

**AAIB Bulletin No: 9/94**

**Ref: EW/G94/06/14**

**Category: 1.3**

**Aircraft Type and Registration:** Piper PA-34-200T Seneca, N3036A

**No & Type of Engines:** 2 Continental piston engines

**Year of Manufacture:** 1978

**Date & Time (UTC):** 13 June 1994 at 1330 hrs

**Location:** Wellesbourne Mountford Airport, Warwickshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Left main landing gear, flap, wingtip and propeller

**Commander's Licence:** Airline Transport Pilot's Licence (FAA)

**Commander's Age:** 49 years

**Commander's Flying Experience:** 3,000 hours (of which 300 were on type)  
Last 90 days - 80 hours  
Last 28 days - 25 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot and metallurgical examination of the failed component.

The pilot reported that he took off from Birmingham airport without any problem and the flight to Hinton-in-the-Hedges only took around ten minutes; an approach was made to Runway 06 and a normal landing carried out. After touchdown the left main landing gear appeared to shimmy from side to side and the pilot thought that the tyre had punctured, but when the aircraft started to sink on the left side he decided to go-around and then return to Birmingham. On the way he carried out the emergency checks to find out what the problem was and after a low level fly past ATC confirmed that the left landing gear appeared to be hanging in an unusual position. After further discussion with Birmingham the pilot decided to go to Wellesbourne Mountford where, he was informed, there was a good grass runway which was both long enough and wide enough to cope with the ground loop which would possibly occur on landing. After burning off fuel he made an emergency landing on the grass at Wellesbourne and the aircraft came to rest adjacent to the tarmac runway.

The left main landing gear trunnion had fractured in bending at the lower limit of the web running externally along the cylinder wall. Examination of the fracture initiation site revealed the presence of a small area characteristic of that produced by a high stress, low cycle tension fatigue mechanism. Detailed examination of the fracture initiation site showed that most of the fractographic evidence had

been obliterated by long term corrosion. It was also evident that the fracture separation rate had not increased progressively; beyond the small region of long term surface corrosion the fracture had developed as a result of a single application of load. It is probable that the small area of fatigue had grown as the result of a series of heavy landings over the life of the trunnion. This had reduced the impact strength of the trunnion by an estimated 15 to 20% before the final application of load from which it failed.

Metallurgical examination, using hardness and conductivity criteria, showed that this trunnion was made from material with a T6 temper, this was confirmed as conforming to specification by Piper. However, at least one trunnion examined for this type of failure in the past has had a T4 temper, this temper standard has a lower UTS (ultimate tensile strength) than T6 and significantly lower proof stress. The T4 material can also support higher internal stresses from the heat treatment process than T6, and can therefore be less resistant to fatigue damage.

Piper Service Bulletin (SB) 787A, which was superseded by 787B in August 1993, called for a visual inspection after paint removal using a x10 power magnifying glass and has been mandated by the CAA under AD 002-01-88. Both Service Bulletins are presently regarded as optional by the FAA. The aircraft was registered in the United States and was therefore maintained under FAA regulations, it had flown 2,795 hours and the trunnion had its original paintwork and had therefore never been inspected in accordance with either Service Bulletin. Piper SB 787B lifes this item at 2,500 hours and requires repetitive paint removal and die penetrant inspection of the area after 500 hours. The SB 787B is considered mandatory by Piper and the FAA have issued a Notice of Proposed Rule making declaring their intention to make SB 787B mandatory in the near future, and the CAA intends to follow suit.

For details of six previous similar failures see AAIB Bulletin 10/93.