



 **STALL**

WHAT SINGLE FACTOR IS NECESSARY FOR A WING TO STALL?

EXCEEDING CRITICAL ANGLE OF ATTACK!

 **STALL**

WHAT SINGLE FACTOR IS NECESSARY TO RECOVER FROM A STALL?

REDUCING ANGLE OF ATTACK BELOW CRITICAL

 **A DEMONSTRATION**



 **A DEMONSTRATION**

WHY WOULD A PILOT EVER DO THAT?

BECAUSE THAT'S THE WAY THEY WERE TAUGHT!



POWER OFF STALL SCENARIOS

WHEN ARE POWER OFF STALLS LIKELY?

- **BASE TO FINAL TURN**
- **STRETCHING A GLIDE**
- **FLARING TOO HIGH**
- **WIND SHEAR ON FINAL**

HOW TO PRACTICE

- 1. Sufficient Altitude**
- 2. Reduce Power**
- 3. Configure**
- 4. Power to Idle**

HOW TO PRACTICE

- 5. Establish Glide**
- 6. Slowly Increase Angle of Attack**
- 7. Recognize Aircraft Indications**
- 8. Recover:**
 - a. reduce AoA**
 - b. add power**

 **A DEMONSTRATION**



Sufficient Altitude

 **POWER ON STALL SCENARIOS**

WHEN ARE POWER ON STALLS LIKELY?

- Too high AoA > Ground Effect
- Go Around
- Clearing an Obstacle
- Trim Stall
- Practicing Maneuvers
- Lee Side Sink

 **LEE SIDE SINK**

THE SCENARIO:

- High DA (Hot, Low Pressure, High Elevation, Humid)
- Heavy (CG Considerations)
- Power Limited by Conditions
- Wind
- Approaching Ridge Straight On

 **HOW TO PRACTICE**

1. Sufficient Altitude
2. Reduce Power to 55% - 65%
3. Slowly Increase Angle of Attack
4. Recognize Aircraft Indications

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HOW TO PRACTICE

5. At Stall Warning Roll 30° - 45°
6. Maintain Pitch
7. Recover:
 - a. Reduce AoA
 - b. Leave Power Alone

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A DEMONSTRATION



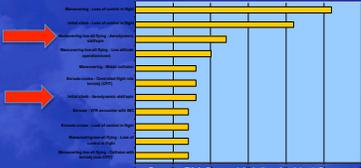
Sufficient Altitude

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SPINS

WHEN IS A SPIN MOST LIKELY TO OCCUR?

1. MANEUVERING-LOW-ALTITUDE
2. INITIAL CLIMB



Source: FAA General Aviation Accident Causes PowerPoint Slides, September 8, 2010

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THE BASE-TO-FINAL STALL / SPIN

DEADLY SEQUENCE INITIATED BY THE PILOT:

1. Overshoots runway centerline
2. Elects not to execute a go-around
3. Believes ailerons turn the airplane, but advised not to exceed "X" in the pattern
4. Tries to tighten the turn with inside/bottom rudder instead

 **THE BASE-TO-FINAL STALL / SPIN**

DEADLY SEQUENCE INITIATED BY THE PILOT:

- 5. Nose yaws below the horizon**
- 6. Pulls back on yoke, believing "elevator = up"**
- 7. Turn tightens, G's increase, speed decreases - increasing AOA cues!**
- 8. Consequence: Yaw + Stall = LOC-I, i.e., Stall/Spin at low altitude**

 **SPINS**

BASE-TO-FINAL SPIN: SOURCE: RICH STOWELL'S YOU-TUBE CHANNEL



 **SPINS**

WHAT TWO THINGS MUST OCCUR FOR AN AIRPLANE TO SPIN?

- STALLED**
- YAWED**

 **SPINS**

WHAT ARE VARIOUS SOURCES OF YAW?

- IMPROPER RUDDER USE**
- ADVERSE YAW FROM AILERON**
- ENGINE/PROP EFFECTS: TORQUE, P-FACTOR, SLIPSTREAM, GYROSCOPIC PRECESSION**
- WIND SHEAR**

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SPINS

DURING A SPIN, HOW DO THE AOA OF THE LEFT & RIGHT WINGS COMPARE?

AOAs are unequal during a spin!

Source: Airplane Flying Handbook, Fig. 4-10

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SPINS

WHAT ARE THE FOUR PHASES OF A SPIN?

“There are four phases of a spin: entry, incipient, developed, and recovery.”

Source: Airplane Flying Handbook, Pg. 4-13 and Fig. 4-10

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SPINS

HOW SHOULD SPIN RECOVERY INPUTS BE APPLIED?

Step 1—REDUCE THE POWER (THROTTLE) TO IDLE
(Power aggravates the spin characteristics.)

Step 2—POSITION THE AILERONS TO NEUTRAL
(Ailerons may have an adverse effect on spin recovery.)

Step 3—APPLY FULL OPPOSITE RUDDER AGAINST THE ROTATION
(Make sure that full opposite rudder has been applied.)

Source: Airplane Flying Handbook, Pg. 4-15

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SPINS

HOW SHOULD SPIN RECOVERY INPUTS BE APPLIED?

Step 4—APPLY A POSITIVE AND BRISK, STRAIGHT FORWARD MOVEMENT OF THE ELEVATOR CONTROL
(This should be done immediately after full rudder application)

Step 5—AFTER SPIN ROTATION STOPS, NEUTRALIZE THE RUDDER.

Source: Airplane Flying Handbook, Pg. 4-15



SPINS

When spinning, the slip/skid ball is totally unreliable for determining spin direction.
—What instrument does provide reliable spin direction information (upright spins)?

- 1. SYMBOLIC AIRPLANE OF TURN COORDINATOR**



SPINS

Some aircraft can exhibit aggravated spin behavior by design (it's just their nature).
—Even so, what pilot-controlled actions tend to aggravate a spin?



SPINS

SPIN AGGRAVATORS:

- 1. INCREASING POWER**
- 2. DEFLECTING AILERONS**
- 3. RECOVERY ELEVATOR APPLIED PRIOR TO RECOVERY RUDDER**
- 4. LOADING BEYOND WEIGHT & AFT CG LIMITS**



SUMMARY

- STALL SCENARIOS & DYNAMICS**
- SPIN SCENARIOS & DYNAMICS**
- TRAIN FOR:**
 - STALL RECOGNITION & RECOVERY**
 - SPIN PREVENTION & RECOVERY**



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