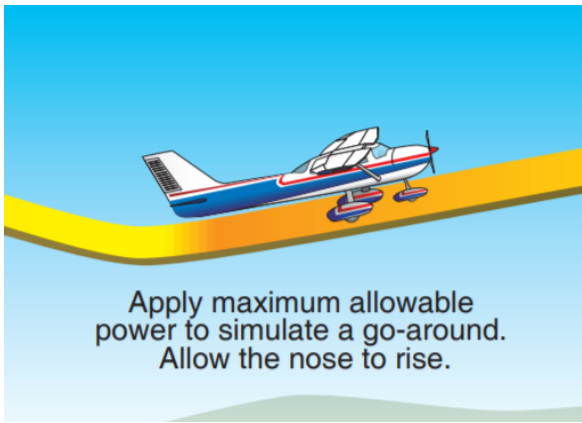


## Elevator Trim Stalls (Demonstration)

<b>Objective</b>	
<p>To ensure the applicant learns the purpose of and can exhibit a clear understanding of the elevator trim stall maneuver and how to perform the maneuver properly.</p>	
<b>Purpose</b>	<b>Equipment</b> <ul style="list-style-type: none"> <li>● Whiteboard / Markers (optional)</li> <li>● Model Airplane (optional)</li> </ul>
<p>During go-arounds, pilots are often under high stress and workload, and elevator trim stalls can develop unexpectedly. This maneuver introduces CFI applicants to the hazards of failing to arrest nose-up pitching during go-arounds and how to properly recover from an elevator trim stall.</p>	
<b>Schedule</b>	<b>Instructor Actions</b> <ul style="list-style-type: none"> <li>● Deliver the ground lesson (below).</li> <li>● Demonstrate the maneuver in flight.</li> <li>● Debrief after each flight.</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Ground Lesson:</b> 15 minutes</li> <li>● Initial <ul style="list-style-type: none"> <li>■ <b>Flight:</b> 40 minutes - <i>Demonstrate Maneuver</i></li> </ul> </li> <li>● CFI Applicants Only <ul style="list-style-type: none"> <li>■ <b>Flight:</b> 30 minutes - <i>Practice Maneuver (Dual)</i></li> <li>■ <b>Flight:</b> 20 minutes - <i>Demonstrate Proficiency</i></li> </ul> </li> <li>● <b>Debrief:</b> 10 minutes (<i>per flight</i>)</li> </ul>	
<b>Student Actions</b>	<b>Completion Standards</b> <ul style="list-style-type: none"> <li>● <b>Ground:</b> Student can explain the purpose of the elevator trim stall maneuver, the aerodynamics that affect the maneuver, and how to execute it properly.</li> <li>● <b>Flight:</b> Student can perform the maneuver to the following standards: <ul style="list-style-type: none"> <li>● Clears the area, performs a pre-maneuver checklist, and configures the airplane for landing.</li> <li>● Selects an altitude <b>no lower than 2,000ft AGL</b>.</li> <li>● Begins a stabilized descent at a normal approach airspeed.</li> <li>● Rapidly applies full power and allows the nose to rise.</li> <li>● Recognizes and acknowledges the first indications of an approaching elevator stall and applies nose down pitch and elevator trim, while maintaining coordinated flight.</li> <li>● Returns to a normal climb attitude and airspeed and returns to pre-maneuver altitude.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>● Ask any questions, receive study material for the next lesson.</li> <li>● Watch linked video.</li> <li>● Review listed references.</li> </ul>	

## References

- Leo Horton - "CFI Elevator Trim Stall"
  - YouTube - <https://www.youtube.com/watch?v=DZfOtvjJR-I>
- FAA-H-8083-3B (Airplane Flying Handbook) - Chapter 4, Page 5-6 [Stalls/Stall Recognition/Stall Recovery], Chapter 4, Page 12-13 [Elevator Trim Stall]
- FAA-H-8083-25B (Pilot's Handbook of Aeronautical Knowledge) - Chapter 5, Page 25-26 [Stalls]
- FAA-S-8081-6D (CFI PTS) - Area XI Task E

## Ground Lesson Outline

- What is an Elevator Trim Stall?
  - Go-arounds
  - Power-off stall recovery
- Aerodynamics of Elevator Trim Stalls
  - Low Thrust Line
  - Increased Downwash
- Don't Overpitch During A Go-Around
  - Dangers of Failure to Arrest Pitch Up
- Recognition and Recovery
  - Excessive nose-up attitude
  - Stall warning
  - Forward elevator, reduce nose-up trim, maintain coordination
- Maneuver Description - step-by-step
  - Entry position, airspeed, etc.

## Common Errors

- Failure to present simulated student instruction that adequately emphasizes the hazards of poor correction for torque and up-elevator trim during go-around and other maneuvers.
- Failure to establish selected configuration prior to entry.
- Improper or inadequate demonstration of the recognition of and the recovery from an elevator trim stall.

## Ground Lesson Content

- **What is an Elevator Trim Stall?** - An elevator trim stall is simply a stall that occurs by having excessive nose-up trim in a situation where the airplane naturally wants to pitch up. For example, an elevator trim stall is often encountered when performing a go-around, or recovery from a power-off stall, because the airplane is trimmed for slow flight and a sudden burst of power can cause the nose to rise rapidly into a stall.

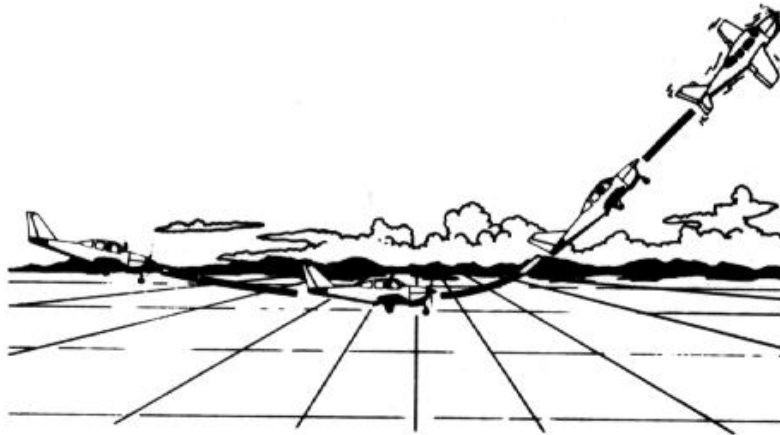
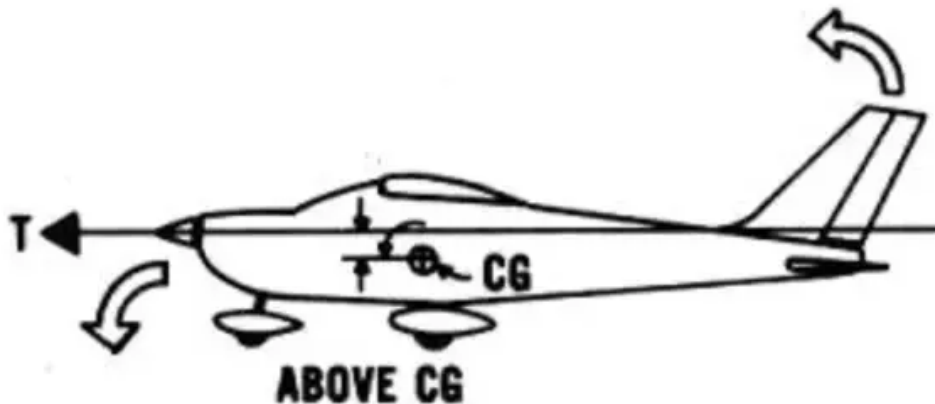
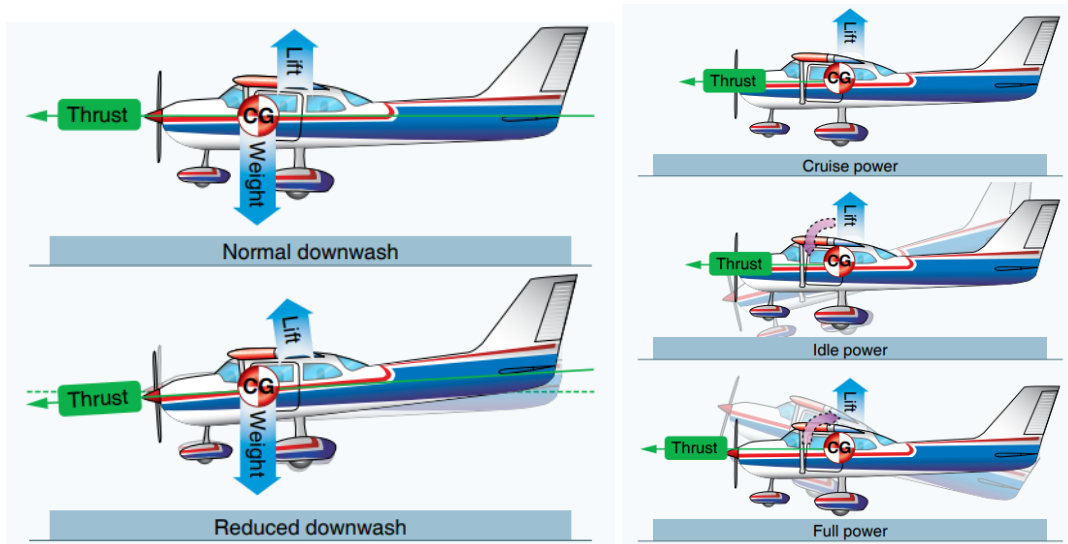


Figure 11-26 Elevator Trim Stall

- **Aerodynamics of Elevator Trim Stalls** - Elevator trim stalls occur for two main reasons:
  - **Low Thrust Line** - The line through the propeller indicating the direction and location of the center of the engine thrust is called the *thrust line*. In many airplanes, **the thrust line is below the center of gravity, so that when power is applied, there is an upward pitching tendency.** (Likewise, reducing power has a downwards pitching tendency)

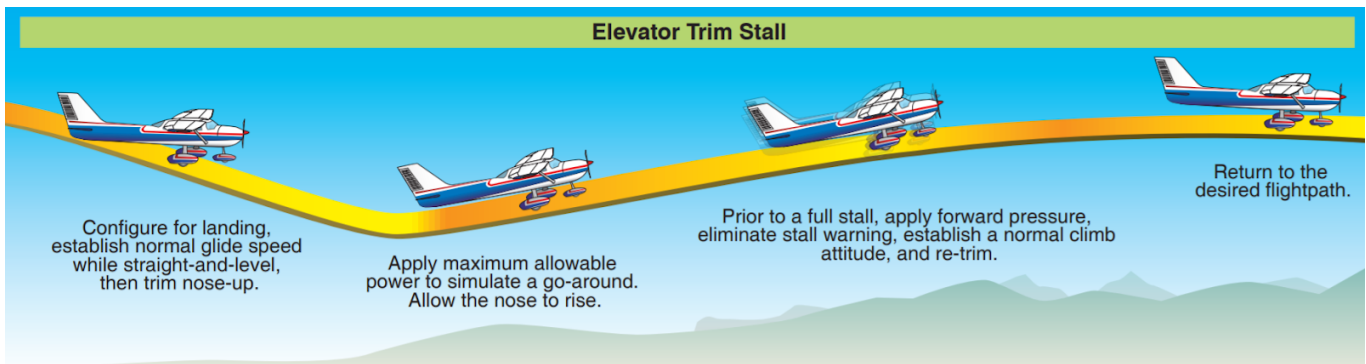


- **Increased Downwash** - During normal straight and level flight, the thrust from the propeller creates a significant amount of *downwash* over the rear horizontal stabilizer. When flying at low speeds and low power settings, this downwash is reduced. This requires more nose-up elevator trim in order to maintain the same airspeed. **When a high power setting is restored, the downwash increases again, and the elevator trim setting is now much too high for the airspeed, causing a rapid nose-up pitch.**



- **Don't Overpitch During A Go-Around** - Because of the low thrust line and the suddenly increased downwash, when full power is applied in a go-around, the airplane will tend to pitch up on its own, sometimes violently. It is important that pilots are prepared for this and apply *nose-down* elevator pressure to counteract it. **If this pitch up is not stopped by the pilot, it is possible for the airplane to enter a power-on stall!** (An 'elevator trim stall')
  - It may be necessary to quickly apply nose down trim and aggressively apply forward elevator pressure to overcome the nose-up pitch!
  - Proper go-around pitch is similar to proper takeoff pitch. The nose should be *above the horizon*, but not excessively so.
  - Because of the high power setting and suddenly greatly increased pitch (and therefore angle of attack), left-turning tendencies will be exaggerated. **If left uncorrected, this will tend to create an uncoordinated stall, which creates a high risk of a spin!**
  
- **Recognition and Recovery** - Pilots can recognize an approach to an elevator trim stall by noticing when the nose rises rapidly when power is applied quickly. **Nose-up attitudes of greater than 20 degrees of pitch, or a stall warning indication are important cues that should be acted upon promptly!**
  - Recovery is simple: **apply forward elevator pressure, quickly trim nose-down, and maintain coordination.** Resume a normal climbing pitch attitude and accelerate to  $V_x$  or  $V_y$ , as appropriate.

## Maneuver Description



- **Entry Altitude** - Stalls should always be performed at a safe altitude, in case of a delayed or inadequate recovery, or other problems. The maneuver should be performed such that accounting for altitude loss during the stall, the final altitude is no lower than 1,500 feet AGL. Therefore it is best to begin the maneuver **at least 2,000 feet AGL**.
- **Entry Airspeed** - The maneuver should be started at a normal approach airspeed.
- **Checklists** - Pilots must perform a pre-maneuver checklist before beginning the maneuver. Because this maneuver is meant to simulate a go-around following an approach to landing, it is a good idea to also perform a pre-landing checklist.
- **Configuration** - Configure the airplane for landing (generally add flaps and lower landing gear).
- **Entry Power and Trim** - Initially, reduce the power and apply nose-up elevator trim to begin a normal descent for landing at the approach airspeed.
- **'Go Around'** - Simulate a go-around by applying full power rapidly but *do not* apply forward elevator pressure and allow the nose to rise rapidly.
- **Recognize** - Acknowledge (call out) the **first indications** of an approaching stall (especially the buffet or stall warning horn).
- **Recovery** - Promptly **apply strong forward elevator pressure, level the wings, and rapidly apply nose-down elevator trim, maintaining coordination**. Establish a normal climb at  $V_x$  or  $V_y$  to get back to the pre-maneuver altitude. Progressively retract flaps, landing gear, etc.
- **Coordination** - Due to the strong left-turning tendencies present at high power settings during stall recovery, **proper coordination is essential**. Failure to correct for left-turning tendencies can lead to an uncoordinated power-on stall and spin.
- **This is a visual maneuver!** Eyes should remain outside the cockpit as much as possible to scan for traffic and to hold heading.