

ACCIDENT

Aircraft Type and Registration:	Glasair IIS RG, G-KSIR	
No & Type of Engines:	1 Lycoming IO-360-B1E piston engine	
Year of Manufacture:	1995	
Date & Time (UTC):	18 November 2008 at 1050 hrs	
Location:	Upfield Airfield, Whitson, Newport	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Nose landing gear collapsed, engine shock-loaded	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	69 years	
Commander's Flying Experience:	1,100 hours (of which 99 were on type) Last 90 days - 8 hours Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional AAIB inquiries	

Synopsis

The aircraft had returned from a navigation exercise and made a normal approach to Runway 05 at Upton Airfield. On touching down, the nose landing gear collapsed rearwards, allowing the aircraft's nose to descend until the propeller struck the runway. The aircraft slid to a halt on the concrete surface, following which the occupants exited without difficulty.

Examination

The Glasair IIS RG is a two seat retractable tricycle landing gear aircraft of composite material construction. After the accident it was apparent that the nosewheel had become partially detached from the nose leg fork, as a result of the loss of the nut that

retains the wheel axle bolt. The bolt normally passes through the wheel hub and both halves of the fork and the loss of the nut had allowed it to migrate from its correct position. This allowed the wheel to tilt within the fork and also to move rearwards, so that it contacted a guide strap that passed around the rear of the wheel. This resulted in it becoming jammed and to effectively act as a locked wheel on touchdown; the consequent force on the nose leg, generated by friction between the surface and the tyre, caused the leg to collapse rearwards.

A drawing of the nosewheel fork and hub assembly is shown in Figure 1, and it can be seen that it specifies

an AN364-428A nut to attach to the AN4-56A axle bolt. The nut is of the self-locking type in that it has a nylon thread insert.

The owner/pilot was unsure as to why the nut had become detached. Thread debris was present on the end of the spindle bolt suggesting that the thread within the nut may have suffered an overload failure in tension.

In May 2007 Glasair issued Service Bulletin (SB) 160 (which was also issued as Glastar/Sportsman Service Bulletin 61), which addressed the issue of nut detachment. The SB noted that there had been:

'...two Glasair incidents since 2001 in which the nose wheel axle detached from the nose wheel fork causing substantial damage to the engine and prop (and the airframe as well in one case). The exact cause in both incidents is unclear; however, in light of the combined hundreds of thousands of successful take-off and landings with the Glasair and Sportsman nose fork and axle design, we speculate that something out of the ordinary must have contributed to these incidents.

Notwithstanding, because nose gear shimmy can cause fairly severe side loads to the axle and fork assembly, replacement of the AN364-428A (shear) nut with an A365-428A (tension¹) nut would be a prudent change.'

The owner of G-KSIR considered that his aircraft had been equipped with the shear nut; examples of both are shown in Figure 2.

Footnote

¹ A shear nut is intended to restrain a bolt in its installation where it experiences predominantly shear loading; it is not designed to resist any significant axial load in the bolt. Where such axial loads exists, a tension nut is used.

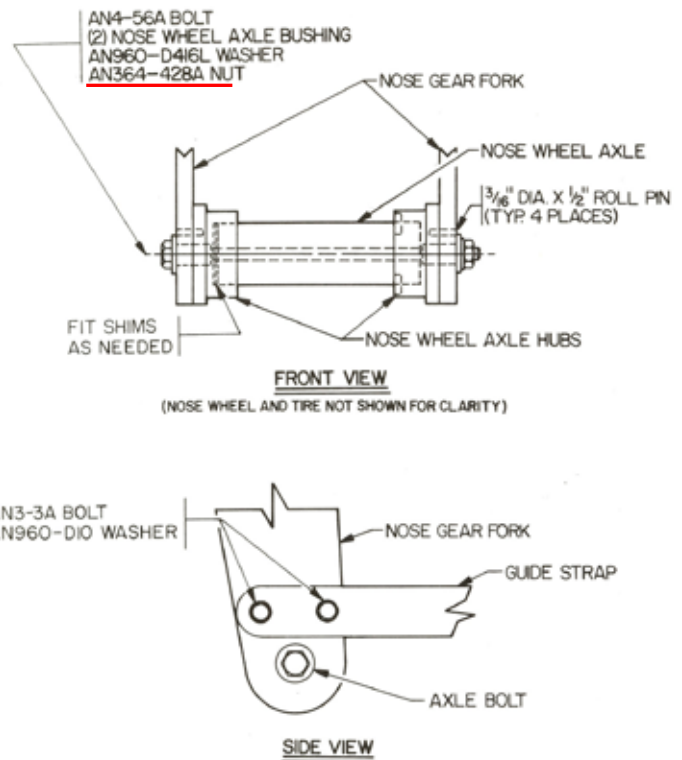


Figure 1

The tension nut is deeper than the shear nut, which increases the overall width of the fork assembly, although in fact the SB does not specify a longer axle bolt. However it does advise that for retractable gear aircraft, such as G-KSIR, it may not be feasible to use the AN365 tension nut due to width constraints in the nose gear well. In such a case, it advises using a 'lower height' MS21042-4 steel self-locking nut, which offers high tensile strength.



AN364-428A (shear)

AN365-428A (tension)

Figure 2