

Schaufele Annotations

Chapter 6 Horizontal and Vertical Tail Sizing

Pitch Control

On the DC-9 the elevators and rudder (Fig 6-19 and 6-20) are operated by control tabs in a similar manner to the ailerons (see Annotations to Chapter 4). Additionally, the elevators have a hydraulic boost when the control column is in the full forward position to provide extra control power to get out of a deep stall. Control columns are linked in pitch by a frangible torque tube. The port elevator control tab is controlled by the captain's control column and the starboard control tab by the first officer's control column. Failure of the pitch control system on one side can be overridden by breaking the torque tube. Fig 6-19 shows two tabs on each side. This was done because a single tab of the required span would have been structurally unstable. The tabs on each side operate together.

On commercial aircraft, pitch trim usually accomplished by moving the horizontal stabilizer. On the DC-9 a single jack screw in the vertical stabilizer is used to move the horizontal stabilizer.

The use of control tabs is unusual for a commercial airplane but not unique; the BAC 1-11 used a similar system.

Vertical Stabilizer Geometric Characteristics

If an airplane has a T-tail, the vertical stabilizer must carry heavy loads. For this reason the taper ratio is very large (i.e., it has a small, or zero, taper) as illustrated in Schaufele Fig. 6-20. If the horizontal stabilizer is mounted on the rear fuselage then the vertical stabilizer has a taper ratio which is comparable with the horizontal stabilizer.