Area of Operation **XI** - Task **G**

Spins

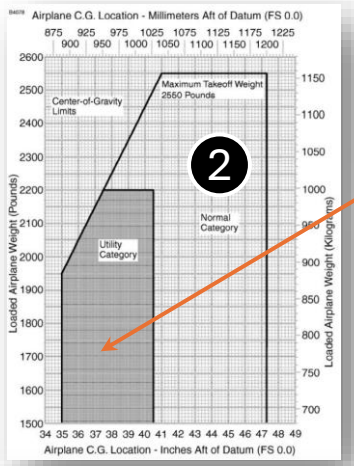
Content

Key References:

- Airplane Flying Handbook
- Pilot's Handbook of Aeronautical Knowledge
- Stall and Spin Awareness Training (AC 61-67)

1. Introduction

- **What**: An aggravated stall that results in an "autorotation," and the airplane follows a downward corkscrew path
- **Why**: Understanding spins and their recovery procedures in case the student find themselves in that situation, and also to increase confidence and reduce the anxiety associated with stalls and spins
- **Not all aircraft are approved for Spins**
  - Check the AFM/POH (Limitation section) (1)
  - If Spins are approved, check W&B Limitations (2) and Entry/Recovery Procedures (3)
  - Do not intentionally spin an aircraft not certified for spins
- **Spins & Anxiety**
  - Common misconception: spin is a death sentence
  - Knowledge/training can teach you how to recover
- **Flight Situations where Spin may occur**
  - Any condition where you have Stall + Yaw
  - Uncoordinated go-arounds or short field takeoff
  - Overshooting base to final
  - High pitch attitude + high power + low airspeed



SPINS 1

Intentional spins are approved when the airplane is operated in the utility category. Spins with baggage loadings or occupied rear seat(s) are not approved.

UTILITY CATEGORY

This airplane is not designed for purely aerobatic flight. However, in the acquisition of various certificates such as commercial pilot and flight instructor, certain maneuvers are required by the FAA. All of these maneuvers are permitted in this airplane when operated in the utility category.

In the utility category, the rear seat must not be occupied and the baggage compartment must be empty .

UTILITY CATEGORY MANEUVERS AND RECOMMENDED ENTRY SPEED*

Chandelles	105 Knots
Lazy Eights	105 Knots
Steep Turns	95 Knots
Spins	Slow Deceleration
Stalls (Except Whip Stalls)	Slow Deceleration

1

SPINS 3

Should an inadvertent spin occur, the following recovery procedure should be used:

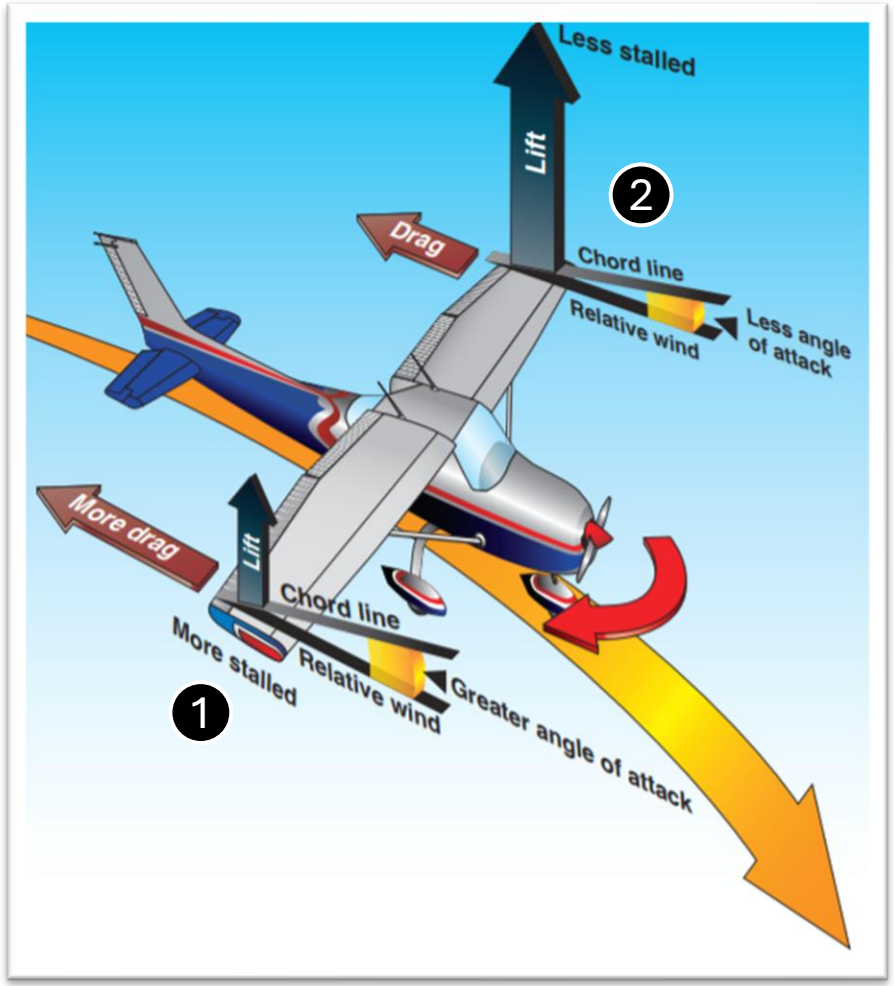
1. RETARD THROTTLE TO IDLE POSITION.
2. PLACE AILERONS IN NEUTRAL POSITION.
3. APPLY AND **HOLD** FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.
4. JUST **AFTER** THE RUDDER REACHES THE STOP, MOVE THE CONTROL WHEEL **BRISKLY** FORWARD FAR ENOUGH TO BREAK THE STALL. Full down elevator may be required at aft center of gravity loadings to assure optimum recoveries.
5. **HOLD** THESE CONTROL INPUTS UNTIL ROTATION STOPS. Premature relaxation of the control inputs may extend the recovery.
6. AS ROTATION STOPS, NEUTRALIZE RUDDER, AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE.

NOTE

If disorientation precludes a visual determination of the direction of rotation, the symbolic airplane in the turn coordinator may be referred to for this information.

2. Aerodynamics

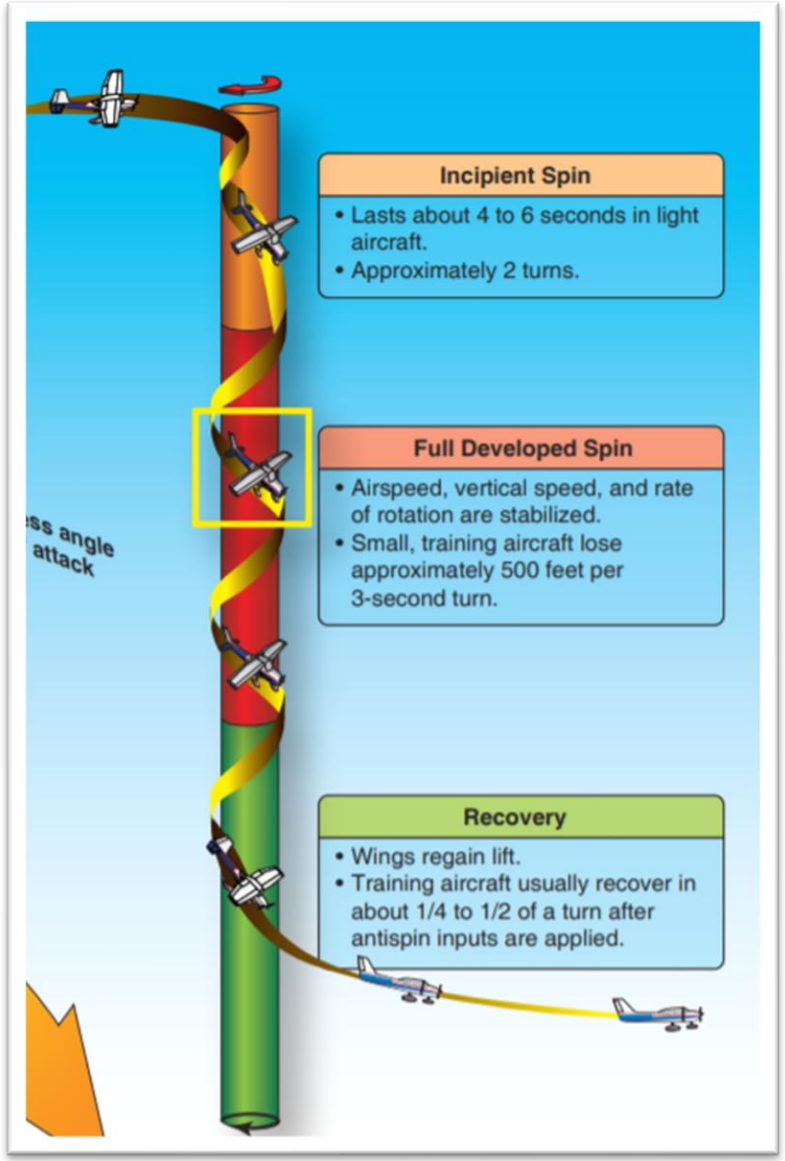
- Requirements for a spin: **Stall + Yaw**
- The inboard, lower wing is more stalled than the outboard wing, creating an autorotation around the vertical axis
  - During a stall, one wing drops (in the direction of the yaw)
  - ① The wing that drops has an increasing AOA (more stalled) **(decreased lift / increased drag)**
  - ② The raised wing has a decreasing AOA (less stalled) **(increased lift / decreased drag)**
  - **Autorotation results from the unequal AOA on each wing**
- Load factor during a spin:
  - Varies with aircraft
  - **Usually slightly above 1G**
- 4 Phases of a Spin
  - Entry / Incipient / Developed / Recovery



2. Aerodynamics

Phases of a Spin & Recovery

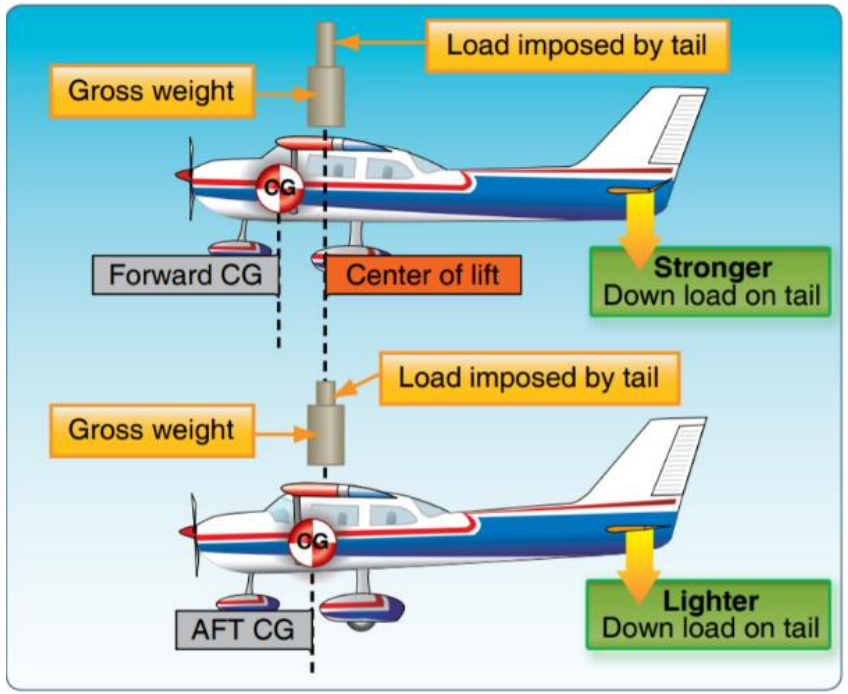
- Entry: Airplane enters in an uncoordinated stall and a wing drops
- Incipient: Aerodynamic forces have not reached a balance
    - Airspeed is near or below stall speed
    - Turn coordinator indicates the direction of spin
- Developed: Aerodynamic and inertial forces in balance (**spin in equilibrium**)
    - Note: Some airplanes will transition from the incipient phase to a spiral dive, where the Airplane will be accelerating and G-load can rapidly increase
- Recovery:
    - **Power Idle** ➔ reduce speed and torque effect
    - **Aileron neutral** ➔ If in direction of the spin: increase rotation
      If opposite of the spin: can flatten the spin
    - **Opposite Rudder** ➔ to stop the rotation
    - **Elevator forward** ➔ to reduce AoA and break the stall (hold on this position)
    - Then rudder neutral, bring nose level and add power (recover from stall)



2. Aerodynamics

Factors influencing spins

- Configuration
  - **Flaps** – Generally increase the lifting ability of the wings, decreasing stall speed
  - **Gear** – Effects of gear can vary based on aircraft design and characteristics
- Weight
  - **Heavier** = Higher stall speed (more lift / higher AOA to maintain altitude)
  - **Lighter** = Lower stall speed
- Forward CG
  - Increases stall speed, More controllable in stall recovery
- Aft CG
  - Decreases stall speed, Less controllable in stall recovery
- Coordination: can prevent spins (Stall + Yaw required for spin)



3. Execution

Performing the maneuver

1. Perform two 90° clearing turns
2. Select an altitude where recovery can be made safely (at minimum, recovery no lower than 1500ft AGL)
3. **Entry Procedure**
    - Similar to Power Off Stall: Reduce power to idle while raising the nose to a stalling pitch attitude
    - Approaching the stall, apply full rudder in the direction of desired spin, with full back pressure (keep ailerons neutral)
4. **Maintain a Stabilized Spin**
    - Keep full back pressure and full rudder pressure, with ailerons neutral
5. **Maintain Orientation**
    - Use an outside reference point
    - Use the turn coordinator – Deflects in the direction of the spin
    - Gyroscopic instruments may tumble and be misleading
6. **Recover** using Spin recovery technique and then Cruise checklist

4. Common Errors

1. Failure to establish proper configuration prior to spin entry
2. Failure to achieve and maintain a full stall during spin entry
3. Failure to close throttle when a spin entry is achieved
4. Failure to recognize the indications of an imminent, unintentional spin
5. Failure to distinguish between a high-speed spiral and a spin
6. Excessive speed or accelerated stall during recovery
7. Failure to recover with minimum loss of altitude
8. Hazards of attempting to spin an airplane not approved for spins

Questions?