

Flight Lesson: Eights on Pylons

Objectives:

1. To develop the pilot's ability to maneuver the plane accurately while dividing one's attention between the flight path and the selected points on the ground.
2. To develop the pilot's precision flying in wind conditions.
3. To develop the pilot's confidence maneuvering low to the ground.

Justification:

1. Required for the commercial checkride.

Schedule:

Activity	Est. Time
Ground	0.75
Preflight/Taxi	0.25
Flight	1.0
Debrief	0.25
Total	2.25

Recommended Readings:

AFH	Ch. 6: 6-12 to 6-16 Eights on Pylons
WEB	http://www.youtube.com/watch?v=12MF1L5gcdw

Elements Ground:

- Eights on Pylons
 - "wingtip view"
 - pivotal altitude
 - view technique
 - procedure

Elements Air:

- eights on pylons

Completion Standards:

1. When the student is able to complete the maneuver to the requirements of the Commercial PTS

Common Errors:

- Rudder used to center pylon
- does not use pivotal altitudes correctly
- makes altitude changes too abruptly
- focuses on pylons only
- does not roll out of first turn at proper heading to allow for drift
- wings level too long

Presentation Ground:

Eights on Pylon Overview

1. :ground reference maneuver about 2 pylons where the airplane is flown at an altitude and airspeed such that a line parallel to the plane's lateral axis, and extending from the pilot's eye appear to pivot on each of the pylons.

2. draw overhead and side views

PTS Standards			
initial altitude	Appropriate PA	Max Bank	30-40°

3. distance from pylons will vary throughout maneuver.

(1) upwind position you will be closest to pylon (ground distance)

“wingtip view”

1. while in the correct position, during the maneuver, when we look outside, our view will look as though the pivot is “on our wingtip”

(1) a line drawn from our eye parallel to the imaginary extended lateral axis will intersect the pylon

(2) imagine a string connected to this imaginary line.

i. regardless of what point in the maneuver we are at, the string length should stay the same.

(3) will appear to pivot on the pylon throughout the maneuver.

Pivotal Altitude

1. :the specific altitude at which, when the airplane turns at a given ground speed, a projection of the sighting reference line to the selected point on the ground will appear to pivot on that point.

(1) i.e., the altitude at which our plane will pivot correctly around the pylon.

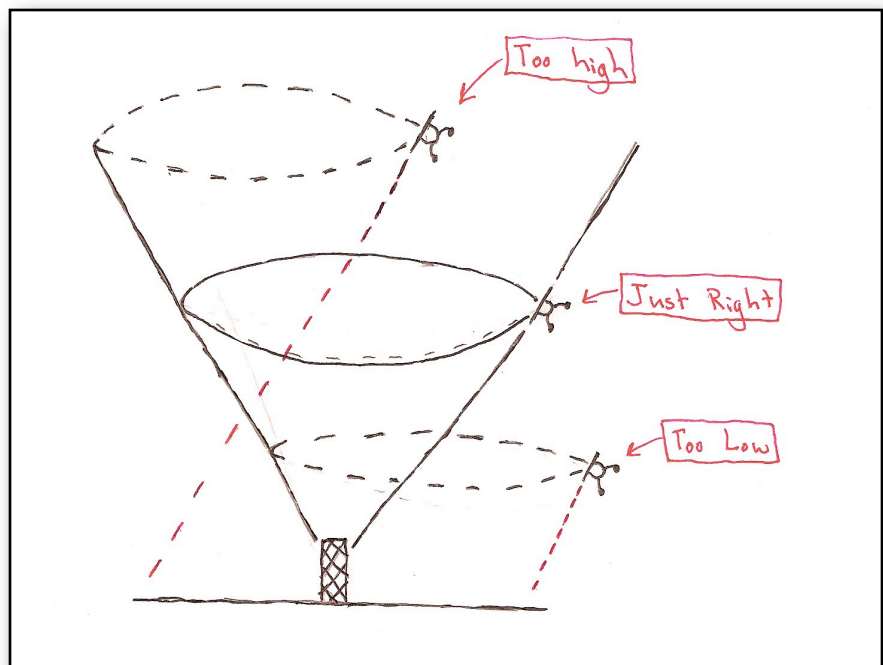
2. Pivotal altitude is only effected by ground speed, not bank angle so your pivotal altitude will be the same regardless of how far you are from the pylons.

(1) in a no wind situation, pivotal altitude will not change since the GS does not change.

(2) with wind, we will constantly change altitude to compensate for changes in GS.

3. To select a pivotal altitude there is a formula:

(1) pivotal altitude = $(GS \times GS) / 11.3$



4. Pivotal altitude is not effected by bank angle so pivotal altitude will remain the same regardless of how far you are from the pylons
5. since our pivotal altitude will constantly be changing when wind conditions are present, we will always calculate our downwind pivotal altitude, and then use a view technique to change the altitude thereafter.

(1) when GS is faster, PA is highest

Push Forward, Pull Back (View Technique)

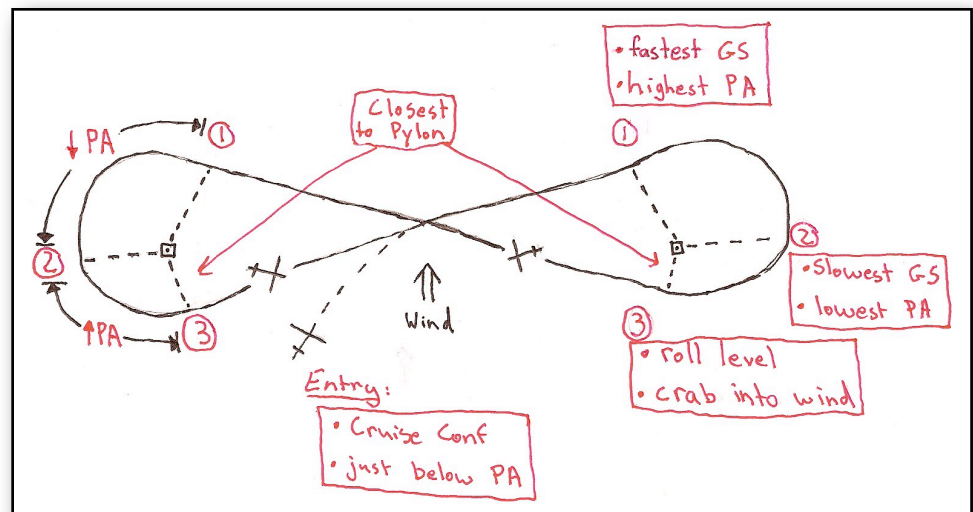
1. This view technique allows easy intuitive adjustment of pivotal altitude based on what we are seeing outside the plane.
2. After entering at the correct altitude for our downwind GS, a bank should begin when the pivot is intersecting our reference line.
3. From then on, push forward, pull back
 - (1) if the pivot is moving forward, we push the plane forward
 - (2) if the pivot is moving backward, we pull the plane back
4. This technique must be done with small changes only. don't chase the pivot.
5. Anticipate, and lead the changes to make it as smooth as possible.

Procedure

1. Before beginning, select two points on the ground along a line which lies 90° to the direction of the wind.
 - (1) The pivots should be picked such that they are sufficiently prominent so they can be seen by the pilot and allow adequate spacing to provide time for planing the next turn, but should not cause unnecessary straight and level time between turns
 - i. approx. 3-5 seconds of S&L flight should be sufficient for checking the area properly before entering the next turn.
2. The area should be cleared and the plane should be at the pivotal altitude (using the wind speeds from a local airport) and entering diagonally crosswind at V_a
3. As the plane approaches the pylon, the turn should be started toward the first pylon, and the wingtip should be placed on the pylon.

- (1) The wingtip should appear to pivot on the pylon.
- (2) As the plane turns upwind, the groundspeed decreases, and the pivotal altitude should be lower.
 - i. (Push Forward, Pull Back)

- (3) Since a constants distance from the pylon is not required, maintain a bank angle sufficient to keep the pylon on the wingtip of the plane.
- (4) As the plane approaches downwind, the plane should be rolled out to allow a diagonal path to the next pylon, accounting for wind drift corrections.



(5) Once plane is in the correct position for the next turn, begin the pivot using the same technique as the first pylon.

4. **NOTE: do NOT use rudder to keep the wing on the pylon. KEEP THE PLANE COORDINATED. This is the #1 mistake.**

Presentation Air:

1. Eights on Pylons

- (1) Find a good practice area and practice using student picked points.
- (2) Allow student to practice picking the points, choosing the altitude, and entry point
- (3) Note, the view may be different for one seat than another.