

No: 4/90 **Ref: EW/C/1146** **Category: 1a**

Aircraft Type and Registration: Grumman G-159 Gulfstream 1, G-BMOW

No & Type of Engines: 2 Rolls Royce Dart 529-8X Turboprop engines

Year of Manufacture: 1965

Date and Time (UTC): 29 January 1990 at 1830 hrs

Location: Birmingham International Airport

Type of Flight: Scheduled public transport

Persons on Board: Crew - 4 Passengers - 6

Injuries: Crew - None Passengers - None

Nature of Damage: Nose landing gear wheels disintegrated, minor damage to left propeller

Commander's Licence: Airline Transport Pilot's Licence

Commander's Age: 61 years

Commander's Total Flying Experience: 13,500 hours (of which 590 hours were on type)

Information Source: AAIB Field Investigation

History of the Flight

The flight crew reported for duty at Birmingham International Airport at 0800 hrs and were scheduled to operate the sectors Birmingham-Newcastle-Frankfurt-Newcastle-Birmingham. Prior to their reporting time both pilots had completed rest periods in excess of the minimum required; the commander had been on leave for some days, and the first officer had been off duty for the preceding 14 hours. The day's schedule was completed on time and without incident, until the landing on the final sector from Newcastle to Birmingham.

The aircraft took off from runway 25 at Newcastle at 1736 hrs with the commander as the handling pilot. The actual take off weight was 14093 kg; the maximum permitted take off weight is 15920 kg. Weather conditions at the time were cloudy with rain and a surface wind of 170/20 knots. The operating company's maximum crosswind components allowed for take off and landing in this aircraft are 20 knots, dry or wet, provided that there is no standing water and braking action is reported as good. The surface conditions at the time were within these limits.

Take off, departure and cruising flight were normal, and during the cruise the destination and alternate airports' actual weather conditions were noted. The Birmingham ATIS 'Yankee' was recorded as

surface wind 200/19 gusting 29 knots, visibility 8 kilometres in rain, cloud 6 oktas at 1200 feet, 8 oktas at 1800 feet - runway 15 in use, ILS unserviceable - warning of wind shear on final approach. At 1815 hrs the aircraft contacted Birmingham Approach Control, advising that it was descending to Flight Level (FL) 60 and had copied the weather. This was acknowledged and the aircraft was further cleared to FL 50 and told to expect a Surveillance Radar Approach (SRA) to runway 15.

Radar positioning to the final approach was normal and at 1823 hrs the aircraft was transferred to the SRA controller. The approach was flown in moderate, occasionally severe turbulence and at 1828 hrs, at a range of about 4 nm from touchdown, the flight crew reported that they had the field in sight. The crew next contacted Birmingham Aerodrome Control and were given landing clearance. Throughout the final stages of the approach the aerodrome controller gave successive read outs of the surface wind which varied between 190/25kts to 210/20kts. The final wind report, as the aircraft was approaching touchdown was 200/22kts.

The commander reports that on landing, with both engines' power selected at flight idle, and with both main landing gear legs in firm contact with the runway, he held the control column back in order to keep the nose landing gear off the ground, a technique that the company pilots describe as normal. However the aircraft then became airborne again and his corrective action resulted in the aircraft porpoising down the runway several times until the nose wheels disintegrated. As it came to a stop the aerodrome controller informed the aircraft that 'a lot of sparks had been observed coming from the undercarriage'. The engines were shut down and the crew and passengers were transported to the terminal area by coach. There were no injuries.

The maximum permitted landing weight was 15551 kg, and the actual landing was 13508 kg, which required a Vref of 105 knots. The Company Operations Manual contains the advice that 'Wind shear and/or gustiness may be encountered under certain conditions. Some measure of protection against this may be obtained by increasing the approach speed by 1/2 the reported surface wind, up to a maximum of 15 knots.'

Flight Recorders

The Cockpit Voice Recorder (CVR) was a Fairchild A100 4-Channel recorder with 'Hot Mike' installation, which operated on a continuous 30-minute duration tape. As ground power had been applied during the recovery of the aircraft from the runway to the maintenance area, the tape self-erased and no useful information was recorded.

The Flight Data Recorder (FDR) was a Sundstrand UFDR which recorded 6 analogue parameters and 2 discrete events. The quality of the playback was good except that the airspeed trace was found to be outside tolerance. A summary of data relevant to the landing is included in graphical form at the end of this Bulletin. It should be noted that the airspeed trace, even after re-calibration, is considered to be accurate only within + or - 10 knots.

Analysis of this data shows that the aircraft first touched down at a pitch attitude of about 1 degree nose down, 1 degree right wing down, and at an airspeed of about 118 knots (Vref 105 knots).

Over the next 7 seconds it porpoised until striking the runway with a vertical acceleration of 1.75g in a pitch attitude of 7.5 degrees nose down. It is highly likely that this precipitated the failure of the nosewheels.

Engineering examination

The aircraft came to a stop approximately 1900 metres from the threshold of runway 15 with the nose and main landing gear still extended but the nose landing gear axle in direct contact with the runway surface. The right nosewheel, rim and tyre were missing, and were later found alongside the edge of the runway. The left nosewheel tyre, badly damaged in the bead area, and half of the wheel rim were still loosely attached to the axle. Both nose wheel rims and the axle had been severely abraded by the runway surface. Examination of the runway marks showed that both nosewheel rims had contacted the surface together, at a position approximately 900 metres from the runway threshold. No marks prior to these were found that could be attributed to this aircraft. Unfortunately only the larger pieces of debris from the nose landing gear were recovered and available for examination. In particular the remains of the wheel bearings were not found.

Examination of the two nosewheel tyres indicated that they had not run under load whilst totally or partially deflated, and there had not been either a rupture of, or tread throw from the main carcass. Both tyres had bead area damage, but this had been caused when they came off the wheel rims. The wheel rim areas that were recovered were microscopically examined and no evidence was found of bead seat cracking or fatigue; however very small areas of corrosion were discernible which could, at some future time, have acted as an initiator for fatigue cracks. The remains of the wheel bearings were not available for examination, and thus the possibility of nosewheel bearing failure could not be ruled out.

Meteorological information

An aftercast of the weather conditions prevailing at the time of the accident was prepared by the Meteorological Office Bracknell. This reports the synoptic situation as 'a very strong southerly existed over Birmingham with an active cold front some 10nm to the west moving east at about 25 knots.

Winds:- Surface 190/20 gusts 35-40
1000 ft 200/40
3000 ft 210/70

Visibility:- Generally around 8 kilometres

Weather:- Rain, moderate at times

Cloud:- 5/8 ST base 1000ft, 8/8 SC base 2400ft

Remarks:- Severe turbulence would have been experienced due to the strong vertical shear and strong surface winds.

Air Accidents Investigation Branch.....plotted on Tue Mar 20 08:34:06 1990
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