ACCIDENT

Aircraft Type and Registration:	Pulsar, G-BUDI
No & Type of Engines:	1 Rotax 582 piston engine
Year of Manufacture:	1994
Date & Time (UTC):	13 October 2006 at 1328 hrs
Location:	Popham Airfield
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to propeller, nose landing gear and engine mountings
Commander's Licence:	Private Pilot's Licence
Commander's Age:	60 years
Commander's Flying Experience:	228 hours (of which 111 were on type) Last 90 days - 3 hours Last 28 days - 3 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and metallurgical examination of the failed component

Synopsis

After a normal touchdown the nose landing gear failed. The separation resulted from fatigue damage induced by cyclic bending due to normal operating loads on the landing gear.

History of the flight

The pilot carried out a standard approach and landing onto Runway 08 at Popham. During the flare he continued to apply back pressure on the control column to allow the nosewheel to lower gently onto the grass. As the nose landing gear touched down the aircraft pitched down and came to rest on the propeller. The sole occupant exited the aircraft without injury.

Description of the nose landing gear

The nose landing gear strut on this type of aircraft consists of a thick-walled square tube, with a castoring nose wheel assembly attached to the lower end (see Figure 1). Near the top of the strut a drag brace is attached, which runs forward to the central longitudinal member of the engine mount assembly. This longitudinal member is welded to lateral bracing tubes. Some aircraft, including G-BUDI, have a damper incorporated with the drag brace.

Metallurgical examination

The longitudinal engine mount tube had failed at the location of the weld attaching it to the rear lateral

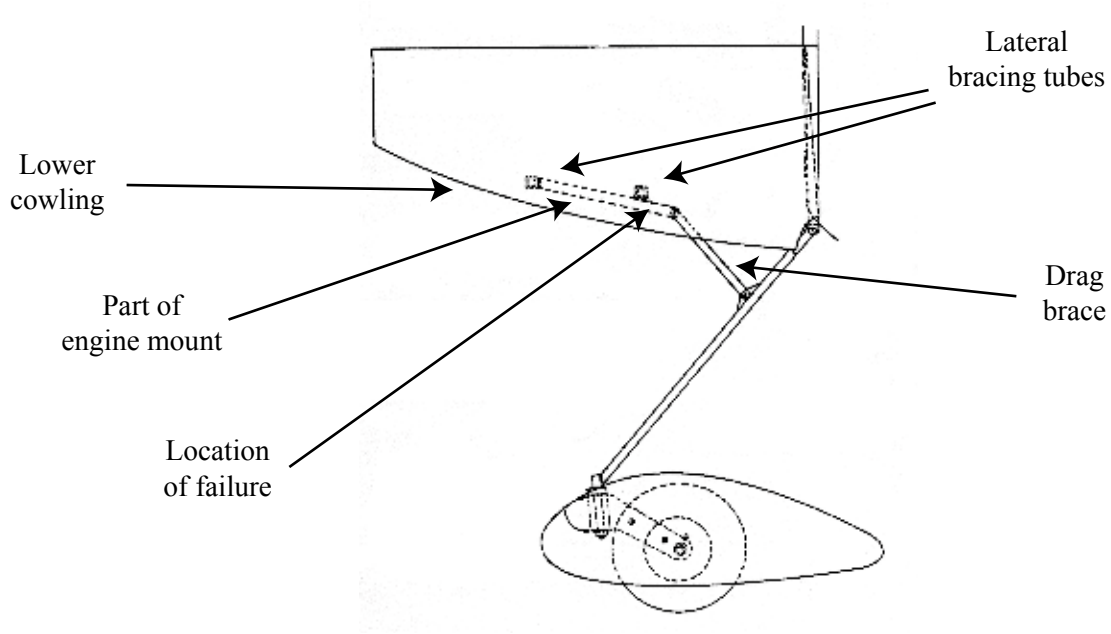


Figure 1

Nose landing gear and engine mount assembly

bracing tube. The engine mount, together with the drag brace, was returned to the AAIB for metallurgical examination (see Figure 2).

Magnetic tests on the tubing showed that it had been manufactured from ferro-magnetic steel. The failure had developed from multiple fatigue initiations across the majority of the tube face. The face had been extensively mechanically damaged during and after separation (see Figure 3) but it was evident that multiple, relatively low-cycle, fatigue initiations had occurred along the top edge where the weld had been located. It was concluded that the separation resulted from fatigue damage induced by cyclic bending due to normal operating loads on the landing gear.

Aircraft information

G-BUDI was built in 1994, since when it had accumulated 114.55 hours. The aircraft has been flown by the current owner since it was built and is operated from the grass airfield at Popham. It had previously been operated from a paved runway and taxiways at Blackbushe.

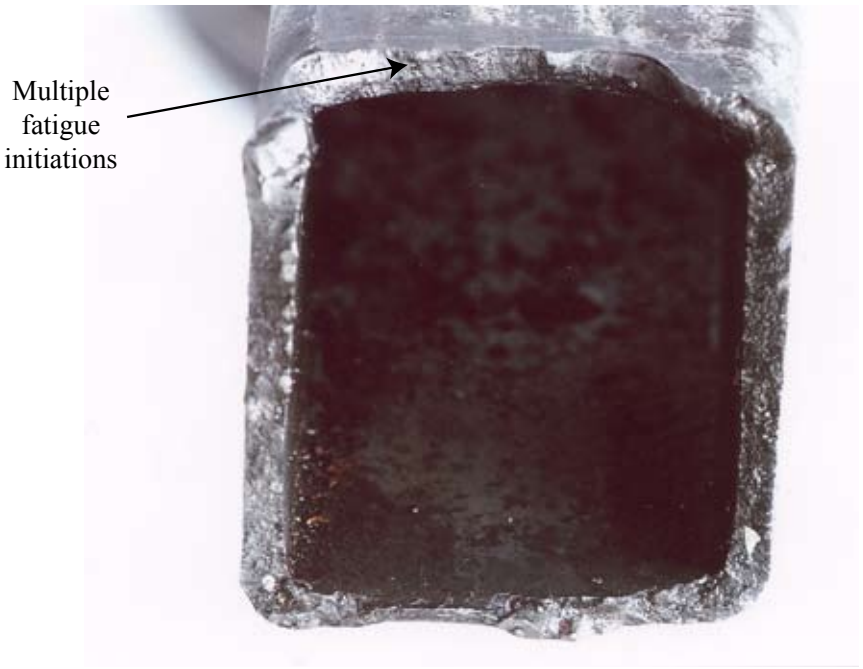
(Photo: H T Consultants)

Figure 2

Failed engine mount tubing for G-BUDI

Previous accident

A previous accident occurred to a Gill SA Pulsar, G-BSFA on 14 August 2002 at Staverton, which resulted from the loss in flight of the nosewheel. The AAIB report, EW/G2002/08/13 published in AAIB Bulletin 2/2003, described a fatigue failure of the nosewheel pivot pin. Examination of the failed pin indicated that the failure was the result of a fatigue process, with multiple initiation sites. There was thus no evidence to suggest that a single event, such as a heavy landing had been responsible for the initiation. The report concluded:



(Photo: H T Consultants)

Figure 3

End-on view of fracture face from G-BUDI

'In the absence of any evidence indicating that this aircraft had been operated in a radically different way to others in the UK, it was concluded that the failure resulted from typical in-service loads. This posed the question of whether the design was suitable for operation from all but the smoothest of surfaces and, as a consequence, whether a 'safe life' should be imposed on the nose landing gear. It should be noted that the nature of the installation is not conducive to a reliable inspection method for discovering cracks in the pin.'

G-BSFA had achieved more than 300 flying hours, which was high relative to the other 20 or so aircraft on the UK register. Although at the time of the accident the aircraft was based at Staverton, which has paved runways and taxiways, it was previously operated as a demonstration machine from a grass airfield.

The following Safety Recommendation was made as a result of the investigation:

Safety Recommendation 2003-06

It is recommended that the Popular Flying Association conduct a design review of the nose landing gear as fitted to Pulsar aircraft on the UK register and liaise with the Experimental Aircraft Association (EAA) in the USA on this matter.

No response to this recommendation was received.

Safety action

The PFA Type Acceptance Data Sheet (TADS) 202 has now been re-issued, dated 02/02/07, with the addition of a reference to the problems experienced with Pulsar noseleg failures. The salient information from Section 12 is reproduced below:

'Noseleg failures have occurred due to failure of early type 5/8" diameter noseleg castor pivot pins. As a result, improved pivot pins were introduced by Aerodesigns with diameter increased to 3/4".

Aerodesigns manufactured 3/4" diameter pivot pins were made removable from the leg, whereas the earlier 5/8" diameter pins by Aerodesigns, and the later Skystar produced 3/4" diameter pins were welded integral with the noseleg. Check carefully for signs of bending/cracking of noseleg pivot pins particularly if they are of the earlier 5/8" diameter design and particularly following any heavy landing.

Noseleg failures have occurred due to the square steel tube support stub for the front noseleg suspension strut failing through fatigue where it is welded to the forward engine mounting cross-beam. The tube concerned is the one which runs fore and aft on the aircraft centre line, linking the front and rear cross beams, and projects aft to provide a mounting for the front noseleg strut. Check carefully for signs of bending or cracking of this square tube where it passes underneath the forward cross beam, especially following any heavy landing and especially if the early type fixed-length support strut is used rather than the later suspension spring link. This does not apply to the Pulsar XP which has a different noseleg suspension strut mounting arrangement'.

The PFA intend to issue a bulletin to Pulsar owners calling for a reinforcement of the nose leg support stub. This will be mandatory for the issue or renewal of a Permit-to-Fly.