

ACCIDENT

Aircraft Type and Registration:	Reims Cessna F172N Skyhawk, G-DUVL	
No & Type of Engines:	1 Lycoming O-320-H2AD piston engine	
Year of Manufacture:	1978 (Serial no: 1723)	
Date & Time (UTC):	20 December 2016 at 16:04 hrs	
Location:	White Waltham Airfield, Berkshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 3
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Right main landing gear failed, minor damage to the tailplane and elevator	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	61 years	
Commander's Flying Experience:	15,600 hours (of which 230 were on type) Last 90 days - 3 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and AAIB enquires and examination of failed components	

Synopsis

Shortly after landing, the right mainwheel assembly detached from the landing gear leg. The failure occurred as a result of a fatigue crack in the landing gear leg that initiated at the position where a screw in the wheel fairing had made contact with the leg.

History of the flight

The pilot reported that the touchdown on the grass runway at White Waltham was smooth with little impact; however as the aircraft slowed to approximately 35 kt, there was a loud bang and the right side of the aircraft dropped. The aircraft turned to the right by approximately 120° before it came to a halt. On vacating the aircraft, the pilot noticed that the right main wheel assembly had detached from the landing gear leg (Figure 1).



Figure 1

Right main wheel assembly detached from its leg

Aircraft examination

The right main landing gear leg failed adjacent to the top fastener in the aerodynamic fairing, which covers the lower part of the leg and is attached to the wheel spat (Figure 2). The screws in the fairing should all be identical; however the top two screws were found to be magnetic and heavily corroded, whereas the bottom two screws were non-magnetic and were bright in appearance. The screws were therefore made from different materials and varied in length by between 9 and 11 mm.

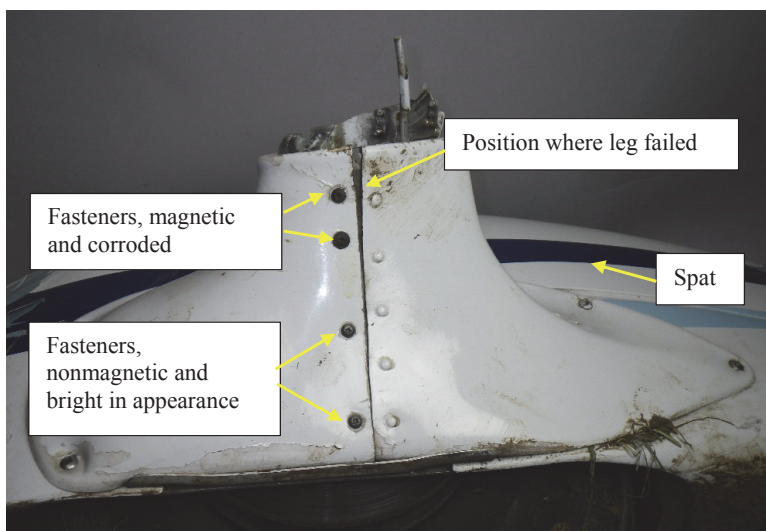


Figure 2

Fairing attached to right wheel spat

The top fastener had made contact with the leg and formed a dent approximately 6.8 mm in diameter and 1.6 mm deep (Figure 3). Spots of discoloration and surface damage indicated that the other three screws had also been in contact with the leg.



Figure 3

Top fastener in contact with the landing gear leg

Examination of the fracture surface

Examination of the fracture surface under a microscope revealed multiple cracks emanating from the dent, which had been caused by contact with the screw. The surface in the area of the dent was discoloured and corroded, and beachmarks extended from the centre of the dent to approximately 0.5 mm from the inner surface of the landing gear leg (Figure 4). The beachmarks were evidence of fatigue cracking and the corrosion and discolouration showed that the crack had grown over a period of time before it failed in overload. Due to the nature of the failure it was not possible to estimate the time period over which this occurred.

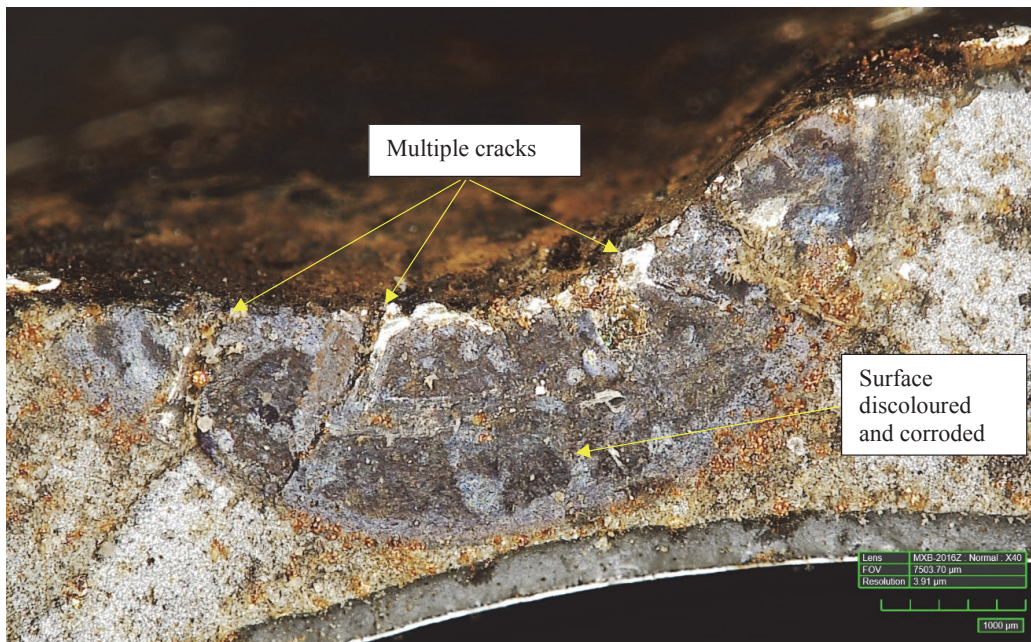


Figure 4

Multiple cracks and corroded surface

Clearance between the screws and landing gear leg

Contact between the landing gear leg and the end of the screws might have been a result of the screws being too long, the fairing being too close to the leg, or a combination of both.

The four screws that secured the right fairing were compared with the correct screw (S1021Z6-6) identified in the parts catalogue, which was 9 mm long, made of steel and therefore magnetic. Only two of the four screws, including the one involved in the fatigue crack, were magnetic and of the correct length. The insurance loss adjuster provided the AAIB with the four screws from the left main wheel fairing and reported that there were witness marks indicating that these screws had also made contact with the leg. Only one of these screws was magnetic, three were of the correct length and one was 2 mm longer.

It was not possible to determine if the wheel spats had the correct profile and clearance from the landing gear leg.

Maintenance

A 150-hour check was carried out in accordance with Issue 1 of the CAA Light Aircraft Maintenance Programme (LAMP) and completed on the 10 October 2016, which was 34 flying hours and two months prior to the accident.

The LAMP required the landing gear structural members, the brakes, and the wheel fairings to be examined during the 150-hour check. The maintenance records show that during this check the brake pads were replaced, which would have required the spats to have been removed.

Comment

The right landing gear leg failed as a result of a fatigue crack that initiated from damage caused by the end of a screw in contact with the leg. The condition of the fracture surface indicated that the fatigue crack was present for a period of time. The cyclic loads in the leg during the landing and taxiing would have caused the fatigue crack to grow until the leg eventually failed in overload during a ground roll.

Witness marks show that the screws securing the fairings on both main wheel spats had been in contact with their respective landing gear legs. While some of the eight screws were longer than the correct screw identified in the parts catalogue, the screw where the fatigue crack initiated was of the correct length. This indicates that it was probably some aspect of the fitting or profile of the wheel spat and fairing that had resulted in insufficient clearance between the screws and the landing gear leg.