AAIB Bulletin No: 2/93 **Ref: EW/G92/09/09** **Category: 1b**

Aircraft Type and Registration:	Beech C90 King Air, F-GBLU
No & Type of Engines:	2 Pratt and Whitney Canada PT6A-21 turboprop engines
Year of Manufacture:	1979
Date & Time (UTC):	8 September 1992 at 0945 hrs
Location:	Luton Airport, Bedfordshire
Type of Flight:	Private
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Right main landing gear, right wing, flaps and aileron damaged
Commander's Licence:	Commercial Pilot's Licence with Instrument rating
Commander's Age:	48 years
Commander's Flying Experience:	12,963 hours (of which 5,000 were on type) Last 90 days - 70 hours Last 28 days - 32 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and initial inspection by the AAIB and reports by Bureau Veritas, France

The French corporate aircraft made a passenger flight from Le Bourget to Luton and then took-off to position to Northolt. The crew reported that, following normal pre take-off checks and an uneventful take-off, the landing gear was selected up after confirmation of a positive climb. Immediately there was a loud crunching noise from the area of the nose landing gear gearbox and the red Landing Gear In Transit caption remained illuminated. After cycling the landing gear selector and operating the manual extension system, both the cockpit indications and visual inspection from Luton Airport Control Tower indicated that the nose and left landing gear legs were locked down but the right leg was only partially extended. When the luggage on board had been secured, the emergency exit prepared and the emergency services assembled on the airport, the aircraft was radar vectored for a full-flap ILS approach to Runway 25 at Luton. This runway is 2,160 x 46 metres, asphalt surfaced. At around 400 feet agl the crew shutdown the engines, feathered the propellers and switched off the fuel boost pumps. The right wing sank gently to the runway as the aircraft slowed during the ground roll and the aircraft turned right but came to rest on the runway on the left main and nose wheels and

the right wing. The crew evacuated without difficulty, uninjured, and the emergency services were rapidly at the scene. There was no fire.

Landing gear extension and retraction is by means of a system of torque tubes and chains driven by a centrally mounted gearbox operated by an electric motor and incorporating an overload limiting clutch. For each main gear a torque tube system drives a screwjack actuator mounted in the landing gear bay that acts on the articulated drag strut of each main gear leg and on the downlock hook mechanism. Operation of the electric motor is controlled by the cockpit landing gear selector lever and by an up and a down limit microswitch.

Inspection of the aircraft showed that the right main landing gear screwjack actuator had torn from the brackets that mounted it to the airframe. This was consistent with the effects of the landing gear having reacted ground loads while not locked down. Thorough inspection of the remainder of the landing gear system was not possible in the UK as it was agreed that in order to expedite repair the aircraft should be flown to France with the landing gear extended following temporary repairs, with further investigation being made under the auspices of the Bureau Veritas. This revealed that the right output shaft in the landing gear gearbox had fractured. The reasons for this have not been established. It was noted that both microswitches were maladjusted such that on retraction the motor would stop before the landing gear was fully retracted and on extension the motor would continue to run when the landing gear had reached fully extended.

The aircraft had suffered a very similar accident on 6 February 1991. In this case investigation had disclosed that the same shaft in the gearbox had fractured at the same position as in this accident, as a result of fatigue cracking. It was also found after the 1991 accident that the limit microswitches were incorrectly set, but this had been attributed to the effects of having operated the manual gear lowering system. As part of the repair following this accident the failed shaft had been replaced with a new component. Since then the aircraft had flown 673 hours, 473 cycles, at the time of the second accident.

The CAA database lists 6 previous cases since 1977 of Beech aircraft in the UK with a similar type of landing gear suffering landing gear collapse or inability to lower. None was reportedly caused by failure of the motor driven gearbox.