XI.D. Accelerated Maneuver Stalls

References: FAA-H-8083-3; POH/AFM

Objectives The student should develop knowledge of the elements related to Accelerated Stalls and develop the ability to recognize such stalls immediately, with the capability to take prompt, effective recovery action.

Key Elements
1. Excessive Maneuvering Loads
2. Unusual Stall Attitudes
3. Normal Recovery

Elements
1. Aerodynamics
2. Possible Situations
3. The Maneuver

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 understands situations in which an Accelerated Stall is possible and has the ability to recognize and effectively recover from the stall.
XI.D. Accelerated Maneuver Stalls

Instructors Notes:

Introduction:

Attention
Stalling during a steep turn, or in a level, possibly even nose low attitude? Didn’t think that could happen?

Overview
Review Objectives and Elements/Key ideas

What
Stalls entered from flight situations that impose excessive maneuvering loads on the airplane. Situations such as steeps turns, pull-ups, or other abrupt changes in flightpath.

Why
Stalls which result from abrupt maneuvers tend to more rapid, or severe, than the unaccelerated stalls, and because they occur at higher than normal airspeeds, and/or may occur at lower than anticipated pitch attitudes, they may be unexpected.
The objective is to learn how Accelerated Stalls may occur and to develop the ability to recognize such stalls immediately, and to take prompt, effective recovery action.

How:

1. Aerodynamics
   A. A stall occurs whenever the critical angle of attack is exceeded
      i. The airstream can no longer follow the upper curvature of the wing
      ii. As the Critical AOA is approached the airstream begins separating from the rear of the upper surface
         • This causes a swirling or burbling of air as it attempts to flow over the upper surface
      iii. When the Critical AOA is reached, the turbulent airflow spreads forward over the entire upper wing
         a. Due to the loss of lift and the increase in form drag (wing/fuselage exposed to wind) the remaining lift cannot support the airplane
   B. Specific to an Accelerated Stall
      i. The airplane will stall at a higher indicated airspeed when excessive maneuvering loads are imposed on it
      ii. The AOA may exceed the critical angle while recovering from a steep descent too sharply
         a. The relative wind may be aligned with the descent angle causing a almost level stall
      iii. The airplane will stall during a coordinated steep turn exactly as it does from straight and level flight
         a. Except, the pitching and rolling actions tend to be more sudden
            • Slipping - Tends to roll rapidly toward the outside of the turn (Outside wing stalls 1st)
            • Skidding - Tends to roll rapidly toward the inside of the turn (Inside wing stalls 1st)
            • Coordinated - Both wings stall simultaneously, just like straight and level
      iv. Tend to be more rapid/severe as they occur at higher AS and lower than normal pitch attitudes
   C. Hazards of Accelerated Stalls
      i. Significant load factor increases can be imposed when pulling out of steep dives or in steep turns
         a. This can result in structural damage due to the excessive loads on the airplane (Stay below $V_A$)

2. Possible Situations
   A. Steep turns, stall and spin recoveries, steep pull ups, or other abrupt changes in the airplanes’ flightpath
XI. D. Accelerated Maneuver Stalls

3. The Maneuver
   A. Pre-Maneuver
      i. Checklist
         a. Fuel Pump ON
         b. Mixture RICH
         c. Lights ON
         d. Gauges GREEN
      ii. Clearing Turns
      iii. At a Safe Altitude
         a. Recovery no lower than 1,500’ AGL
      iv. Setup
         a. In a steep turn (Most common)
         b. Or, recovery from a descent
   B. Performing
      i. Establish the desired flight attitude
         a. From straight and level, roll into a steep, level turn (About 45°)
         b. At or Below $V_A$
            • The airplane will stall before the limit load factor can be exceeded
      ii. Then smoothly, firmly, and progressively increase the AOA until a stall occurs (At/Below $V_A$)
         a. This will increase wing loading, decrease AS, and the CF will push the pilot into the seat
   C. Recognizing the Stall
      i. High sink rate, nose-down pitching, extremely negative load factor, loss of control effectiveness
   D. Recovery
      i. The elevator pressure should be released and power increased to break the stall (Normal Recovery)
      ii. If uncoordinated, one wing may drop suddenly
         a. Recover by releasing excessive back pressure, adding power, and coordinated control pressures

Common Errors:
• Failure to establish selected configuration prior to entry
• Improper or inadequate demonstration of the recognition and recovery from an accelerated maneuver stall
• Failure to present simulated student instruction that adequately emphasizes the hazards of poor procedure in recovering from an accelerated stall

Conclusion:
Brief review of the main points
It is important that the pilot be able to determine the stall characteristics of the airplane being flown and develop the ability to instinctively recover at the onset of a stall at other than normal stall speeds or flight attitudes.

PTS Requirements:
To determine that the applicant:
   1. Exhibits instructional knowledge of the elements of accelerated maneuver stalls by describing:
      a. aerodynamics of accelerated maneuver stalls.
      b. flight situations where accelerated maneuver stalls may occur.
      c. hazards of accelerated stalls during stall or spin recovery.
      d. entry procedure and minimum entry altitude.
XI.D. Accelerated Maneuver Stalls

2. Demonstrates and simultaneously explains accelerated maneuver stall, from an instructional standpoint.

3. Exhibits instructional knowledge of common errors related to accelerated maneuver stalls by describing:
   a. failure to establish proper configuration prior to entry.
   b. improper or inadequate demonstration of the recognition of and recovery from an accelerated maneuver stall.
   c. failure to present simulated student instruction that adequately emphasizes the hazards of poor procedures in recovering from an accelerated stall.

4. Analyzes and corrects simulated common errors related to accelerated stalls.