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## Tailstrike on landing, Boeing 727-200, N12305, 8 December 1999 at 1112 hrs

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**Micro-summary:** This Boeing 727-200 experienced a tailstrike when landing on a runway under construction.

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**Event Date:** 1999-12-08 at 1112 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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# Boeing 727-200, N12305, 8 December 1999 at 1112 hrs

**AAIB Bulletin No: 8/2000**      **Ref: EW/C99/12/2**      **Category: 1.1**

**Aircraft Type and Registration:** Boeing 727-200, N12305  
**No & Type of Engines:** 3 Pratt and Whitney JT8D-9A turbofan engines  
**Year of Manufacture:** Not known  
**Date & Time (UTC):** 8 December 1999 at 1112 hrs  
**Location:** East Midlands Airport, Derbyshire  
**Type of Flight:** Public Transport (Cargo)  
**Persons on Board:** Crew - 3 - Passengers - None  
**Injuries:** Crew - None - Passengers - N/A  
**Nature of Damage:** Minor damage to tail bumper  
**Commander's Licence:** Airline Transport Pilot's Licence  
**Commander's Age:** 43 years  
**Commander's Flying Experience:** 8,121 hours (of which 323 were on type)  
Last 90 days - 85 hours  
Last 28 days - 39 hours  
**Information Source:** AAIB Field Investigation

## History of the flight

The crew were operating a cargo flight from Brussels and carrying out an NDB approach to Runway 27 at their destination of East Midlands Airport. The airfield weather report (METAR) for 1050 hrs, issued some 20 minutes before their approach, gave the surface wind as 210°/ 22 to 33 kt, visibility 8,000 metres in light rain with broken cloud at 2,700 feet, overcast cloud at 8,000 feet, temperature +8°C, dewpoint 5°C and a QNH of 997 mb. At the time some work was being carried out resurfacing the runway. A sterile area existed from close to the threshold of Runway 27 adjacent to taxiway 'W' which restricted the Landing Distance Available (LDA) to 1,600 metres. The aircraft therefore had to overfly the work in progress before touching down beyond the displaced threshold. A supplement to the UK Aeronautical Information Publication (AIP) detailing the runway restrictions had been issued in September 1999.

The commander reported that, having established visual contact with the runway, he used the Precision Approach Path Indicators (PAPIs) to maintain the correct glide slope. On short finals, due

to the gusty wind conditions, the aircraft descended slightly to show three red lights and one white light. A high sink rate then developed and the appropriate corrective action was taken, but the aircraft landed heavily on what the crew believed was 'the active runway side of the displaced threshold'.

The aerodrome controller reported that the crew established initial communications with him whilst still under Manchester Control in order to check the surface wind conditions. The aircraft was subsequently transferred to his control as it approached 6 nm on finals. He confirmed during one of his transmissions that the first half of the runway was sterile and he reported several readings of the instantaneous surface wind. He saw the aircraft as it crossed the sterile area and described it as flying level at approximately 30 feet over the sterile area before touching down heavily at the beginning of the declared landing distance. The crew of an aircraft waiting for departure also saw the touchdown and reported, after their take off, that a collision may have occurred between the landing Boeing 727 and contractor's equipment positioned within the sterile area.

After the incident the duty ATC watch supervisor carried out a runway inspection. This showed evidence of a possible tailscrape, heavy landing and damage to a sandbag as well as part of the approach lights within the 210 metre sterile area prior to the displaced threshold. The supervisor reported that in a later conversation with the aircraft commander, he (the commander) said that he was aware of the tailstrike.

### **Information on runway restrictions**

Supplement S39-40/1999 to the UK AIP was published on 1 September 1999 detailing the runway resurfacing work to be carried out at East Midlands Airport. It specified the 'Timetable of Works' and the various 'Operational Plans' with their associated declared runway distances, revised visibility and RVR minima, revised Obstacle Clearance Altitudes (OCAs) and Obstacle Clearance Heights (OCHs) for the different approaches, and the associated information to be included in the transmitted ATIS message. Annex B to the Supplement showed, in diagrammatic form, the areas of 'Work in Progress' for each Operational Plan. Additionally the airport provided '3D' type pictures of all the Operational Plans along with data from the supplement as well as faxing to all the operators the next days proposed operational plan with any minor amendments.

The Automated Terminal Information System (ATIS) in force at the time of the accident stated that 'OPS PLAN 12 IN FORCE - ONLY 210 METRES OF LOW INTENSITY APPROACH LIGHTS AVAILABLE'. The day following the accident the ATIS message was changed to: 'OPS PLAN 12 IN FORCE - ONLY 210 METRE LOW INTENSITY APPROACH LIGHTS AVAILABLE - WORK IN PROGRESS ON FIRST SECTION OF RUNWAY USE TEMPORARY THRESHOLD AND PAPIs'.

### **Flight recorders**

Recorded information was available from the 25-hour Flight Data Recorder (FDR) fitted to the aircraft. The Cockpit Voice Recorder had been over written during flights made subsequent to the incident.

Contrary to the commander's recollection the FDR data showed that, during the latter stages of the approach, airspeed remained relatively constant at between 140 kt and 150 kt as the aircraft descended at approximately 800 ft/min. At just above 100 feet agl the aircraft started to pitch up,

reaching 3° nose up by approximately 60 feet agl. The pilot then pitched the aircraft down by 2° and the power levers were closed.

The aircraft remained at this pitch attitude for a second and the airspeed started to decay from 141 kt. The pitch attitude then rapidly increased over a period of 1.75 seconds, at the end of which the aircraft contacted the runway. At touchdown the pitch attitude was 7.2° nose up, airspeed had reduced to 131 kt, and a normal acceleration of 1.38G was recorded.

During the landing roll reverse thrust was used on all engines. No evidence was found in the parameters recorded on the FDR of windshear or a sudden loss of altitude during the final phase of the flight.

### **FDR parameter conversion**

Despite repeated requests by the AAIB, the aircraft operator was unable to provide any document detailing the data frame layout and parameter conversion algorithms for the FDR installation. The National Transportation Safety Board (NTSB), whilst investigating an earlier incident to another aircraft operated by the same company, was also unable to acquire this documentation. Therefore the limited number of parameters quoted in the preceding paragraphs have been derived from general conversion algorithms used for this type of FDR installation. As the conversions are not specific to the subject aircraft small datum offsets to the actual parameter values present at the time are possible. Some recorded parameters were not recoverable due to the absence of the data frame layout and conversion documentation.

### **Federal Aviation Regulations**

Federal Aviation Regulation (FAR)121.343(j) requires that:

'a correlation must be established between the values recorded by the flight data recorder and the corresponding values being measured. The correlation must contain a sufficient number of correlation points to accurately establish the conversion from the recorded values to engineering units or discrete state over the full operating range of the parameter'.

It further states that:

'documentation sufficient to convert recorded data into the engineering units and discrete values specified in the applicable appendix must be maintained by the certificate holder'.

The aircraft is operated in accordance with FARs and therefore the problems arising from documentation deficiencies relating to data frame layout and parameter conversions associated with the FDR have been referred to the Federal Aviation Administration for further investigation. The UK CAA has also been informed.