

ACCIDENT

Aircraft Type and Registration:	Grob G115, G-BOPT
No & Type of Engines:	1 Lycoming O-235-H2C piston engine
Year of Manufacture:	1988
Date & Time (UTC):	4 August 2008 at 1140 hrs
Location:	Runway 27L, Manchester (Barton) Airport,
Type of Flight:	Training
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Failure of the right main wheel stub axle
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	52 years
Commander's Flying Experience:	4,637 hours (of which 772 were on type) Last 90 days - 182 hours Last 28 days - 56 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, AAIB examination of the failed stub axle.

Summary

During a normal landing, the right main wheel separated from the aircraft due to failure of the right main gear stub axle.

veered to the right again and came to rest at right angles to the runway.

History of the flight

Following an uneventful demonstration by the instructor of a precautionary circuit and full stop landing, control of the aircraft was handed to the student to repeat the exercise. The student executed an uneventful circuit followed by a stable approach and landing but, as the aircraft started to decelerate, it began to veer to the right. The instructor suspected a steering problem and applied left rudder, after which the aircraft regained runway heading. However, shortly afterwards, it

On leaving the aircraft, it was evident that the right main landing gear stub axle was broken, and that the complete right wheel assembly had separated from the aircraft. The instructor reported that a similar occurrence had taken place on 17 June 2008, when another instructor had been flying the aircraft¹, on that occasion involving the left landing gear.

Footnote

¹ This event was not reported to the AAIB.

Axle examination

The fractured stub axle was sent to the AAIB for detailed metallurgical examination. The axle had fractured as a result of fatigue cracking at a location a short distance outboard of its attachment to the landing gear strut, Figure 1. This was close to a change of cross-section that formed a shoulder providing an abutment for the inner wheel bearing, Figure 2.

The fracture plane was normal to the axis of the axle, fractionally outboard from the corner formed by the reduced axle diameter at the shoulder. Optical microscopy revealed two separate and distinct regions of fatigue cracking on diametrically opposing sides of the fracture, both originating from multiple origins on the outer surface. The configuration of the axle's flanged attachment to the strut was symmetrical, which allows it to be installed onto the strut either way up. Given the stub axle's loading environment, it was evident that the two opposing zones of fatigue had propagated at separate times, the first crack having initiated and grown to a size insufficient to cause a complete rupture during some earlier period in service. At that time, the axle had been installed at 180° from its position at the time of final failure. The second region of fatigue cracking had so weakened the remaining material that it had ruptured in overload, allowing the wheel to separate.

It was not possible to establish precisely when the orientation of the axle had been reversed, or the reason for its removal from the strut. The aircraft's log book recorded replacement of both axles with new items in March of 1998. A Grob Service Bulletin, dated

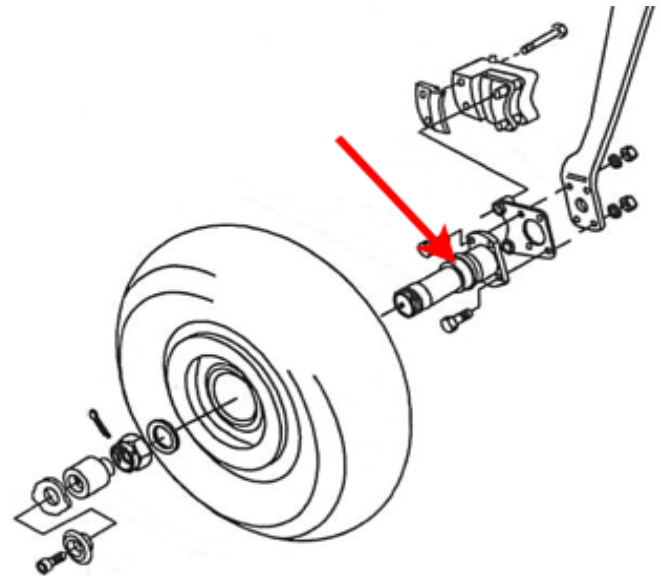


Figure 1

Main landing gear stub axle arrangement, showing location of failure



Figure 2

Stub axle fatigue cracking region

27 June 1990, required the axle to be inspected for cracks at the welded joint between the axle attachment flange and the axle proper, and it is possible that the change in orientation was associated with removal to facilitate these inspections.