



# No Decision at DECISION HEIGHT

**Citation pilots were taken off guard by a fast-moving fog bank.**

BY MARK LACAGNINA

Witnesses described the weather conditions at Birmingham (England) Airport the afternoon of Nov. 19, 2010, as extremely unusual. For hours, sunshine and blue skies prevailed at the airport, with southerly winds holding a fog bank at bay to the north of the field. When the winds suddenly shifted to the north, however, the fog moved with startling rapidity over the airport.

During this time, the flight crew of a Cessna Citation 501 was conducting the instrument landing system (ILS) approach to Runway 15. Weather reports and their own observations at

the beginning of the approach likely had led the pilots to expect visual conditions all the way to touchdown, according to the report by the U.K. Air Accidents Investigation Branch (AAIB).

However, the fog bank moved in the same direction and enveloped the light jet as it neared the published decision height (DH). The commander, the pilot monitoring, likely became distracted by the sudden and unexpected loss of visual references, and he neglected to make the required callout to land or go around when the aircraft reached DH, the report said.

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U.K. Air Accidents Investigation Branch

The copilot, the pilot flying, became confused, and the Citation continued descending until it struck the glideslope antenna and then terrain off the right side of the runway. The commander was seriously injured, the copilot sustained minor injuries, and the aircraft was destroyed by the impact and a fire.

### Organ Transfer

The Citation 501, or I/SP, usually was used by the Liverpool-based operator for corporate flights. The other two aircraft in its fleet, both Citation 550 II models, mainly were used for charter operations. Nevertheless, the 501 had been pressed into service for a charter flight, to transport a human transplant organ from Belfast, Northern Ireland, to Cambridge.

The commander, 58, had 7,200 flight hours, including 3,000 hours in type. The copilot, whose age was not specified, had 1,785 flight hours, including 735 hours in type. “The commander was experienced on the aircraft type and had flown G-VUEM [the 501] on a number of previous occasions,” the report said. “The copilot had been flying the aircraft type with the operator regularly for several years but had not flown G-VUEM as frequently as their other two aircraft.”

The pilots reported for duty at Liverpool Airport at 0845 local time. After positioning the aircraft to Belfast City Airport, they found that the charter flight to Cambridge no longer was necessary. Apparently by chance, however, transport of another transplant organ was required from Belfast Aldergrove Airport to Birmingham, and the crew was reassigned to make that flight.

The Citation departed from Belfast Aldergrove at 1450. Forecasts for Birmingham called for visual meteorological conditions. Nearing the airport, the crew monitored the latest automatic terminal information service broadcast, which said that the surface winds were from 160 degrees at 5 kt, visibility was 10 km (6 mi) or more, and that there were a few clouds at 700 ft.

The applicable minimum runway visibility range (RVR) for the ILS approach was 550

m (1,800 ft). The DH was 200 ft, at a decision altitude of 503 ft.

A radar controller provided vectors to help the crew establish the aircraft on the ILS approach. “On the approach, the commander sighted the airfield from some distance,” the report said. “Thus, the circumstances were such that the crew could reasonably have expected to complete the approach in visual conditions.”

### Late Intercept

As mentioned, the copilot had limited experience in the 501. “There were a number of differences between G-VUEM and the other two aircraft, including the instruments, operation of cockpit displays and equipment, engine management and aircraft performance,” the report said.

The copilot, who was in the right seat, had selected the autopilot’s approach mode. The flight instruments on his panel did not include a flight director.

The report said that although the autopilot in the 501 was capable of conducting a coupled approach, “other pilots who had flown this aircraft advised the AAIB that to intercept and track a localizer course successfully with the autopilot engaged, the speed would need to be reduced to around 180 kt.”

The pilots had calculated an approach speed of 104 kt, but recorded air traffic control (ATC) radar data showed that the Citation’s groundspeed was 254 kt as it neared the 149-degree localizer course on a heading of 135 degrees, the final vector assigned by the radar controller.

Apparently because of the high speed, the aircraft flew through the localizer centerline about 12 nm (22 km) from the runway touchdown zone (Figure 1, p. 24). The autopilot then turned the aircraft to a track of 158 degrees but again failed to capture the localizer. Groundspeed was 242 kt when the Citation flew through the localizer centerline about 9 nm (17 km) from the runway touchdown zone.

The autopilot subsequently captured the glideslope, but the aircraft crossed the localizer

The aircraft struck the glideslope antenna before hitting the ground.



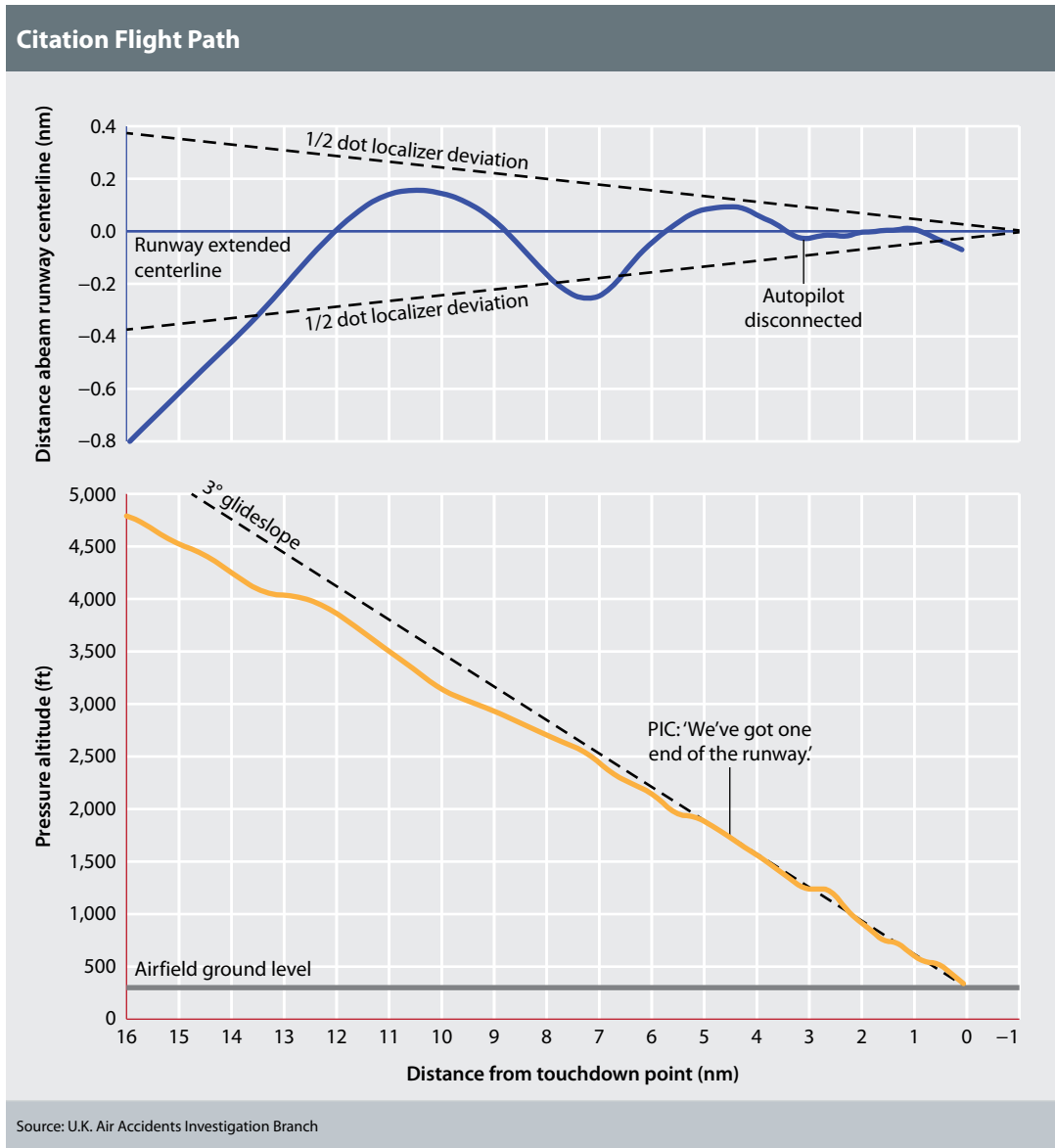


Figure 1

centerline a third time about 6 nm (11 km) from the touchdown zone. The copilot disengaged the autopilot and hand-flew the aircraft, establishing it on the localizer about 3 nm (6 km) from the runway touchdown zone. Groundspeed by then had decreased to 122 kt.

**'We've Got One End'**

While the Citation was bracketing the localizer course, the radar controller had broadcast an advisory that the fog bank had moved onto the final approach course for Runway 15. The controller also advised that RVR in the touchdown

zone was 1,400 m (4,500 ft) and that the RVRs at both the mid-point and the end of the runway were 1,500 m (5,000 ft).

After establishing radio communication with the tower controller, the Citation crew was cleared to land and was advised that touchdown RVR had decreased to 1,100 m (3,500 ft). The aircraft was about 1,000 ft above DH when the commander replied, "We've got one end of the runway."

The report said both pilots recalled that the commander made the standard callouts at 500 ft and at 100 ft above DH. However, neither pilot remembered a callout being made at DH, per standard operating procedure (SOP).

The Citation was at DH and about 1 nm (2 km) from the

runway touchdown zone when it deviated slightly to the right of the localizer centerline on a heading of 152 degrees. About 30 seconds later, at 1536, the leading edge of the left wing struck the top of the glideslope antenna, which was 15 m (49 ft) tall and adjacent to the runway touchdown zone. The impact ruptured the aircraft's left fuel tank and separated a position light from the top of the antenna, exposing live electrical cables that likely ignited fuel vapors.

The aircraft then struck soft, waterlogged ground in a wings-level attitude and slid

sideways 220 m (722 ft) before coming to a stop.

### Trapped in the Cockpit

The copilot evacuated through the main cabin door, on the left side of the fuselage, and sustained minor flash burns as he passed through the fire. The commander's right foot was trapped by the wreckage, and he was unable to exit the cockpit. He discharged a portable fire extinguisher around the cockpit and then donned his oxygen mask.

The tower alerted the airport fire station, which was east of Runway 15. Rescue and fire fighting (RFF) personnel at the station initially saw smoke rising above the fog to the west. Four vehicles were deployed, but the fog had become so dense that the RFF personnel had difficulty locating the accident site.

The driver of an RFF vehicle that was proceeding north on the runway saw an orange glow to the left and turned toward it. "The grass area [off the side of the runway] was soft and made access difficult, but the vehicle reached the site at 1539, and the fire crew applied foam to the left side of the aircraft," the report said.

Two other RFF vehicles reached the accident site shortly thereafter; the fourth had become bogged down in the soft ground. The copilot told the RFF personnel that the commander was still inside the burning aircraft.

"The fire was suppressed quickly," the report said. "A fireman approached the aircraft and could see that the commander was moving, so he smashed the side windows to allow air into the cockpit."

Another fireman entered the aircraft through the emergency door on the right side of the fuselage but was unable to enter the cockpit because of his bulky breathing apparatus. "However, the commander managed to free

himself and crawl backward "where he could be assisted from the aircraft," the report said. "He was treated at the scene and then flown by air ambulance to a local hospital."

The RFF personnel also were able to recover the transplant organ from the cabin.

### 'No Perception of Time'

The report said that in the last three minutes of the Citation's approach, touchdown RVR had decreased from 1,100 m to 300 m (1,000 ft). The fog bank had not yet reached the midpoint and the end of the runway, where the RVRs remained at 1,500 m.

A pilot of an aircraft that preceded the Citation on the ILS approach told investigators that his aircraft had entered but quickly exited the fog bank as it neared DH. A pilot in another aircraft ahead of the Citation said that his aircraft appeared to be "surfing" down the sloping face of the fog bank on final approach.

Recorded ATC radar data showed that the Citation's flight path had not changed when it descended below a height of 300 ft, which indicated that the copilot had made no control inputs after the commander called "100 above" DH.

The copilot told investigators that shortly after hearing that callout, he asked the commander if he should go around. "He recalled hearing the commander say, 'No, go left,'" the report said. "He then caught a glimpse of the antenna ahead, too late to attempt to avoid it."

The commander did not recall having given any instructions to the copilot after the "100 above" callout. The report said that the aircraft likely entered the fog bank at this point, and the captain lost all external visual references.

The commander told investigators he had perceived that only a few

seconds had passed between his "100 above" call and the collision with the glideslope antenna.

"The commander may have become absorbed with seeking visual reference in the unexpectedly altered conditions and thereby [was] distracted from the primary task of monitoring the approach," the report said. "He had no perception of the passage of time from the '100 above' call, believing that only a few seconds elapsed before he saw the glideslope antenna ahead of the aircraft. In fact, the elapsed time would have been around 25 seconds."

The report said that the crew's expectation of completing the approach in visual conditions and the unexpected encounter with the fog late in the approach caused a breakdown in crew coordination.

"As an aircraft gets closer to a runway, the localizer and glideslope indications become increasingly sensitive, and small corrections have a relatively large effect," the report said. "The task for the flying pilot becomes more demanding, and the role of the monitoring pilot has greater significance."

"A successful outcome relies on effective crew coordination, based on clear SOPs. The monitoring of the approach broke down in the latter stages, and the crucial [callout at DH] was missed, which led to the aircraft's descent below minimums."

The report said that the aircraft operator reviewed its SOPs after the accident and issued a crew notice requiring, in part, that all instrument approaches be conducted with the autopilot and/or the flight director engaged. 🌀

*This article is based on AAIB accident report no. EW/C2010/11/02, which is available at <a>aaib.gov.uk/publications/bulletins/august\_2011/cessna\_501\_citation\_g\_vuem.cfm</a>.*