



VICTORIA FLYING CLUB

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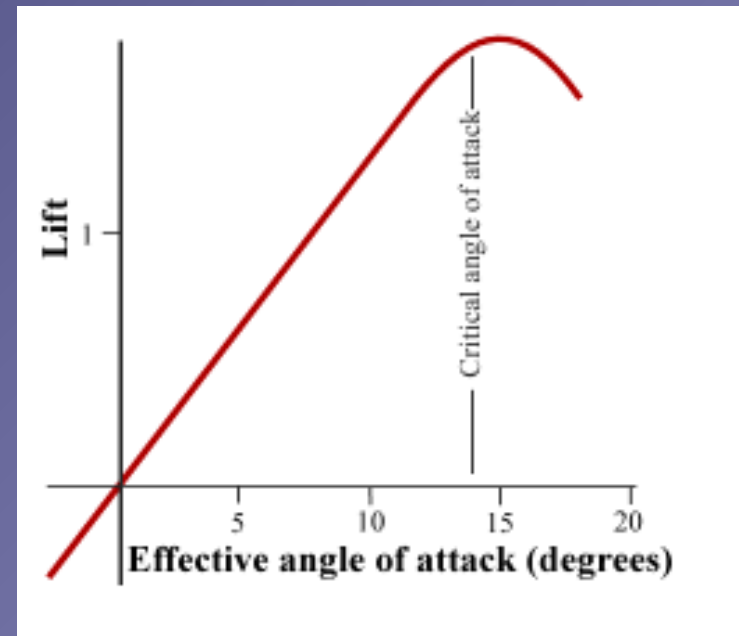
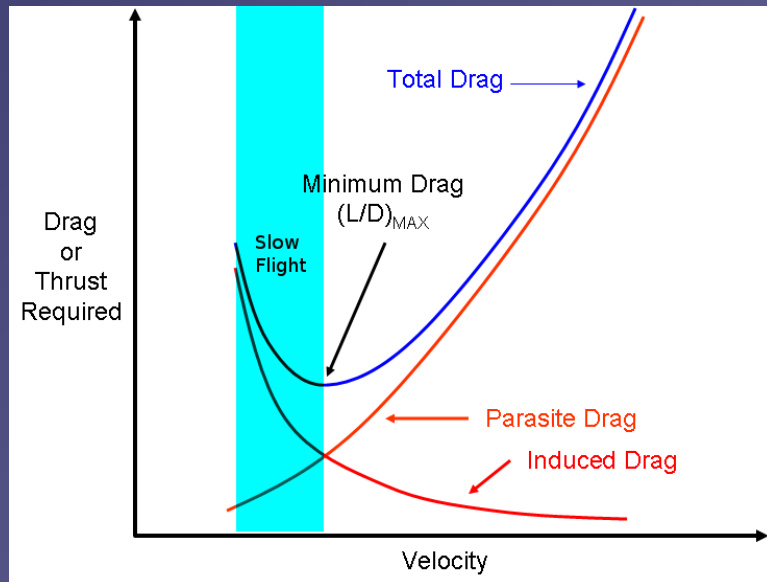
VICTORIA FLYING CLUB

Stalls

- Definition and Motivation
- **Power-Off** and **Power-On Stalls**
- **Approach Stalls** (Straight / Turning) and
- **Departure Stalls** (Straight / Turning)



Definition and Motivation



- **Lower limit of the slow flight range**
- Any angle of attack **beyond** the **critical angle of attack** at which any further increase leads to **less lift** and **more drag**
- *Imminent* – **stall warning**, **bottom of arc**, **buffet**
- *Fully Developed* – **nose or wing drop**



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Safety Considerations

- High **nose-up** attitude maneuver
- Limited forward visibility
- **HASEL, lookout** ahead and below
- **Maintain** good **lookout** during maneuver
- **Yaw** is to be controlled precisely with **rudder**
- **Remain coordinated** at all times



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Entering a Power-Off Stall

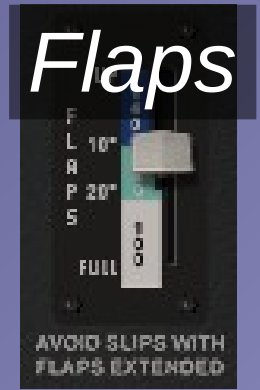


- Reduce **power** to **idle**, decelerate and control yaw
- Apply elevator **back-pressure** to increase **nose-up attitude** controlling yaw with **rudder** maintaining **altitude**
- Extend flaps in stages to desired degree in **white arc**



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Recovering a Power-Off Stall



- Apply **elevator forward pressure** to lower the nose *immediately*
- Apply **full power** controlling **yaw** with **rudder** to remain **coordinated**
- **Accelerate** past the slow flight range and **regain altitude**
- Retract **flaps** in stages to up in **white arc**
- Establish **cruise attitude** and **accelerate** to **cruise airspeed**
- Reduce **power** to **cruise power** setting and finally **trim**



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Entering a Power-On Stall

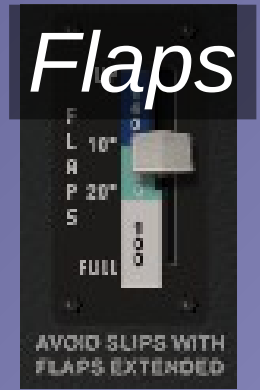


- Apply elevator **back-pressure** to increase and **hold nose-up attitude** controlling yaw with **rudder**
- Extend flaps in stages to desired degree in **white arc**



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Recovering a Power-On Stall



- Apply **elevator forward pressure** to lower the nose *immediately*
- Apply **full power** controlling **yaw** with **rudder** to remain **coordinated**
- **Accelerate** past the slow flight range and **regain altitude**
- Retract **flaps** in stages to up in **white arc**
- Establish **cruise attitude** and **accelerate** to **cruise airspeed**
- Reduce **power** to **cruise power** setting and finally **trim**



Imminent and Fully Developed Stalls

- Stall **recovery** in normal flight operations should be performed as **early as possible** – during the **imminent stall**
- Recover at the **first indication** of **stall warning, bottom of arc** or **buffet**
- Fully developed stalls are practiced to develop **proficiency in recognition and recovery *only***



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Approach / Turning Stall

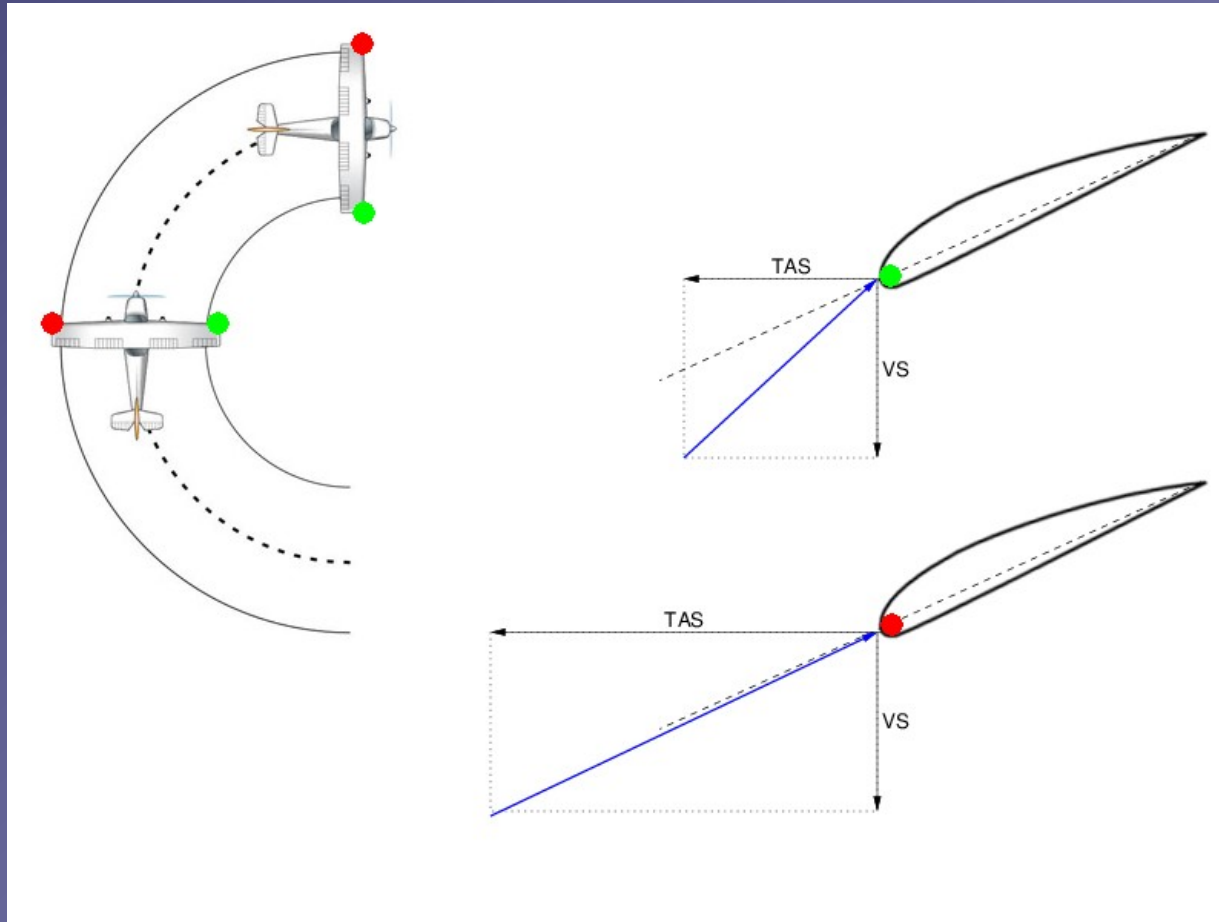


- Establish a power-off descending turn
- Increase bank attitude with high rate of turn
- Inner wing *may* stall first and drop
- **Release** elevator back-pressure lowering nose, apply **opposite rudder** and **ease out** of dive applying **power**



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Approach / Turning Stall AoA





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Departure / Turning Stall

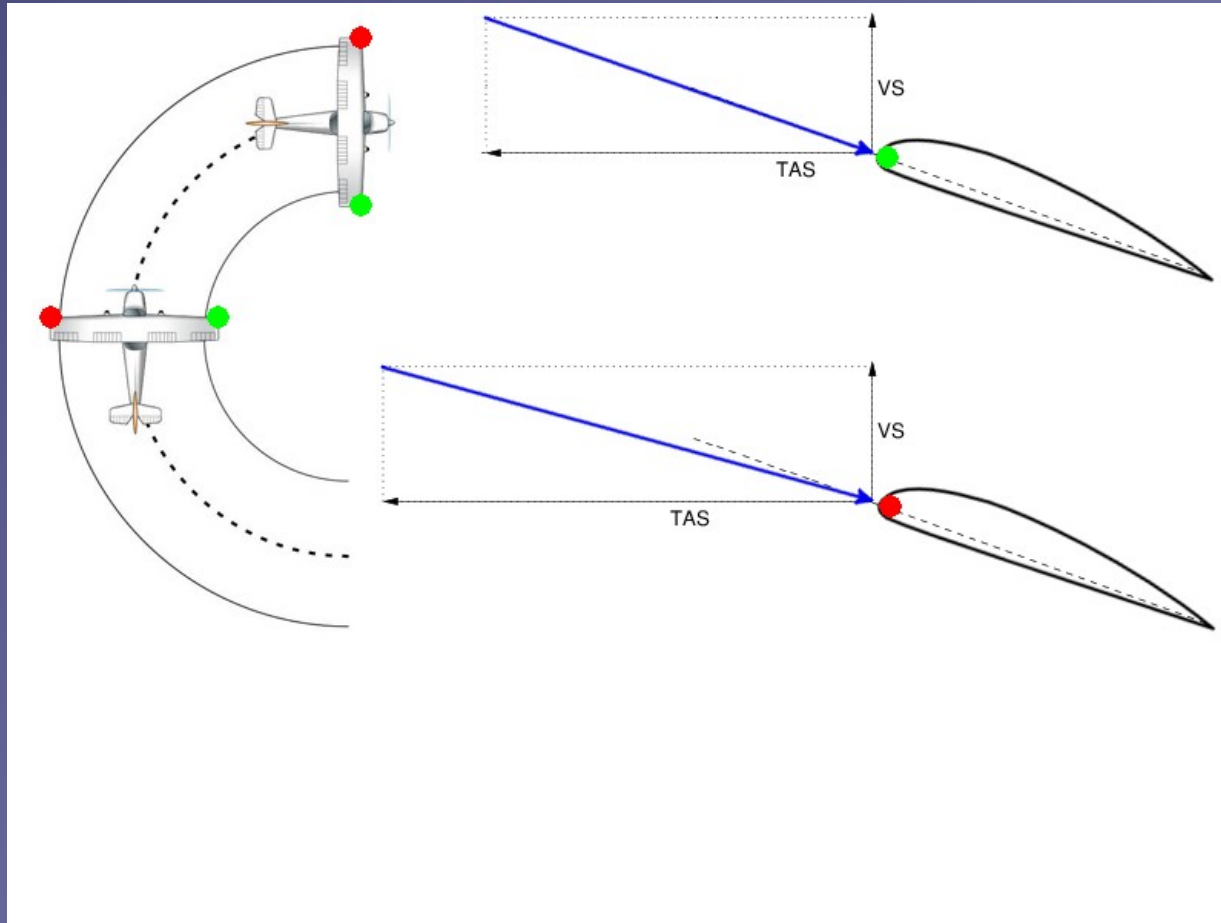


- Establish a power-on climbing turn
- Increase nose-up attitude while turning
- **Outer wing** *may* stall first and drop – **opposite** to the turn
- **Release** elevator back-pressure lowering the nose, **reduce power**, apply **opposite rudder**, then **neutralize**, wings level and **ease out** of dive applying power



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Departure / Turning Stall AoA





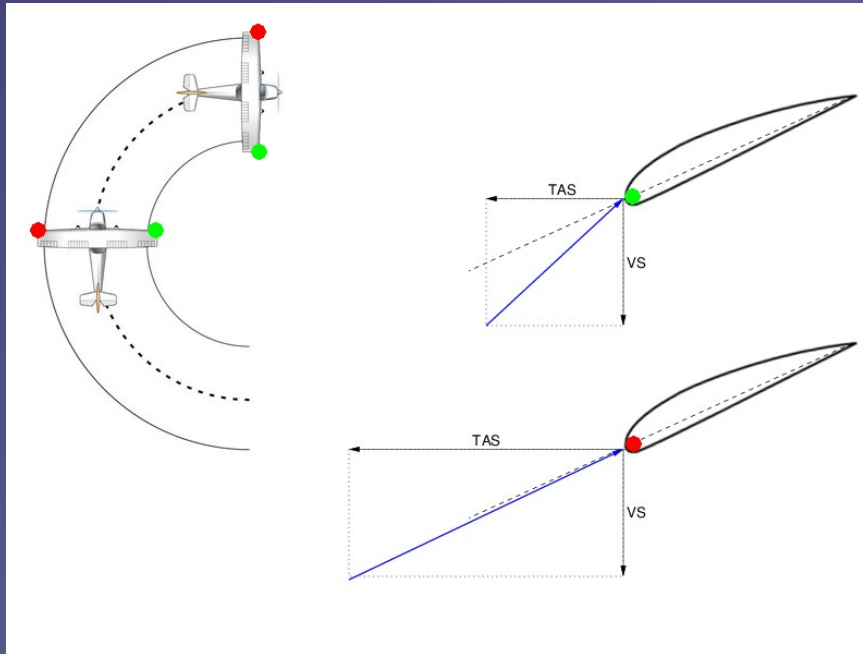
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Spins

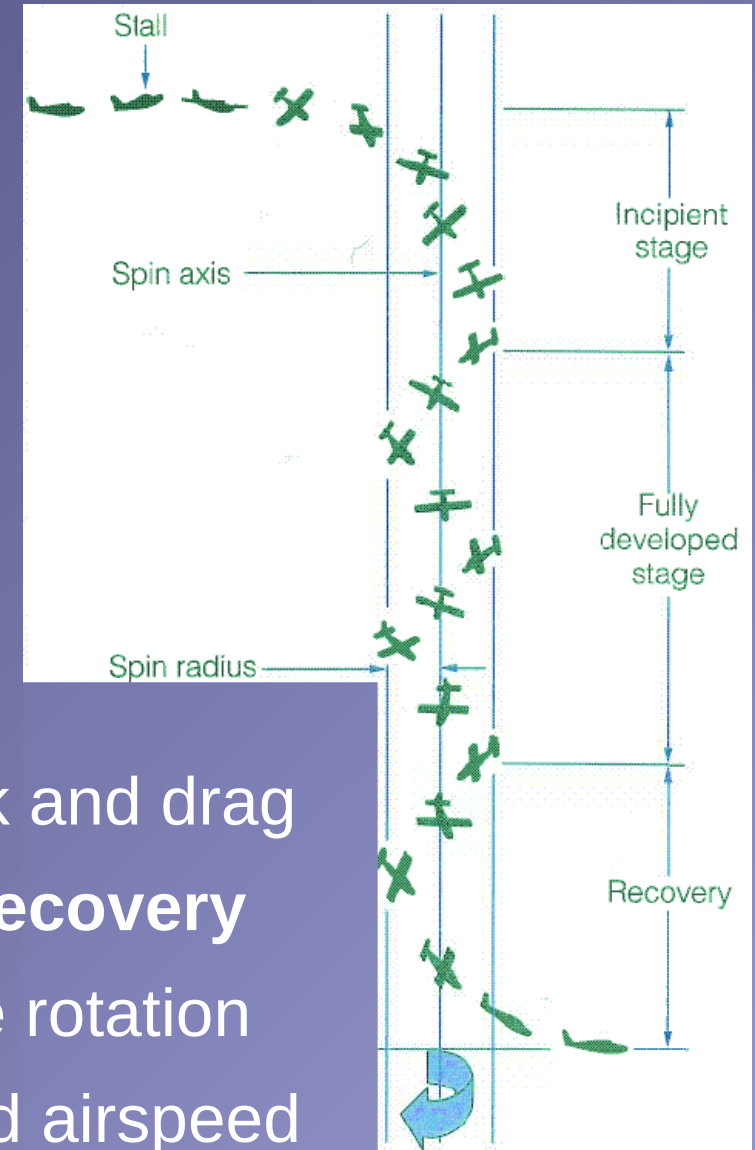
- Definition and Motivation
- **Spinning** and Factors



Definition and Motivation



- **Stall** *aggravated by yaw*
- Inner wing has higher angle of attack and drag
- No applications – **recognition** and **recovery**
- *Incipient* – initial transition into stable rotation
- *Fully Developed* – stable rotation and airspeed





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Safety Considerations

- High **nose-up / nose-down** attitude maneuver
- Spin can occur at any attitude and airspeed
- **AFM – utility category** is required
- **HASEL, lookout** ahead and below
- Significant **loss of altitude**
- **Recovery** above **2000' AGL**



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Spin Entry

Enter Imminent Stall



Full Aft Elevator



Full Left Rudder

- Reduce **power** to low power setting (**1500 RPM**)
- Apply elevator **back-pressure** to increase **nose-up attitude** controlling yaw with **rudder** maintaining **altitude**
- During the imminent stall *simultaneously* apply and **hold full elevator back-pressure** and **full left-rudder**



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Spin Entry

Enter Imminent Stall



Full Aft Elevator



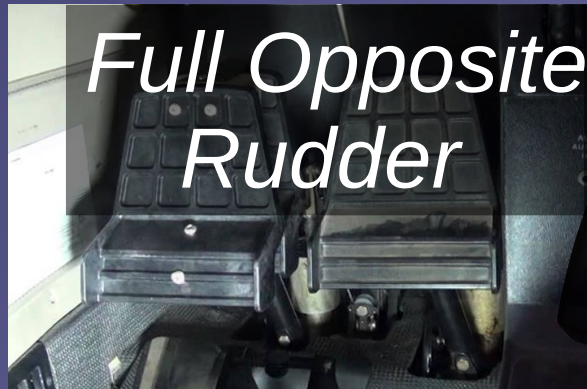
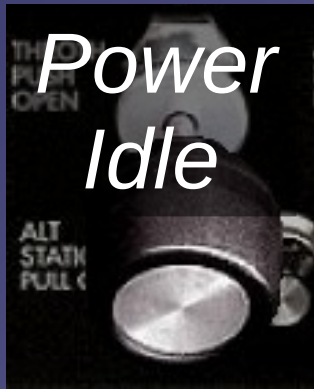
Full Rudder

- Reduce power to idle
- Apply elevator **back-pressure** to increase **nose-up attitude** controlling yaw with **rudder** maintaining **altitude**
- During the imminent stall *simultaneously* apply and **hold full elevator back-pressure** and **full rudder**



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Spin Recovery



- Reduce **power** to **idle** and keep **ailerons neutral**
- Apply **full opposite rudder** (opposite spin direction) and **release elevator back-pressure** (briskly forward) until turn stops, then **neutralize rudder**
- **Ease out** of dive and increase **power** to regain **altitude**
- Establish **cruise attitude**, set **cruise power** and **trim**



Spin Recovery – Factors

- *Incipient versus fully developed* spin – rate of turn and recovery time
- Power – additional yaw and flatter spin
- Flaps – flatter spin, reduced elevator effectiveness and structural damage
- Weight and Balance – forward versus rearward center of gravity, load factor and inertia
- Altitude – density and control effectiveness



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Incipient versus Fully Developed Spin

Power on stall recovery Pitch down to break the stall

Roll wings level

Resume normal climb



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Instruments



- **Turn coordinator** may help to determine direction of spin
- **Airspeed** should not increase significantly
- High airspeed (acceleration) could indicate a spiral dive
- **Rate of descent** should be stable – constant **altitude** loss