Area of Operation **VI** - Task **G**

Steep Turns
(Instrument)

Content

Key References:
- Instrument Flying Handbook

1. Introduction

- **What**: Learn and practice the control inputs necessary to maintain altitude and airspeed at high angles of bank by reference to the instruments.
- **Why**: Increases proficiency in basic instrument flying, and Enables smooth, quick, and confident reactions to unexpected abnormal flight attitudes in IMC
- **Overview**:
  - Considered as any turn greater than standard rate
  - Same principles as a standard rate turn, but with greater aerodynamic forces on the airplane
  - Errors occur quickly and are more difficult to correct
  - Skill in crosscheck, interpretation and control
  - Maneuver is practiced at 45º bank

2. Steep Turn | Entry

- Establish the turn as you would normally do for any turn – bug **heading** and **altitude**
- Coordinated **rudder** and **aileron**: 45º bank
- As bank steepens, accelerate the crosscheck
  - Increase pitch to maintain altitude
  - Increase power to maintain airspeed
- Know & set the approximate pitch attitude
- Technique: Slow & smooth roll-in

2. Steep Turn | While in the Turn

Bank Control

- Primary Instrument: **Attitude Indicator**
- Coordinated aileron & rudder to maintain 45º
- Correct for overbanking tendencies
- Apply minor corrections
  - *If high, increased bank will reduce lift*
  - *If low, decreased bank will increase lift*

Pitch Control

- Primary Instrument: **Altimeter** (leverage VSI to anticipate correction)
- Don't delay pitch inputs, stay ahead
- To recover from an overbank/diving spiral
  - *Shallow the bank first*
  - *Hold or slightly relax elevator pressure*
  - *Increase crosscheck*
  - *Reduce power if needed*

Power Control

- Primary Instrument: **Airspeed Indicator**
- Additional power is needed to compensate for drag
  - *If entry was correct, power adjustments while in the turn will not likely be required*

2. Steep Turn | Recovery

- Begin the rollout approximately ½ bank angle prior to desired heading
- As bank is reduced:
  - Decrease pitch
  - Reduce power
  - Lead with rudder to maintain coordination
- Trim the airplane if needed

3. Partial Panel

Loss of Gyroscopic / AHRS Instruments

- Bank angle will be unknown without an attitude indicator
- Magnetic compass replaces heading indicator → Careful with ERRORS

If backup available, use backup, otherwise:

- Smooth & Steady Roll-in
- Turn Coordinator (if avail) as Primary bank
  - *Keep it stable*
- Altimeter as Primary Pitch
- Airspeed Indicator as Primary Power
  - *Set the approximate power setting*
- If airspeed is constant, alt/VSI constant, and rate of turn constant, your bank is likely constant as well

4. Common Errors

1. Failure to recognize and make corrections for pitch, bank and power
2. Failure to compensate for precession of the horizon bar in the attitude indicator
    - Precession may cause the instrument to move slowly and sluggishly or fall out of alignment
    - Possibility of a small bank angle and pitch error after a 180° turn (small, self corrects within a minute)
3. Uncoordinated use of flight controls
4. Improper trim technique

Questions?