Fabricio Simoes, CFI

Area of Operation **IX** - Task **A**

Steep Turns

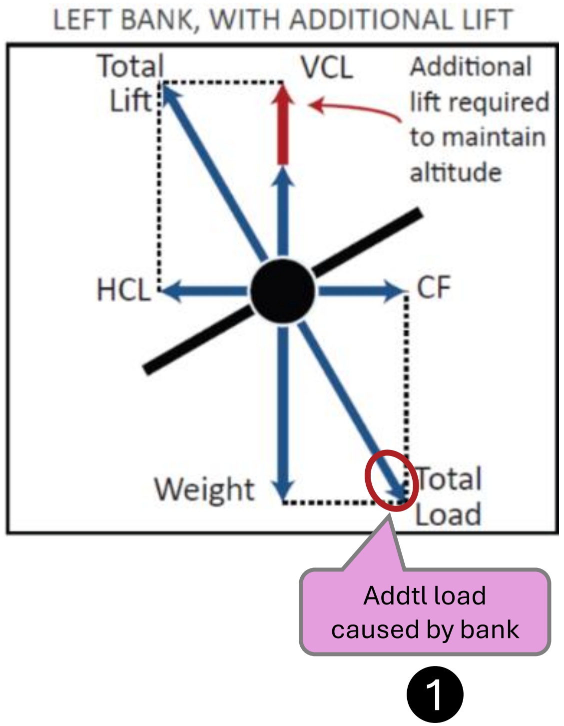
westflying

Key References:
- Airplane Flying Handbook
- Private and Commercial Pilot ACS

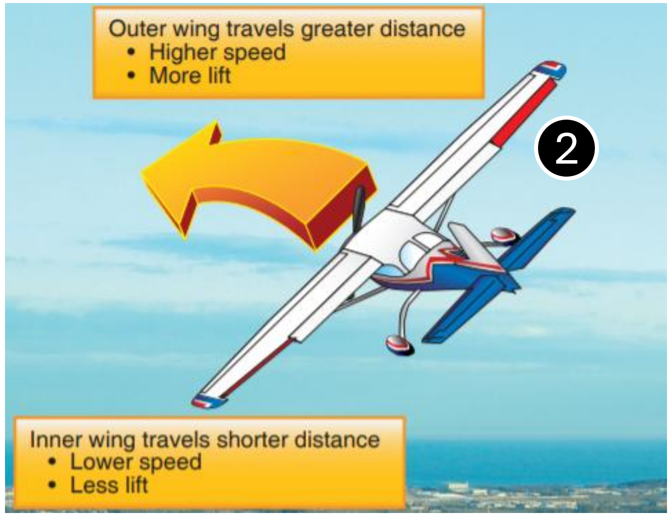
Content

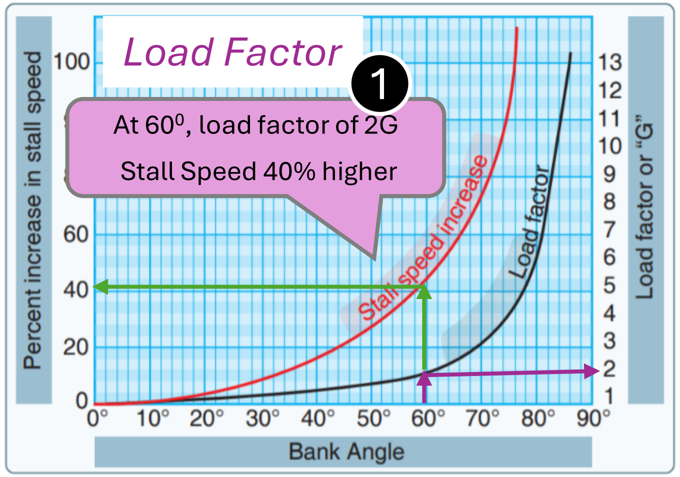
1. Introduction

- **What**: A constant altitude 360^0 turn in either direction using a bank of 45^0 (Private) or 50^0 (Commercial)
- **Why**: Understand the overbanking tendency, feel higher load factors and develop control techniques for maximum performance turns
- **The Science Behind it**:
  1. Higher bank = higher stall speed, higher load factor
  2. Overbanking Tendency = require opposite aileron
     - Adverse Yaw: higher wing creates more lift (thus more drag), yawing to the outside
     - Torque Effect in High Power settings: greater turning tendencies (to the left)
       - ✓ Left Turn → less left rudder + more opposite aileron
       - ✓ Right Turn → more right rudder + less opposite aileron



Overbanking Tendency





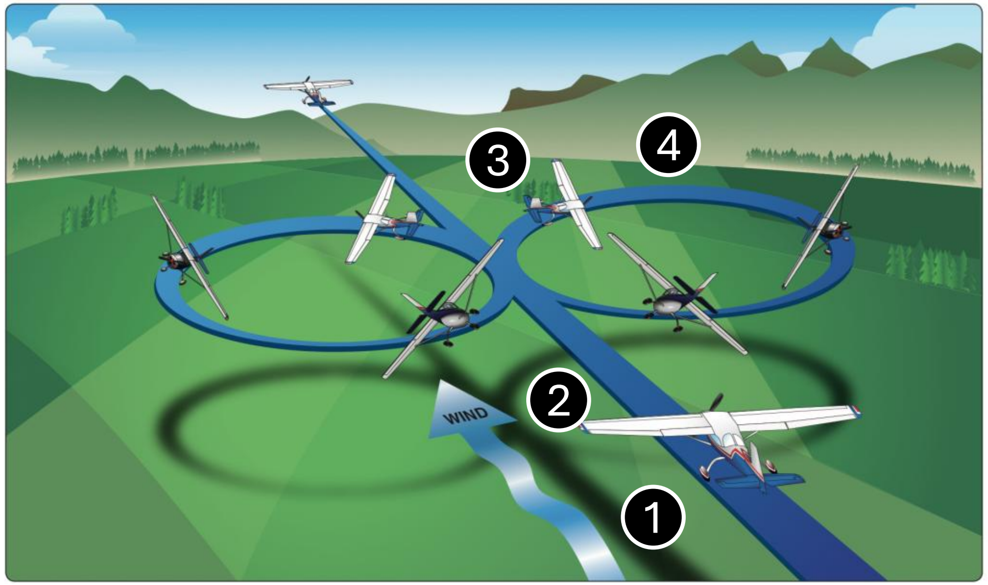
➡ **Standard (ACS):**

- Bank: **45^0** (PPL) or **50^0** (CPL) **±5^0**
- Airspeed **±10 kts**, Alt **±100ft (>1500ft AGL)**, Final hdg **±10^0**

2. The Maneuver

Rule of the thumb: Apply 2 rolls of trim and add approximately 200 rpm of power as you roll into the turn

1. Get a good reference in front of you (e.g. a mountain) and bug your heading as well
2. From stable, straight and level at the selected altitude, setup power to below Va (Maneuvering Speed)
3. Roll the airplane (bank and rudder), while applying a little power and adding trim
4. After 30^0 bank, add back pressure as needed and start applying **some opposite aileron**
5. Aim for 45^0 bank for Private, or 50^0 for Commercial
6. Cross reference outside references w/ instruments
7. **Adjust bank to help correct altitude**, and also pitch
8. Roll out smoothly about 20-25^0 before desired heading, **looking at the outside reference**.
9. Apply rudder and forward pressure while rolling out (if airplane is trimmed) and transitioning to the other side



3. Execution

Performing the maneuver in a C172S

1. Perform two 90° clearing turns
2. Select altitude above 1500ft AGL and outside reference
3. 95 KIAS (approx. 2300 RPM)
4. Cruise checklist
5. Bug heading and altitude
6. Enter a 360^0 turn → **add 2 rolls of Trim** + **200rpm of power**
7. Maintain alt (**±100ft**), airspeed (**±10 kts**), bank (**45^0** or **50^0 ±5^0**)
8. Between 20-25^0 heading, start rolling out using the outside reference, applying proper forward pressure and rudder
9. Look for traffic and roll into the opposite direction
10. Finish the maneuver in the same heading **±10^0**

4. Common Errors

1. Improper pitch, bank and power coordination during entry and rollout
2. Uncoordinated use of flight controls
3. Improper procedure in correcting altitude deviations
4. Loss of orientation

Questions?