Stall/Spin Awareness

What you don't know can hurt you

Presented by Rich Stowell
Live from McCall, Idaho
October 1st 20:00 EDT

The **Maintaining Aircraft Control** series
from Mindstar Community Aviation

www.LearnDoFly.com

Rich Stowell
Presenter
McCall, Idaho

Billy Winburn
Organizer
Alexandria, VA

Rich Stowell

33,800 Spins - 24,600 Landings - 9,800 Hours

- USA's first Master CFI - Aerobatics
- 2014 National FAA Safety Team Rep of the Year
- 2006 National Flight Instructor of the Year
- Charter Member of SAFE.
- Author of three Aviation textbooks.
- EMT Program Modules recognized by the FAA as approved courses under the Wings Program

www.RichStowell.com

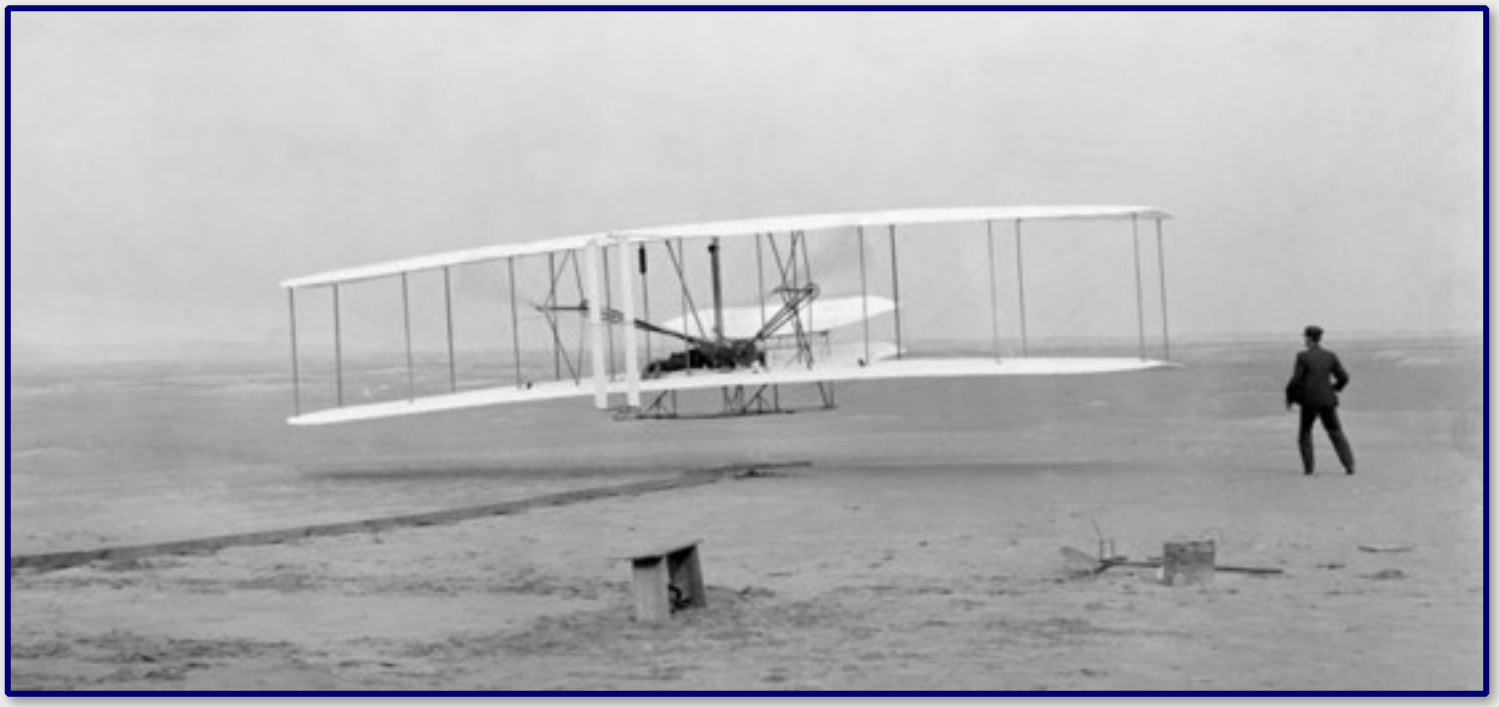
Mindstar's Maintaining Aircraft Control Series

Part 1

Stall/Spin Awareness

Learn → Do → Fly

1903 – Kitty Hawk



1912 – Parke's Dive

Prevailing Wisdom

Power full on

Power full on

Elevator full aft

Prevailing Wisdom

Power full on

Elevator full aft

Rudder full in direction

Prevailing Wisdom

Power full on

Elevator full aft

Rudder full in direction

1912 – Parke's Dive

1912 – Parke's Dive

1912 – Parke's Dive

AUGUST 31, 1912.

FLIGHT

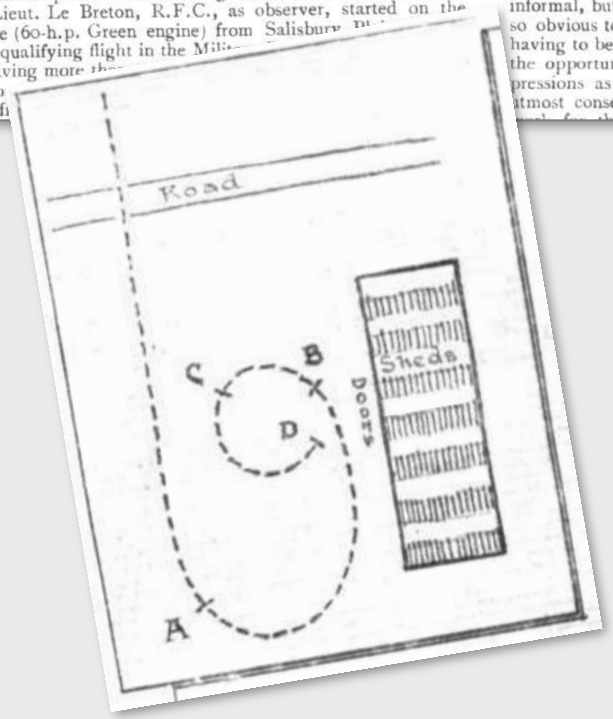
PARKE'S DIVE.

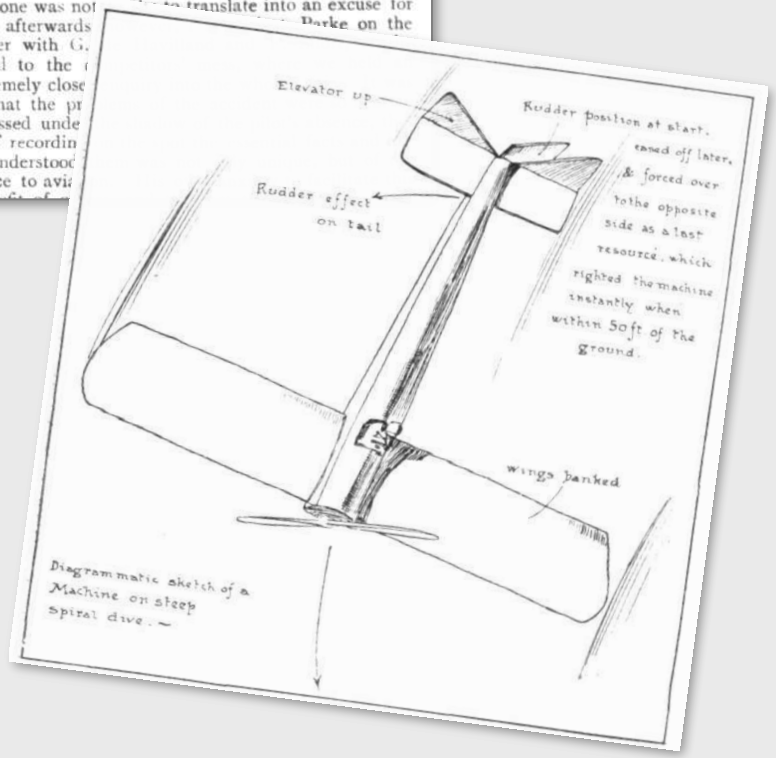
Salisbury Plain, Sunday, August 25th.

HERE is the true story of one of the worst experiences in mid-air from which any pilot has extricated his machine in absolute safety, and as the circumstances precisely represent the hypothesis of the most debated problem among pilots at the present time, the following particulars should be studied with the closest attention by all.

At four minutes past six this morning Lieut. Parke, R.N., accompanied by Lieut. Le Breton, R.F.C., as observer, started on the Avro biplane (60-h.p. Green engine) from Salisbury Pl... three hours' qualifying flight in the Mili... past nine, having more th... returning fro... alighting in fi...

Like the majority, I was at breakfast when the dive occurred; for, having watched the Avro during the earlier part of its flight and up to the end of its second hour, its uniform behaviour inspired a confidence that one was not ... to translate into an excuse for leave. Very soon afterwards ... Parke on the field, and, together with G... R.A.F., adjourned to the ... informal, but extremely close ... so obvious to all that the pr... having to be discussed unde... the opportunity of recordin... pressions as he understood ... utmost consequence to avi...





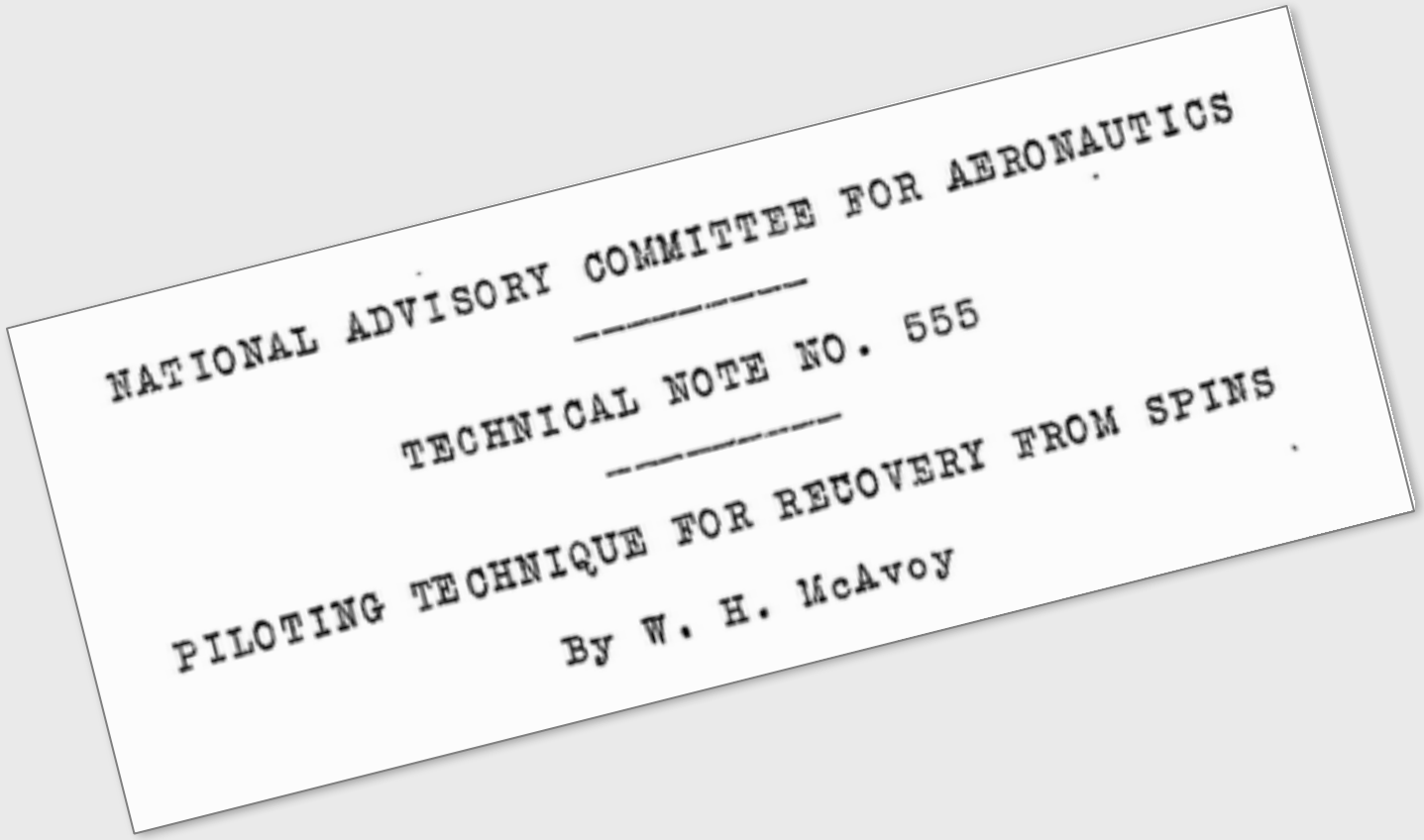
1912 – Parke's Dive

"the entire phenomenon is related to elevator and rudder action only."

1936 – NACA Procedure

W.H. McAvoy, Test Pilot

1936 – NACA Procedure



NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

TECHNICAL NOTE NO. 555

PILOTING TECHNIQUE FOR RECOVERY FROM SPINS

By W. H. McAvoy

1936 – NACA Procedure

1936 – NACA Procedure

With power off and ailerons neutral

1936 – NACA Procedure

With power off and ailerons neutral

Briskly apply full opposite rudder

1936 – NACA Procedure

With power off and ailerons neutral

Briskly apply full opposite rudder

After about ½ turn

1936 – NACA Procedure

With power off and ailerons neutral

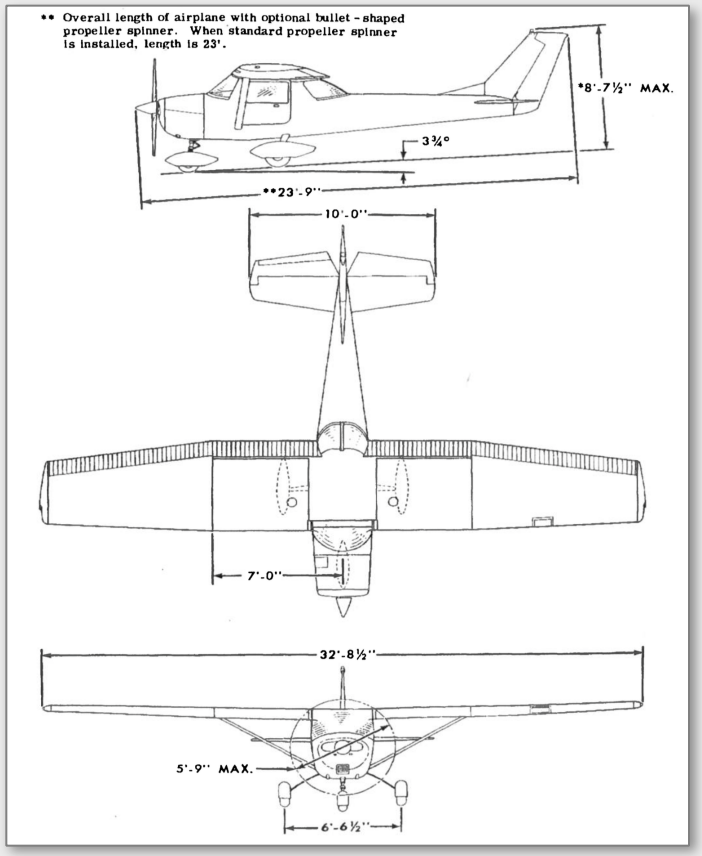
Briskly apply full opposite rudder

After about ½ turn

Briskly move the elevator forward

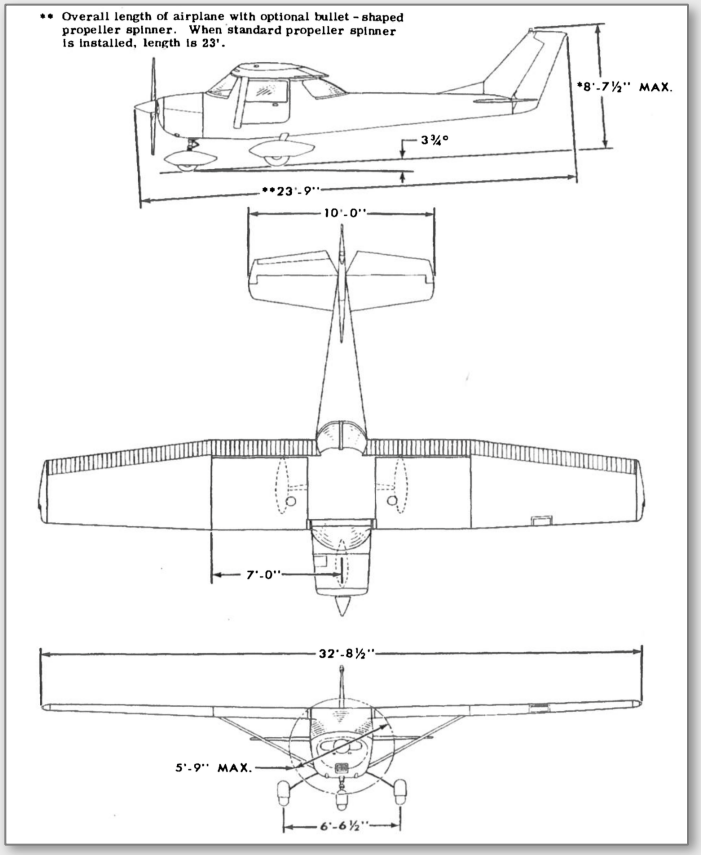
1976 – GA Stall Awareness Study

1976 – GA Stall Awareness Study



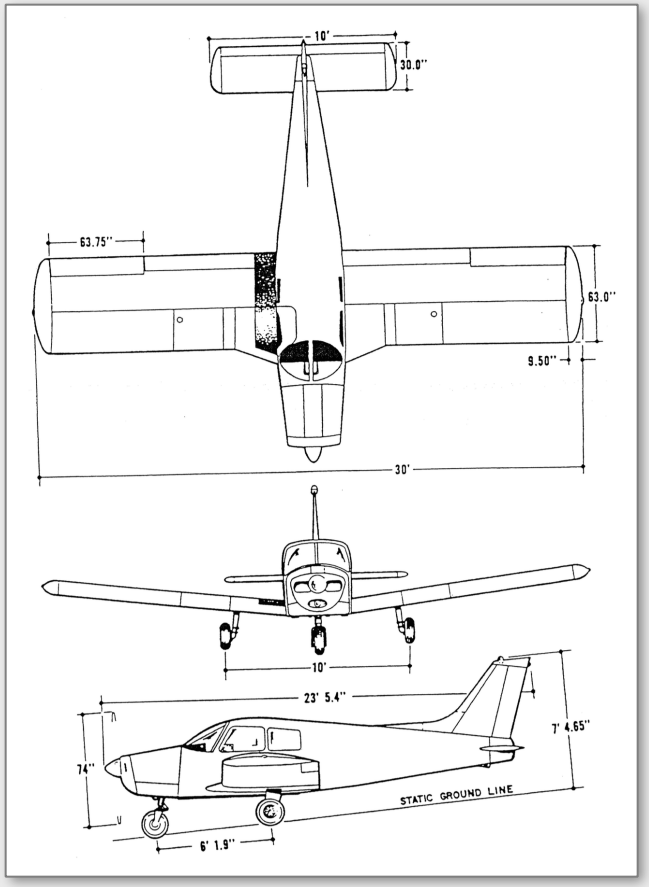
Cessna 150

1976 – GA Stall Awareness Study



Cessna 150

Piper 140



1976 – GA Stall Awareness Study

#1 – Control Group

1976 – GA Stall Awareness Study

#1 – Control Group

Std Pilot Training

1976 – GA Stall Awareness Study

#1 – Control Group

Std Pilot Training

i.e., “Stall Avoidance”

#2 – Ground School Group

Std Pilot Training

1976 – GA Stall Awareness Study

#2 – Ground School Group

Std Pilot Training

+ 90-page Handbook

#2 – Ground School Group

Std Pilot Training

+ 90-page Handbook

+ 3 Hrs: Lecture, Movie, Q&A

1976 – GA Stall Awareness Study

#3 – Stall Avoidance/Incipient Spins Group

Std Pilot Training

+ 90-page Handbook

+ 3 Hrs: Lecture, Movie, Q&A

1976 – GA Stall Awareness Study

#3 – Stall Avoidance/Incipient Spins Group

Std Pilot Training

+ 90-page Handbook

+ 3 Hrs: Lecture, Movie, Q&A

+ 2 Hrs: Stall Avoidance

#4 – Spin Training Group

Std Pilot Training

+ 90-page Handbook

+ 3 Hrs: Lecture, Movie, Q&A

+ 2 Hrs: Stall Avoidance

#4 – Spin Training Group

Std Pilot Training

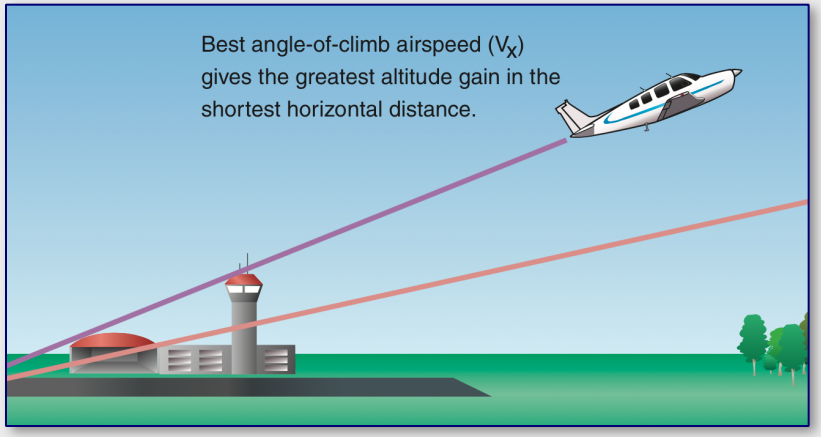
+ 90-page Handbook

+ 3 Hrs: Lecture, Movie, Q&A

+ 2 Hrs: Stall Avoidance

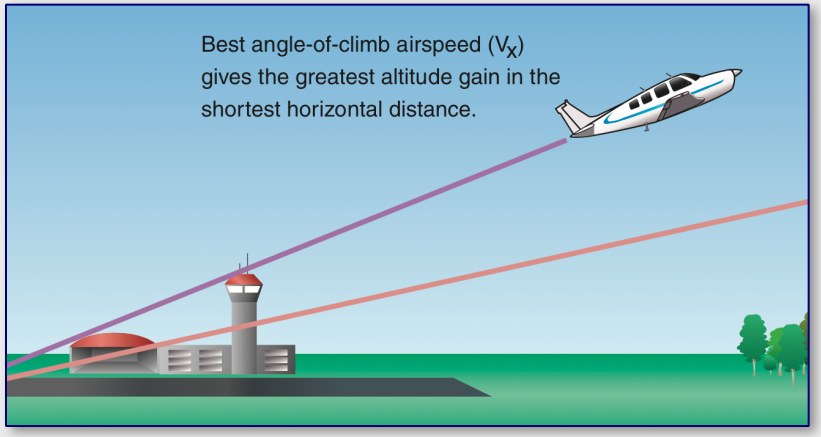
+ 25 Mins: Intentional Spins

Departure Phase



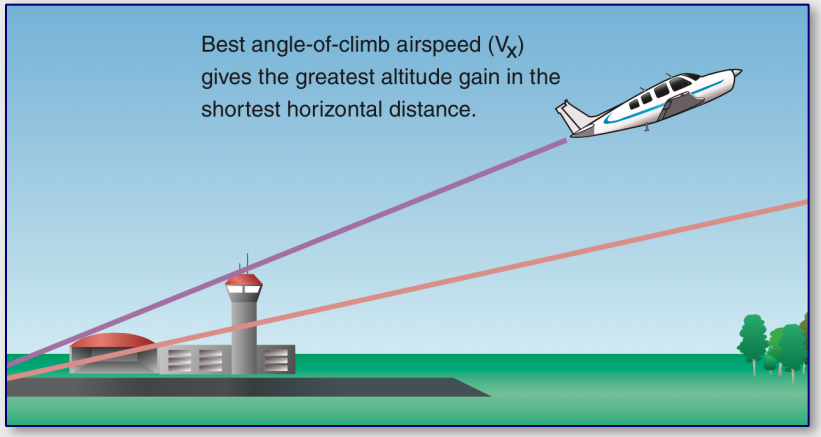
Departure Phase

- Short Field Takeoffs



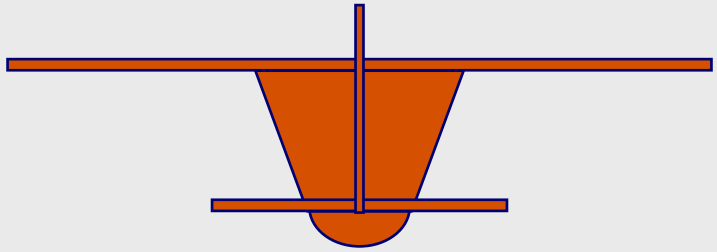
Departure Phase

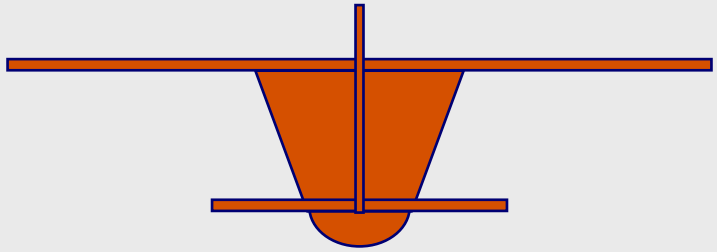
- Short Field Takeoffs
- Engine Failure on Takeoff / Climb-out



Critical Traffic Pattern Ops

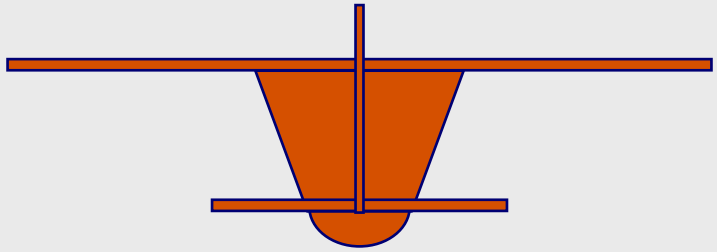
In the Pattern





In the Pattern

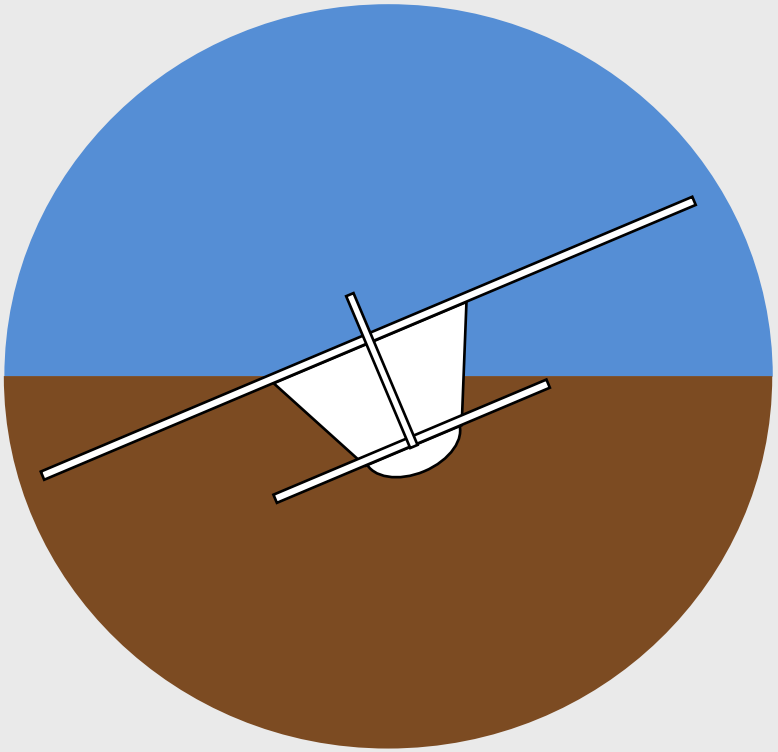
- Overtaking Slower Traffic



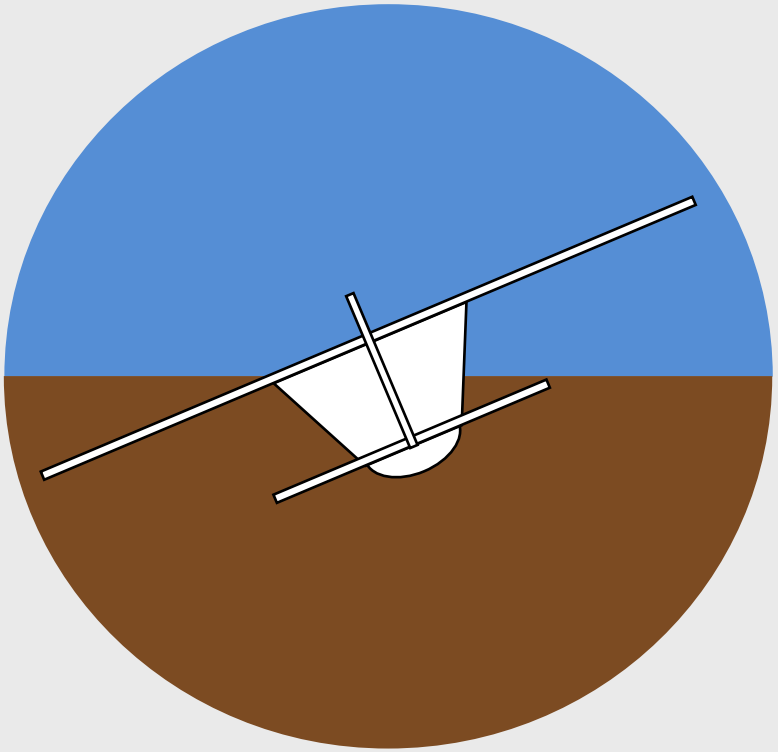
In the Pattern

- Overtaking Slower Traffic
- Cross-Controlled Turn Base-to-Final

Classic Skid/Spin



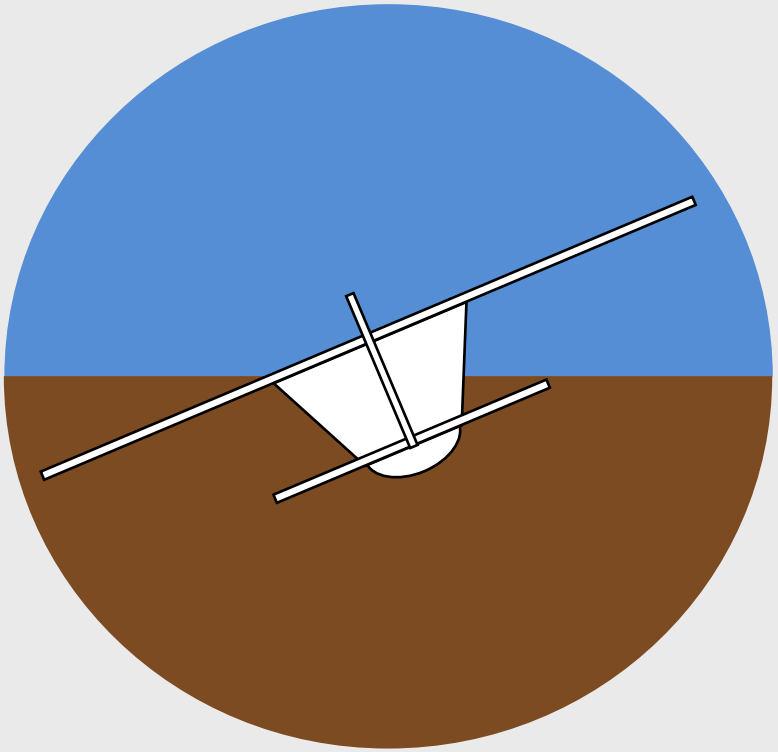
Slow Flight



Classic Skid/Spin

Slow Flight

+ Overshoot

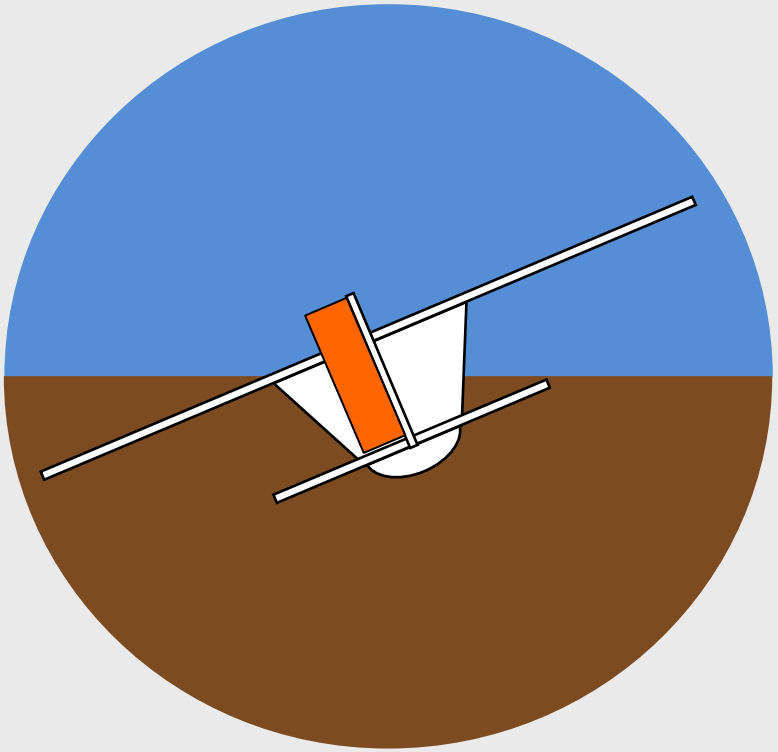


Classic Skid/Spin

Slow Flight

+ Overshoot

+ Skid w/ Left Rudder



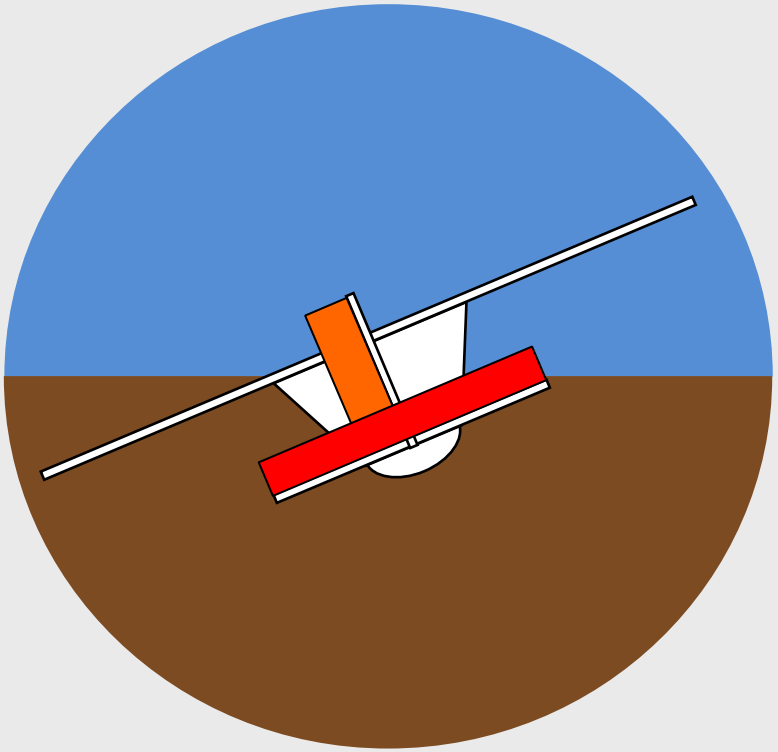
Classic Skid/Spin

Slow Flight

+ Overshoot

+ Skid w/ Left Rudder

+ Increase Aft Elevator



Classic Skid/Spin

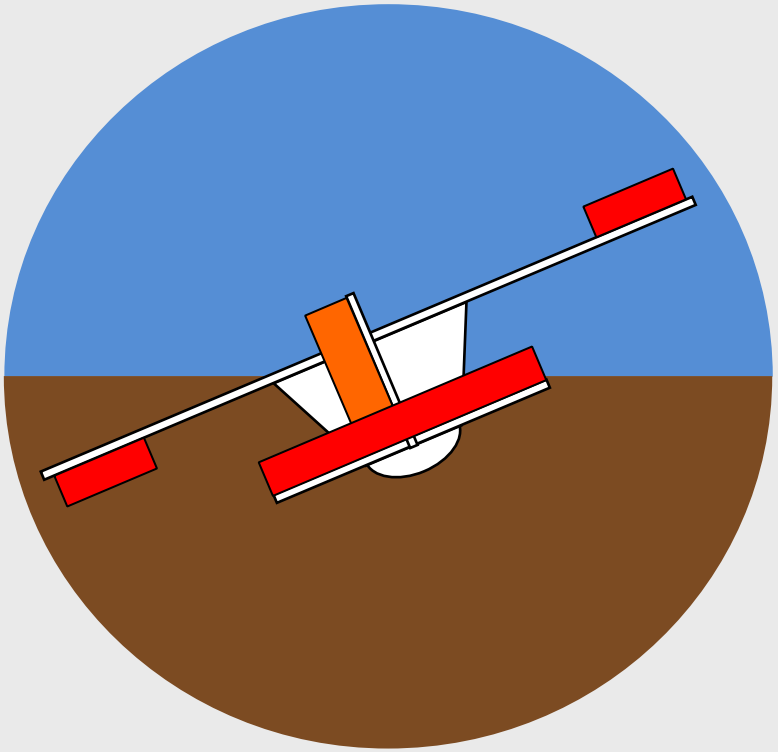
Slow Flight

+ Overshoot

+ Skid w/ Left Rudder

+ Increase Aft Elevator

+ Right Aileron at Break



Classic Skid/Spin

Slow Flight

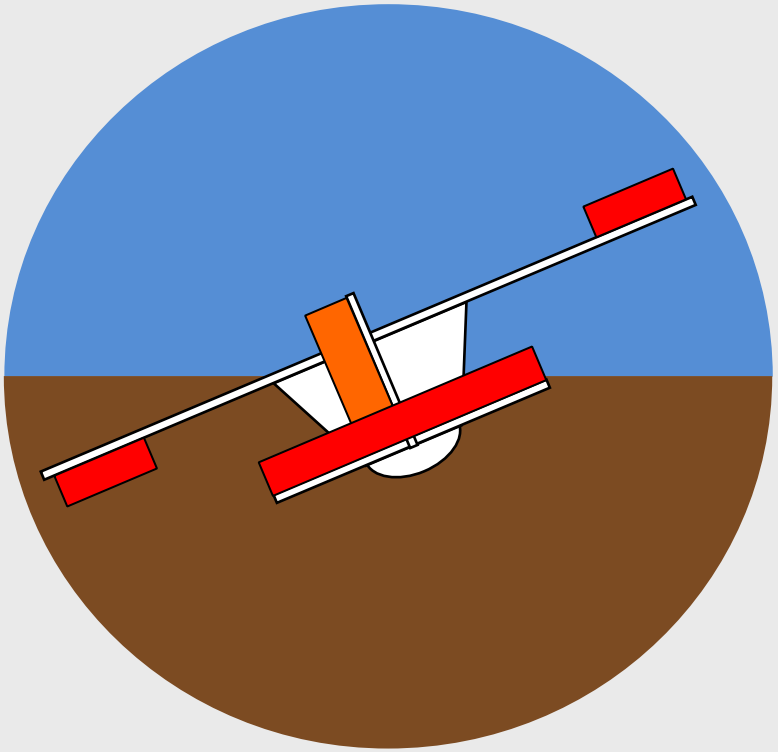
+ Overshoot

+ Skid w/ Left Rudder

+ Increase Aft Elevator

+ Right Aileron at Break

Accelerated Stall/Spin



Final Approach

Final Approach

- Engine Failure/Poor Airspeed Management

Final Approach

- Engine Failure/Poor Airspeed Management
- High Sink Rate/Mush

Go-Arounds

Go-Arounds

- Nose Up Trim

Go-Arounds

- Nose Up Trim
- Premature Flap Retraction

Go-Arounds

- Nose Up Trim
- Premature Flap Retraction
- From Slips

First Rule in Aviation:

First Rule in Aviation:

Fly the Airplane!

1976 – GA Stall Awareness Study

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Additional Training vs. Accidental Stalls

1976 – GA Stall Awareness Study

Additional Training vs. Accidental Stalls

More Stall Training Made No Difference!

1976 – GA Stall Awareness Study

Additional Training vs. Accidental Stalls

More Stall Training Made No Difference!

Accidental stall rate of Groups (1 + 2)
was identical to Groups (3 + 4)

1976 – GA Stall Awareness Study

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Additional Training vs. Accidental Spins

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Additional Training vs. Accidental Spins

Groups (1 + 2): Worsened 50%

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Additional Training vs. Accidental Spins

Groups (1 + 2): Worsened 50%

Group 3: Improved 33%

1976 – GA Stall Awareness Study

Additional Training vs. Accidental Spins

Groups (1 + 2): Worsened 50%

Group 3: Improved 33%

Group 4: Improved 100%

The Culprit

Excess Yaw @ Stall

Excess Yaw @ Stall

Adverse Yaw (ailerons)

Excess Yaw @ Stall

Adverse Yaw (ailerons)

Torque, P-factor, Slipstream (engine)

Excess Yaw @ Stall

Adverse Yaw (ailerons)

Torque, P-factor, Slipstream (engine)

Rigging Effects

The Culprit

Excess Yaw @ Stall

Adverse Yaw (ailerons)

Torque, P-factor, Slipstream (engine)

Rigging Effects

Improper Footwork (rudder)

Stall / Spin Awareness =

Yaw Awareness!

Let's Take a Poll

Is the slip/skid ball always reliable?

Let’s Take a Quiz

What issues can affect slip/skid ball indications?

➢ Lag

- Lag
- Bank Angle

- Lag
- Bank Angle
- Spins

- Lag
- Bank Angle
- Spins

Sensing Yaw in VMC

Sensing Yaw in VMC

- Sight

Sensing Yaw in VMC

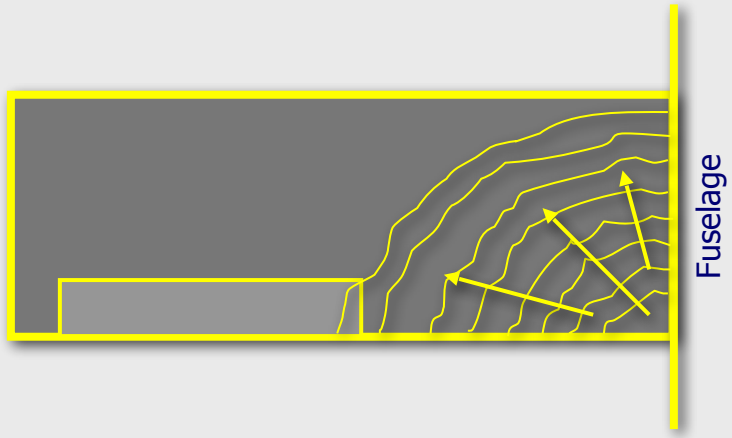
- Sight
- Sound

Sensing Yaw in VMC

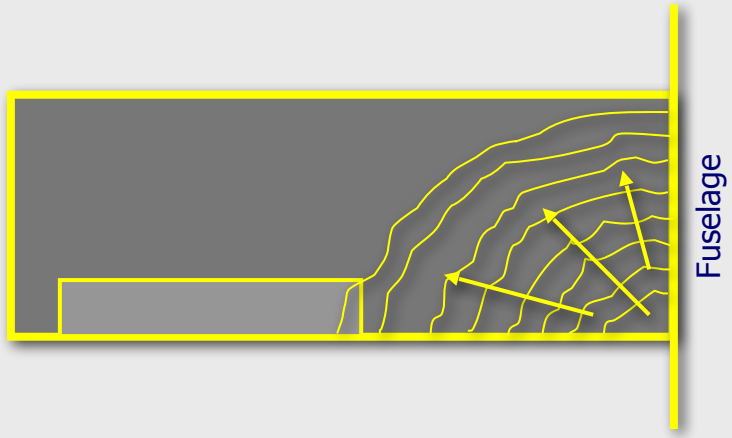
- Sight
- Sound
- Feel

Sensing Yaw in VMC

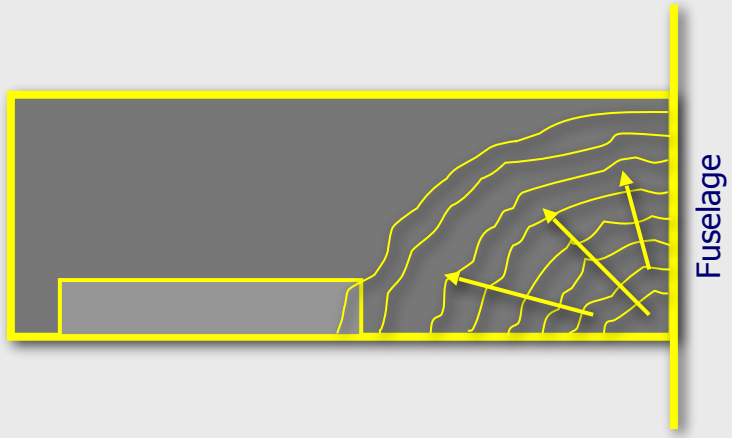
- Sight
- Sound
- Feel
- Aeronautical Knowledge


Fuselage

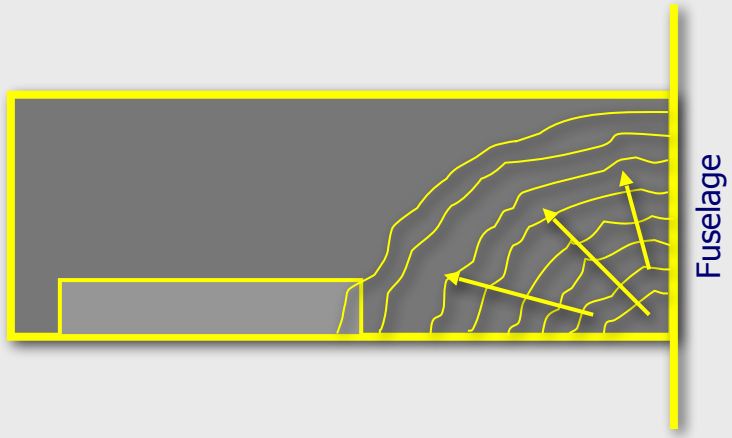
- Stalls at root first

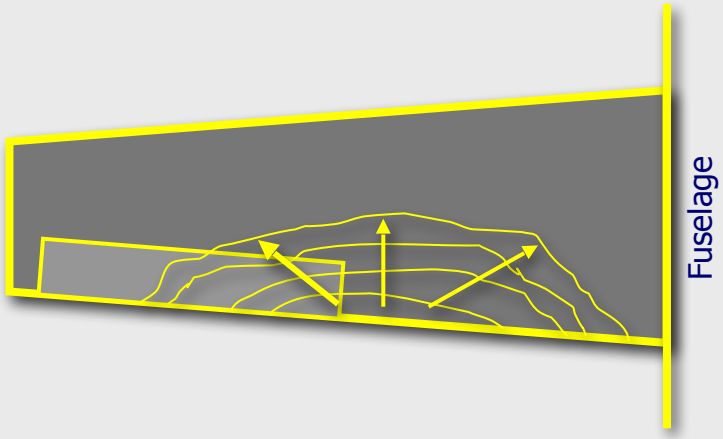


- Stalls at root first
- Lateral control longer

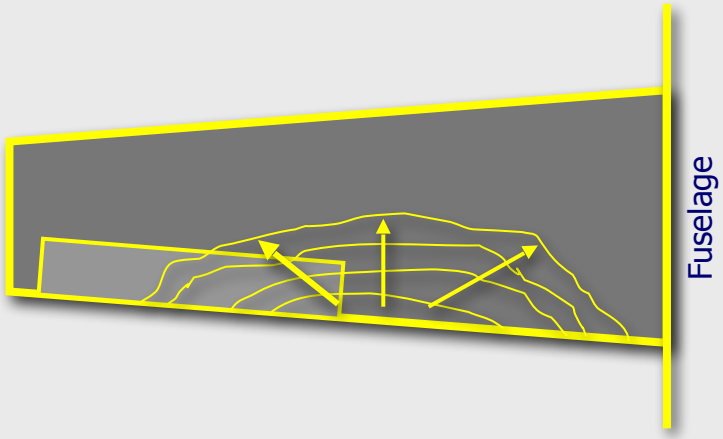


- Stalls at root first
- Lateral control longer
- Most docile stall characteristics

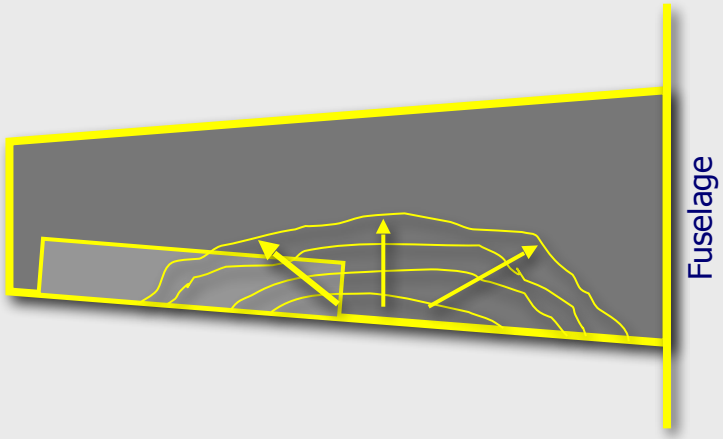



Fuselage

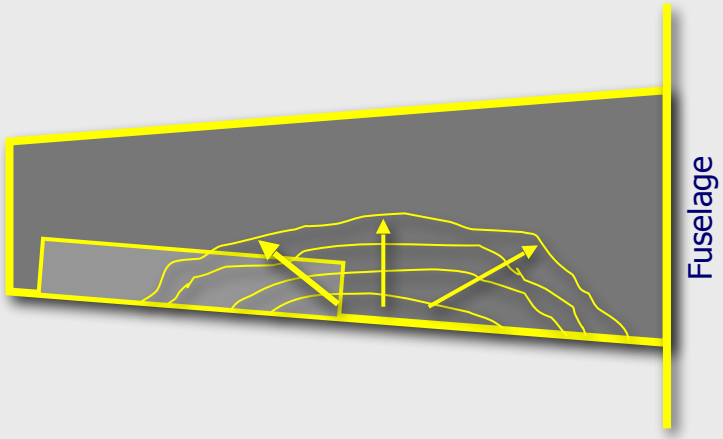
- Stalls simultaneously throughout span



- Stalls simultaneously throughout span
- Lateral control lost earlier in the stall



- Stalls simultaneously throughout span
- Lateral control lost earlier in the stall
- Less docile stall characteristics



Aerodynamic Tricks

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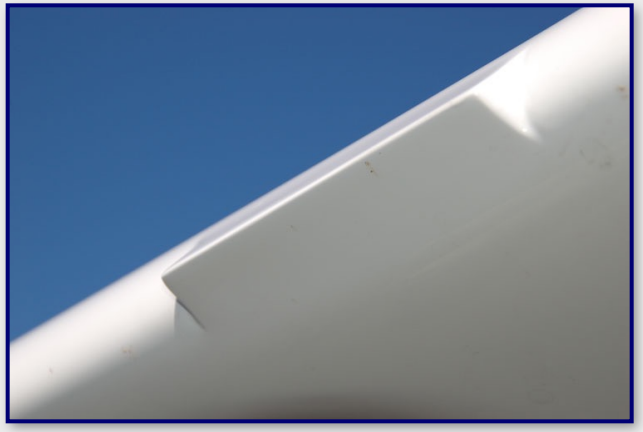
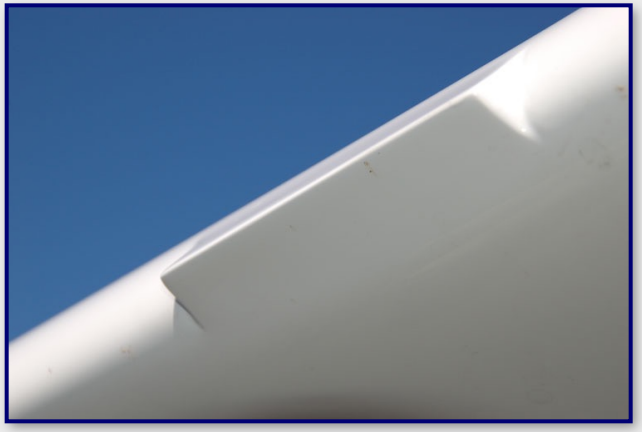
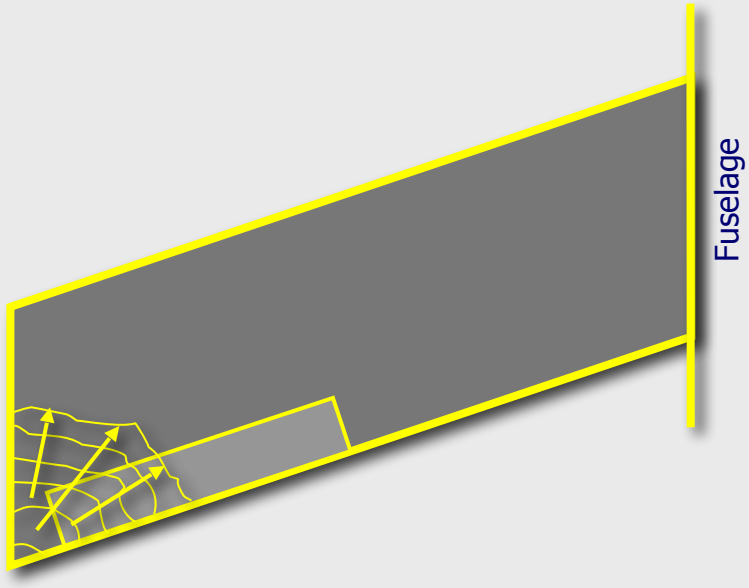
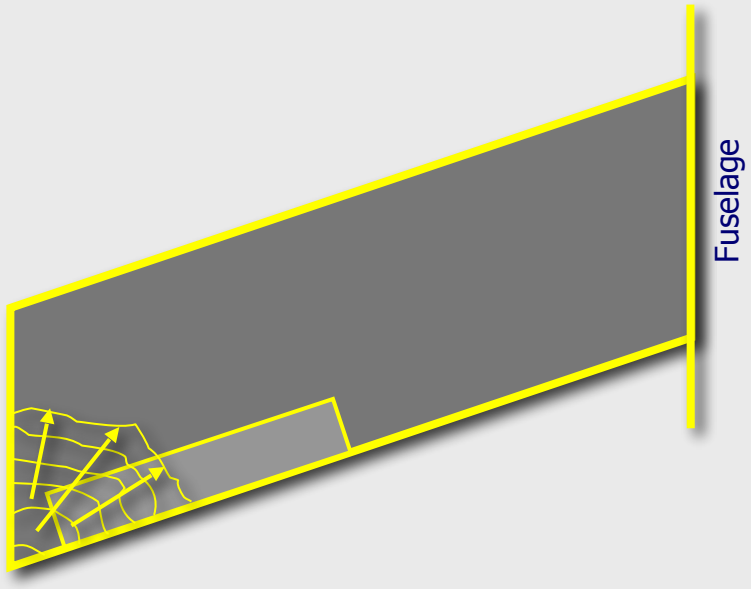


Aerodynamic Tricks

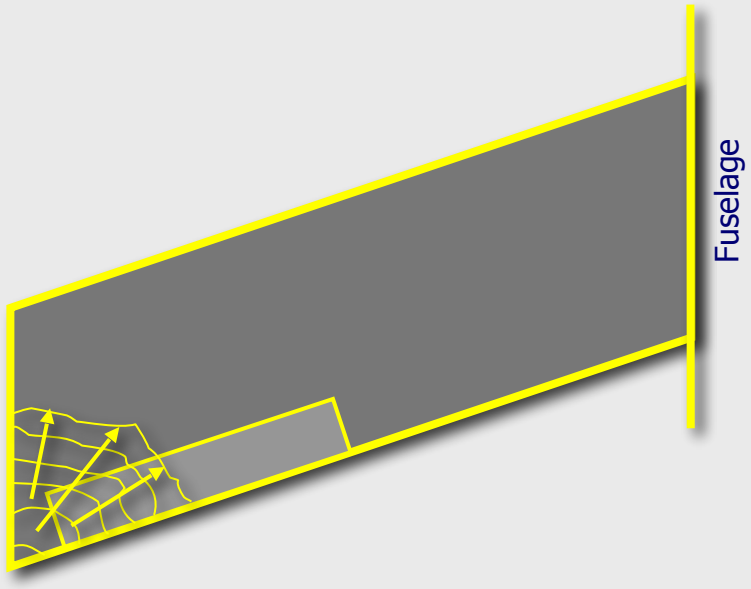



Fuselage

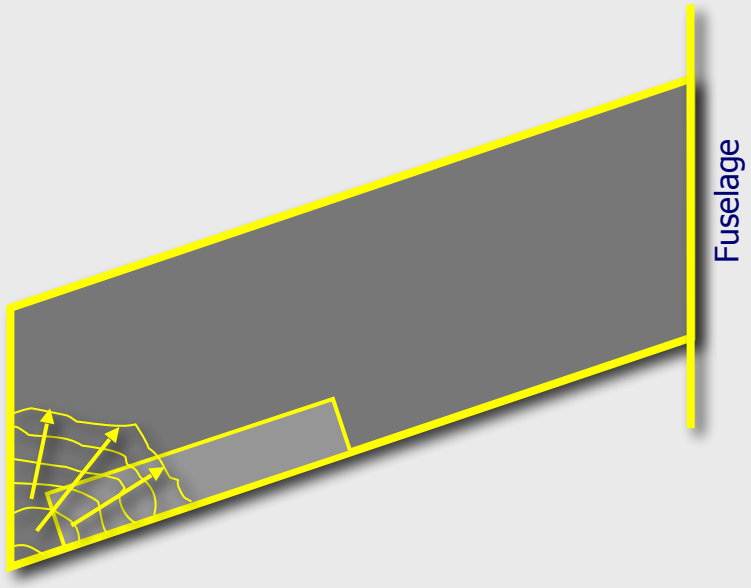
- Stall begins at wingtip first



- Stall begins at wingtip first
- Lateral control lost immediately



- Stall begins at wingtip first
- Lateral control lost immediately
- Aggressive stall & pitch up



Let's Take a Poll

What four words accurately describe "spirals" in their broadest sense?

AOA

ICON Aircraft

AOA

Spirals: Below Critical

ICON Aircraft

AOA

Spirals: Below Critical

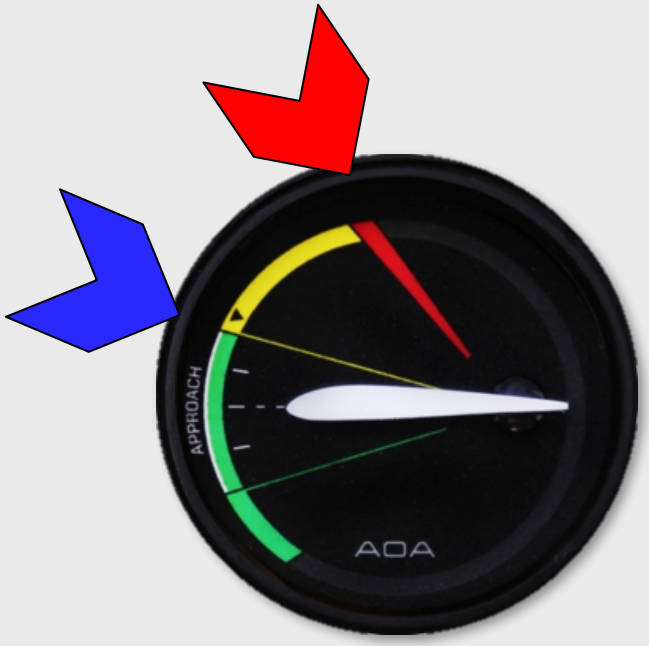
Stalls & Spins: Above Critical

ICON Aircraft

AOA

Spirals: Below Critical

Stalls & Spins: Above Critical



ICON Aircraft

ASI

ASI

Spirals: Rapidly Increasing

ASI

Spirals: Rapidly Increasing

Stalls & Spins: Low, Constant

ASI

Spirals: Rapidly Increasing

Stalls & Spins: Low, Constant

G-Load

G-Load

Spirals: Increasing

G-Load

Spirals: Increasing

Stalls & Spins: ≈ +1G

G-Load

Spirals: Increasing

Stalls & Spins: ≈ +1G

Primary Drivers

Primary Drivers

Spirals: Excessive AOB

Primary Drivers

Spirals: Excessive AOB

Stalls: Excessive AOA

Primary Drivers

Spirals: Excessive AOB

Stalls: Excessive AOA

Spins: Yaw/Roll Coupling

Spirals:

Spirals:

Aileron is the primary recovery control!

Spirals:

Aileron is the primary recovery control!

Power – Push – Roll

Spirals:

Aileron is the primary recovery control!

Power – Push – Roll

Off

Spirals:

Aileron is the primary recovery control!

Power – Push – Roll

Off A Little

Spirals:

Aileron is the primary recovery control!

Power – Push – Roll

Off A Little A Lot

Let’s Take a Quiz

What potential benefits arise from the “Push” in Power–Push–Roll?

Stalls:

Stalls:

Elevator is the primary recovery control!

Stalls:

Elevator is the primary recovery control!

Maintain heading & wings level with Rudder inputs,

Stalls:

Elevator is the primary recovery control!

Maintain heading & wings level with Rudder inputs,
lower the AOA with Elevator inputs

Nose & stick/wheel must move
in the same direction

Spins:

Spins:

In typical light general aviation SE airplanes,

Spins:

In typical light general aviation SE airplanes,

Rudder is the primary recovery control!

Spins:

In typical light general aviation SE airplanes,

Rudder is the primary recovery control!

P A R E

Spins:

In typical light general aviation SE airplanes,

Rudder is the primary recovery control!

P A R E

What's Next

and

Q & A

Learn More

Webinars, Courses & Seminars

Also with Rich Stowell…

Webinars

12 Myths About Stalls & Spins: *Letting the Facts Fly*
October 12th 20:00 EDT - $24.95

Landings: *The Good, the Bad and the Ugly*
October 19th 20:00 EDT - $24.95

Courses

EMT® (Emergency Maneuver Training) - Module I
Four Lesson Series starting October 21st - $74.95

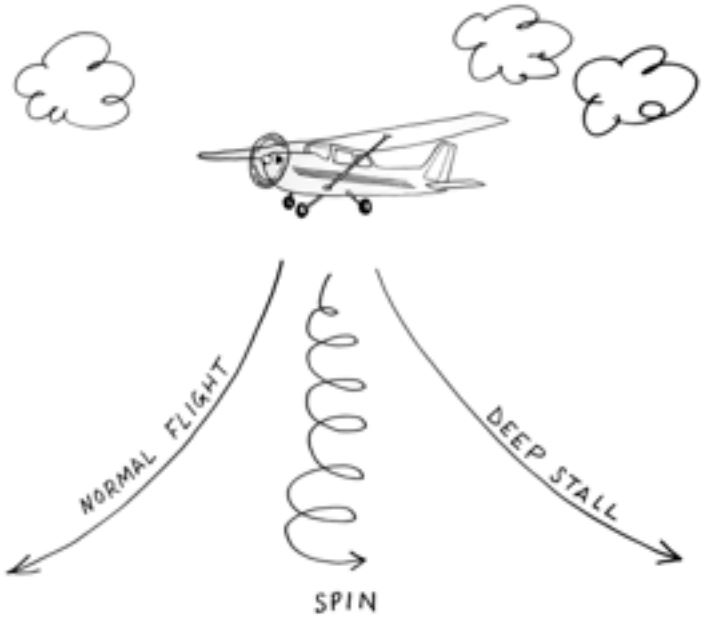
Seminars

KJYO Leesburg, VA - *Sponsored by Atlantic Airways*
October 8th 19:00 EDT

GFCA Novato, CA - *Sponsored by Scanlon Aviation*
October 22nd 19:00 PDT

The **Maintaining Aircraft Control** series
from Mindstar Community Aviation

www.LearnDoFly.com



www.LearnDoFly.com

Do More

Simulation Scenario Training

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Flight Training

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Bozeman, MT | Bedford, MA | Santa Paula, CA
Renton, WA | Tucson, AZ | Novato, CA
Boise, ID | Helena, MT

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Stall/Spin Awareness

What you don't know can hurt you

Presented by Rich Stowell
Live from McCall, Idaho
October 1st 20:00 EDT

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Rich Stowell
Presenter
McCall, Idaho

Billy Winburn
Organizer
Alexandria, VA