STALLS

This is not intended to be a full and complete discussion of aerodynamic stalls. It should, however give you a basic understanding of stalls and how they affect flight. If you have obtained a private pilot's license, you should be well acquainted with stalls and have no doubt practiced them.

First, stalls are a function of angle of attack -- the angle of the wing compared to the relative wind -- and not a function of airspeed. High speed stalls can be just as real and dangerous as low speed stalls.

Why does the pilot need to study and practice stalls? Because they are most likely to occur during the most dangerous phases of flight -- takeoff, landing, turning final and go-arounds. The objective of practice is to be able to recognize and recover from a stall or approaching stall before you find yourself running out of airspeed, altitude and ideas at the same time.

This discussion will cover four types of stalls.

1) Power Off Stall - simulates landing stalls
2) Power On Stall - simulates a stall on takeoff
3) Cross Control Stall - a turn to final stall
4) Elevator Trim Stall - failure to control the plane during a go-around

The following instructions are general in nature and may vary somewhat based on the type and model plane you are flying.

1) Power Off Stall - simulates a landing stall

A. Insure adequate altitude for a safe recovery (3,000' to 5,000' AGL)

B. Set up for the stall. Slow aircraft to a base leg airspeed and establish a landing configuration: power settings, gear down with half flaps.

C. Reduce throttles to idle

D) Raise the nose 10 to 15 degrees nose up

E) Recognize the stall. In a real airplane you will feel a burble or buffet (approach to stall), a shudder as the wing stalls (airflow breaks away from the wing's upper surface), and some planes have a stick shaker and an audio warning signal.

In the flight simulator, some models have the audio signal and probably all will display a visual "STALL" signal in the lower right corner of the screen.

F) Recover - allow the nose to drop below the horizon and apply full power, and when you have stopped any loss of altitude gear and flaps up, bring the nose back to level flight attitude and reduce power. Keep the airplane well trimmed. Use smooth control inputs for recovery. Abrupt input can result in a secondary stall, which is more severe than the original -- and at the worst a spin.

In the example of the Power Off stall to the right, I never got the stall warning signal because I did not reach stall speed. I was approaching a stall as indicated by the airspeed (60 knots) and a vertical velocity indicator showing 500 feet per minute rate of descent even with the yoke full back. The airplane was mushing downward and a recovery is needed.	

2) Power On Stall - Simulate a stall during takeoff

A. Insure adequate altitude for a safe recovery (3,000' to 5,000' AGL)

B. Set up for the stall. Establish climb power settings and a takeoff configuration: gear down with takeoff flap setting.

C. Raise the nose. It will take a nose high attitude much greater than for the Power Off Stall.

D) Recognize the stall (as described in the Power Off Stall).

E) Recover (as described in the Power Off Stall).

3) Cross Control Stall - a turn to final problem

Do not practice this stall in large airplanes -- use smaller models that are stressed for acrobatics.

This predicament occurs when you attempt to salvage a poor base to final turn and are overshooting final approach heading. The temptation is to use the rudder to force the nose to align with the runway.

In the turn, the nose drops due to the rudder input and the "down" aileron drag. To counteract this, the tendency is additional elevator input to bring the nose up.

The situation compounds, more rudder, nose drops, add more elevator until the stall occurs. This one can be quite disconcerting since

the plane will snap roll toward the low wing. Not a good aerobatic maneuver 500 feet of so above the ground.

The solution for this problem - maintain coordinated turns and don't try to salvage a poor approach -- go-around instead.

4) Elevator Trim Stall - a go-around hazard

On final approach, you will be adding nose up trim to compensate for the lower airspeeds and landing configuration. This is a continuing input throughout the traffic pattern and final approach.

Now you decide to go-around or the tower directs you to abort the landing. The first step is to add go-around power, somewhere near full power and when you have a positive rate of climb you begin to bring the gear and flaps up.

Consider your situation. You have maximum power on the engines and a large chunk of nose up trim -- the tendency of the plane is to climb to match the elevator trim input. You have two choices. Use brute force to keep the nose at a reasonable climb attitude or you trim nose down throughout the process.

Failure to do either of those two steps results in an extreme nose up attitude and a possible stall. This combination nearly caused the loss of a KC-135 aircraft and the crew. This incident occurred at Castle AFB, California, USA, which was the KC-135 transition training base.

This particular student crew had an instructor who liked to scream and belittle his students. On the approach in question, he was doing his usual number on the student pilot and demanded the student execute a go-around. The student complied, adding full power and starting to clean up the plane. He didn't bother with nose trim, but held the yoke forward with brute force.

The instructor didn't like something about the go-around and stated, "I've got the airplane." The student said, "Okay," and turned loose of the yoke, which snapped full back into the instructor's gut. The instructor screwed up on two accounts. First, he should have noticed that the student pilot was not trimming during the go-around and

second, he should have been prepared to take full control of the yoke when he ordered the student to relinquish control.

The bird popped up to 1,000 feet in nothing flat and was rapidly running out of airspeed. The instructor began nose down trimming and slammed the yoke against the forward stop. This resulted in a negative G recovery and put a couple of students, not strapped into seats, up against the ceiling. As the recovery proceeded and a positive G was attained, those students crashed to the floor. One of them broke an ankle.

When you are able to anticipate potential stall situations, you can avoid them. Early recognition will also save the day. If a full stall occurs, do not hesitate -- initiate recovery procedures immediately.