Piper PA-25-235C, G-BSTH

AAIB Bulletin No: 6/99 Ref: EW/G98/12/14 Category: 1.3

Aircraft Type and Registration:	Piper PA-25-235C, G-BSTH
No & Type of Engines:	1 Lycoming O-540-G1A5 piston engine
Year of Manufacture:	1969
Date & Time (UTC):	29 December 1998 at 1119 hrs
Location:	Portmoak Airfield, Tayside, Scotland
Type of Flight:	Glider towing
Persons on Board:	Crew - 1 - Passengers - None
Injuries:	Crew - None - Passengers - N/A
Nature of Damage:	Landing gear and left wing
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	41 years
Commander's Flying Experience:	3,480 hours (of which 93 were on type)
	Last 90 days - 133 hours
	Last 28 days - 38 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and examination of failed component by the AAIB

The aircraft was landing at Portmoak Airfield having completed an aerotow launch of a glider. Some five seconds after touchdown, the left landing gear leg collapsed and the left wing dropped causing its tip to contact the grass. The pilot shut the engine down as a ground loop to the left developed and the aircraft turned through approximately 180° before coming to rest. After vacating the aircraft, it quickly became apparent to the pilot that the left landing gear leg had detached from its shock absorber assembly.

The main landing gear on the PA 25 is sprung by the use of bungee shock chord wrapped around an oil filled damper unit. This unit is supported by a single bolt at each end, one securing the end of its ramrod to the fuselage, the other securing the damper body to the landing gear via an attachment lug welded to the damper body. The damper unit from this aircraft, which had been used as a glider tug for some years, had suffered a failure of the gear attachment lug. Examination of the associated fracture surfaces revealed two distinct regions, one more 'smooth' than the other. It was apparent that the smooth fracture had resulted from a progressive fatigue cracking mechanism, while the

more ragged fracture had occurred as a result of the final overload failure of the reduced lug section on landing. Microscopic examination showed that the fatigue cracking had originated at the surface of the bolt bore and had initially propagated in high cycle fatigue before changing to low cycle fatigue as the crack had extended. Figure 1 shows the location and progression of the lug failure, with the poor quality of the surface finish in the bore.

On this type of aircraft, which is often used for towing gliders and operated from relatively rough grass fields, high loads and a high number of take offs and landings are to be expected over the life of the aircraft and its equipment. This particular spring/damper had been fitted as a new unit to this aircraft only some 200 flying hours previously. However, fatigue cracks may be initiated by high cyclic tension loads in otherwise serviceable and apparently correctly designed components by surface defects which induce stress concentration.