

AILERONS

The ailerons are control surfaces attached to the trailing edge of the wing near the tip. They move in opposite directions; as one goes up the other goes down. They are controlled by movement of the control column or stick and serve to roll the airplane.

When the control column or stick is moved right, the left aileron moves down and the right aileron moves up. The lifting capacity of the right wing is decreased. The lift on the left wing increases and the wing rises. This motion is known as rolling.

ELEVATOR

The elevator is hinged to the trailing edge of the horizontal stabilizer and is controlled by forward or aft movement of the control column.

When the control column is pushed forward, the elevator moves down, increasing the lifting capability of the tail. The tail raises and the nose of the airplane moves down. This up and down movement is called pitching.

THE STABILATOR

The Stabilator is a one-piece, horizontal tail surface that pivots up and down. It operates on the same principle as the elevator, moving up or down, changing its angle of attack and hence its lifting capabilities as the pilot pulls back or pushes forward on the control column.

RUDDER

The Rudder moves the nose of the aircraft either left or right in a motion known as yaw. The rudder is attached to the trailing edge of the vertical stabilizer or fin.

Pressure applied to the right rudder pedal moves the nose of the aircraft to the right. This side-to-side motion is called yawing.

The rudder is used with the ailerons to achieve coordinated turns.

TRIM TABS

The purpose of trim systems is to assist the pilot by eliminating the need to exert excessive pressure on the cockpit flight controls during the various phases of flight. This is achieved by proper use of trim tabs.

AIRCRAFT AXIS

Longitudinal Axis

The longitudinal axis is an imaginary line that runs lengthwise through the fuselage from the nose to the tail. Movement of the airplane around the longitudinal axis is known as **ROLL** and is controlled by movement of the ailerons.

Lateral Axis

The lateral axis is an imaginary line that runs crosswise from wing tip to wing tip. Movement of the airplane around the lateral axis is known as **PITCH** and is controlled by movement of the elevators.

Vertical or Normal Axis

The vertical or normal axis is an imaginary line that passes vertically through the C of G. Movement of the airplane around the vertical axis is **YAW** and is controlled by movement of the rudder.

ADVERSE YAW

In a roll, the airplane has a tendency to Yaw away from the intended direction of the turn. This is the result of aileron drag and is called **ADVERSE YAW**.

The up going wing, as well as gaining more lift from the increased camber of the down going aileron, also experiences more induced drag. The airplane skids outward on the turn. Use of rudder in the turn corrects this tendency.

BALANCED CONTROLS

Controls are sometimes dynamically balanced to aid the pilot to move them.

Mass balance:

Mass of streamline shape fitted in front of the hinge of the control surface to balance it.

Static balance:

The control surface is balance about its specific C of G without any airflow over it.