

AAIB Bulletin No: 8/93

Ref: EW/G93/05/10

Category: 1c

**Aircraft Type and Registration:** Piper PA-28-161 Cherokee Warrior II, G-BMUZ

**No & Type of Engines:** 1 Lycoming O-320-D3G piston engine

**Year of Manufacture:** 1980

**Date & Time (UTC):** 7 May 1993 at 1605 hrs

**Location:** Newcastle International Airport

**Type of Flight:** Private (Training)

**Persons on Board:** Crew - 2 Passengers - None

**Injuries:** Crew - None Passengers - N/A

**Nature of Damage:** Left landing gear leg broken, damage to left flap and wingtip

**Commander's Licence:** Basic Commercial Pilot's Licence

**Commander's Age:** 26 years

**Commander's Flying Experience:** 4,250 hours (of which 4,150 were on type)  
Last 90 days - 197 hours  
Last 28 days - 74 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot and failed components examined by the AAIB.

The aircraft was on a dual training circuit detail in good weather conditions and the student had made 3 or 4 landings which were assessed as good by the instructor. The final landing, with 25° flap selected, also resulted in a good touchdown but almost immediately after the main gear touched the left wing dipped. The instructor took control but he was unable to prevent the aircraft swinging to the left as its speed decayed. The left gear appeared then to collapse completely and the aircraft left the runway coming to a halt upright but at 90° to the runway heading. Later, a member of the public reported that he had seen the left mainwheel hanging at 90° to its normal fore and aft orientation.

The left main leg was sent to the AAIB and was examined by a metallurgist. Both lugs of the torque link upper attachment fork had broken, allowing the oleo piston to rotate and the wheel to trail sideways to the line of flight. Both fork lugs showed pre-existing cracking in their root areas at their lower, inner positions. Corrosion products were evident on the fracture faces and some banded features on the surfaces showed that the fractures had been progressive; the inboard lug had probably

failed first, followed rapidly by the outboard. An examination of a microsection revealed that the most likely failure mechanism was corrosion fatigue. The aircraft had completed 5,975 operating hours.

A recommended inspection of the failure area is described in Piper Service Letter No 760 which points out that inspection of the main landing gear castings is normal maintenance and is a requirement of standard Piper maintenance documentation. The service letter compliance time is at owner/operator's discretion but it is recommended that a visual inspection is accomplished at regularly scheduled inspections and a visible dye penetrant inspection (MIL-I-6866 Type II) be carried out annually. The metallurgist who examined the failed leg noted that the illustration in the service letter could be taken to indicate that it is the upper ends of the lug roots which are the subject of inspection whereas on G-BMUZ the cracks were at the lower ends (the text of the service letter asks for inspection of the lugs where they connect to the strut housing - implying coverage of the whole length of the lug roots). The metallurgist also stated that, in order to achieve a reasonable degree of certainty of detecting the size of crack which had proved critical in this case, a fluorescent dye penetrant inspection with full degreasing preparation would be more appropriate and this would entail the removal of the leg from the aircraft.

The CAA's occurrence database contains records of at least twelve previous cases of this type of failure affecting both the upper attachment lugs for the torque link (on leg part number 65319 as above) and the lower lugs on the stub axle and oleo piston assembly (part numbers 78738-02 and -03). Where aircraft operating hours had been recorded for these cases they ranged from 3,654 to 7,415.