Accident

Aircraft Type and Registration:	Extra EA 300/L, G-OLAD	
No & Type of Engines:	1 Lycoming AEIO-540-L1B5 piston engine	
Year of Manufacture:	2007 (Serial no: 1270)	
Date & Time (UTC):	17 January 2024 at 1145 hrs	
Location:	Northrepps Aerodrome, Norfolk	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Both mainwheels detached on landing leading to landing gear detachment, lower fuselage, engine and propeller damaged	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	71 years	
Commander's Flying Experience:	21,404 hours (of which 64 were on type) Last 90 days - 3 hours Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot and follow-up enquiries by the AAIB	

Synopsis

On landing, both mainwheel assemblies detached from their axles. The fasteners attaching both axles to the landing gear leg failed due to the nuts being pulled from the attachment bolts. When the axles were last refitted, the axle attachment bolts were re-used.

The aircraft manufacturer is taking safety action across all applicable aircraft maintenance manuals to include an additional prominent instruction to fit new bolts when refitting the axles.

History of the flight

The pilot was conducting a familiarisation flight in the Extra 300, having flown over 60 hours on the Extra 200 series. The flight comprised three circuits and landings on grass Runway 22 at Northrepps followed by some local flying. Upon returning to the airfield the pilot landed approximately half way along the displaced threshold, and immediately after touchdown the main landing gear collapsed. The propeller struck the ground and the aircraft came to a halt at the left side of the runway.

Accident site

Witness marks in the grass surface appeared to show that the right tyre was initially not turning upon touchdown and that the right mainwheel assembly detached before the left mainwheel assembly (Figure 1).

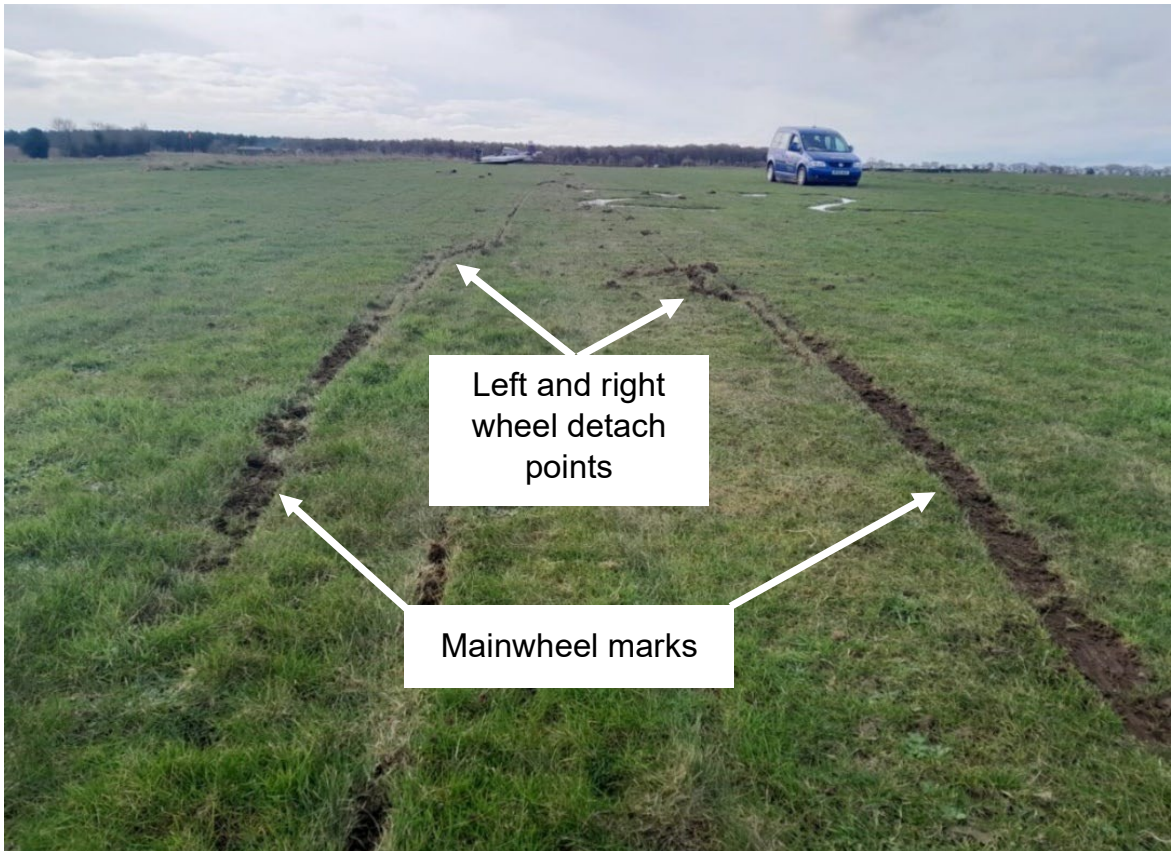

Figure 1
Runway witness marks

Aircraft examination

Both mainwheel assemblies detached from the landing gear leg, which then bent back underneath the fuselage. The maintenance organisation tasked with recovering the aircraft found that both main wheels turned freely. The four axle attachment bolts on each wheel were bent and the threads were stripped (Figure 2). None of the eight axle bolt nuts were recovered.

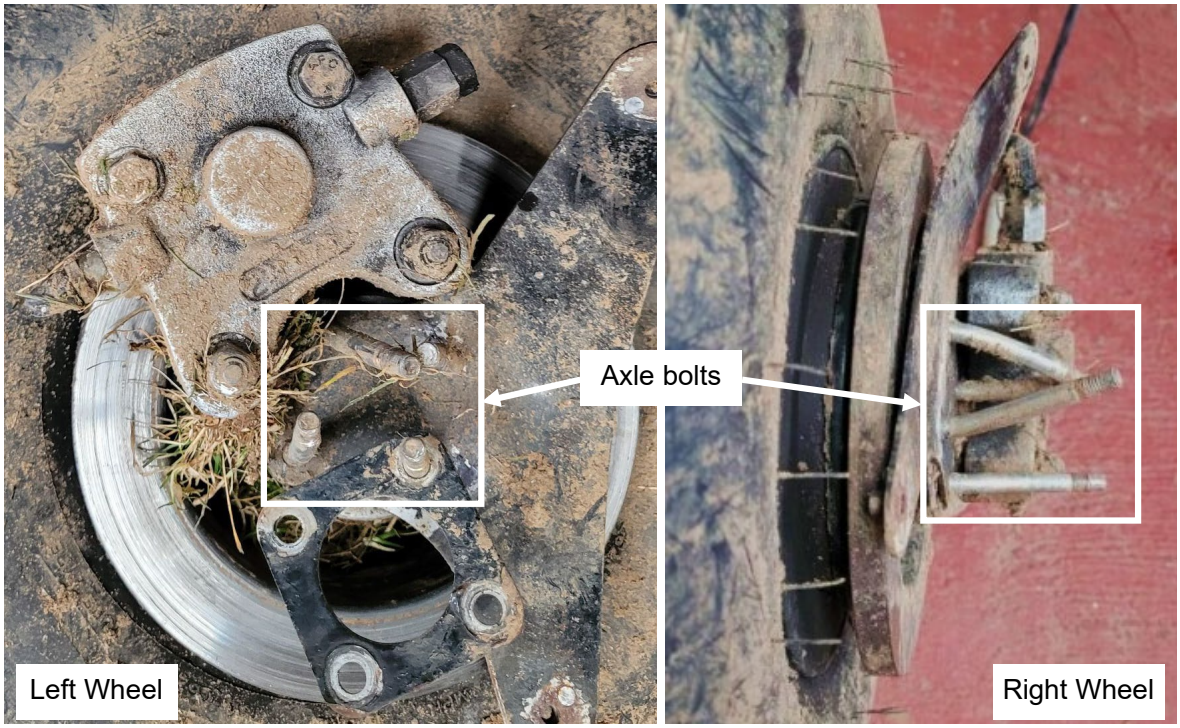

Figure 2
Damaged axle attachment bolts

Maintenance history

A new main landing gear leg assembly was fitted to G-OLAD in May 2022, 111 hours prior to the accident. During the replacement process the axles were refitted using the existing attachment bolts with new nuts. The aircraft maintenance manual used was at Revision 11, dated 2019.

Previous occurrence

AAIB investigation EW/G2010/04/05[1] into a similar failure of axle fasteners on an Extra EA 300 aircraft could not determine the cause of failure but concluded that it is possible to damage the axle attachment bolt threads when the axles are removed and refitted. This damage could then lead to the fasteners failing during normal landing loads.

Safety recommendation 2010-046 was made to the Extra Aircraft Company, and the EA 300/L maintenance manual was amended[2] at Chapter 32-10-03, step 4 of wheel axle removal/installation to include *"Use new nuts and bolts."*

A prominent instruction was also added to Revision 1, Chapter 32-10-00 Landing Gear of the maintenance manuals for the 300/SC, 300/LT and 300/LC models (Figure 3). This is not present in the maintenance manual for the 300/L aircraft.

Footnote

[1] AAIB investigation to Extra EA 300 G-SIII, https://assets.publishing.service.gov.uk/media/54230283e5274a1314000b29/Extra_EA_300__G-SIII_10-10.pdf [accessed 14 February 2024].
[2] Revision 10, 26 October 2015.

IMPORTANT	**New bolts are to be used when the wheel axles are replaced or refitted.**

Figure 3

Excerpt from EA300/LT Maintenance Manual, Chapter 32-10-00
(Used with permission)

Analysis

The damage to the axle attachment bolts is consistent with side forces having been applied to the tyres, and the nuts being pulled from the bolt threads under load. The pilot noted that this aircraft routinely experiences firm landings and heavy braking at Northrepps due to the 615 m runway length. However, neither the pilot or passenger felt this landing was heavier than normal, and both confirmed their feet were clear of the brakes.

Witness marks on the runway show it is likely that the surface in the displaced threshold was soft. This can increase both the landing gear leg flex and the tendency for the aircraft to dig in upon touchdown, introducing higher loads into the main landing gear assembly that may not be felt by the passengers. It was not possible to determine the cause of failure of the fasteners, but it is possible that if there was pre-existing damage to the bolt threads it could lead to failure of the fasteners under normal landing loads.

The axle attachment bolts had been reused when the axles were refitted 111 hours previously. The manufacturer's maintenance manual used included the instruction in Chapter 32-10-03 to use new bolts when refitting axles due to the possibility of damaging the bolt threads. The manual did not include the additional instruction in Chapter 32-10-00 that is present in the manuals of some new aircraft models, which presents an additional opportunity to highlight the requirement to use new bolts.

Extra Aircraft is taking safety action to add the prominent instruction to Chapter 32-10-00 of the maintenance manual for all related models at their next revision.

Conclusion

The axle attachment fasteners of both wheels failed due to the nuts being pulled from the bolts under load. It is possible the bolt threads had been damaged during the axle removal and refitting process when the bolts were re-used. The version of the manufacturer's maintenance manual used for the process specified to use new axle attachment bolts.