XII.E. Recovery from Unusual Flight Attitudes

References: FAA-H-8083-3; FAA-H-8083-15

Objectives  The student should develop knowledge of the elements related to recovering from unusual flight attitudes as required in the necessary PTS.

Key Elements  1. Crosscheck
2. Recovery
3. Coordination

Elements  1. General
2. Unusual Attitude Situations and Conditions
3. Recognizing Unusual Attitudes
4. Recovery Basics
5. Nose High (Climbing Turn) Recovery
6. Nose Low (Diving Spiral) Recovery
7. Coordination During Recovery

Schedule  1. Discuss Objectives
2. Review material
3. Development
4. Conclusion

Equipment  1. White board and markers
2. References

IP's Actions  1. Discuss lesson objectives
2. Present Lecture
3. Ask and Answer Questions
4. Assign homework

SP's Actions  1. Participate in discussion
2. Take notes
3. Ask and respond to questions

Completion Standards  The student will understand the reasons unusual flight attitudes may occur and the proper recovery procedure for a nose low or nose high unusual flight attitude.
Introduction:

Attention
On July 16, 1999, JFK Jr. was killed along with his wife and sister-in-law, when the aircraft he was piloting crashed into the Atlantic Ocean. Kennedy had 310 hours of flight experience, including 55 hours of night flying and 36 hours in the high-performance Piper Saratoga. He had completed about half of an instrument training course. The NTSB investigation found no evidence of mechanical malfunction and determined that the probable cause was "the pilot's failure to maintain control of the airplane during a descent over water at night, which was a result of spatial disorientation (or, not recovering properly from an unusual attitude). Factors in the accident were haze, and the dark night."

Overview

Review Objectives and Elements/Key ideas

What
An unusual attitude is an airplane attitude not normally required for instrument flight.

Why
An uncorrected unusual attitude can result in a dangerous situation if not recovered properly and quickly.

How:

1. General
   A. Since unusual attitudes are not intentional maneuvers, they are often unexpected
      i. The reaction is therefore, instinctive rather than intelligent and deliberate
         a. Individuals usually react with abrupt muscular effort, which is purposeless and even hazardous in turbulent conditions, at excessive speeds, or at low altitudes
   B. When an unusual attitude is noticed on your crosscheck, the immediate problem is not how it got there, but what it is doing and how to get it back to straight and level flight as quickly as possible*

2. Unusual Attitude Situations and Conditions
   A. Without adequate visual references, a pilot may unintentionally allow the aircraft enter a UA
   B. Unusual attitudes may result from a number of conditions, such as:
      • Turbulence
      • Disorientation
      • Instrument Failure
      • Confusion
      • Preoccupation with cockpit duties
      • Carelessness in crosschecking
      • Errors in instrument interpretation
      • Lack of proficiency in aircraft control

3. Recognizing Unusual Attitudes
   A. General Rule: If you note an instrument rate of movement or indication other than those you associate with the basic instrument flight maneuvers already learned, assume an unusual attitude and increase the speed of crosscheck to confirm the attitude, or instrument error, or instrument malfunction
   B. *When an unusual attitude is noticed on your crosscheck, the immediate problem is not how it got there, but what it is doing and how to get it back to straight and level flight as quickly as possible
   C. To avoid aggravating the UA with incorrect controls, the initial instrument reading must be accurate
   D. Nose High Attitudes (Climbing Turn)
      i. Shown by the rate/direction of movement of the altimeter, VSI, and ASI as well as the AI indications
         a. Rapidly decreasing AS
         b. Rapidly increasing Altitude (or increasing faster than desired)
E. Nose Low Attitudes (Diving Spiral)  
   i. Shown by the same instruments but in the opposite directions  
      a. Rapidly increasing AS  
      b. Rapidly decreasing AS (or decreasing faster than desired)  
      c. The TC indicates a bank  
F. CE - Failure to recognize an unusual flight attitude  
   i. This error is due to poor instrument crosscheck and interpretation  
   ii. Once in an unusual attitude, determine how to get out, not how the airplane got there  
   iii. Unusually loud or soft engine and wind noise may provide an indication  
4. Recovery Basics  
   A. In moderate unusual attitudes, the pilot can normally reorient with the AI, but this should not be done:  
      i. If the AI is spillable, its upset limits may have been exceeded  
      ii. It may have become inoperative due to mechanical malfunction  
      iii. Even if it isn’t spillable/is operating properly, errors of up to 5° pitch and bank may result  
      iv. Indications are difficult to interpret in extreme attitudes  
   B. Recovery, instead, is initiated by reference to the ASI, Altimeter, VSI, and TC  
   C. CE - Attempting to recover from an unusual attitude by “feel” rather than by instrument indications  
      i. The most hazardous illusions leading to spatial disorientation are created by the info received in the inner ear  
         a. The motion system in the inner ear can be tricked, and produce false sensations  
      ii. You must believe and interpret the flight instruments since spatial disorientation is normal in UA  
5. Nose High (Climbing Turn) Recovery  
   A. Nose High Attitudes - If the AS is decreasing, or below that desired:  
      i. Increase power  
      ii. Apply forward elevator pressure to lower the nose (preventing a stall)  
      iii. Correct bank by apply coordinated aileron and rudder pressure by reference to the TC  
         a. Aileron pressure before reducing the AOA could result in a spin  
      iv. The pressures listed are made in the order described but almost simultaneously  
      v. CE - Inappropriate control applications during recovery  
         a. Accurately interpret the instrument indications before starting a recovery  
         b. Follow the recovery steps in sequence  
         c. Control movements may be large but they must be smooth, positive, prompt, and coordinated  
   B. After initial control has been applied, continue with a fast crosscheck to ensure proper corrections  
      i. Level Flight is indicated by:  
         a. Reversal and stabilization of the Altimeter and ASI  
      ii. Straight and Coordinated Flight is indicated by:  
         a. Level miniature aircraft and centered ball on the TC  
      iii. CE - Failure to recognize from instrument indications when the passing through level flight  
         a. With an operative AI, level flight exists when the miniature airplane is level with the horizon  
         b. Without the AI, level flight is indicated by the reversal and stabilization of the ASI and altimeter  
6. Nose Low (Diving Spiral) Recovery  
   A. Nose Low Attitudes – If the AS is increasing, or above that desired:  
      i. Decrease power to idle  
      ii. Level the Wings  
         a. Correct the bank attitude with coordinated aileron and rudder pressure by reference to the TC
iii. Raise the nose to level flight attitude by applying smooth back-elevator pressure
   a. Increasing pitch attitude without decreasing bank will result in excessive G’s on the airplane
      • The instinctive reaction is to pull back on the controls
   b. Raise the nose smoothly to avoid overstressing the airplane
iv. The pressures listed should be made in the sequence given
v. CE - Inappropriate control applications during recovery
   a. Accurately interpret the instrument indications before starting a recovery
   b. Follow the recovery steps in sequence
   c. Control movements may be large but they must be smooth, positive, prompt, and coordinated

B. After initial control has been applied, continue with a fast crosscheck to ensure proper corrections
   i. Level Flight is indicated by the altimeter and ASI needles stopping and reversing direction
   ii. When AS returns to normal, set cruise power
   iii. CE - Failure to recognize from instrument indications when passing through level flight
        a. With an operative AI, level flight exists when the miniature airplane is level with the horizon
        b. Without the AI, level flight is indicated by the reversal and stabilization of the ASI and altimeter

7. Coordination During Recovery
   A. The AI and TC should be checked to determine straight/coordinated flight (wings level, ball centered)
      i. Skidding and slipping sensations can easily aggravate disorientation and retard recovery
      ii. A nose low recovery could result in excessive G’s and uncoordination, causing big problems

Common Errors:
- Failure to recognize an unusual flight attitude
- Consequences of attempting to recover from an unusual flight attitude by “feel” rather than by instrument indications
- Inappropriate control applications during recovery
- Failure to recognize from instrument indications when the airplane is passing through a level flight attitude

Conclusion:
Brief review of the main points
When recovering from an unusual attitude, it is essential to use the Airspeed indicator, Altimeter, Turn Coordinator, Heading Indicator and VSI to determine the situation, ignoring the AI. Recovery should be made promptly in the proper order to avoid damaging the airplane or aggravating the condition. Once level flight has been attained, the airplane should be reconfigured for straight-and-level flight.

PTS Requirements:
To determine that the applicant:
1. Exhibits instructional knowledge of the elements of recovery from unusual flight attitudes by describing:
   a. conditions and situations that may result in unusual flight attitudes.
   b. the two basic unusual flight attitudes—nose-high (climbing turn) and nose-low (diving spiral).
   c. how unusual flight attitudes are recognized.
   d. control sequence for recovery from a nose-high attitude and the reasons for that sequence.
   e. control sequence for recovery from a nose-low attitude and the reasons for that sequence.
   f. reasons why the controls should be coordinated during unusual flight attitude recoveries.
2. Exhibits instructional knowledge of common errors related to recovery from unusual flight attitudes by describing:
XII.E. Recovery from Unusual Flight Attitudes

a. failure to recognize an unusual flight attitude.
b. consequences of attempting to recover from an unusual flight attitude by “feel” rather than by instrument indications.
c. inappropriate control applications during recovery.
d. failure to recognize from instrument indications when the airplane is passing through a level flight attitude.

3. Demonstrates and simultaneously explains recovery from a nose-high and a nose-low unusual flight attitude from an instructional standpoint.

4. Analyzes and corrects simulated common errors related to recovery from unusual flight attitudes.