THE INDEPENDENT ON SUNDAY

HD **Who is really flying the plane? (1 of 2)**

WC 891 words
PD 23 June 1991
SN Independent On Sunday
SC INDOS
PG 8
LA English

LP David Black looks at the growing problem of pilots failing to 'interact' with the computers on their aircraft.

A DC10 belonging to the Scandinavian airline SAS ran off the end of the runway at New York's Kennedy airport in February 1984. There were only minor injuries among the 177 passengers and crew aboard. It was by no means a major disaster, but it was the first time a major international safety body explicitly identified a problem between pilot and automatic cockpit system as the cause of an accident.

TD Dr John Lauber, of the US National Transportation Board, said: "The DC10's approach to JFK was flown using autopilot and autothrottles, in spite of the fact that the aircraft's logbook contained write-ups indicating the autothrottle speed control system was intermittently unreliable.

"With allowance for wind conditions, he entered a speed of 168 knots into the autopilot speed selector. But the flight data recorder, which was later recovered, showed the approach was flown at significantly higher speeds - up to 209 knots only 20 seconds from touchdown.

"It was only at that point the captain gave the first indication of crew awareness of the situation. He said, 'I didn't take the power off', and manually retarded the throttles. Touchdown eventually occurred at 179 knots, 4,700ft down an 8,400ft wet runway. He went off the end."

The transportation board's report on the accident cited the crew's "habitual reliance on the proper functioning of the airplane's automatic systems" as the probable cause.

Since 1984, the number of documented incidents of pilots "failing to interact" with their increasingly **automated cockpits** are legion. Some of them have ended happily, such as the China Airlines plunge over the Pacific in 1985, or the Delta Airlines 767 which lost all power climbing away from Los Angeles after one of the crew accidentally shut off the fuel pumps. The aircraft descended several thousand feet before the crew discovered the error and restarted the engines.

Others have been fatal, such as the British Midland 737 crash at East Midlands airport in 1989, when the crew shut down the wrong engine after mis-reading instruments and 47 died; or the Indian Airlines A320 which simply flew into the ground, killing 90, after the computer overrode the pilots' commands, despite the pilots' efforts to save the plane.

It appears likely that, once again, pilots "failing to interact" with their cockpit was the ultimate trigger to the Lauda Air disaster in Thailand last month, in which 223 died. In an industry that prides itself on being able to learn quickly from its mistakes, why is this problem repeatedly arising?

Dr Lauber said: "We failed to appreciate the support required for humans who end up having to use these systems. There has been a major re-distribution of the workload in the cockpit of jets, resulting in an increase in the mental workload for pilots, as opposed to manual work in old, mechanical cockpits. Pilots are being asked to perform different tasks, and we are still learning how to train them."

What some pilots are now asking is: why is that training effectively taking place on the job, with live passengers in the back? The answer is economics. In 1989, Boeing ran a major advertising campaign for its 757/767 series jets headlined: "Two aeroplanes, one learning curve. It's a way to cut training costs, boost productivity." Both aircraft are fitted with the same automatic cockpit which cuts the crew from three to two, removing the need for a flight engineer. And Airbus claims its fully automated A320 "represents the largest single advance in civil air technology since the jet engine".

Behind the blurb is the simple fact that in old cockpits there are several hundred gauges, each a precision electro-mechanical instrument, made and maintained by technicians with all the skills of the finest watchmaker. It took three men to watch them. An automated or "glass" cockpit has only a series of interchangeable TV screens, and needs only two crew.

In an electro-mechanical cockpit, a sensor measuring (say) engine temperature is connected by wire to the cockpit gauge. There is a back-up if the first one fails. Also, if an airline wants to keep flying it has to buy many more sensors, wires and gauges and leave them lying idle on its spares shelves around the world.

In a "glass cockpit" there are only six cathode-ray tubes. If one fails in flight, information displayed on it can be punched up on its neighbour. To repair, it is unplugged and another plugged in. The need for vast spares inventories and costly high-skilled man hours is abolished.

Also, the information pilots receive is reduced because the computer assesses what he sees. Take, for instance, an engine temperature problem. In an old cockpit the pilot must scan other instruments to confirm the problem is real, and not a fault in the warning system. In a "glass cockpit" th e information is sifted by three flight management computers, each policing the other for faults.

They do the cross-checking before flashing up the information the pilot needs to see. If there is a problem, they present the crew with a checklist of action to be taken.

IN I75 : Airlines

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AN Document indos00020011124dn6n004ts