Exercise 13 Spinning

What you will learn:

- ✓ understand
- ✓ recognize
- ✓ recover

SPINS

Private Pilot-avoid
Commercial-demonstrate

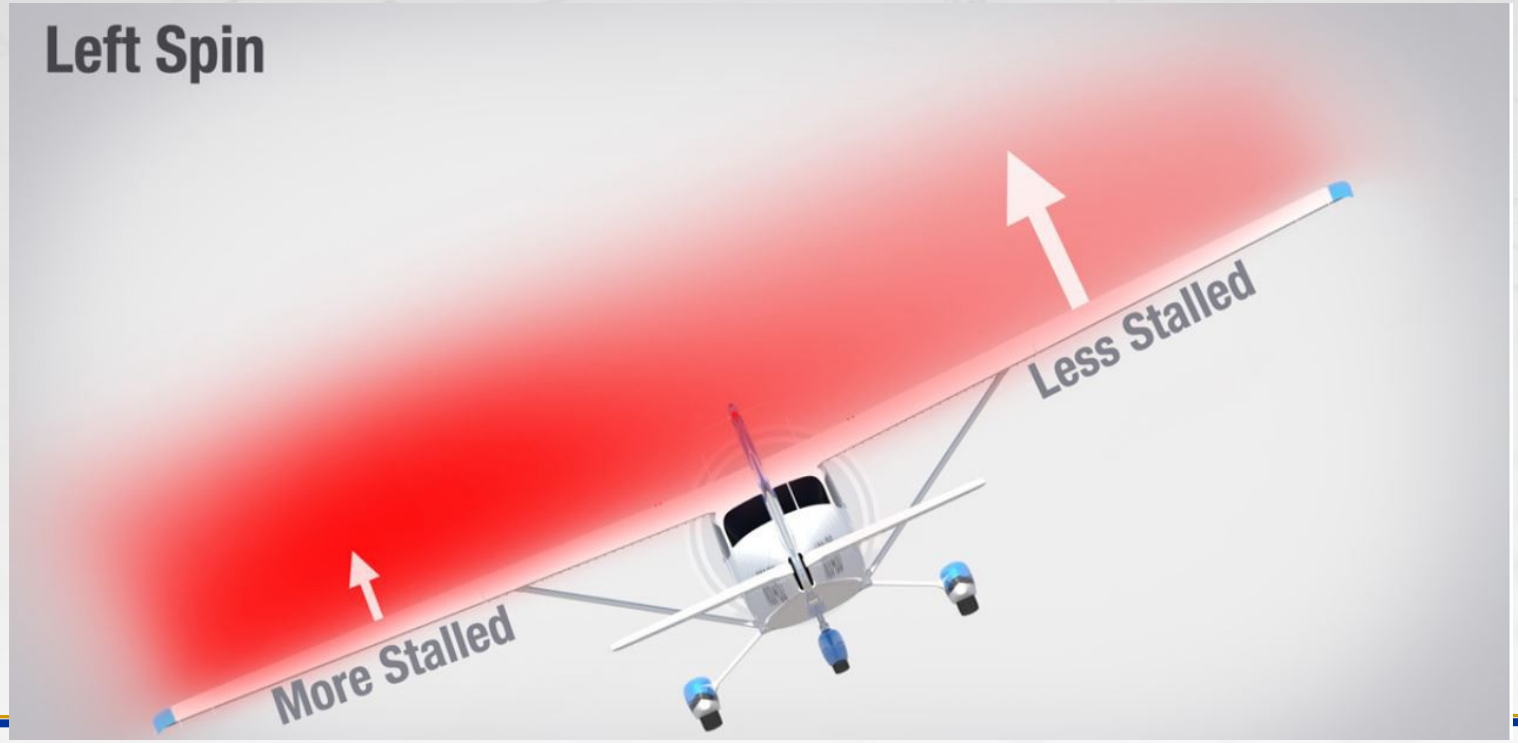
Why learn this:

- ✓ Primary reason: to avoid entering a spin
- ✓ Secondary reason: To be able to recover if entered

F4 Spin recovery-deploy drag chute
Eject back seat pilot.

Theories and Definitions:

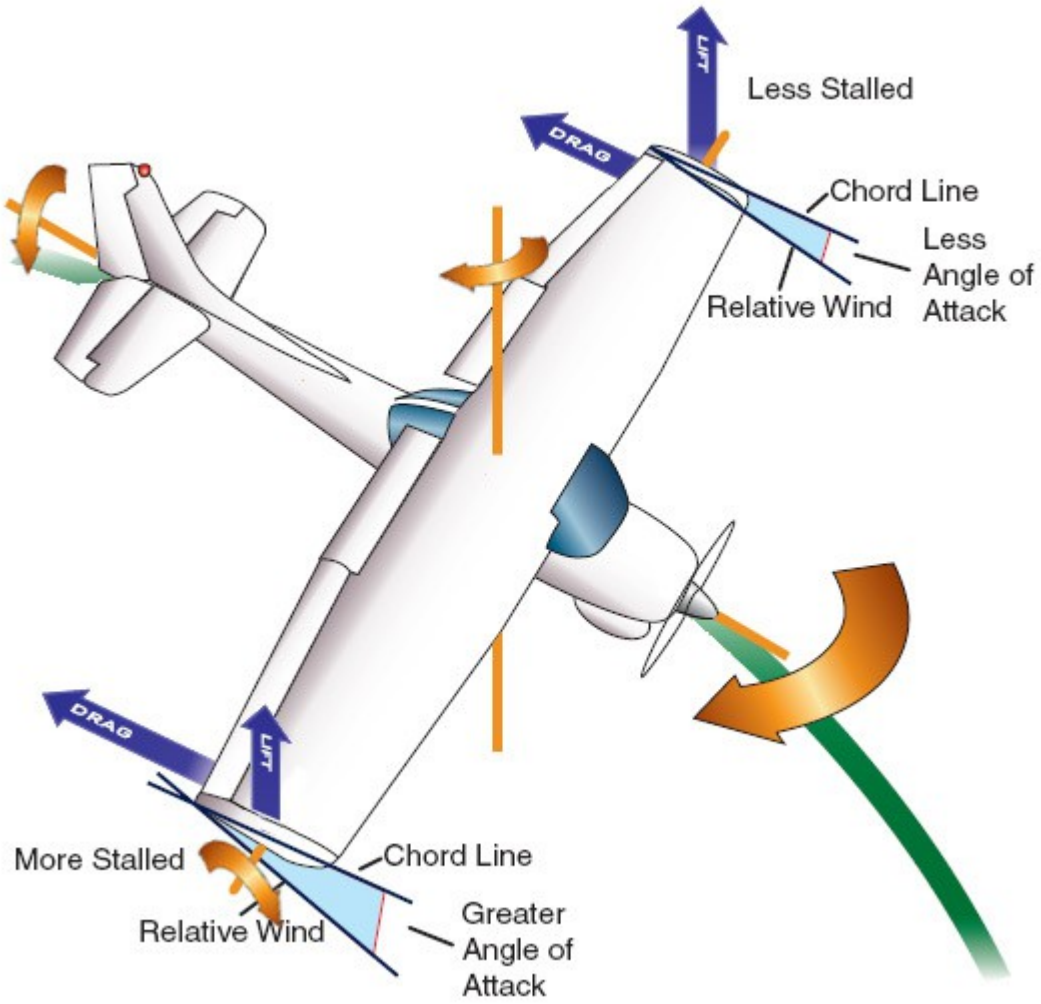
- ✓ Spin: stall with too much yaw.
- ✓ Results in “Autorotation”, a corkscrew path downward
- ✓ One wing is flying-other one is not



Theories and Definitions:

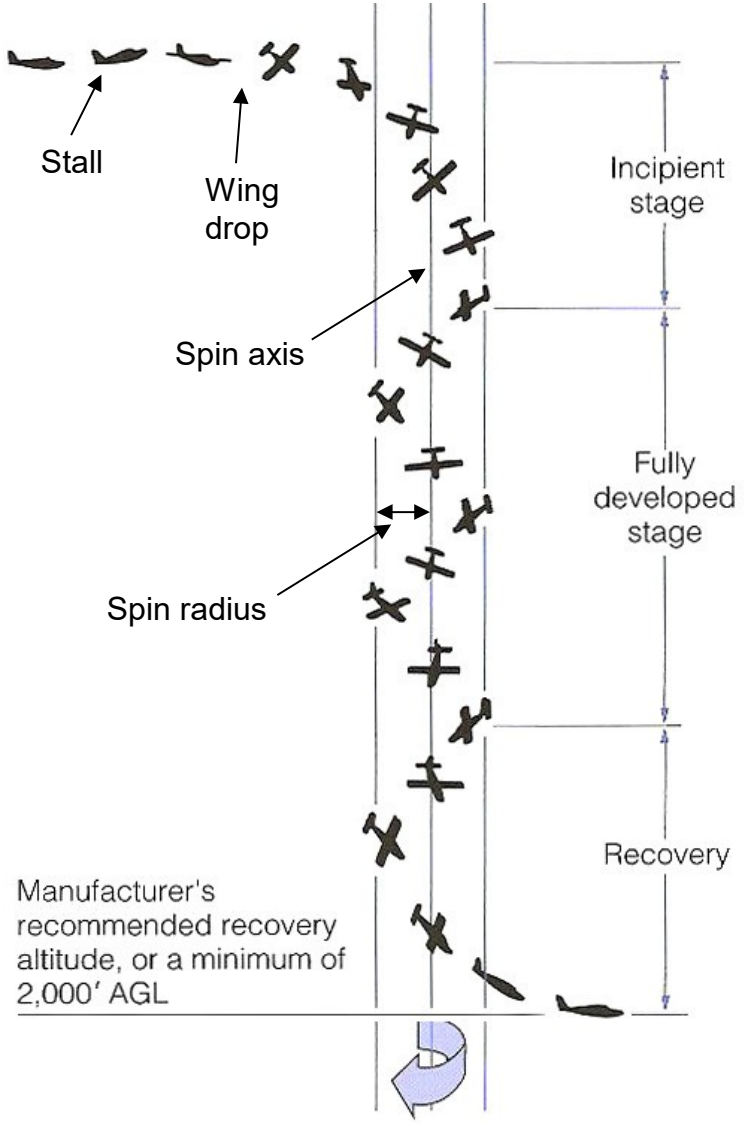
- ✓ How a Spin Develops
- ✓ Stages of a Spin.

How a Spin Develops:



- ✓ For a spin to occur:
  - plane must be stalled
  - yaw must be present
- ✓ Yaw causes one wing to be more stalled than the other, inducing wing drop (roll)
- ✓ The down-going wing will have a higher AoA and will be producing less lift and more drag than the up-going wing
- ✓ This perpetuates “autorotation” – plane’s tendency to keep rolling
- ✓ Nose drop due to stall introduces a pitching moment
- ✓ The result is a complicated spinning motion down a corkscrew path.

Three Stages of a Spin



- ✓ Flight path changes from horizontal to vertical
- ✓ Rotation increases from zero to fully developed
- ✓ Typically takes 4-6 seconds
- ✓ Attitude is stabilized and motions are repetitious
- ✓ Nearly vertical descent
- ✓ Recovery from fully developed stage may take a full turn or more

Procedures

- ✓ **Spin**
  - **Entry**
  - **During**
  - **Recovery**

Spin: Typical Entry Procedure

- ✓ **HASEL Check. Altitude, must recover by 2000'AGL minimum.**
- ✓ **Reduce power**
- ✓ **Ailerons neutral**
- ✓ **Enter a stall**
- ✓ **Just before stall "break", full rudder in desired direction for the spin**
- ✓ **Hold control inputs**

Spin: During

How do you know you're in a spin?
- near-vertical descent
- low airspeed.

✓ **Hold initial control pressures:**

- **Control Column AFT**
- **FULL Rudder** (in the direction of the spin)

Relaxing the controls may turn the spin into a spiral dive!

- **Ailerons NEUTRAL**

Deflecting ailerons may aggravate the spin by producing rolling moment opposite to normal

Spin: Typical Recovery Procedure

- ✓ **Power idle**
- ✓ **Ailerons neutral**
- ✓ **Apply and hold full opposite rudder**
- ✓ **Move control column forward to break the stall**
- ✓ **Hold control inputs until rotation stops and airplane is no longer stalled**
- ✓ **Recover from resulting dive**

Considerations

- ✓ Centre of Gravity
- ✓ Weight
- ✓ Ailerons
- ✓ Flaps
- ✓ Instruments

Centre of Gravity

- ✓ Forward centre of gravity:
  - difficult to obtain pure spin due to decreased elevator effectiveness
  - faster recovery
- ✓ Aft centre of gravity:
  - faster and flatter spin
  - easy to enter, more difficult to recover
- ✓ Any weight away from C of G:
  - increases moment of inertia
  - less steep attitude, sluggish recovery.

Make sure the plane is within approved C of G limits for spins – spins outside of the approved envelope may be unrecoverable!

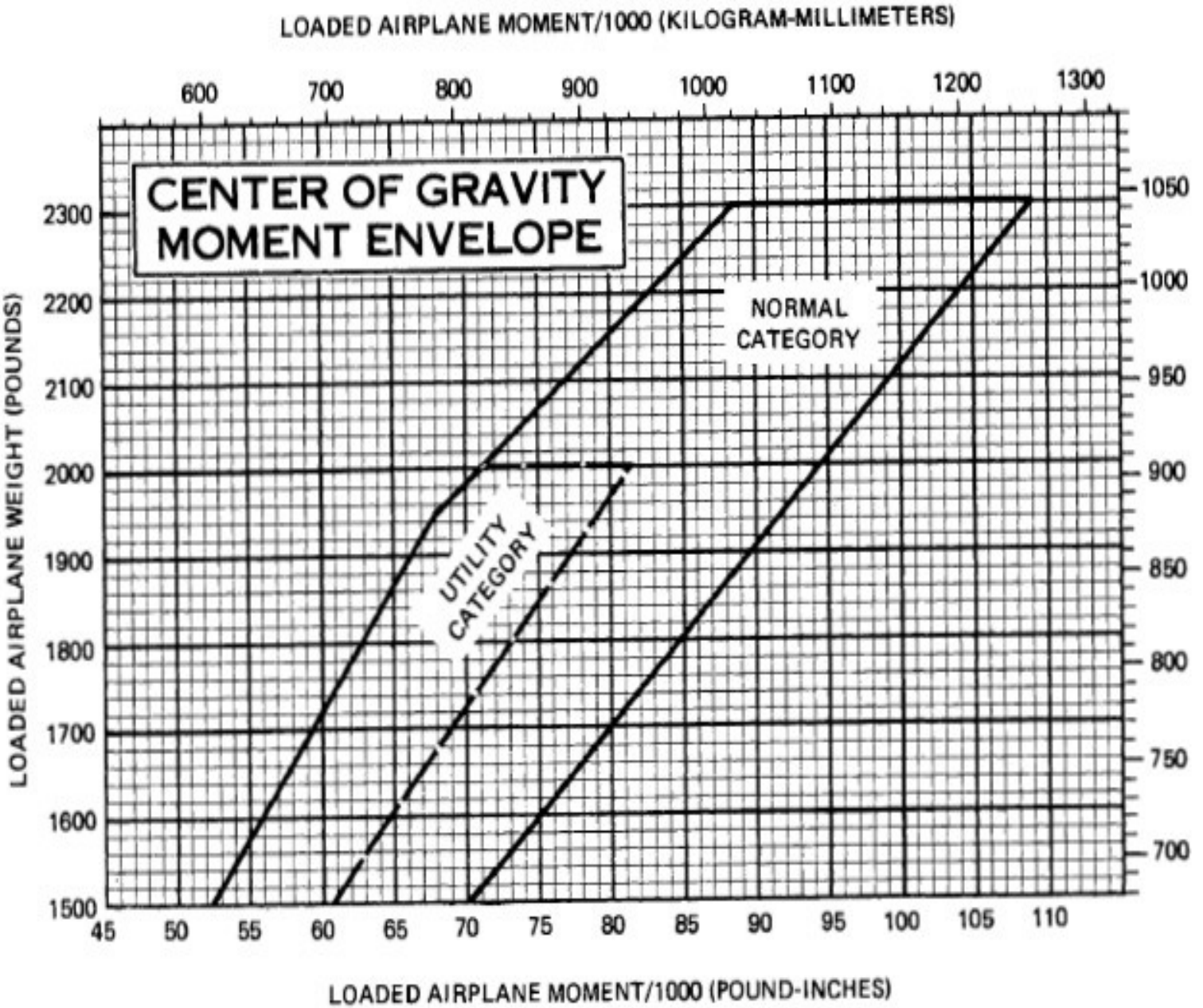


Figure 6-7. Center of Gravity Moment Envelope

SAMPLE ONLY!

Weight

- ✓ Increases inertia
- ✓ May lengthen recovery

Make sure the plane is within approved weight limits for spins!

Ailerons

- ✓ Effect of aileron deflection in a spin varies from plane to plane and spin to spin

- ✓ Deflection of ailerons may increase the rate of rotation and delay recovery

Keep ailerons NEUTRAL during spin entry and throughout the spin and recovery!

Flaps:

- ✓ Prolong the spin by inducing a flatter spin attitude
- ✓ Deflect airflow from rudder, reducing its effectiveness
- ✓ May get damaged as airspeed quickly builds up in the recovery stage

Enter spin with flaps UP!

Retract flaps ASAP if a spin is inadvertently entered with flaps extended!

Instruments

Low airspeed

What if your airspeed is rapidly increasing – are you in a spin?

LOOK OUTSIDE DURING SPIN RECOVERY!

High rate of descent

Only use Turn Coordinator if disoriented

Miniature airplane will indicate spin direction

NOT RELIABLE!

Review

- At what stages of flight is an inadvertent spin most likely to occur?
- Will you have sufficient altitude to recover from a spin happening during a take-off or landing?
- Why is proper loading essential for this maneuver?
- Will an aircraft properly loaded for normal flight, does that necessarily imply it's properly loaded for spins?
- What is the procedure for spin recovery?
- How are ailerons used in spin recovery?

Conclusion

- ✓ Spins are a safe and fun manoeuvre provided that all safety-related procedures are followed
- ✓ Learning to recognize and prevent spins is critical for your and your passengers' safety
- ✓ Read for next lesson: Ex. 14, Spiral Dives

QUESTIONS?