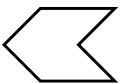


# Steep Turns

THE BACKSEAT PILOT



# Overview

- **What**
  - 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
  - Enables smooth, quick, and confident reactions to unexpected abnormal flight attitudes in IMC

## Content

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- Full Panel Steep Turn
- Partial Panel Steep Turn



# Steep Turn

- Any turn greater than standard rate
- Same principles as a standard rate turn, but greater aerodynamic forces on the airplane
  - Errors are more exaggerated, occur quickly, and are more difficult to correct
  - Skill in crosscheck, interpretation, and control is of greater importance
- Maneuver is practiced at 45° bank



# Steep Turn: Full Panel

## TURN ENTRY

- Established the same as a shallow turn
- As bank steepens, accelerate the crosscheck
- Increase pitch to compensate for reduced vertical lift
  - Know & set the approximate pitch attitude
- Increase power to compensate for increased drag
- Technique: Slow & smooth roll-in is easiest



Source: Instrument Flying Handbook, FAA

# Steep Turn: Full Panel

## BANK CONTROL

- Primary: Attitude Indicator
- Coordinated aileron & rudder
- Correct for overbanking tendencies
- Bank changes can lead to altitude changes
- Bank can also be used to correct altitude
  - If high, an increased bank will reduce lift
  - If low, a decreased bank will increase lift



Source: Instrument Flying Handbook, FAA

# Steep Turn: Full Panel

## PITCH CONTROL

- **Primary: Altimeter**
  - Crosscheck VSI, airspeed & attitude indicator
- **Fast bank changes = Fast lift changes**
  - Smooth, slow changes to bank and pitch
- **Delayed pitch changes require increasingly stronger elevator pressure**
- **To recover from an overbank**
  - Shallow the bank
  - Hold or slightly relax elevator pressure
  - Increase crosscheck
  - Reduce power, as necessary



Source: Instrument Flying Handbook, FAA

# Steep Turn: Full Panel

## POWER CONTROL

- Primary: Airspeed Indicator
- Additional power is required to compensate for increased induced drag
- Crosscheck the airspeed indicator during the turn
  - Adjust power as required



Source: Instrument Flying Handbook, FAA



# Steep Turn: Full Panel

## RECOVERY

- Smooth and steady
- Begin the rollout approximately  $\frac{1}{2}$  the bank angle prior to the desired heading
- Coordinate bank, pitch & power for a smooth, level roll-out
- As bank is reduced, decrease pitch and power
  - Return to straight-and-level flight



Figure 7-57. Straight-and-level flight (normal cruising speed).

Source: Instrument Flying Handbook, FAA



# Steep Turn: Partial Panel



- Differences
  - Bank angle is unknown without an attitude indicator
  - Magnetic compass replaces the heading indicator
  - Accelerated crosscheck is especially important

# Steep Turn: Partial Panel



- Smooth, steady roll-in
  - Establish bank, pitch and power
  - Accelerated crosscheck is especially important
- Primary Bank: Turn Coordinator
  - Keep the miniature aircraft stable
  - Bank angle is unknown
- Primary Pitch: Altimeter
  - As bank increases, elevator pressure must increase
  - Crosscheck the altimeter
- Primary Power: Airspeed Indicator
  - Set the approximate power setting
  - Monitor airspeed and adjust

# Steep Turn: Partial Panel

## RECOVERY

- Use the magnetic compass to rollout on the desired heading
  - Account for compass errors
- Smooth and steady rollout
  - As bank is reduced, lower the nose and reduce power
  - Use altimeter & VSI to recognize level flight
  - Maintain accelerated crosscheck



Questions?

