

ACCIDENT

Aircraft Type and Registration:	DH82A Tiger Moth, G-AXAN	
No & Type of Engines:	1 De Havilland Gipsy Major 1F piston engine	
Year of Manufacture:	1942 (Serial no: 85951)	
Date & Time (UTC):	14 May 2022 at 1515 hrs	
Location:	Private Farm Strip, near Duxford, Cambridgeshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Commercial Pilot's Licence	
Commander's Age:	49 years	
Commander's Flying Experience:	3,687 hours (of which 533 were on type) Last 90 days - 67 hours Last 28 days - 25 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further AAIB enquiries	

Synopsis

While landing at a private farm strip the aircraft touched down in soft ground and the left landing gear failed. The aircraft bounced and became inverted, but the occupants were uninjured. Examination of the failed components showed evidence consistent with a hard landing. It was not possible to determine whether the conditions encountered during the accident landing were sufficient in isolation to have caused the damage, or whether any pre-existing defects might have contributed to the failure.

History of the flight

Following a normal approach to grass Runway 22 at a private farm strip near Duxford, the pilot reported that the touchdown felt unusual, and the aircraft bounced. It then landed in a three-point attitude and came to a sudden stop, resulting in the aircraft nosing over and becoming inverted. Both occupants were uninjured and exited the aircraft without assistance.

Inspection of the aircraft and runway showed that the left wheel had touched down in soft ground, causing the landing gear to fail at the lower fork end fitting on the compression leg (Figure 1).

The pilot had walked the runway several times prior to the flight to check the ground conditions and identified several areas of soft ground at the side of the runway but

considered the conditions adequate. The pilot considered it unfortunate that the aircraft had touched down in an isolated area of soft ground.



Figure 1

G-AXAN after coming to rest inverted

The pilot provided a diagram of the accident site and ground marks (Figure 2) which shows a depression in the grass surface coincident with the left wheel striking the ground, followed by a long narrow ground mark caused by the lower fork end fitting of the compression leg.

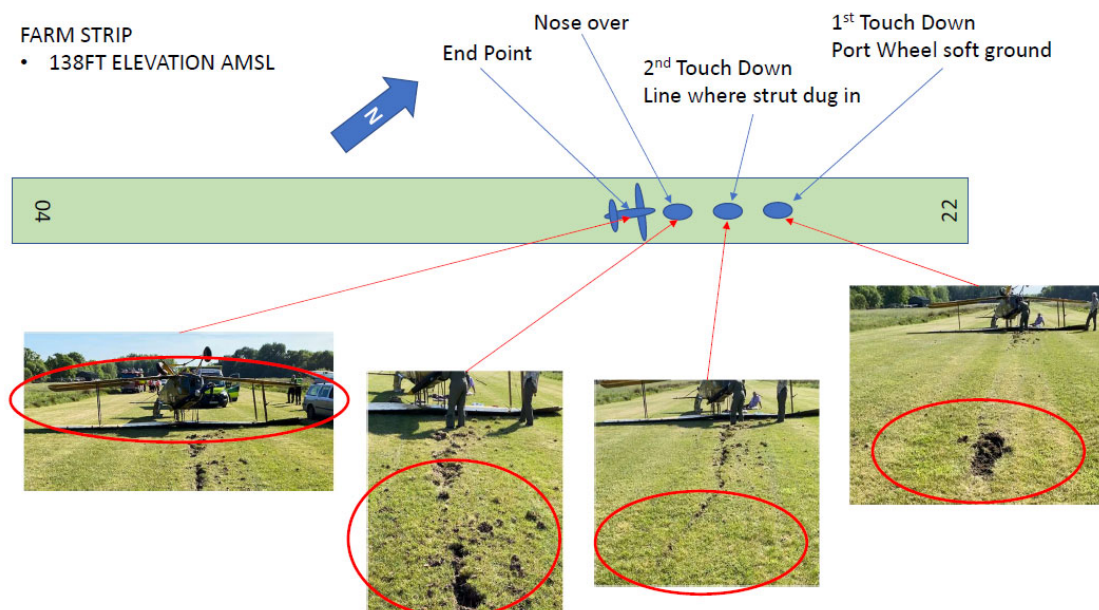


Figure 2

Diagram of accident site and ground marks

Aircraft information

The original design standard for the DH 82 and 82A required the landing gear compression leg lower fork end fitting to be manufactured from aluminium alloy. Service experience indicated that this fitting would fail after repeated hard landings. A steel lower fork end fitting was subsequently introduced. De Havilland Support Ltd Technical News Sheet (TNS) 22, first published in 1990 and re-issued in 2003, recommends fitment of the steel fitting on all standard (unbraked) Tiger Moth aircraft.

Separately TNS 22 describes a widely available modification to fit wheel brakes to Tiger Moth aircraft. Although approved by the CAA, this modification is not endorsed by de Havilland Support Ltd, the design approval holder, or any of its predecessor companies. This is because the landing gear was not designed to take braking loads. On aircraft modified with wheel brakes, cases have occurred where the compression leg lower fork end and/or the axle collar attaching lug have fractured. The design approval holder considered that these failures were caused by torque loads imposed by the brakes, which are in excess of the original design loads. TNS 22 included a warning that operators who choose to fit wheel brakes to Tiger Moth aircraft should ensure that all the components in the landing gear and brake installation have sufficient strength for the static and fatigue loads they will encounter.

G-AXAN had been fitted with the modified steel compression leg lower fork end fitting, in accordance with the TNS 22 recommendation and was also equipped with wheel brakes.

Aircraft examination

The design approval holder considered that the ground conditions encountered by G-AXAN in combination with a hard landing or bounce, may not have been sufficient to cause failure of the compression leg lower fork end fitting. It considered whether braking loads may have contributed to the failure. A representative from the design approval holder examined the aircraft several days after the accident and made the following observations.

The fuselage tubular structure above the compression leg attachment on both sides, was free from damage, suggesting that an extreme hard landing had not occurred. The left compression leg top attachment bolt (where it attached to the fuselage), exhibited signs of shear failure, indicating a very hard landing had occurred, either on the accident flight or a previous flight. The compression leg to axle joint had separated entirely. The pin which passes through this joint had failed, but there were no discernible features on the fracture face. The compression leg lower fork fitting sustained substantial mechanical damage when it struck the ground after the failure, and this had obscured the majority of the fracture face making further analysis difficult. However, there was some evidence of a shear failure on the forward lug. The stub axle was bent slightly upwards, which was indicative of a hard landing.

Comment

Examination of the left landing gear showed damage consistent with a hard landing having occurred, either on the accident flight or at some point in the past. It was not possible to determine whether any pre-existing defect or failure, for example relating to braking loads, may have contributed to the failure. Nonetheless, the design approval holder was keen to draw attention to the warning in TNS 22 relating to the fitment of wheel brakes.