Controlling Crippled Aircraft --
With Throttles Only

by

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On July 19, 1989, the most dreaded failure in a jumbo airliner, not equipped with manual control cable backup, actually happened despite an estimated probability of 1/1,000,000,000 -- The catastrophic, uncontained explosion of the tail engine of UA232 DC-10 produced a hail of shrapnel that severed the lines of all three independent hydraulic systems, leaving the aircraft overloaded, underpowered, and nearly uncontrollable at 37,000 feet. In this talk Capt. Haynes will review the flight of UA232 and explain how the crew regained control of the aircraft by improvising a "throttle-only" control scheme on the two remaining wing engines. Dutch roll was controlled by differential throttling, phugoid was controlled by collective throttling, until the crash landing in Sioux City, Iowa, in which most of those aboard survived.

That 184 people survived the crash can be credited to several factors: that the aircraft remained structurally sound, that meteorological conditions were visual with daylight, etc., contributed to the luck factor. Quick and total response by Air Traffic Control, proper intra-communications training between ground units, and proper use of all available facilities contributed to the communications factor. A live drill leading to improvements and better planning for a disaster coupled with thorough training of the cabin and cockpit crews prepared everyone as well as possible for this seemingly impossible disaster.

The lesson learned from UA232 is that total hydraulic failure is survivable, and this prompted NASA to initiate an entirely new field of aerospace control that became officially known as Propulsion Control Augmentation (PCA).

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