

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Short SC7 Skyvan 3, G-BEOL	
<b>No &amp; Type of Engines:</b>	2 Garrett Airesearch TPE331-2-201A turboprop engines	
<b>Year of Manufacture:</b>	1977 (Serial no: SH.1954)	
<b>Date &amp; Time (UTC):</b>	3 May 2013 at 1320 hrs	
<b>Location:</b>	Weston-on-the-Green, Oxfordshire	
<b>Type of Flight:</b>	Aerial Work	
<b>Persons on Board:</b>	Crew - 1	Passengers - 3
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Nose landing gear fractured, nosewheel detached, damaged frames on the underside of fuselage	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	59 years	
<b>Commander's Flying Experience:</b>	1,117 hours (of which 146 were on type) Last 90 days - 92 hours Last 28 days - 35 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and enquiries by the AAIB	

**Synopsis**

As the nosewheel contacted the ground on touchdown on Runway 27 at Weston-on-the-Green the nosewheel and yoke assembly detached from the aircraft. The aircraft veered off the runway and came to a stop with a nose-down attitude. There were no injuries to the crew or passengers. The nose landing gear had fractured across the plated portion of the oleo. A forensic examination of the damaged nose landing gear assembly is being carried out by the manufacturer.

**History of the flight**

The aircraft had returned to Weston-on-the-Green after refuelling at RAF Brize Norton and made an uneventful approach to the grass Runway 27. The pilot was about to take up steering control on the tiller but as the nosewheel touched down the wheel and its yoke detached from the aircraft. The aircraft veered off the runway to a controlled stop. The pilot conducted engine and aircraft shutdown drills and the passengers and crew disembarked the aircraft without further incident. The nosewheel and yoke assembly had come to rest at the edge of the runway having sheared from the oleo within the plated portion just above the yoke.

### **Pilot's comment**

The pilot described the landing, up to the nose landing gear failure at Weston-on-the-Green, as “quite normal with nothing untoward”. However on reflection he noted that during the landing at RAF Brize Norton he became aware of more nose gear shimmy than usual. This subsided as his speed decayed and he thought nothing more of it. The shimmy did not re-appear during taxi and takeoff for the return flight to Weston-on-the-Green.

### **Aircraft details**

The Short SC7 Skyvan is an all-metal high-wing monoplane powered by two turboprop engines. It is fitted with fixed tricycle landing gear with a steerable nosewheel. It is designed to operate from prepared and unprepared runways and although its primary role was originally for cargo transport it is often used as a parachute drop aircraft.

### **Engineering investigation**

The remains of the nose landing gear assembly were removed from the aircraft and along with the nosewheel and yoke assembly were transferred to the manufacturer

for analysis at the request of the aircraft owner. The lower portion of the torque link had separated at the mid-pivot point and remained attached to the yoke and the upper portion of the torque link had detached completely from the nose landing gear forging. There were two fracture faces apparent on the main forging and on the yoke. The inner oleo liner had fractured just above an area where its diameter increases to accommodate the male portion of the thread on to which the outer piston of the oleo and yoke attaches. The second fracture face was around the circumference of the outer oleo piston where the female portion of the attachment thread finishes. Inspection of the aircraft structure revealed damage to the structure of the underside of the fuselage consistent with the nose landing gear collapse. The mechanism by which the fractures occurred is the subject of an ongoing forensic investigation by the manufacturer.

**BULLETIN ADDENDUM**

<b>Aircraft Type and Registration:</b>	Short SC7 Skyvan 3, G-BEOL
<b>Date &amp; Time (UTC):</b>	3 May 2013 at 1320 hrs
<b>Location:</b>	Weston-on-the-Green, Oxfordshire
<b>Information Source:</b>	Manufacturer's technical investigation report

**AAIB Bulletin No 11/2013, page 14 refers**

The manufacturer has completed the forensic investigation on the nose landing gear (NLG) components that detached on landing due to a fracture of the sliding tube of the oleo. The sliding tube is hollow and has an internal screw thread at its lower end to attach the nose wheel fork assembly. The fracture was near the top of the thread around its undercut<sup>1</sup>. The most likely mechanism leading to failure was the propagation of a fatigue crack from a machining feature in the thread undercut surface. The feature may have resulted from the dimension and tolerance of the undercut diameter on the manufacturing drawing; this meant that there was potential for the thread cutting tool to leave a mark on its surface. However, there were also cracks in some of the thread roots and a fatigue crack initiating from these features cannot be discounted.

**Safety action**

The manufacturer has issued a Service Bulletin (SB) 32-17M that defines a one-off visual and NDT inspection for all Short Skyvan NLG sliding tubes installed on aircraft and held as spares. These inspections are mandated by an EASA Airworthiness Directive 2014-0246 effective from 26 November 2014.

At this stage no further corrective actions resulting from this investigation are proposed. However, the manufacturer will monitor the responses to SB 32-17M and if necessary take action to maintain the continued airworthiness of the fleet.

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**Footnote**

<sup>1</sup> An undercut is a recessed surface, also known as a neck, to provide clearance for the thread cutting tool on a shaft or tube. Undercut surfaces should be of a smooth finish and ideally radiused to reduce the risk of stress raising features. In this case the undercut is required because the bore decreases in diameter where the thread finishes.