STALLS

Occurs when the wing is no longer capable of producing sufficient lift to counteract the weight of the aircraft. A smooth laminar airflow over the wing is needed to produce lift. The stall occurs when the angle of attack is increased to a point where the steady, streamlined flow of air is unable to follow the upper camber of the airfoil. The airflow separates from the wing, becomes turbulent and loss of lift occurs. As the angle of attack increases, the centre of pressure moves forward on the wing until the CRITICAL ANGLE OF ATTACK is reached. At this point the C of P moves abruptly backwards on the wing, which is now stalled.

FACTORS AFFECTING THE STALL:

Weight:

- The greater the weight causes the aircraft to operate at higher angle of attack. Therefore, it has a higher stalling speed

C of G:

- The further forward the C of G moves, the higher the stalling speed. The further back it moves, the lower the stalling speed.

Turbulence:

- Higher stalling speed because an upward vertical gust could cause the aircraft to exceed its critical angle of attack.

Turns:

- As the amount of bank in a turn increases, the stalling speed increases because the load factor increases.

Flaps:

- By increasing the lifting potential of the wing it reduces the stalling speed.

Aircraft condition:

- Snow, frost, ice, dents can all increase the stalling speed because of increased drag
  - **An aircraft will stall if the critical angle of attack is exceeded.**
  - **It will stall at any airspeed if the critical angle of attack is exceeded.**
  - **It will stall at any attitude if the critical angle of attack is exceeded.**
  - **It will stall at the same indicated airspeed regardless of altitude.**

SPINNING

Spinning may be defined as auto-rotation which develops after an aggravated stall. If a disturbance causes a stalled airplane to drop one wing, or if rudder is applied to produce a yaw, the downgoing wing will have a greater angle of attack to the relative airflow, will receive less lift and will tend to drop more rapidly. Drag on the downgoing wing increases sharply, increasing the angle of attack of the downgoing wing still further and stalling it further. The nose drops and auto-rotation sets in.

SPIRAL DIVE

A spiral dive is a steep descending turn in which the airplane is in an excessively nose down attitude. Excessive angle of bank, rapidly increasing airspeed and rapidly increasing rate of descent characterize it. Structural damage can occur to the airplane if the airspeed is allowed to increase beyond its limits.

A spiral dive resembles a spin but don't confuse the two. In a spin, the airspeed is constant and low, it is a stalled condition. In a spiral dive, the airspeed increases rapidly, it is not a stalled condition.

LOAD FACTOR

Dead Load:

- The weight of the aircraft standing on the ground.

Live Load:

The change in dead load due to acceleration or turns.

Load Factor:

The ratio of the actual load acting on the wings to the gross weight of the aircraft. In other words it is the live load divided by the dead load.

Why load factors are important

i. Dangerous overload is possible
ii. An increase in the load factor will result in an increase in the stalling speed.

Load factors are expressed in G's

i. When on the ground or in straight and level flight, you are said to be under the force of 1G or one time the force of gravity.

ii. As the angle of bank increases so does the loading factor.

iii. In a banked attitude of 60° = 2G's