

No: 12/88

Ref: EW/G88/04/17

Category: 1c

Aircraft Type and Registration: Piper PA-38-112, G-BHAF

No & Type of Engines: 1 Lycoming O-235-L2C piston engine

Year of Manufacture: 1979

Date and Time (UTC): 7 April 1988 at 2102 hrs

Location: Liverpool airport

Type of Flight: Training

Persons on Board: Crew - 2 Passengers - None

Injuries: Crew - None Passengers - N/A

Nature of Damage: General damage to left wing

Commander's Licence: Private Pilot's Licence with IMC and Night Ratings

Commander's Age: 29 years

Commander's Total Flying Experience: 737 hours (of which 130 were on type)

Information Source: Aircraft Accident Report Form submitted by the Pilot, telephone contact with maintenance organisation and AAIB examination of components

During the fourth landing roll on a night circuit training detail from runway 27 at Liverpool airport, a "snapping noise" was heard and the aircraft dropped on to its left side. The instructor informed ATC and shutdown the engine and electrical systems. His efforts to prevent the aircraft veering to the left were unsuccessful and it left the paved surface, coming to rest on the grass a short distance from the runway edge some 100° from the runway heading.

Both occupants were uninjured and evacuated the aircraft.

Post accident investigation of the failed undercarriage by a maintenance organisation showed that the single bolt attaching the inboard end of the left landing gear spring strut had failed, allowing the landing gear to pivot aft with consequent failure, due to overload, of the outboard (saddle) mounting.

The inboard mounting bolt failure was caused by a fatigue fracture which had extended across some 80% of the bolt cross-section, at a position approximately in line with the wing lower surface. Corrosion and fretting debris were evident on the shank of the bolt in the area where it passed through the undercarriage member. One of the saddle clamp bolts also exhibited fatigue cracking from multiple origins close to the head of the bolt, but this damage affected only a small percentage of the

total cross-sectional area. This bolt had failed principally in overload as a result of a "wrenching action", following failure of the inner bolt.

The undercarriage mounting bolts and saddle clamps on the Piper Tomahawk series aircraft have been the subject of several service bulletins and ADs since 1980. Piper Service Bulletin SB 673A, which was enforced by AD 83-05-04, had been accomplished on G-BHAF in November 1983 at 1100 hrs, and referred to problems of loose and bent mounting bolts which had been reported during routine maintenance, and made available landing gear bolt replacement kits. Fitment of the new bolts was required within 100 hours or at the next scheduled maintenance, whichever occurred first. The most recent service bulletin covering the undercarriage mountings was issued by Piper as SB 673B dated 2 October 1986. This was essentially a repeat of the earlier (mandatory) SB 673A, but although the document was prefaced by a statement that Piper considered compliance as "mandatory", there was no accompanying AD and therefore the document had no official mandatory status. This service bulletin was not accomplished on G-BHAF, with the result that at the time of the accident (i.e. at 3077 hrs total time), the undercarriage bolts had been in service for almost 2000 hrs.

The UK main agents for this type have pointed out that the Piper Inspection Report Form, covering the Tomahawk series aircraft, specifies an inspection of the "main gear legs, attachments, and bolts for condition, torque and security" at 100, 500 and 1000 hour intervals. They are of the opinion that the requirement to check the bolt torque levels is of particular importance if problems of this type are to be avoided.