

## XII.E. Recovery from Unusual Flight Attitudes

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**References:** [Airplane Flying Handbook](#) (FAA-H-8083-3), [Instrument Flying Handbook](#) (FAA-8083-15)

Objectives	The student should develop knowledge of the elements related to recovering from unusual flight attitudes as required in the ACS/PTS.
Key Elements	<ol style="list-style-type: none"><li>1. Crosscheck</li><li>2. Recovery</li><li>3. Coordination</li></ol>
Elements	<ol style="list-style-type: none"><li>1. <a href="#">General</a></li><li>2. <a href="#">Unusual Attitude Situations and Conditions</a></li><li>3. <a href="#">Recognizing Unusual Attitudes</a></li><li>4. <a href="#">Recovery Basics</a></li><li>5. <a href="#">Nose High (Climbing Turn) Recovery</a></li><li>6. <a href="#">Nose Low (Diving Spiral) Recovery</a></li><li>7. <a href="#">Coordination During Recovery</a></li><li>8. <a href="#">Common Recovery Errors</a></li></ol>
Schedule	<ol style="list-style-type: none"><li>1. Discuss Objectives</li><li>2. Review material</li><li>3. Development</li><li>4. Conclusion</li></ol>
Equipment	<ol style="list-style-type: none"><li>1. White board and markers</li><li>2. References</li></ol>
IP's Actions	<ol style="list-style-type: none"><li>1. Discuss lesson objectives</li><li>2. Present Lecture</li><li>3. Ask and Answer Questions</li><li>4. Assign homework</li></ol>
SP's Actions	<ol style="list-style-type: none"><li>1. Participate in discussion</li><li>2. Take notes</li><li>3. Ask and respond to questions</li></ol>
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.

**Instructor Notes:**

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**Introduction:**

**Attention**

Interesting fact or attention-grabbing story

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**

Without proper recovery training on instrument interpretation and aircraft control, a pilot can quickly aggravate an abnormal flight attitude into a potentially fatal accident.

**How:**

**1. General**

- A. Since unusual attitudes (UAs) 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 is the aircraft doing and how to get it back to straight and level flight as quickly as possible

**2. Unusual Attitude Situations and Conditions**

- A. Unusual attitudes may result from a number of situations/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, 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 is the aircraft doing and how to get it back to straight and level flight as quickly as possible
- C. Unusual attitudes are broken down into two categories: Nose high, and Nose low attitudes
- D. Nose High Attitudes (Climbing Turn)

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- i. Shown by the rate/direction of movement of the altimeter, VSI, and airspeed indicator as well as the immediately recognizable indication of the attitude indicator (except in extreme attitudes)
  - a. Decreasing airspeed
  - b. Increasing altitude
  - c. Positive rate of climb
  - d. The turn coordinator indicates a bank
  - e. A lot of blue on the attitude indicator
- E. Nose Low Attitudes (Diving Spiral)
  - i. Shown by the same instruments but in the opposite directions
    - a. Increasing airspeed
    - b. Decreasing altitude
    - c. Negative rate of climb
    - d. The turn coordinator indicates a bank
    - e. A lot of brown on the attitude indicator
- F. **Common Error** - Failure to recognize an unusual flight attitude
  - i. Be alert to situations that can lead to unusual attitudes, and any out of the ordinary instrument indications – recover at the first sign
  - ii. Do not distract yourself with how the situation came to be, get back to straight-and-level flight

### 4. Recovery Basics

- A. In moderate unusual attitudes, the pilot can normally reorient with the attitude indicator, but this should not be done:
  - i. If the attitude indicator is spillable - its upset limits may have been exceeded and is unreliable
  - ii. It may have become inoperative due to mechanical malfunction, and is a reason for the UA
  - iii. Even if it isn't spillable and 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 airspeed indicator, altimeter, VSI, and turn coordinator
  - i. Follow the POH recommended recovery procedures, if they differ from the information here
- C. Nose High vs Nose Low Unusual Attitudes
  - i. Although similar, the recovery procedures for each are different
  - ii. The basic intent of the nose high recovery is to prevent a stall
  - iii. The basic intent of the nose low recovery is to prevent over stressing the airplane

### 5. Nose High (Climbing Turn) Recovery

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### A. Nose High Attitudes (Main Point: Avoid a stall) - If the airspeed is decreasing, or below that



desired:

#### i. Procedure

##### a. Power

- Increase power as necessary (in proportion to the deceleration)
- Power is increased to arrest the decreasing airspeed

##### b. Pitch

- Apply forward elevator pressure to lower the nose
- Forward elevator pressure reduces the AOA, in order to prevent a stall

##### c. Bank

- Correct bank with coordinated aileron/rudder pressure by reference to the turn coordinator

##### d. The steps listed are made in the sequence described above, but occur almost simultaneously

#### ii. After initial control has been applied, continue with a fast cross-check for possible overcontrolling

##### a. As the rate and movement of the altimeter and airspeed indicator needles decrease, the attitude is approaching level flight

##### b. When the needles stop and reverse direction, the aircraft is passing through level flight

#### iii. Return to the desired altitude, and establish/verify straight-and-level, coordinated cruise flight

##### a. Level Flight is indicated by:

- Reversal and stabilization of the altimeter and airspeed indicator

##### b. Straight and Coordinated Flight is indicated by:

- Level miniature aircraft and centered ball on the turn coordinator

##### c. Set power to maintain the desired airspeed once the airspeed is under control

### 6. Nose Low (Diving Spiral) Recovery

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### A. Nose Low Attitudes (Main Point: Avoid over G-ing) - If the airspeed is increasing, or above that



desired:

#### i. Procedure

##### a. Power

- Reduce power to prevent excessive airspeed and loss of altitude

##### b. Bank

- Level the wings
- Correct bank with coordinated aileron/rudder pressure by reference to the turn coordinator
- Leveling the wings prior to raising the nose reduces the load factors in the recovery

##### c. Pitch

- Raise the nose to level flight attitude by applying smooth back-elevator pressure
  - a Smooth back pressure avoids overstressing the airplane
  - b If ground contact is a concern, use whatever back pressure necessary to survive

##### d. All components of control should be changed simultaneously for a smooth, proficient recovery

#### ii. After initial control has been applied, continue with a fast cross-check for possible overcontrolling

##### a. As the rate and movement of the altimeter and airspeed indicator needles decrease, the attitude is approaching level flight

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#### iii. Return to the desired altitude, and establish/verify straight-and-level, coordinated cruise flight

##### a. Level Flight is indicated by:

- Reversal and stabilization of the altimeter and airspeed indicator

##### b. Straight and Coordinated Flight is indicated by:

- Level miniature aircraft and centered ball on the turn coordinator

##### c. Set power to maintain the desired airspeed once the airspeed is under control

##### d. With an operative attitude indicator, level flight exists when the miniature airplane is level with the horizon

##### e. Without the attitude indicator, level flight is indicated by the reversal and stabilization of the airspeed indicator and altimeter

## 7. Coordination During Recovery

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- A. The attitude indicator and turn coordinator should be checked to determine and maintain 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* uncoordinated flight, causing big problems

### 8. Common Recovery Errors

- A. **Common Error** - Inappropriate control applications during recovery
  - i. It is very important to properly recognize the type of UA and apply the proper procedures
    - a. Improper recognition/procedures can aggravate the UA, and lead to a stall or high load factors
- B. **Common Error** - Consequences of attempting to recover from an unusual flight attitude by “feel” rather than by instrument indications
  - i. Feel can be especially deceiving in IMC conditions. Without the ability to see the natural horizon, spatial disorientation can convince the pilot the aircraft is in a state that it is not
  - ii. Feelings are not to be trusted. Trust the instruments
- C. **Common Error** - Failure to recognize from instrument indications when passing through level flight
  - i. Level flight is indicated by the reversal/stabilization of the airspeed indicator and altimeter needles
  - ii. Increase your crosscheck to verify the passing through level flight

### 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 ignoring the attitude indicator and use the airspeed indicator, altimeter, turn coordinator, heading indicator and VSI to determine the attitude of the aircraft. Recovery should be made promptly in the proper order to avoid damaging the airplane or inducing a stall. 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.

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- 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:
  - 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.

### **Private Pilot ACS Skills Standards**

1. Recognize unusual flight attitudes; perform the correct, coordinated, and smooth flight control application to resolve unusual pitch and bank attitudes while staying within the airplane’s limitations and flight parameters