FINAL REPORT

AAIU Synoptic Report No: 2006-009
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In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 20 December '05, appointed Frank Russell as the Investigator-in-Charge to carry out a Field Investigation into this occurrence and prepare a Synoptic Report.

Aircraft Type and Registration:	Beech Queen-Air 70, N70AA
No. and Type of Engines:	2 x Piston Lycoming 480
Aircraft Serial Number:	LB35
Year of Manufacture:	1971
Date and Time (UTC):	20 December 2005 @ 0945 hrs
Location:	Sligo Airport
Type of Flight:	Cargo
Persons on Board:	Crew - Two Passengers - Nil
Injuries:	Crew – None Passengers - Nil
Nature of Damage:	Undercarriage damage
Commander's Licence:	UK CPL
Commander's Details:	Male, aged 62 years
Commander's Flying Experience:	10,208 hours of which 83 were on type
Information Source:	Airport Manager, Sligo Airport. AAIU Incident Report Form submitted by pilot.

SYNOPSIS

This cargo flight originated in Coventry, UK and it's intended destination was Ireland West Airport, Knock, Co Mayo. In the event, poor weather conditions at Knock caused the commander to divert to Sligo Airport. Here, the weather was benign with Runway (RWY)11 in use. After touchdown the aircraft veered to the left and departed the tarmac surface onto the grass area, north of the runway. While the crash alarm sounded, as the Airport Fire Service (AFS) responded quickly, the Commander advised ATC that he did not require assistance and he steered the aircraft back on the runway and, thence, taxied slowly to the apron. On engine shutdown, an inspection showed damage to the left main wheel.

FINAL REPORT

1. FACTUAL INFORMATION

1.1 History of the Flight

(a) This information is based on the Commander's report to the AAIU. After landing at Sligo Airport and, after the initial landing roll, the aircraft started to turn left towards the edge of the runway. The pilot applied right rudder and brake. The aircraft continued to close on the left runway edge lights. Rather than risk any damage he elected to leave the runway through the lights onto the grass area. Thereafter, he powered back onto the runway. Once on the runway, it felt like the left tyre had "shredded". The aircraft quickly went "smooth", he recalled, and he taxied it slowly back to the apron.

On inspection, after shutdown, it became obvious, he said, that the torque link had broken upon landing and released the alignment of the wheels. The link was found later by the AFS. This breakage, he said, allowed the wheel and leg to turn through 180 degrees, the left wheel now being on the outside of the leg. The pull to the left occurred as the leg rotated and the tracking went very badly out of line, to the point that right rudder and brake could not compensate. This led to the brief runway excursion. Finally, the Commander felt, that, by leaving the runway as he did, he minimised the risk of damage or stress to the aircraft or the lights.

The runway was dry with light Southerly winds at 170/12 kt.

(b) In addition, the Airport Manager informed the Investigation that when he saw the aircraft taxying on the runway, following the excursion, he became concerned that the port undercarriage might collapse, thereby blocking the runway. He therefore instructed the aircraft to stop, and the aircraft was manhandled to the parking area, with one individual keeping the port wheel in line.

1.2 Metallurgy Report

The AAIU commissioned an examination of the Left Hand (LH) Main Torque Link of N70AA. The link is shown in *Figures* 1 and 2.

The examination noted that the tork link had failed at two of the attachment points to the leg (one upper and one lower) and the other upper and lower attachment points were cracked. The joint in the link had also failed.

The fracture surfaces were referenced A to D (as indicated in *Figures* 1 and 2) for ease of identification. These surfaces were cleaned with acetone to reveal bright fracture features in all cases, indicative of single event overload failure with no indication of any pre- existing defect.

Each of the fracture surfaces was examined in detail on a Scanning Electron Microscope (SEM). This examination confirmed the visual examination.

2. ANALYSIS

The metallurgical examination showed that the fractures in the torque link were caused by single event overload. No evidence of any pre-existing cracks or other defects was found. The only mechanism by which an overload can be applied to such a main wheel torque link is by means of the application of a rotational torque loading being applied to the link. There are two circumstances which can apply such a rotation torque to the link.

(a) The aircraft landed initially with the left wing low and the brakes applied. This would cause a torque to be applied to the torque link, as the wheel is laterally displaced from the vertical axis of the undercarriage leg on the aircraft.

(b) The aircraft landing initially with the left wing low, significant lateral drift, and a high tail down altitude. This could have caused the wheel contact point to be aft of the axle centre line. The reaction of the lateral drift wheel contact load, aft of the axle centre line would result in a rotational torque being applied to the torque link.

In the absence of further evidence the Investigation is unable to determine which of these scenarios occurred in this instance, However, it is apparent, from the undercarriage geometry, that the first scenario has the capacity to apply the larger torque on the link.

3. Findings

3. 1 Fracture in the torque link occurred through a single event overload.

3. 2 There was no indication of any inherent defect or of any pre-existing defect associated with the fractures.

3. 3 Weather was not a factor in this incident.

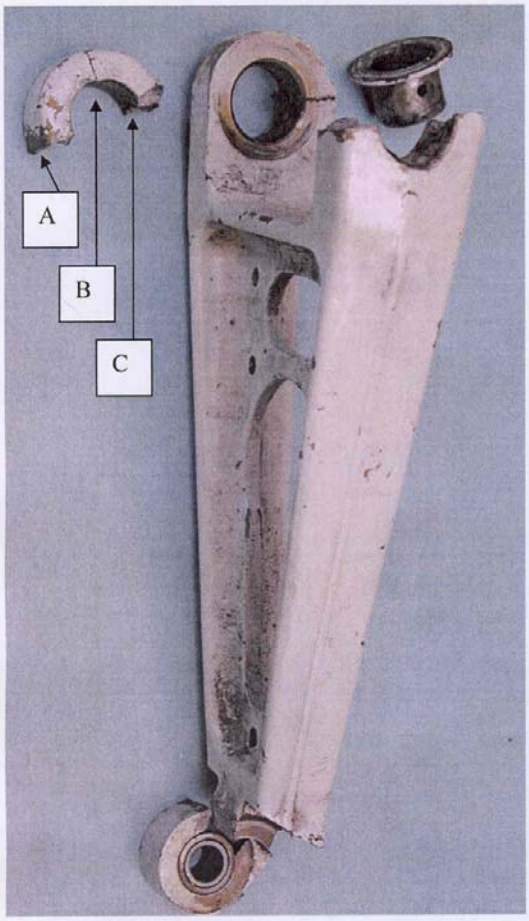

Figure 1

Figure 2