

Flight Lesson: Chandelles

Objectives:

1. to develop the pilot's coordination, orientation, planning, and feel for maximum performance flight
2. to develop positive control techniques at varying airspeeds and attitudes
3. to understand the elements relating to the chandelle maneuver, and be able to perform it to the standards of the PTS

Justification:

1. Required for the commercial checkride.

Schedule:

Activity	Est. Time
Ground	0.25
Preflight/Taxi	0.25
Flight	1.0
Debrief	0.25
Total	1.75

Recommended Readings:

AFH	Ch. 9: 9-4 to 9-5 Chandelles

Elements Ground:

- chandelle overview
- procedure
- notes

Elements Air:

- chandelles left and right

Completion Standards:

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

Common Errors:

- does not pitch up enough to attain minimum controllable airspeed
- does not change pitch and bank at constant rates
- does not end up 180° from entry heading
- does not look outside

Presentation Ground:

Chandelles Overview

1. :climbing turn beginning from approximately straight-and-level flight, and ending at the completion of 180° of turn in a wings level, nose high attitude at minimum controllable airspeed

2. draw overhead and demonstrate with airplane

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

3. maneuver requires that the maximum flight performance of the airplane be obtained, thus:

- (1) the airplane should gain the most altitude possible for a given degree of bank and power setting without stalling
- (2) since planes get different performance depending on atmospheric conditions, specific altitude gain is not a criterion

4. keys to maneuver:

- (1) 1st 90° - constant bank, changing pitch
- (2) 2nd 90° - constant pitch, changing bank

Procedure

1. entry configuration

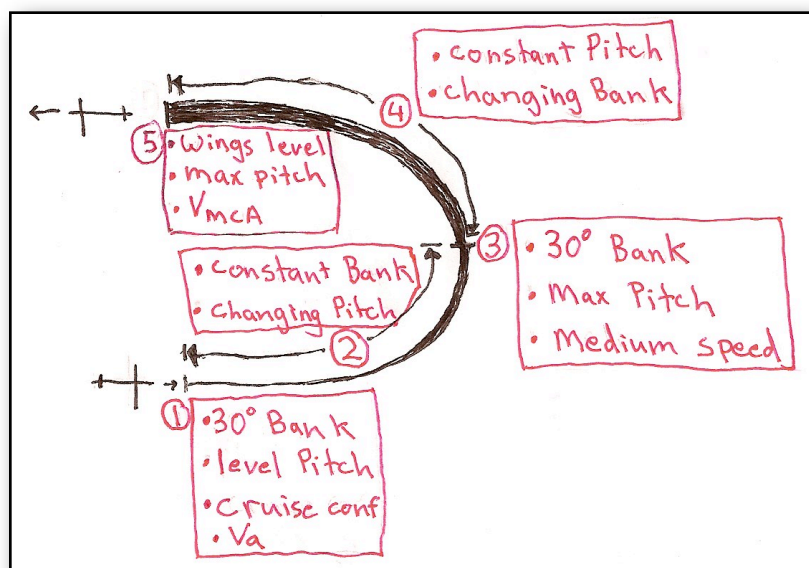
- (1) prior to starting the maneuver, flaps & gear up
- (2) power set to cruise
- (3) maneuver should be started at an airspeed no greater than the manufacturer's recommended speed for chandelles (or in its absence, designed maneuvering speed)
- (4) clear area

2. 0° - 90°

- (1) smoothly enter coordinated turn to a bank of 30° with no back elevator
- (2) upon reaching 30° established, pitch nose up at a constant rate to the 90° point
- (3) simultaneously add full power
 - i. should result in attaining the highest pitch attitude
- (4) remember, until 90° point, bank remains constant at 30°

3. 90° - 180°

- (1) begin rolling out at a constant rate so as to be wings level 180° from entry heading
 - i. fairly slow roll out
 - ii. as you roll out, vertical lift component will increase, so less back pressure will be needed to keep pitch attitude



(2) remember, after 90° point, pitch remains constant, bank is changing

4. **exit**

(1) once at 180° point, plane should be at minimum controllable airspeed (stall horn should be sounding)

(2) attitude should look something like a power-on stall

(3) maintain attitude momentarily, then pitch nose over slowly to resume straight and level cruise while maintaining altitude

Notes

1. since the airplanes speed is constantly decreasing, right rudder usage will be constantly changing

(1) coordination is important to pay attention to

i. use feel of controls and ball to keep centered

2. rollout coordination is important

(1) because of the effects of lowering an aileron to raise a wing (creating more drag), the plane will want to yaw in the direction of the turn during rollout

i. to the left, the plane will want to yaw even more left (high power setting, high AoA) so significant right rudder will be necessary

ii. to the right, the plane will want to yaw right, but that will be counteracted by left turning tendencies, so don't use too much left rudder

(i) releasing right rudder is usually sufficient

3. in order to hold constant 30° bank, opposite aileron will be increasing through out the first 90° heading change due to decreasing airspeed

4. in order to hold pitch constant , back elevator will continue to increase throughout the second 90° due to decreasing airspeed

5. stall speeds indicated on the airspeed indicator are the power-off stall speeds. the power on stall speeds will be lower than the indicated stall speed due to:

(1) vertical component of thrust available

(2) pitot static installation errors

Presentation Air:

1. chandelles over practice area

2. continue practice until check ride as maneuver is easily forgotten