No: 12/90 **Ref: EW/G90/07/05** **Category: 1b**

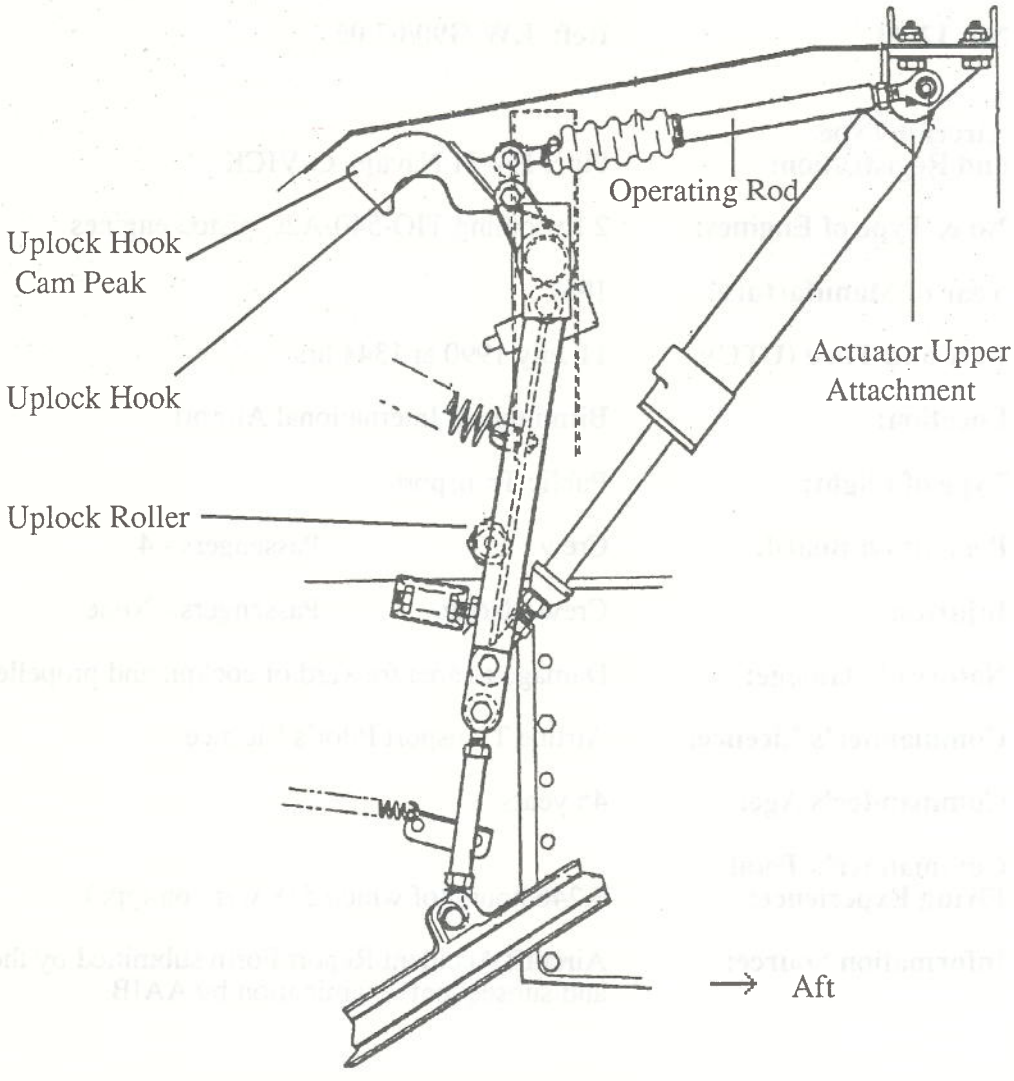
Aircraft Type and Registration:	Piper PA-31 Navajo, G-VICK
No & Type of Engines:	2 Lycoming TIO-540-A2C piston engines
Year of Manufacture:	1967
Date and Time (UTC):	11 July 1990 at 1344 hrs
Location:	Birmingham International Airport
Type of Flight:	Public Transport
Persons on Board:	Crew - 1 Passengers - 4
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to area forward of cockpit and propeller tips
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	45 years
Commander's Total Flying Experience:	3,246 hours (of which 518 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent examination by AAIB

On the outward flight to Edinburgh the landing gear unsafe light remained on, but retraction noises and handling implied that the gear was stowed. The gear extended without trouble at Edinburgh, where the aircraft was jacked and the mechanism lubricated.

On the next flight the gear was retracted normally and the flight was uneventful until the gear was selected down on approach at Birmingham when the nose gear green light failed to illuminate and the gear unsafe light stayed on. A fly past was carried out and ATC advised that the nose wheel was still retracted. After some 25 minutes effort to lower the nose wheel the pilot made an unpowered landing with both two-bladed propellers feathered, and allowed the nose to fall onto the runway. Damage to the nose structure was caused primarily by vertical forces rather than by the effect of sliding along the runway.

The uplock hook is spring-loaded in the locked direction. On extension of the gear, the actuator upper attachment moves aft in a slot, thereby opening the hook by means of an operating rod. On gear retraction the uplock roller contacts a cam portion of the hook and rotates the hook nose up allowing the roller to enter the hook. This rotation of the hook is permitted by a telescopic action of the operating rod.

Examination showed that the welded lugs forming the support for the uplock hook pivot bolt were both distorted in a manner consistent with overload forces applied by uplock rod tension with rotation of the uplock hook restricted.



Nose Landing Gear Operation

The uplock operating rod was bent in two places, probably by overload forces applied during nose up rotation of the uplock hook beyond the point at which the uplock operating rod telescopic action bottomed out (under compression). There was also considerable play in the uplock hook pivot, with some elements found to be oval - again consistent with overload. Marking was found on the upper face of the uplock hook consistent with contact from the uplock roller nut.

After the damaged components had been replaced and the system rigged, the overall length of the operating rod was approximately 4 mm less than that of the original rod: this was equivalent to approximately 10° of uplock hook rotation in the closed direction, and 20 mm movement of the peak of the uplock hook cam.

The bending of the operating rod and the ovality of the hook pivot could have been caused by forces produced when the spring portion of the operating rod bottomed out because of its excessive length. Slop developing in the uplock hook pivot could eventually cause the roller to contact the uplock cam hook above the peak during retraction, allowing the roller nut to ride on the top face of the uplock hook, thereby preventing a subsequent nose gear extension.

A search of the SDAU database did not reveal any similar incidents.