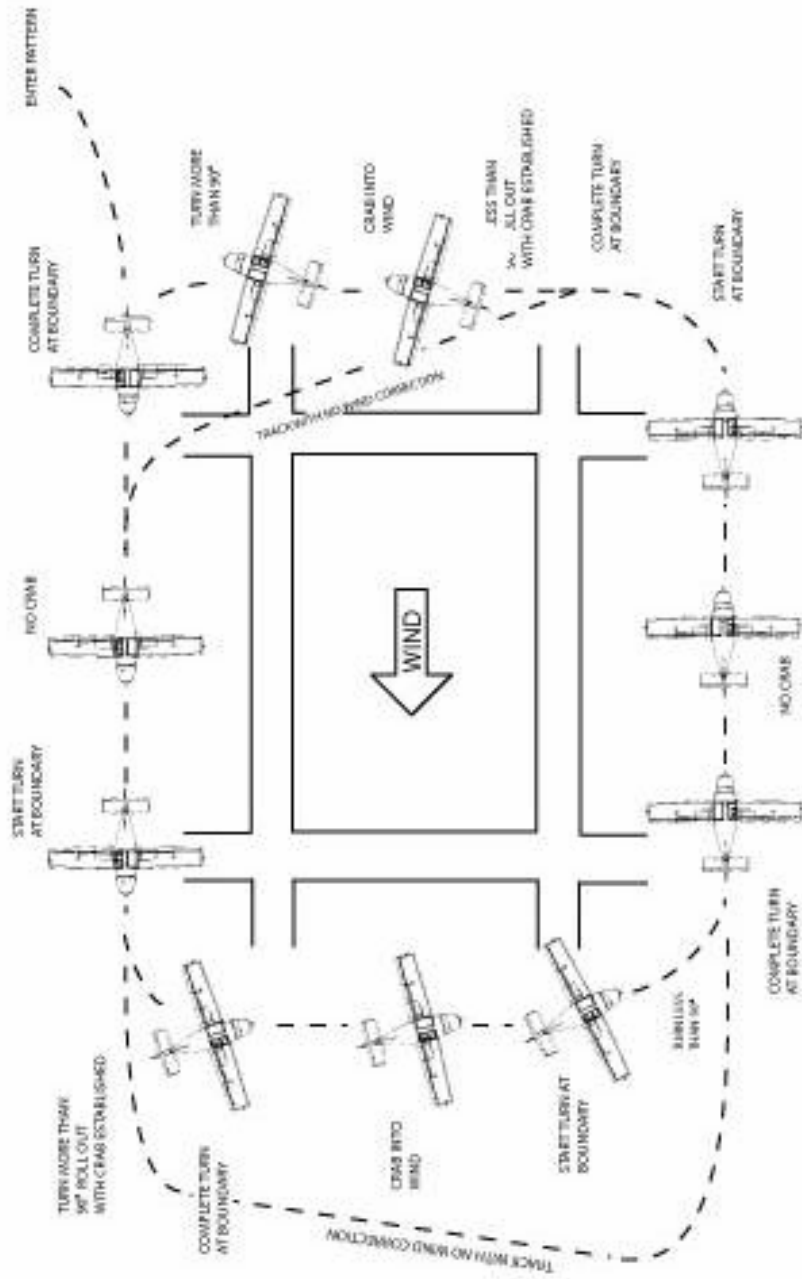
**Rectangular Course**  
Airplane Flying Handbook FAA-H-8083-3

1. Select a reference area that is similar to a normal traffic pattern.
2. Plan the maneuver so as to enter a left or right pattern, 600 to 1000 feet AGL at an appropriate distance from the selected reference area, 45° to the downwind leg.
3. The proper power setting for the maneuver is approximately 2300-2350 RPM. This will yield an airspeed of approximately 95 knots, which is the normal traffic pattern (downwind) maneuvering speed.
4. Apply adequate wind-drift correction during straight-and-turning flight to maintain a constant ground track around the rectangular reference area.
5. When making turns, use both a rate of roll and rate of turn sufficient to maintain an equal distance from all sides of the reference area. Up to 45° of bank may be used.
6. Be sure to divide attention between airplane control and the ground track while maintaining coordinated flight.

**Completion Standards:**

- **Private Pilot PTS Area of Operation VI, Task A**

# RECTANGULAR COURSE





## **S-Turns**

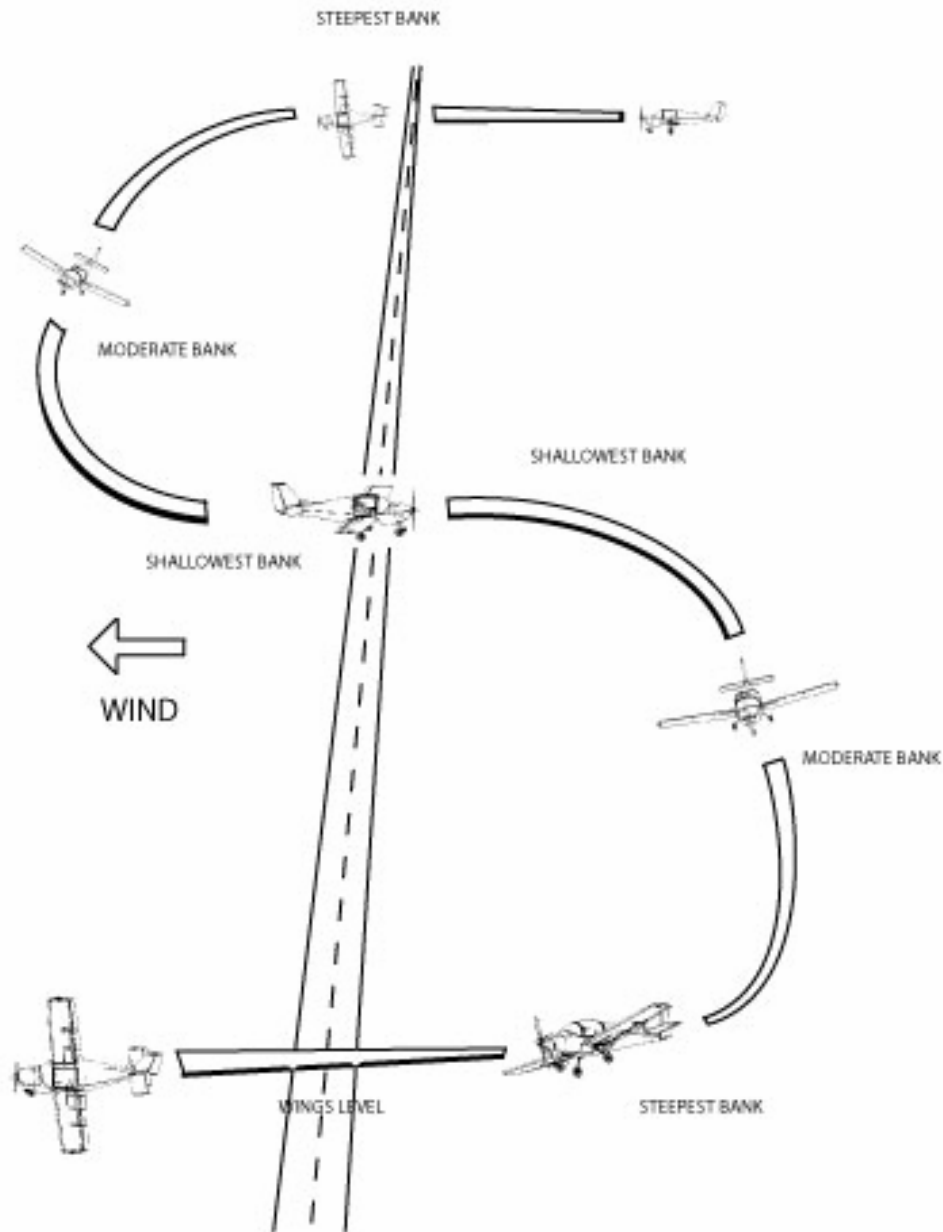
Airplane Flying Handbook FAA-H-8083-3

1. Select a reference line that is perpendicular to the wind, approximately 2 miles in length.
2. Plan the maneuver so as to enter downwind, perpendicular to the reference line, at an appropriate distance from the reference line. Enter the maneuver at 600 to 1000 feet AGL.
3. The proper power setting for the maneuver is approximately 2300 RPM.
4. Once passing over the reference line, begin a turn to the right or left and maintain a constant radius. Up to 45° of bank may be used.
5. Apply wind-drift correction to track a constant radius turn on each side of the selected reference line.
6. Reverse the direction of the turn directly over the reference line.
7. Be sure to divide attention between airplane control and the ground track while maintaining coordinated flight.

### **Completion Standards:**

- **Private Pilot PTS Area of Operation VI, Task B**

# S-TURNS ACROSS A ROAD





### **Turns Around a Point**

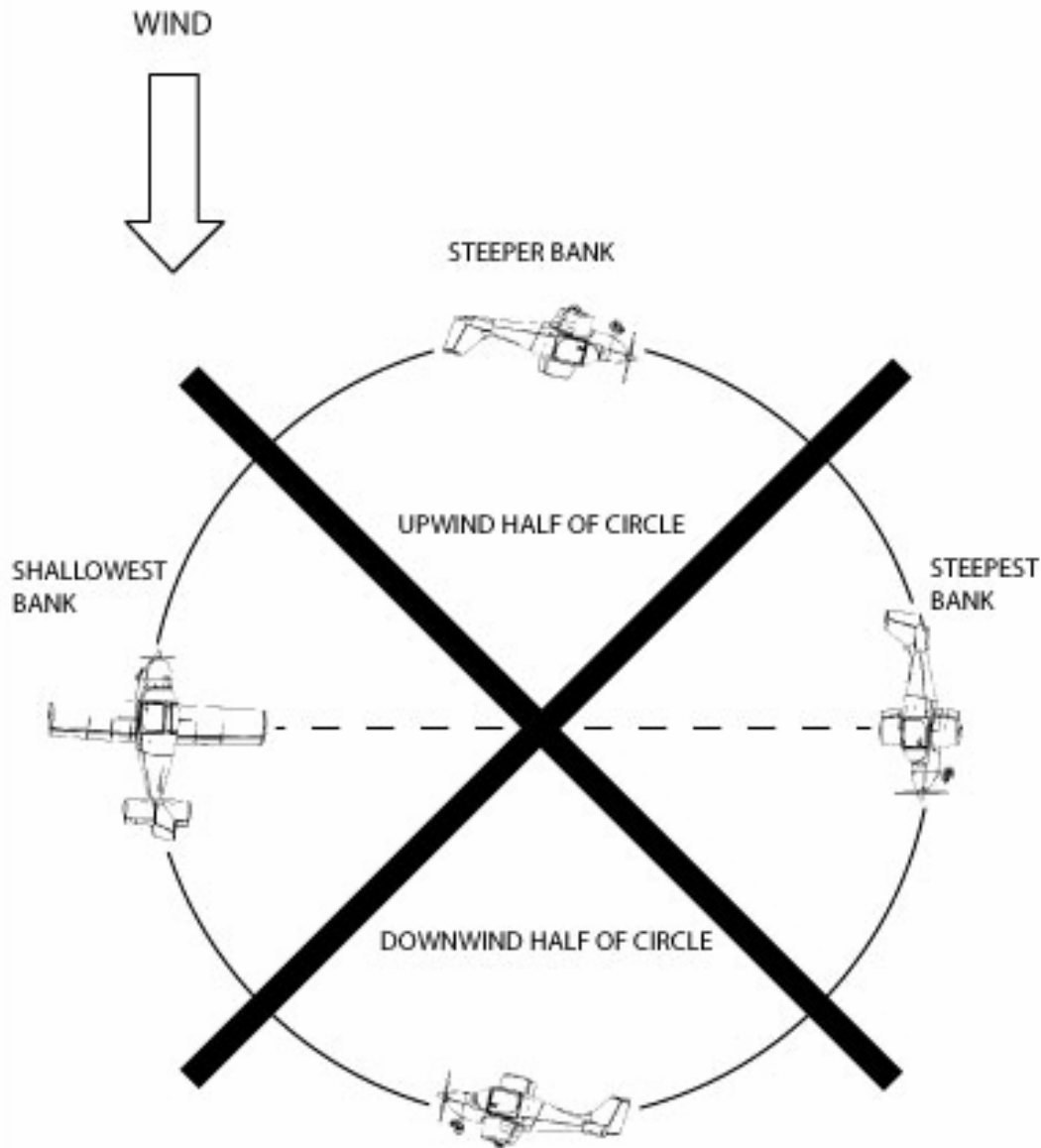
Airplane Flying Handbook FAA-H-8083-3

1. Maneuver the aircraft into a downwind heading.
2. Select a suitable ground reference point. This point should be approximately 1/3 of a wingspan away from you when viewing it from the cabin to the ground.
3. Plan the maneuver so as to enter 600 to 1000 feet AGL at an appropriate distance from the reference point.
4. The proper power setting for the maneuver is approximately 2300 RPM.
5. Apply adequate wind-drift correction to track a constant radius turn around the selected reference point.
6. Adjust bank angle as necessary to keep a constant radius. The greatest bank angle should be used at the point of maximum groundspeed, and vice versa. Up to 45° of bank may be used.
7. Be sure to divide attention between airplane control and the ground track while maintaining coordinated flight.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation VI, Task C**

# TURNS AROUND A POINT





## **Slow Flight**

Airplane Flying Handbook FAA-H-8083-3

1. Select an entry altitude that will allow the maneuver to be completed no lower than 1500 feet AGL.
2. Reduce power to approximately 1500 RPM and allow the airplane to decelerate while maintaining altitude.
3. Once airspeed is 80 knots or lower, set the flaps to 30°. Adjust trim as necessary.
4. Establish a pitch attitude that will allow the airplane to maintain altitude while decreasing airspeed to the lowest controllable airspeed possible. This airspeed should be that at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall.
5. Adjust power as necessary to maintain altitude.
6. Perform straight-and-level flight, turns, climbs, and descents. Turns should be at standard rate.
7. Be sure to divide attention between airplane control and orientation.
8. To initiate recovery, apply full power with the throttle and reduce flaps to 20°. Be sure to maintain altitude and heading throughout the recovery.
9. Once airspeed accelerates past  $V_x$ , 70 knots, reduce flaps to 0°.
10. Return to cruise and complete the cruise checklist.

### **Completion Standards:**

- **Private Pilot PTS Area of Operation VIII, Task A**
- **Commercial Pilot PTS Area of Operation VIII, Task A**



## **Power-Off Stalls**

Airplane Flying Handbook FAA-H-8083-3

1. Select an entry altitude that will allow the maneuver to be completed no lower than 1500 feet AGL.
2. Reduce power to approximately 1500 RPM and allow the airplane to decelerate while maintaining altitude.
3. Once airspeed is 80 knots or lower, set the flaps to 30°. Adjust trim as necessary.
4. Maintain altitude while allowing the airspeed to decrease to approach speed, 70 knots.
5. Upon reaching 70 knots, establish a landing approach either straight ahead or with no more than 20° bank.
6. Once stabilized in the landing descent, reduce throttle to idle and smoothly increase backpressure to maintain altitude. (This simulates a landing flare.)
7. Once the stall occurs, initiate the recovery by simultaneously reducing the angle of attack, increasing power to maximum allowable, and leveling the wings to return to a straight-and-level flight attitude with a minimum loss of altitude.
8. Adjust pitch attitude for  $V_y$  climb attitude and reduce flaps to 20°.
9. Once the aircraft has accelerated to  $V_y$ , 80 knots, retract the flaps to 0° and return to the desired altitude, heading, and airspeed.

### **Completion Standards:**

- **Private Pilot PTS Area of Operation VIII, Task B**
- **Commercial Pilot PTS Area of Operation VIII, Task B**



### **Power-On Stalls**

Airplane Flying Handbook FAA-H-8083-3

1. Select an entry altitude that will allow the maneuver to be completed no lower than 1500 feet AGL.
2. Reduce power to approximately 1500 RPM and allow the airplane to decelerate while maintaining altitude.
3. Once airspeed is 80 knots or lower, set the flaps to takeoff configuration, 20°. Adjust trim as necessary.
4. Maintain altitude while allowing the airspeed to decrease to rotation speed, 55 knots.
5. Upon reaching 55 knots, apply takeoff power and slowly increase pitch until a stalled condition is encountered. Maintain straight flight or no more than 20° bank in turning flight.
6. Once the stall occurs, initiate the recovery by simultaneously reducing the angle of attack and leveling the wings to return to a straight-and-level flight attitude with a minimum loss of altitude.
7. Adjust pitch attitude for  $V_y$  climb attitude.
8. Once the aircraft has accelerated to  $V_y$ , 80 knots, retract the flaps to 0° and return to the desired altitude, heading, and airspeed.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation VIII, Task C**
- **Commercial Pilot PTS Area of Operation VIII, Task C**



**Emergency Approach and Landing (Simulated)**  
Airplane Flying Handbook FAA-H-8083-3

1. First establish best glide speed, 80 knots.
2. Select a suitable landing area, such as a field.
3. Plan the direction of the flight pattern to the landing area considering altitude, wind, terrain, and obstructions. Attempt to execute a normal traffic pattern, landing into the wind, if possible.
4. Attempt to restart the airplane if time and altitude permits.
5. With time and altitude permitting, simulate transmitting a MAYDAY message on 121.5MHz and set the transponder to 7700.
6. If the emergency landing is being made anywhere but an airport, simulate activating the ELT.
7. Simulate turning the ignition switch to OFF.
8. Simulate turning the FADEC A and B power switches to OFF.
9. Simulate turning the fuel boost pump mode switch to OFF.
10. Reduce the throttle to idle and simulate turning the fuel selector valve to OFF.
11. When the landing area is made, set flaps to 30°, or at the pilot's discretion.
12. Simulate turning the master switch to OFF, ONLY AFTER THE FLAPS HAVE BEEN SET. The flaps will not operate if the master switch is turned to OFF.
13. Secure seat belts and shoulder harnesses.

**Completion Standards:**

- **Private Pilot PTS Area of Operation X, Task A**
- **Commercial Pilot PTS Area of Operation IX, Task A**



### **Recovery from Unusual Flight Attitudes**

Airplane Flying Handbook FAA-H-8083-3

Instrument Flying Handbook FAA-H-8083-15

1. Using the instruments, determine the attitude of the airplane. The airspeed indicator is a quick way to determine the attitude of the airplane.
2. If airspeed is increasing, reduce power to idle and determine which way the aircraft is turning. The turn coordinator is a quick way to determine the direction of the turn; the attitude indicator may tumble in an unusual attitude. Roll the wings level and smoothly increase pitch to return to level flight.
3. If airspeed is decreasing, apply full power and decrease pitch to return to level flight. Determine the direction of the turn by referencing the turn coordinator and roll the wings level to return to normal flight.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation IX, Task E**
- **Instrument Pilot PTS Area of Operation IV, Task G**



## **Diversion**

Airplane Flying Handbook FAA-H-8083-3

1. Determine the position of the airplane and select an alternate airport.
2. Estimate an approximate heading to get to the alternate, turn to that heading, and make a note of the time to accurately calculate arrival time to the alternate.
3. Using an E6B, calculate groundspeed to determine arrival time, and calculate fuel consumption to the alternate.
4. If necessary, notify flight service of any changes.

### **Completion Standards:**

- **Private Pilot PTS Area of Operation VII, Task C**
- **Commercial Pilot PTS Area of Operation VII, Task C**



### **Lost Procedures**

#### Airplane Flying Handbook FAA-H-8083-3

1. If disorientation is suspected, do not continue forward; make circles around a point until position is determined.
2. If at a low altitude, climb to a higher altitude. This will allow for better visibility and radio communications.
3. If the airplane's position still cannot be determined, attempt to determine position by using VOR radials. Tune and identify a VOR station and center the needle with a "FROM" indication. Draw the radial from the VOR. Repeat this procedure using a second VOR.
4. If position cannot be determined using VOR radials, attempt to contact air traffic control or flight service.
5. If contact cannot be made with anyone, transmit the situation on 121.5MHz and enter 7700 into the transponder.
6. If contact still cannot be made, land at the first available airport, and if there is no airport in sight or a dangerous situation may be forming (such as low fuel), find a suitable off-airport landing area.

#### **Completion Standards:**

- **Private Pilot PTS Area of Operation VII, Task D**
- **Commercial Pilot PTS Area of Operation VII, Task D**



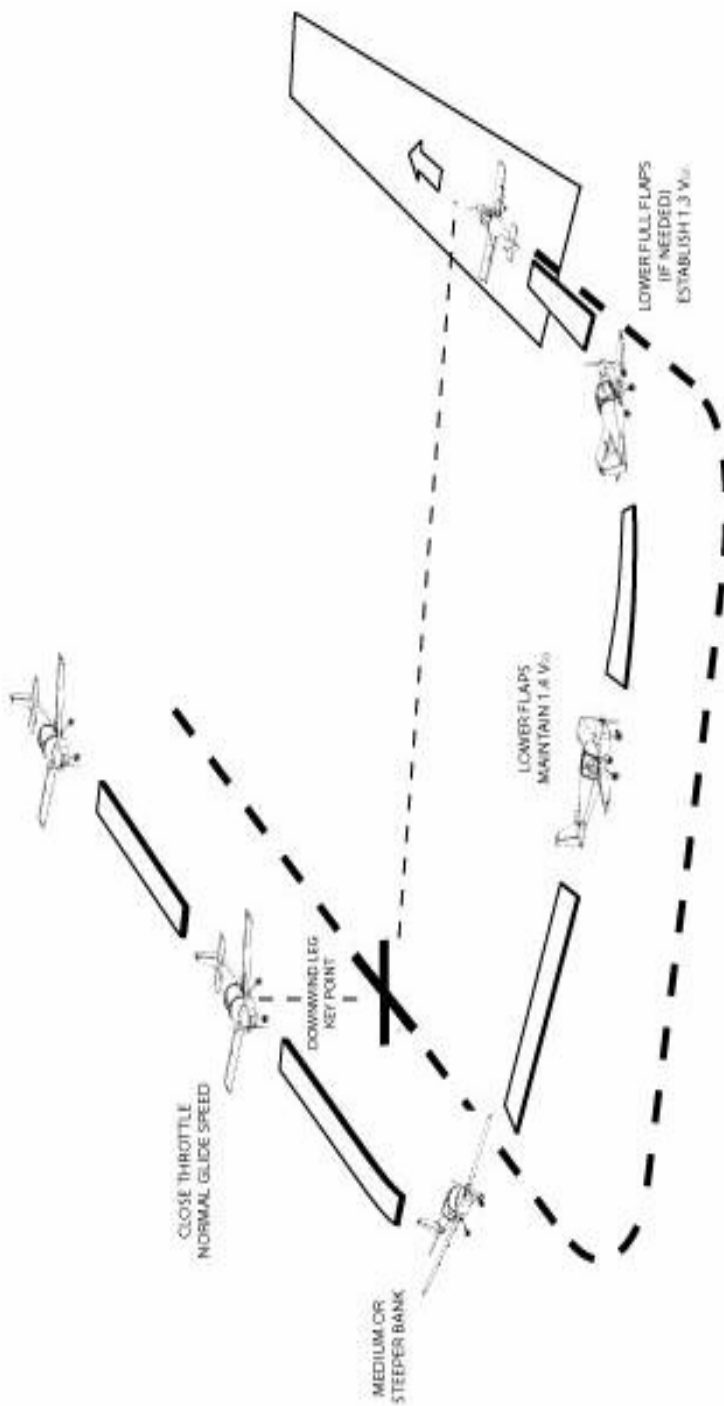
**Power-Off 180° Accuracy Approach and Landing**  
Airplane Flying Handbook FAA-H-8083-3

1. Complete the descent and before landing checklists.
2. Establish pattern altitude, 95 knots, and 2300 RPM.
3. When abeam the touchdown point on downwind and not more than 1000 feet AGL, reduce power to idle and pitch for best glide, 80 knots.
4. Plan the steepness of the turn to base by considering the current wind conditions. Also plan the turn to adjust for altitude, as appropriate. To conserve altitude, there should be no hesitation in the turn from downwind to base. To dissipate altitude, the turn from downwind to base may be delayed a few seconds.
5. After turning base, set flaps 20°. Adjust pitch trim as necessary.
6. Once on final, set flaps 30° when landing on the desired touchdown point is assured. Reduce airspeed to 70 knots.
7. Touch down in a normal landing attitude on the desired point, throttle still at idle, and using crosswind correction, as appropriate.

**Completion Standards:**

- **Commercial Pilot PTS Area of Operation IV, Task K**

# 180° POWER-OFF APPROACH





### **Steep Spiral**

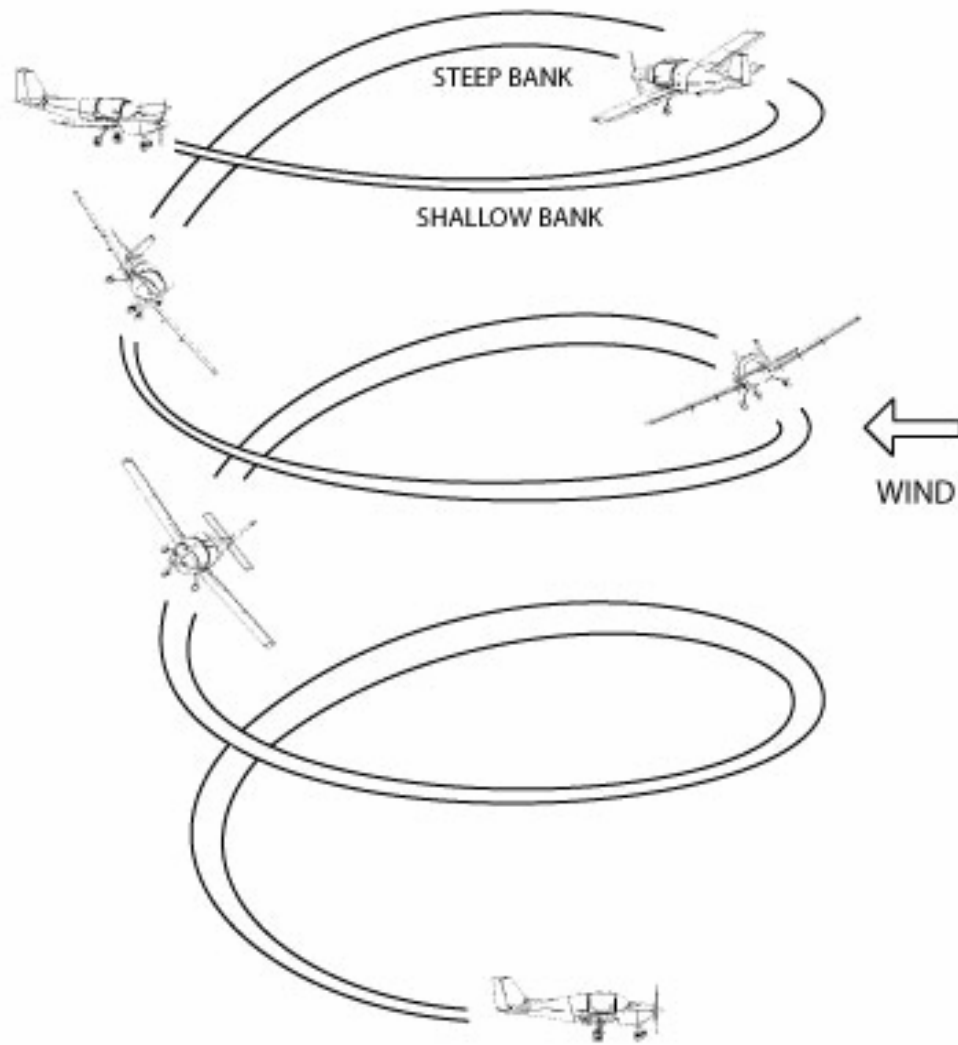
Airplane Flying Handbook FAA-H-8083-3

1. Select an altitude that is sufficient to continue through a series of at least three 360° turns.
2. Select a suitable ground reference point, and enter the maneuver on the upwind (into the wind) abeam the reference point.
3. Before commencing the spiral, bring the throttle to idle and decelerate to best glide speed, 80 knots.
4. Enter the spiral, adjusting bank angle as necessary to correct for wind and track a constant radius circle around the reference point. Bank angle should not exceed 60° throughout the maneuver. The steepest bank angle should be abeam the reference point on downwind, and the shallowest bank angle should be abeam the reference point on upwind.
5. Airspeed should remain at 80 knots.
6. Be sure to divide attention between airplane control and ground track while maintaining coordinated flight.
7. When the maneuver is complete, apply power and return to straight-and-level flight.
8. The roll-out from this maneuver should be toward a specified object or heading, such as an area that could be used in the event of an emergency landing.

#### **Completion Standards:**

- **Commercial Pilot PTS Area of Operation V, Task B**

# STEEP SPIRALS





## **Chandelles**

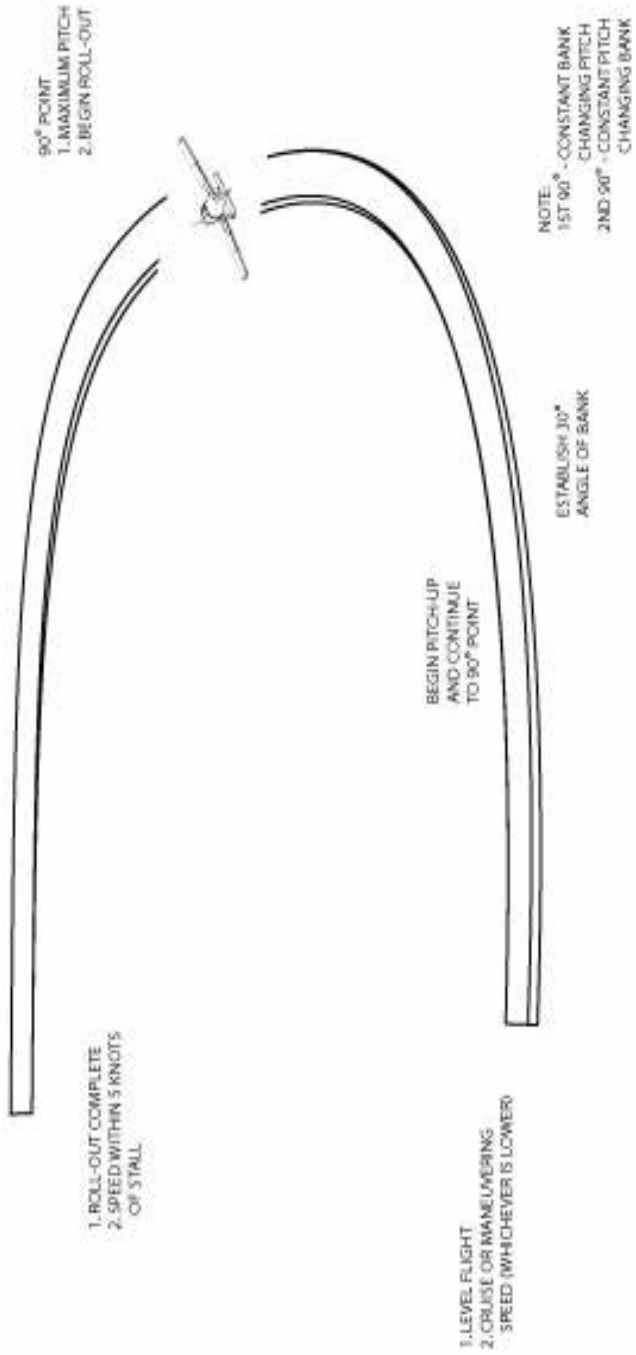
Airplane Flying Handbook FAA-H-8083-3

1. Selected an altitude that will allow the maneuver to be performed no lower than 1500 feet AGL.
2. Fly a heading perpendicular to the wind, and select a 90° point, to be seen off the airplane's wing.
3. Begin the turn, slowly increasing bank to 30° while simultaneously increasing pitch slowly, and slowly applying full power.
4. Continue increasing pitch to arrive at the 90° point with the maximum pitch up, approximately 15°.
5. Continue the turn to the 180° while maintaining the maximum pitch up attitude. Increase backpressure on the stick as necessary.
6. Slowly reduce the bank angle to arrive at the 180° point with wings level, maximum pitch up, and airspeed of approximately 55 knots.
7. To recover, resume straight-and-level flight and maintain altitude.

### **Completion Standards:**

- **Commercial Pilot PTS Area of Operation V, Task C**

# CHANDELLE





## **Lazy Eights**

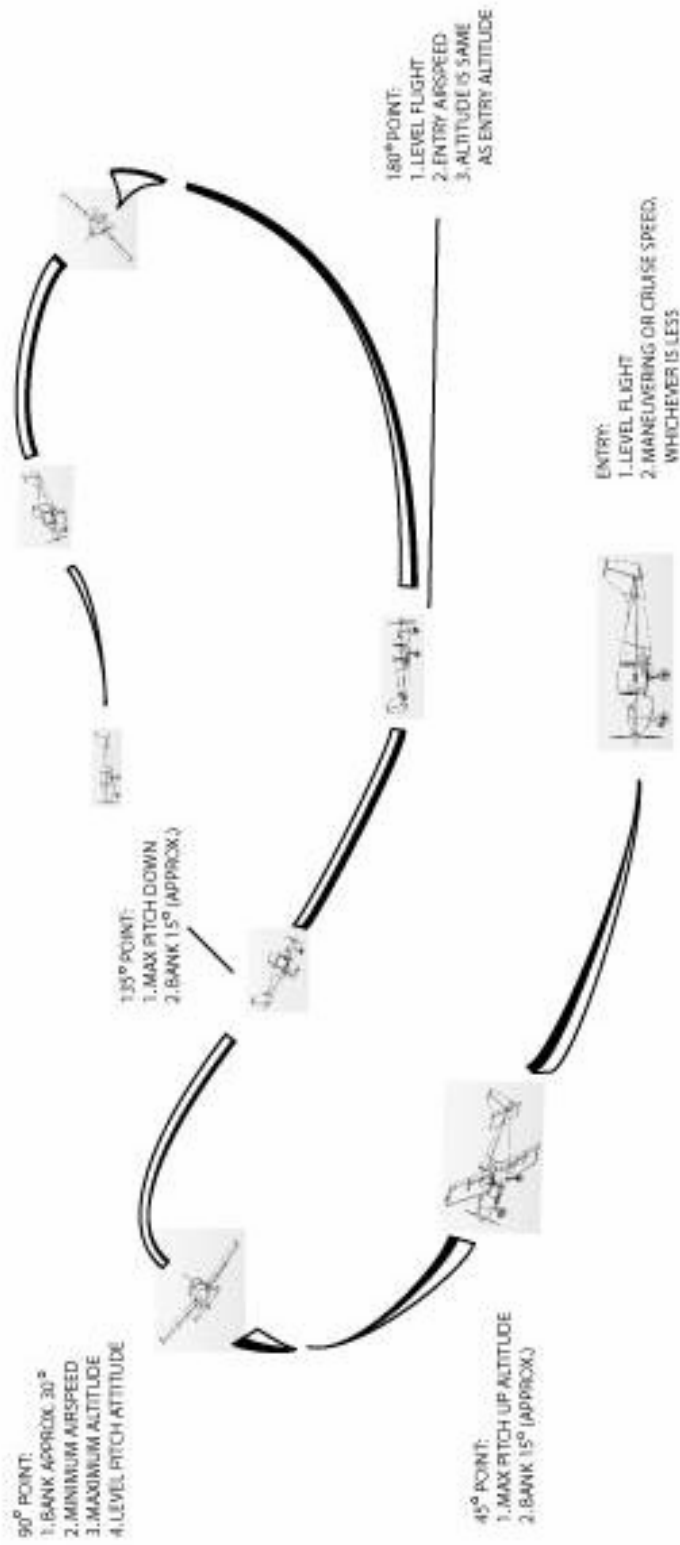
Airplane Flying Handbook FAA-H-8083-3

1. Select an altitude that will allow the maneuver to be performed no lower than 1500 feet AGL.
2. Fly a heading perpendicular to the wind, and select a 90° point, to be seen off the airplane's wing, a 45° point off the airplane's nose, and another 45° point off the airplane's tail.
3. Start the maneuver, slowly increasing pitch and bank to arrive at the first 45° point with maximum pitch up of approximately 15° and a bank angle of 15°.
4. Passing through the first 45° point, decrease the pitch attitude and increase the bank angle to arrive at the 90° point with 30° bank and 0° pitch attitude.
5. Passing through the 90° point, continue to decrease pitch attitude and bank to arrive at the second 45° point with maximum pitch down of approximately 15° and a bank angle of 15°.
6. Passing through the second 45° point, continue to decrease bank and allow the pitch attitude to increase to achieve straight-and-level flight upon reaching the 180° point. At the 180° point, the airplane should be at its original altitude airspeed.
7. Perform the maneuver to the opposite direction using the same techniques stated above.

### **Completion Standards:**

- **Commercial Pilot PTS Area of Operation V, Task D**

# LAZY EIGHTS





### **Eights on Pylons**

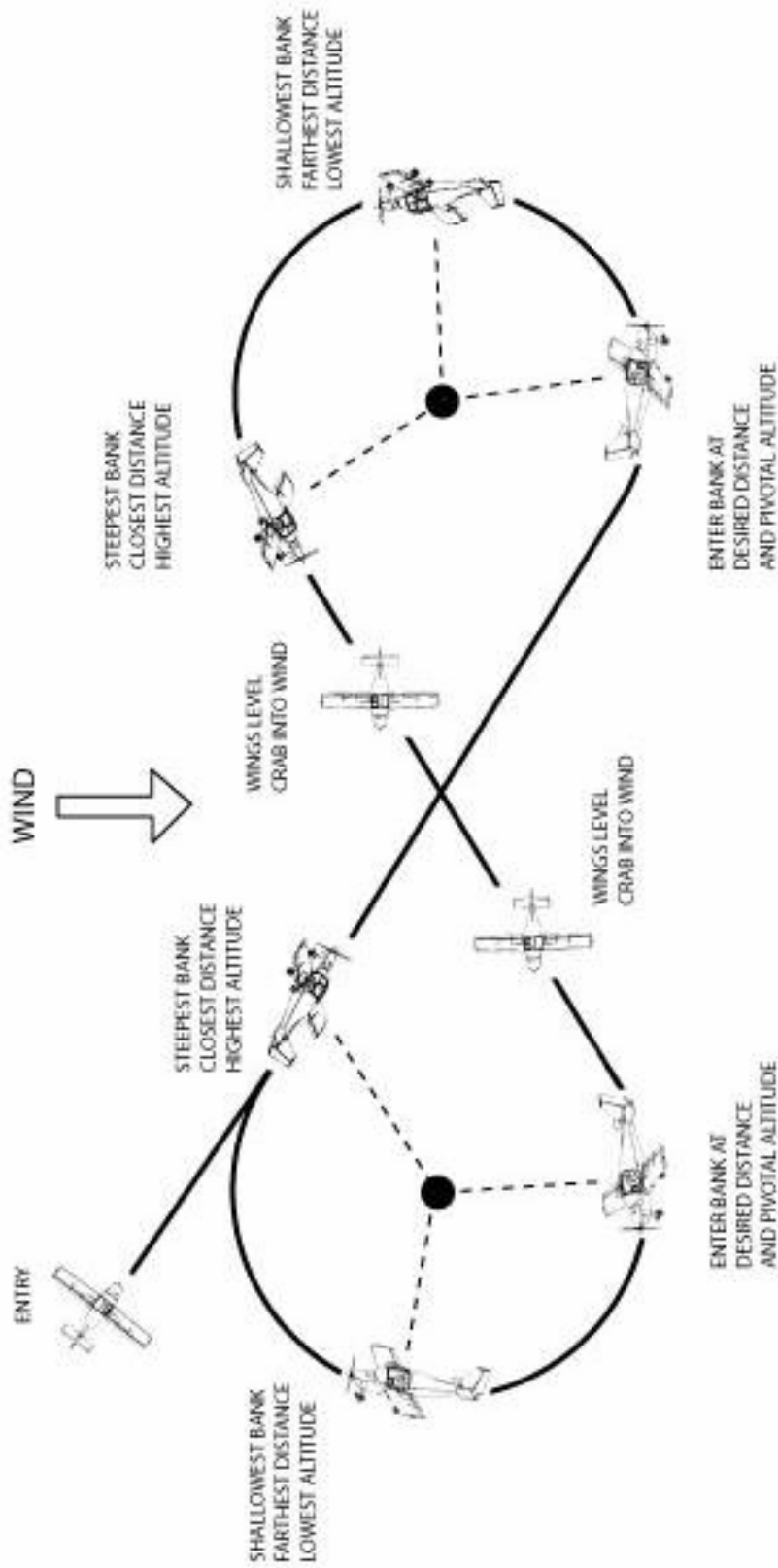
Airplane Flying Handbook FAA-H-8083-3

1. Select two pylons, perpendicular to the wind, which will permit straight-and-level flight between the two pylons for approximately 3-5 seconds.
2. Determine the pivotal altitude. This can be determined by squaring the groundspeed and dividing this product by 11.3.
3. Enter the maneuver on the downwind between the two pylons at a distance from the pylon that will require the use of a 30° to 40° bank at the steepest point of the maneuver.
4. Apply pitch corrections so that the line-of-sight reference line remains on the pylon to compensate for changes in groundspeed. Groundspeed changes should be anticipated to maintain the alignment of the pylon with the reference line.
5. Be sure to divide attention between airplane control and outside visual references.
6. About three-quarters of the way around the pylon, establish straight-and-level flight for approximately 3-5 seconds to transition to the second pylon.
7. Perform the maneuver to the opposite direction using the techniques stated above.

#### **Completion Standards:**

- **Commercial Pilot PTS Area of Operation VI**

# EIGHTS-ON-PYLONS





**Intercepting and Tracking VOR Radials**  
Instrument Flying Handbook FAA-H-8083-15

1. Tune and identify the VOR station.
2. Determine the radial the aircraft is on FROM the station.
3. Rotate the OBS to the radial that is to be intercepted.
4. The movement of the CDI will indicate the direction of the turn to intercept the radial. For example, if the CDI moves to the right, the turn to intercept the radial will be to the right, and vice versa.
5. To determine the intercept heading, find the difference in degrees between the radial you are on and the radial to be intercepted.
6. Double this difference to determine the intercept angle, which will not be less than 20° nor greater than 90°. If the airplane is within five miles of the station, the intercept angle should not exceed 30°.
7. Turn to the interception heading.
8. Hold this heading until the CDI begins to move towards center. Plan to lead the turn to prevent overshooting the course. When the CDI centers, the airplane is on course.
9. Turn to the magnetic heading corresponding to the selected course and track the radial.

**Completion Standards:**

- **Instrument Pilot PTS Area of Operation V**



**Intercepting and Tracking DME Arcs**  
Instrument Flying Handbook FAA-H-8083-15

1. Tune and identify the facility.
2. Determine the radial the airplane is on FROM the station.
3. When the airplane is .5 miles from the desired DME arc distance, select the radial 10° ahead of your current radial in the direction the arc is to be flown. Turn 90° ahead of this radial in the direction the arc is to be flown.
4. When the CDI centers, turn the OBS to the next 10° increment that the aircraft will cross and turn to a heading 90° ahead of that radial.
5. Make adjustments to correct for the wind as appropriate.

**Completion Standards:**

- **Instrument Pilot PTS Area of Operation V**



## **Holding Procedures**

Instrument Flying Handbook FAA-H-8083-15

1. Once receiving holding instructions from ATC, determine if a direct, parallel, or teardrop entry will be the appropriate entry into the holding pattern.
2. Reduce airspeed to holding speed of 100 knots approximately three minutes prior to reaching the holding fix.
3. Once crossing the holding fix, notify ATC and use the appropriate holding pattern entry. If your entry is a parallel entry, turn to a heading parallel the holding course outbound on the non-holding side. If your entry is a teardrop entry, turn to a heading 30° in the direction of the holding pattern of the outbound leg heading. If your entry is a direct entry, turn to the outbound heading.
4. Timing of one minute begins on the outbound leg of the hold when, if holding on a VOR, a complete reversal of the TO/FROM flag. For intersection holding, timing begins when established on the outbound leg. Timing is not required for DME holding, as only leg distance is required.
5. After timing the outbound course for one minute, turn to intercept the inbound course. Timing for the inbound course starts when established on the inbound heading.
6. When crossing the holding fix, if inbound leg time did not equal one minute, adjust the outbound leg time to establish a one minute inbound leg time. For example: if inbound time was 1 minute and 10 seconds, adjust the outbound leg to 50 seconds.
7. Adjust for wind, as appropriate, to maintain the desired pattern.
8. Depart the holding pattern when crossing the holding fix, and notify ATC when leaving the fix.

### **Completion Standards:**

- **Instrument Pilot PTS Area of Operation III, Task C**



**VOR Instrument Approach**  
Instrument Flying Handbook FAA-H-8083-15

1. Complete the descent and before landing checklists.
2. Once intercepting the intermediate approach course inbound, maintain an airspeed of 90 knots at approximately 2300 RPM.
3. Keep the CDI centered to stay on course.
4. When indicated by the approach procedure (usually the Final Approach Fix), set flaps to 20° and begin a descent at 700 feet per minute at approximately 1850 RPM.

**NOTE: Flaps may be set to 20° at 90 knots for the approach. Full flaps may NOT be extended above 80 knots.**

5. At MDA, if the runway environment is in sight, continue the descent for landing. Slow the aircraft to a safe flap operating speed and set full flaps, at the pilot's discretion.
6. Execute a normal landing if the runway environment is in sight.
7. If the runway environment is not in sight at MDA, or the airplane cannot make a normal descent to landing for any reason, execute the appropriate missed approach procedure.

**Completion Standards:**

- **Instrument Pilot PTS Area of Operation VI, Task A**



## **ILS Instrument Approach**

Instrument Flying Handbook FAA-H-8083-15

1. Complete the descent and before landing checklists.
2. Once intercepting the intermediate approach course inbound, maintain an airspeed of 90 knots at approximately 2300 RPM.
3. Keep the CDI centered to stay on course.
4. Once the glide slope needle is centered, set the flaps to 20° and begin a descent that will maintain the glide slope. A 500 foot per minute descent can be obtained at approximately 2000 RPM.

**NOTE: Flaps may be set to 20° at 90 knots for the approach. Full flaps may NOT be extended above 80 knots.**

5. At DA, if the runway environment is in sight, continue the descent for landing. Slow the aircraft to a safe flap operating speed and set full flaps, at the pilot's discretion.
6. Execute a normal landing if the runway environment is in sight.
7. If the runway environment is not in sight at DA, or the airplane cannot make a normal descent to landing for any reason, execute the appropriate missed approach procedure.

### **Completion Standards:**

- **Instrument Pilot PTS Area of Operation VI, Task B**



### **Missed Approach**

Instrument Flying Handbook FAA-H-8083-15

1. If the runway is not in sight at the MAP, apply full power, pitch for 80 knots, and notify ATC you are executing a missed approach.
2. Retract the flaps to 20° once a positive rate of climb is established and  $V_x$ , 70 knots, is attained.
3. Retract the flaps to 0° upon reaching  $V_y$ , 80 knots.
4. Execute the appropriate missed approach procedure.

#### **Completion Standards:**

- **Instrument Pilot PTS Area of Operation VI, Task C**



### **Circling Approach**

Instrument Flying Handbook FAA-H-8083-15

1. Before beginning the circling approach, verify the maneuver can be safely executed.
2. Establish the airplane on the appropriate leg of the traffic pattern to circle to the runway.
3. Maintain visual contact with the runway at all times.
4. When the airplane is in a position from which a safe and normal descent to landing can be executed, reduce power as required and begin a descent to landing.
5. At any time during the circling approach, if visual contact is lost with the runway, execute a missed approach.

#### **Completion Standards:**

- **Instrument Pilot PTS Area of Operation VI, Task D**

## NOTES:

**NOTES:**

