

ACCIDENT

Aircraft Type and Registration:	Piper PA-38-112, G-BNVD	
No & Type of Engines:	1 Lycoming O-235-L2C piston engine	
Year of Manufacture:	1978	
Date & Time (UTC):	9 December 2006 at 1110 hrs	
Location:	Durham Tees Valley Airport	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Left wing and main landing gear damaged beyond repair	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	63 years	
Commander's Flying Experience:	22,300 hours (of which 140 were on type) Last 90 days - 110 hours Last 28 days - 25 hours	
Information Source:	AAIB Field Investigation	

Synopsis

Whilst taxiing following a firm landing, the left main landing gear detached from the aircraft. Examination showed that one of the three landing gear attachment bolts had unscrewed and fallen out and the remaining two bolts had pulled out as the gear detached from the aircraft.

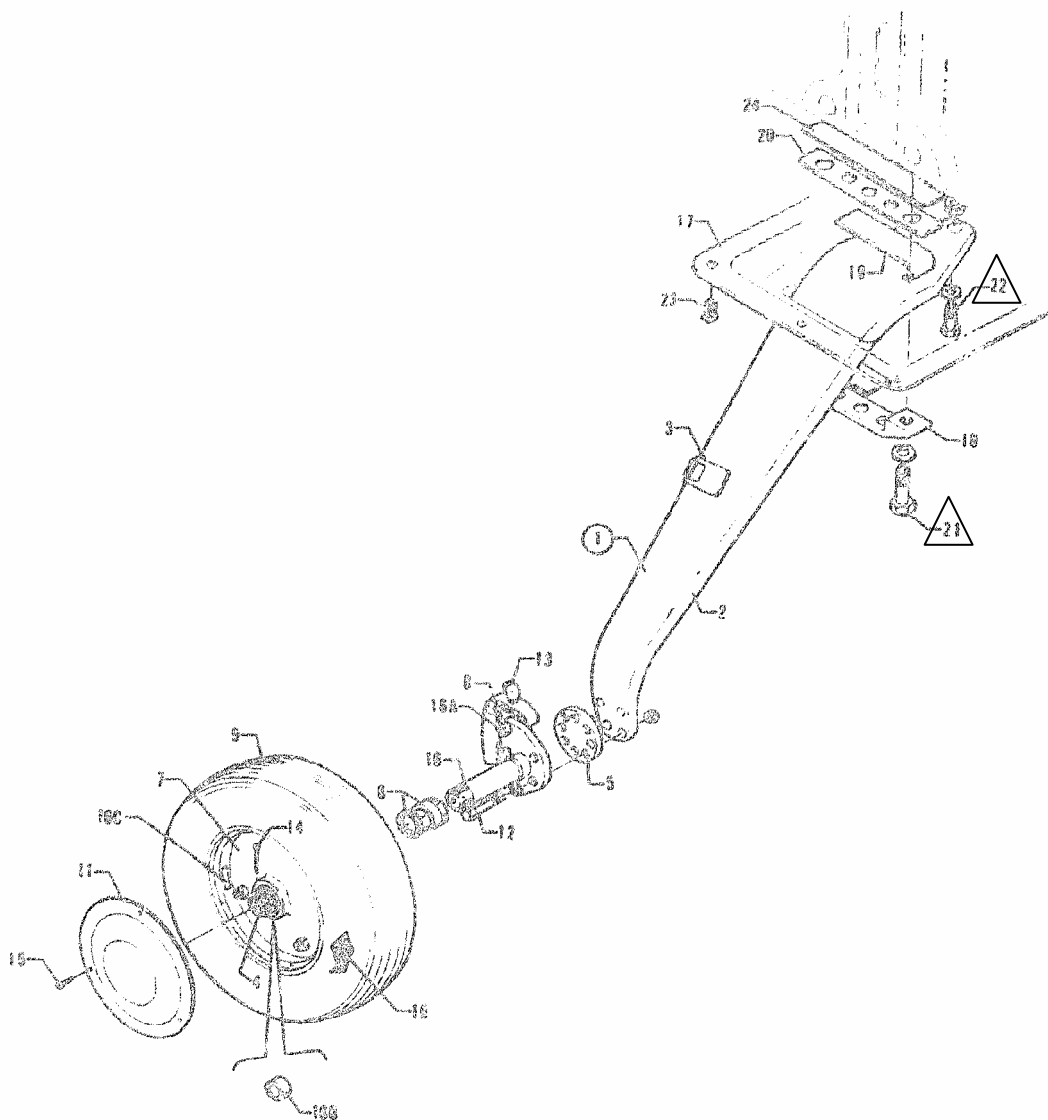
History of the flight

The aircraft was being flown by the student on a dual cross-country flight from Carlisle to Durham Tees Valley Airport. The landing at Durham Tees Valley was firm (but not hard enough to warrant a report) and with no bounce. Whilst taxiing along the runway following the completion of the landing roll, it was noticed by the

crew that the left wing appeared to be lower than the right. This was initially attributed to the crosswind. The aircraft was taxied, at walking speed, off the runway and onto the taxiway when suddenly the left main landing gear detached from the wing and the aircraft stopped with the left wing tip touching the ground.

Engineering examination

Examination of the detached left main landing gear indicated that one of the three bolts (Figure 1, item 22), part number 401 511, that attach the landing gear to the aircraft, was missing. The other two bolts (Figure 1, items 21), part number 401 462, were attached to the landing gear with locking wire and exhibited very good



*Courtesy of
the aircraft manufacturer*

Figure 1
Main Landing Gear

evidence of having been pulled out of their barrel nuts as the landing gear was in the process of detaching from the aircraft. A search of the runway touchdown area located the missing bolt, which, upon examination, showed that it had unscrewed and dropped out of the barrel nut located in the wing. There was no wire locking or lock washer and none were specified in the aircraft's Maintenance Manual.

Maintenance

The aircraft was maintained to the Civil Aviation Authority's (CAA) Light Aircraft Maintenance Schedule (LAMS) CAP 411 which requires Pre-Flight, Daily, 50 hour, 150 hour and Annual maintenance checks. The inspection for security of the landing gear attachment bolts is required during the 150 hour and Annual maintenance checks. There is no requirement to take the aircraft weight off the

landing gears when carrying out this check. The aircraft manufacturer's Maintenance Manual requires Pre-Flight, 50 hour, 100 hour, 500 hour, 1,000 hour and Annual maintenance checks. The inspection for condition, torque and security of the main landing gear attachment bolts is required during the 100 hour, 500 hour, 1,000 hour and Annual maintenance check.

This aircraft had the main landing gear attachment bolts replaced during an Annual maintenance check on 19 January 2006 at 5,716:50 airframe hours. The bolts were those specified in Piper Service Bulletin (SB) 673B and were retorqued after 24 hours with the aircraft weight on the landing gears, in accordance with the aircraft's Maintenance Manual. Between the Annual maintenance check and the accident two 150 hour maintenance checks had been carried out on the aircraft during which the condition and security of the landing gear bolts was checked. At the time of this accident the aircraft had flown 108 hours since the last 150 hour maintenance check.

Civil Aviation Authority CAP 520, Part 3 titled 'Light Aircraft Maintenance Schedules', paragraph 2.4 states:

'Generic light aeroplane scheduled maintenance inspection requirements have been included in the LAMS aeroplanes, consequently:

- a) inspections recurring up to and including 100 hr intervals which significantly differ from the inspections specified in the LAMS Schedule 150 hr check, may be completed at the 150 hr check.'*

Service Bulletins and Airworthiness Directives

The main landing gear attachment bolts on the Piper PA-38 series aircraft have been the subject of three Piper SBs; 673, 673A and 673B and two Federal

Aviation Administration (FAA) Airworthiness Directives (AD) 83-05-04 and 90-19-03. These SBs and ADs required, within 100 airframe hours, a one-time replacement of the attachment bolts with higher strength bolts, barrel nuts and, if required, saddle clamps. They also introduced revised torquing procedures. There were no repetitive inspections called for as there is an inspection and torque check requirement every 100 hours in the aircraft Maintenance Manual.

Previous occurrences

The CAA Mandatory Occurrence Report (MOR) database shows that there have been ten reported incidents of Piper PA-38 main landing gear attachment bolts failing or becoming loose. Five of these incidents were reportable accidents which the AAIB investigated (AAIB Bulletin Nos 6/85, 1/88, 12/88, 10/89 and 3/90). Following the investigation into the accident to Piper PA-38, G-BMXL, on 25 November 1989 (AAIB Bulletin 3/90) the following Safety recommendation was made:

'A recommendation has been made to the Civil Aviation Authority that they re-examine Airworthiness Directive 83-05-04 with a view to introducing a repetitive and/or mandatory scrap life for these bolts.'

The CAA responded to this Safety Recommendation on 28 February 1990 with:

'---the Authority already has this matter in hand. A CAA Additional Airworthiness Directive (PAAD 983) is currently being finalised, and it is hoped to have it issued by the end of April 1990. This directive will require NDT inspection of the bolts within 50 hours, a torque check

every 50 hours thereafter, and subsequent NDT inspection and/or replacement with new bolts every 150 hours or on reported heavy landing.'

This Additional Airworthiness Directive was not subsequently issued.

In August 2007 the CAA commented that CAA/LAMS/1999/A Issue 2 does, in Section 3 paragraph 8, state that, in addition to the LAMS schedule, the owner/operator should also consider:

'Instructions for continuing airworthiness ... published by type design organisations ... to ensure the approved maintenance schedule remains valid for the aeroplane listed'.

Safety Recommendations

Safety Recommendation 2007-087

It is recommended that the Civil Aviation Authority reconcile the anomaly of the aircraft manufacturer's requirement to check the torque of the main landing gear attachment bolts on Piper PA-38 aircraft every 100 hours against the LAMS requirement to check the security of landing gear attachment bolts every 150 hours.

Safety Recommendation 2007-088

It is recommended that the Federal Aviation Administration require that Piper Aircraft introduce a form of locking on the main landing gear attachment bolt, part number 401 511, fitted to PA-38 series aircraft.