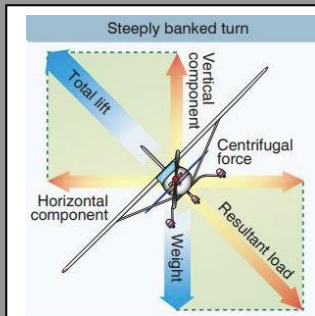


Steep Turns



AIR ECHO ALPHA 51, LLC.

Objective: Develop smoothness, coordination, orientation, division of attention and control techniques during turns.



Common Errors

- Not clearing the area
- Improper pitch, bank & power coordination during entry & rollout
- Uncoordinated use of the flight controls
- Improper procedure in correcting altitude deviations
- Loss of orientation
- Gaining or losing altitude
- Failure to maintain constant bank angle
- Ineffective use of trim
- Ineffective use of power & airspeed control
- Performing by reference to the flight instrument rather than visual references
- Failure to scan for other traffic during the maneuver
- Failure to stop the turn on designated heading

Completion Standards

- Adheres to recommended safety precautions
- Understands how the load factor changes in a steep turn and the affects on stall speed
- Accomplishes the maneuver in both directions
- Divides attention between aircraft control and orientation
- Maintain the entry altitude ± 100 feet, airspeed ± 10 knots, bank $\pm 5^\circ$, and roll out on the entry heading $\pm 10^\circ$.

Preparation for Flight & Preflight Discussion

20- Min

- The Pilot & Crew**
P/M Safe Checklist & Delegate Duties
- The Plane**
POH - Stall speeds, CG location, Weight, Configuration (flaps) & bank angles
- The Environment**
Weather Briefing
The effects of environmental elements on aircraft performance (turbulence, wind shear, and high-density altitude)
- External Pressures**
Aerodynamics associated with steep turns
Loss of vertical component of lift
Increased load factor
Overbanking tendency
Left turning tendencies
Factors & situations that could lead to an accelerated stall
Limitations of stall warning horns/speeds
Distractions, improper task management, loss of situational awareness, or disorientation.
Coordinated and uncoordinated flight
- Rate and radius of turn
Function of airspeed & angle of bank
- Altitude deviations in steep turns
Slight increase or decrease in bank angle to control small altitude deviations
- Load Factor & Stall speed
Load factor in 45° bank = 1.414 G's

Bank	G's
0°	1
30°	1.155
45°	1.414
60°	2
70°	2.924
75°	3.864

The stall speed increases as the square root of the G's applied

- Inadvertent stalls while turning
Reduce AOA before leveling the wings
- Spin Awareness
Stalls which result from abrupt maneuvers tend to be more rapid, or severe. Failure to take immediate steps toward recovery may result in a complete loss of control & spins.

Flight Maneuvers

20- Min

- Clear the Area**
Altitude: Task completed $> 1,500$ ft
Airspeed: @ or below V_A
Airspace: E or G
Area Clear: No traffic
- The Set-up**
Choose a ground reference point and/or set heading bug to note starting heading & note altitude
- Steep Turns (One in each direction)
Smoothly roll into a 50° bank angle
As the bank angle is being established, smoothly apply elevator back pressure
**As AOA \uparrow induced drag \uparrow*
Increase Throttle (power) to maintain altitude and airspeed.
**As power & pitch \uparrow left turning tendencies \uparrow*
Trim to relieve back pressure
Anticipate roll out ($1/2$ bank angle
 $45^\circ = 22^\circ$ prior to desired heading)
Remove both the trim & power inputs as the maneuver is completed.
Roll out on the entry altitude & heading

Traffic Pattern & Low altitudes

15-Min

- When maneuvering in the pattern or at low altitudes, bank angles should be shallow to medium. No greater than (30 degrees)
- A stabilized approach = A good landing
Do not increase bank angles to salvage a bad approach. Go-around!