
ILS interference with autoland, Boeing 757-3CQ, G-JMAA

Micro-summary: This Boeing 757-3CQ rolled significantly when being landed on autoland, due to ILS interference from a departing airplane.

Event Date: 2004-11-23 at 1928 UTC

Investigative Body: Aircraft Accident Investigation Board (AAIB), United Kingdom

Investigative Body's Web Site: <http://www.aaib.dft.gov/uk/>

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INCIDENT

Aircraft Type and Registration:	Boeing 757-3CQ, G-JMAA	
No & Type of Engines:	2 Rolls-Royce RB211-535E4-B-37 turbofan engines	
Category:	1.1	
Year of Manufacture:	2001	
Date & Time (UTC):	23 November 2004 at 1928 hrs	
Location:	Manchester International Airport, Manchester	
Type of Flight:	Public Transport (Passenger)	
Persons on Board:	Crew - 9	Passengers - 281
Injuries:	Crew - None	Passengers - None
Nature of Damage:	None	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	37 years	
Commander's Flying Experience:	8,358 hours (of which 6,833 were on type) Last 90 days - 210 hours Last 28 days - 57 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The aircraft rolled unexpectedly during the flare phase of an automatic landing at Manchester International Airport. The commander disconnected the autopilots and landed safely. The aircraft rolled in response to temporary interference of the ILS localiser signal caused by a departing Embraer 145 aircraft; this aircraft took off immediately prior to the Boeing 757's landing. Low Visibility Procedures (LVPs), which are intended to protect aircraft carrying out automatic landings, had been cancelled a short time before the incident but this information was not communicated to the Boeing 757 crew. Two safety recommendations were made.

History of the flight

The aircraft flew from Antalya in Turkey to Manchester. Some low cloud and drizzle were forecast for the scheduled arrival time at Manchester.

During the early part of the arrival, the crew received Manchester ATIS¹ information Quebec, which included information that the meteorological visibility was 200 m and that LVPs were in operation. Because of the reported weather conditions, the crew briefed and prepared for a

Footnote

¹ The Automatic Terminal Information Service is a continuous broadcast, used at many airports to provide pilots with a means of obtaining pertinent weather and operational information prior to arrival and departure.

Category 3A automatic landing using the ILS, with the commander as Pilot Flying.

The flight crew made initial radio contact with the Approach controller and were instructed to take up the hold at DAYNE and informed that the current ATIS information was Quebec. The crew confirmed that they had received this information.

At 1905 hrs, the crew requested Runway Visual Range² (RVR) information, and were informed that the touchdown RVR was in excess of 1,500 m, and at the mid-point it was 900 m. Soon afterwards, a pilot of another aircraft asked whether LVPs were still in force and was informed that this was so. During the period that the Boeing 757 was on the Approach frequency, no further mention was made of LVPs.

The Boeing 757 flight crew were instructed to leave the hold, continue the approach, and contact the Director. Whilst the aircraft was on the Director frequency, no reference was made to LVPs by any aircraft or the controller.

At 1923 hrs, the Boeing 757 flight crew contacted the Air (Aerodrome) controller and were instructed to continue the approach. Another aircraft was on short final approach to land, and the Air controller had assessed that the interval between the arriving aircraft was sufficient to permit two aircraft (an MD-80 and an Embraer 145) to depart after the aircraft on short final had vacated the runway but before the Boeing 757's landing.

Footnote

² Runway Visual Range is the visibility (in metres) measured adjacent to the runway and is intended to give a clearer indication to pilots of the visibility during landing than meteorological visibility. It is measured at three points along the runway: touchdown, mid-point, and stop-end.

Examination of the RTF recordings showed that the Embraer 145 was slow to respond to instructions from the Air controller, and did not take off promptly, despite twice being instructed to do so.

As the Embraer 145 lifted off, and with the Boeing 757 approaching the runway threshold, the controller cleared the Boeing 757 to land. The final approach continued normally until at about 30 ft height when the aircraft rolled unexpectedly. The commander recognised that the aircraft was not performing the automatic landing correctly, disconnected the autopilots, and completed a manual landing.

The pilots' recollections

The commander reported that during the approach, he became aware that the weather was improving and that the RVR was in excess of 1,500 m. However, he stated that the company policy when an automatic landing had been planned was to carry on and complete the automatic landing, provided there was no specific reason to revert to a manual landing. He reported that he was surprised that the Embraer aircraft was instructed to line up on the runway when it was, because the available time for it to depart would be very short, and that he prepared for a possible go-around. He reported that, as the autopilots flared the aircraft, the aircraft banked to the right. He disconnected the autopilots, banked to the left, and landed the aircraft manually.

The co-pilot reported that he saw the approach and runway lights at approximately 4 nm from touchdown, and judged that the conditions were "*clearly not LVP weather*". He did not express this surprise to the commander.

Recorded flight data

The aircraft was equipped with a Cockpit Voice Recorder (CVR) and a Flight Data Recorder (FDR). The airport had Surface Movement Radar (SMR) and Approach Radar. By the time that the AAIB was notified of the event, the airport's SMR and the aircraft's CVR had over-written their recordings³. The CVR was not removed from the aircraft but the FDR was removed and successfully replayed. The airport's Approach Radar was recorded, and replay was of some value to the investigation in indicating the relative positions of aircraft.

The FDR data showed clearly that the localiser signal was steady until the aircraft's height above ground had reduced below 50 ft. Two seconds after the transition through 50 ft, at approximately 30 ft, the aircraft began the flare and almost immediately started rolling right. Approximately two seconds later the aircraft's heading started drifting right. Just prior to touchdown corrective action was taken, with an initial large rudder input and left roll input. The largest recorded heading deviation was slightly less than 2° although this parameter was sampled only once per second so the FDR may not have captured the maximum deviation. The data indicated that the aircraft was subjected to erroneous localiser deviation signals that led the autopilots to start deviating from the appropriate flight path.

Manchester Airport ATIS dissemination procedures

When ATIS information changed, a new broadcast was made. Each recorded broadcast was identified by a code letter, and pilots were required to report the code letter of the ATIS broadcast that they had received, on their first contact with ATC at the airport. When a pilot had received a particular ATIS broadcast, and pertinent

information in it changed, ATC procedures required controllers to provide the new information to pilots on their radio frequency by either a 'broadcast' to all aircraft on the frequency, or by addressing the new information to individual aircraft.

The Manchester Airport Manual of Air Traffic Services (MATS) Part 2, which contains instructions specific to operations at the airport, states:

The primary tool for advising pilots that LVPs are in operation is the ATIS. However, there are occasions when, because of the time lag between ATIS broadcasts or the length of time since a pilot listened to the ATIS, there is a need for information to be passed by R/T.

Controllers are therefore required to notify pilots by R/T, individually if necessary, of operating conditions other than those contained in the reported ATIS broadcast received.

Throughout the period from 1833 hrs until 1921 hrs, the ATIS included information that LVPs were in force.

Manchester Airport ATC

ATC staff involved in the incident were interviewed, and documents and recordings were examined.

At about 1830 hours, the Air controller took the decision to instigate LVPs, on account of deteriorating visibility. This information was communicated to the Approach and Director controllers, but neither placed an LVP 'reminder' strip into their displays⁴ although procedures approved by the CAA required them to do so.

Footnote

³ The airport SMR recordings were only retained for 24 hours, the CVR recorded the last thirty minutes of flight.

Footnote

⁴ Controllers use Flight Progress Strips upon which pertinent data relating to each aircraft under control are recorded. These strips are kept on display boards, and other strips are also displayed from time to time to indicate the status of navigational facilities, airspace, and the like.

Investigations revealed that when the Air controller took the decision to cease LVPs, this information was communicated by telephone to her colleagues in the Approach and Director positions. However, neither controller passed this information on to the Boeing 757 flight crew. It was noted that a widespread controller 'handover' was in progress at the time and that the controllers were moving between the operational positions.

Analysis

The flight crew prepared to carry out an automatic landing at Manchester because of the reported poor visibility. They established radio contact with the Approach controller and acknowledged receipt of ATIS information 'Quebec', which included the fact that LVPs were in force.

The flight progressed normally until the final approach, when both pilots gained visual contact with the runway earlier than expected. The co-pilot identified that the weather was well above the LVP trigger criteria, but given that conversation on the flight deck is kept to the minimum possible during critical phases of flight, such as during an approach, it is not remarkable that he did not mention this to the commander.

The recorded flight data showed a clear, though slight, deviation in the flight path just prior to touchdown.

Communications within the ATC unit were central to the incident. About one hour before the incident the decision was taken to introduce LVPs on account of the rapidly deteriorating weather conditions. However, when LVPs were introduced, neither the Approach nor the Director controllers placed LVP reminder strips into their displays.

Soon after the decision to cease LVP operations was taken, a controller handover occurred and it is apparent that this played a part in the continuing confusion regarding the communication of LVP status to aircraft.

This incident identified several anomalies in the system by which LVP information was communicated to pilots. ATIS is used not only to communicate LVP status, but also other safety-critical information such as runway in use, meteorological conditions, and Essential Aerodrome Information⁵. The provider of ATC services at the Airport has taken action in light of this event.

Safety Recommendations

Safety Recommendation 2005-098

The Civil Aviation Authority should review the means by which critical information from airports, such as whether Low Visibility Procedures are in force, is communicated to pilots, and its receipt and ongoing accuracy are confirmed, and should take action to eliminate as far as is practicable any weaknesses identified during this review.

The absence of Surface Movement Radar data deprived the investigation of information about the disposition of the two aircraft, and the precise sequence of events, particularly with regard to the Embraer 145's movement relative to the Boeing 757. Therefore, the following Safety Recommendation was made:

Safety Recommendation 2005-099

The Civil Aviation Authority should require providers of air traffic services at aerodromes which have Surface

Footnote

⁵ Essential Aerodrome Information is information concerning the state of the manoeuvring area and its associated facilities which may constitute a hazard.

Movement Radar equipment to ensure that arrangements are in place for effective retention of information for a suitable period of time following any incident or accident.

Safety action taken

The Boeing 757 operator has amended the company Operations Manual to include additional guidance to pilots concerning LVP operations and automatic landings.

National Air Traffic Services (NATS), the provider of ATC services at Manchester, issued a NOTAC on 26 November, 2004, reminding controllers of the importance of adhering to correct procedures for dissemination of LVP status information to pilots, especially when there is a change in the status.

NATS investigators carried out a wide-ranging internal investigation into the incident, and identified causal and human factors within it. Their report noted that:

'While it is not uncommon to work using LVP procedures, the process of going into and coming out of LVPs is not a frequent or well-practised activity. As such, a lack of recency in this task was a contributory factor',

and that confusion arose during the period of handover. Seven internal recommendations were made, and in response to these, NATS has made the following changes to the ATC operation at Manchester:

- Controller handover times are to be staggered where possible
- An 'LVP Action List' (in the style of a checklist) has been introduced on a trial basis
- Further training has been planned, in particular to take place prior to the annual 'fog season'