

**AAIB Bulletin No: 11/95**

**Ref: EW/G95/08/01**

**Category: 1.3**

**Aircraft Type and Registration:** Piper PA-34-200 Seneca, G-BVEV

**No & Type of Engines:** 2 Lycoming IO-360 piston engines

**Year of Manufacture:** 1972

**Date & Time (UTC):** 2 August 1995 at 0853 hrs

**Location:** Southend Airport, Essex

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

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

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

**Nature of Damage:** Damage to nose underside, nose landing gear doors and propellers

**Commander's Licence:** Basic Commercial Pilot's Licence with Instrument and Instructor Ratings

**Commander's Age:** 42 years

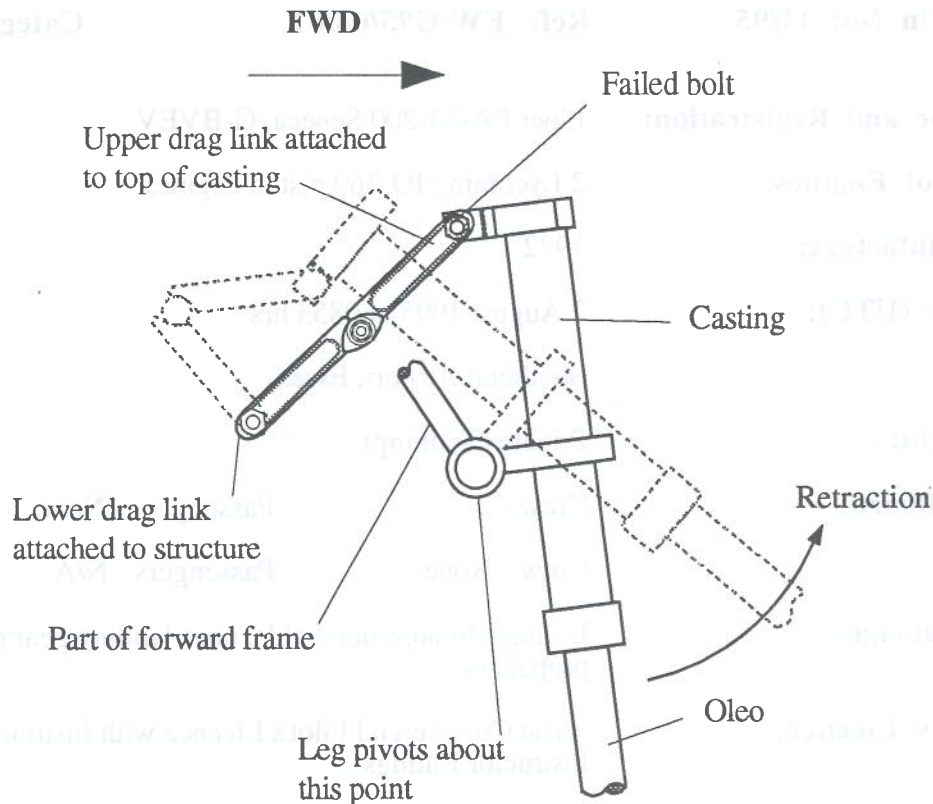
**Commander's Flying Experience:** 10,850 hours (of which 100 were on type)  
Last 90 days - 232 hours  
Last 28 days - 75 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot and AAIB examination of aircraft

The aircraft took off for a circuit training detail at Southend Airport. During the first circuit, the approach and initial touchdown were normal. However, as the nosewheel was lowered onto the runway the nose landing gear collapsed. After the aircraft had come to a halt, the fuel and electrics were switched off and the crew exited the aircraft normally.

It was subsequently found that the nose gear collapse had been caused by failure of the AN7-35 bolt that attached the drag linkage to the top of the leg. The locations of these components are shown in the following diagram, and in the accompanying photographs.

Metallurgical examination of the bolt revealed that it had cracked in bending fatigue across approximately 90% of its section before finally failing in overload. The fatigue origin was not associated with any obvious corrosion or metallurgical defect in the bolt material.



### SCHEMATIC OF PA34 NOSELEG

The aircraft had been operated in Switzerland before coming onto the UK register in June 1994. The total airframe hours at the time of the accident were 6,319 but it was not known when, if ever, the bolt (which is not a lifed item) was last renewed. However, the bolt that secured the lower end of the drag linkage to the aircraft structure was replaced in June during an annual inspection. The associated reason was wear in the shank of the bolt which had caused some free play in the linkage.

With reference to the above diagram, it can be seen that the nose leg on the PA34 is attached to the horizontal member of the fuselage forward frame, which is of tubular steel construction. The leg pivots about this horizontal member such that the nosewheel retracts in a forwards direction. The installation is such that vertical loads are reacted by the frame. Fore and aft loads, the magnitude of which are largely dependant on the nature of the runway surface, are reacted by the drag linkage. It was considered possible that any free play (caused in this instance by the wear in the lower drag link bolt) could have resulted in a 'hammering' action on rough runways, which in turn may have initiated the fatigue process in the upper bolt. It can be seen from the photographs that this bolt is used in a single shear application compared with the smaller diameter lower bolt (not shown) which, as the lower link is located between two airframe mounted lugs, is in double shear.



General view of nose landing gear bay



View of top of nose leg of G-BVEV, showing how upper drag link is attached to RHS of leg

*(NB. Bolt shown is non-standard "slave" item; hence washer stack)*



Failed drag link attachment bolt (Photo: DRA)