## XIII.D. Emergency Descent

**References:** Airplane Flying Handbook (FAA-H-8083-3), POH/AFM

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|---|---|
| Objectives | The student should develop knowledge of the elements related to an emergency descent, when the descent is required, and the proper procedure to perform the maneuver. The student will have the ability to perform the maneuver as required in the ACS/PTS. |
| Key Elements | 1. Configuration<br>2. Airspeed and Load<br>3. Recovery |
| Elements | 1. General<br>2. The Maneuver |
| Schedule | 1. Discuss Objectives<br>2. Review material<br>3. Development<br>4. Conclusion |
| Equipment | 1. White board and markers<br>2. References |
| IP's Actions | 1. Discuss lesson objectives<br>2. Present Lecture<br>3. Ask and Answer Questions<br>4. Assign homework |
| SP's Actions | 1. Participate in discussion<br>2. Take notes<br>3. Ask and respond to questions |
| Completion Standards | The student understands the situations which necessitate an emergency descent and can properly perform the maneuver with a smooth, controlled recovery. |

**Instructor Notes:**

**Introduction:**

**Attention**

Interesting fact or attention-grabbing story

This maneuver is a lot of fun to practice, partly because there is not a lot too it, but also because the airplane is put in a very nose low attitude and is descending very fast. You're dive bombing the ground.

**Overview**

Review Objectives and Elements/Key ideas

**What**

An emergency descent is a maneuver for descending as rapidly as possible to a lower altitude, or to the ground for an emergency landing.

**Why**

The need for this maneuver may result from an uncontrollable fire, a sudden loss of cabin pressurization, or any other situation demanding an immediate and rapid descent.

**How:**

1. **General**
   - A. Objective
     - i. To descend as soon and as rapidly as possible, within the structural limitations of the airplane
   - B. Situations
     - i. Fire, smoke, loss of cabin pressurization, or any other demanding situation (medical, injury, etc.)
     - ii. Common Error - The consequences of failing to identify reason for executing an emergency descent
       - a. If an emergency descent is necessary and not executed, the situation can become very dangerous, and unrecoverable
         - A fire can grow/spread quickly –often considered the most threatening hazard in an airplane
         - In the case of decompression, symptoms of hypoxia can set in
   - C. Follow the procedures outlined in the Emergency Procedures section of the POH
2. **The Maneuver**
   - A. Prior to the Maneuver
     - i. Clear the area visually
       - a. Thoroughly clear the area and broadcast intentions to alert other aircraft
       - b. Ensure it is clear below the aircraft – turns are likely necessary, especially in low wing aircraft
       - c. Common Error - Improper use of clearing procedures for initiating the emergency descent
     - ii. *Pre-Maneuver Checklist: Fuel Pump ON, Mixture RICH, Lights ON, Gauges GREEN
   - B. Procedure
     - i. Reduce power to idle

ii. Extend the flaps and gear as required by the manufacturer
    a. Provides maximum drag to make increase the rate of descent, without excessive airspeed
    b. Common Error - Improper use of the prescribed emergency checklist to verify accomplishment of procedures for initiating the emergency descent
        - Follow the POH
        - If the airplane is not configured correctly, the rate of descent may be less than desired and/or the airplane could be structurally damaged (exceeding airspeeds or load factors)
        - For example, leaving the flaps up could decrease the rate of descent/increase the airspeed, potentially exceeding limitations ($V_{NE}$), and overstressing the airplane during recovery
iii. Put the nose down to maintain the maximum allowable airspeed based on the procedure
    a. *Nose down pitch is approximately 12°, but may be adjusted based on the configuration
    b. This speed may vary based on flaps used, the nature of the emergency, and turbulent conditions
        - Never exceed $V_{NE}$ or $V_{FE}$ and always maintain positive control of the airplane
        - In an engine fire, a high speed descent could blow out the fire, however, weakening of the structure is a concern, and a low airspeed would result in less airframe stress
        - In the case of turbulence, do not exceed $V_A$
iv. As the nose is lowered, begin a 90° left turn at 30-45° of bank
    a. The turn acts as a clearing turn (below and to each side) and gets the airplane off an airway
    b. The turn is made to the left because faster traffic passes on the right (right of way rules)
    c. The bank puts positive load on the aircraft (countering the negative load from the descent)
v. Maintain the required airspeed until close to the desired altitude

C. Leveling Off (The most difficult part)
i. The recovery should be smooth to prevent overstressing the airplane
    a. These recommendations generally work well, but in the case of a real life emergency descent (i.e. a fire in the cabin), do what is necessary to land safely/stay alive
    b. Initiate the level off at an altitude that will ensure a safe recovery or precautionary landing
    c. The 10% rule works well
        - Ex: If descending at 1500 fpm, start the level off 150' above the desired altitude
ii. Increase power to the cruise setting, or as required
iii. Once straight and level, return the airplane to a normal configuration (flaps, gear, etc. are retracted)
iv. Re-trim the aircraft and adjust/lean the mixture as necessary
v. Common Error - Improper procedures for recovering from an emergency descent
    a. Follow the POH procedures
    b. Avoid overstressing the airplane with an aggressive level off

**Common Errors:**

- The consequences of failing to identify reason for executing an emergency descent
- Improper use of the prescribed emergency checklist to verify accomplishment of procedures for initiating the emergency descent

- Improper use of clearing procedures for initiating the emergency descent
- Improper procedures for recovering from an emergency descent

**Conclusion**:
Brief review of the main points
An emergency descent is used in a situation where altitude must be lost quickly in order to make a landing as soon as possible. If possible, the manufacturer's procedures should be followed. The airplane is put into a configuration which will allow for the maximum descent rate. Recovery should be smooth and controlled as straight and level cruise flight is reestablished.

**PTS Requirements:**
To determine that the applicant exhibits instructional knowledge of the elements related to emergency descents appropriate to the airplane being flown by:

1. Exhibiting instructional knowledge of the elements related to an emergency descent by describing:
   a. Situations that require an emergency descent.
   b. Proper use of the prescribed emergency checklist to verify accomplishment of procedures before initiating and during the emergency descent.
   c. Proper use of clearing procedures before initiating and during the emergency descent.
   d. Procedures for recovering from an emergency descent.
   e. Manufacturer's procedures.
2. Exhibits instructional knowledge of common errors related to an emergency descent by describing:
   a. The consequences of failing to identify reason for executing an emergency descent.
   b. Improper use of the prescribed emergency checklist to verify accomplishment of procedures for initiating the emergency descent.
   c. Improper use of clearing procedures for initiating the emergency descent.
   d. Improper procedures for recovering from an emergency descent.
3. Demonstrates and simultaneously explains emergency descents from an instructional standpoint.
4. Analyzes and corrects simulated common errors related to emergency descents.

**Private Pilot ACS Skills Standards**

1. Clear the area.
2. Establish and maintain the appropriate airspeed and configuration appropriate to the scenario specified by the evaluator and as covered in POH/AFM for the emergency descent.
3. Demonstrate orientation, division of attention and proper planning.
4. Use bank angle between 30° and 45° to maintain positive load factors during the descent.
5. Complete the appropriate checklist.

**Commercial Pilot ACS Skills Standards**

1. Clear the area.
2. Establish and maintain the appropriate airspeed and configuration appropriate to the scenario specified by the evaluator and as covered in POH/AFM for the emergency descent.
3. Demonstrate orientation, division of attention and proper planning.
4. Use bank angle between 30° and 45° to maintain positive load factors during the descent.
5. Maintain appropriate airspeed +0/-10 knots, and level off at specified altitude, ± 100 feet.
6. Complete the appropriate checklist.