PRIVATE PILOT

VIII. AREA OF OPERATION: SLOW FLIGHT AND STALLS
D. TASK: SPIN AWARENESS

OBJECTIVE

To determine that the applicant exhibits knowledge of the elements related to spin awareness by explaining:

1. Aerodynamic factors related to spins.
2. Flight situations where unintentional spins may occur.
3. Procedures for recovery from unintentional spins.

NOTE: The student will NOT be tested on PERFORMING spins at the Private Pilot level.

ELEMENTS

1. A spin is an aggravated stall that results in "autorotation" – a downward corkscrew path.
2. As the airplane rotates around a vertical axis, the rising wing is less stalled than the descending wing creating a rolling, yawing and pitching motion in a spiral path.
3. The rising wing has a decreased angle of attack and the descending wing has an increasing angle of attack, past the wing's critical angle of attack (stall).
4. An airplane must be stalled in order to enter a spin.
5. If a stall occurs while in a slipping or skidding turn, an inadvertent spin can result.
6. Rudder control to counteract a wing's tendency to drop during a stall averts inadvertent spins.
7. Continued practice in stalls will help the pilot develop a more instinctive and prompt reaction in recognizing an approaching spin.
8. If an inadvertent spin is entered, the pilot should immediately execute spin recovery procedures.
9. Spin procedures:
    a. Before performing intentional spins, the following items should be reviewed for the specific spin-approved airplane to be flown:
        i. AFM / POH limitations section, placards and type certification data.
        ii. Weight and balance limitations.
        iii. Recommended entry and recovery procedures.
        iv. Requirements for parachutes in 14 CFR part 91.307: Exception for spins, but only if required for the certificate or rating sought (not required for Private Pilot certificate, so parachutes for Private Pilot students ARE required).
    b. A thorough airplane preflight should be accomplished with special emphasis on excess or loose items that may affect weight, center of gravity, and controllability.
    c. The flight area, above and below the airplane should be cleared of other traffic.
    d. All spin training should be initiated at an altitude high enough for a completed recovery at or above 1500' AGL.
    e. Carburetor heat should be applied according to the manufacturer's recommendations.
10. Entry phase:
    a. The entry phase is from the time of normal flight to the start of spin rotation.
    b. Reduce the power slowly to idle and simultaneously raise the nose to a pitch attitude that will ensure a stall.
    c. As the airplane approaches a stall, smoothly apply full rudder in the direction of the desired spin rotation while applying full back-elevator to the limit of travel.
    d. Always maintain neutral aileron position unless the AFM / POH specifies otherwise.
11. Incipient phase:
    a. The incipient phase is from the start of spin rotation to the fully developed spin.
    b. This change may take up to two turns for most airplanes.
    c. Incipient spins that are not allowed to develop into a steady-state spin are the most commonly used in the introduction to spin training and recovery techniques.
    d. In the incipient phase, the aerodynamic and inertial forces have not achieved a balance.
    e. As the incipient spin develops, the indicated airspeed should be near or below the stall airspeed.
    f. The turn-and-slip indicator should indicate the direction of the spin (the ball will be deflected in the direction of the turn).

12. Developed phase:
    a. The developed phase is from the fully developed spin to the beginning of the recovery.
    b. The airplane's rotation rate, airspeed and vertical speed are stabilized while in a flightpath that is nearly vertical.
    c. The airplane aerodynamic forces and inertial forces are in balance.
    d. The attitude, angles and self-sustaining motions about the vertical axis are constant.
    e. The spin is in equilibrium.
13. Recovery phase:
    a. The recovery phase is from the beginning of recovery to straight-and-level flight.
    b. The recovery occurs when the angle of attack is reduced below the critical angle of attack and autorotation slows - may last from a quarter turn to several turns.
    c. The pitch angle steepens and rotation stops.
    d. To recover, control inputs are initiated to disrupt the spin equilibrium by stopping the rotation and the stall.
    e. Follow the manufacturer's recommended spin recovery procedures.
    f. In the absence of the manufacturer's recommended procedures, think "P.A.R.E.":
        i. Power - Idle.
        ii. Ailerons - Neutral.
        iii. Rudder - Full deflection opposite to direction of turn.
        iv. Elevator - Forward-elevator pressure to break the stall.
    g. After the spin rotation stops, neutralize the rudder pressure, begin applying back-elevator pressure to raise the nose to level flight, and increase power to a cruise setting.

COMMON ERRORS

NOTE: These are common errors related to PERFORMING spins – the student will NOT be tested on PERFORMING spins at the Private Pilot level.

a. Failure to establish proper configuration prior to spin entry.
b. Failure to achieve a fully stalled condition prior to spin entry.
c. Failure to apply full rudder pressure in the desired spin direction during spin entry.
d. Failure to apply and maintain full up-elevator pressure during spin entry, resulting in a spiral.
e. Failure to close throttle when a spin entry is achieved.
f. Failure to recognize the indications of an imminent, unintentional spin.
g. Improper use of flight controls during spin entry, rotation, or recovery.
h. Failure to apply full rudder against the spin during recovery.
i. Failure to apply sufficient forward-elevator pressure during recovery.
j. Failure to neutralize the rudder during recovery after rotation stops, resulting in a possible secondary spin.
k. Disorientation during a spin.
l. Slow and overly cautious control movements during recovery.
m. Excessive back-elevator pressure after rotation stops, resulting in a possible secondary spin or excessive G-forces.
n. Insufficient back-elevator pressure during recovery resulting in excessive airspeed.
o. Failure to distinguish between a high-speed spiral and a spin.
p. Excessive speed or accelerated stall during recovery.
q. Failure to recover with minimum loss or altitude.
r. Hazards or attempting to spin an airplane not approved for spins.

REFERENCES

1. FAA-H-8083-3A, Airplane Flying Handbook, Chapter 4.
2. AC 61-67, Stall and Spin Awareness Training.
3. POH / AFM, Pilot Operating Handbook / FAA-Approved Airplane Flight Manual.