Piper PA-34-200T, G-BMUT

AAIB Bulletin No: 5/2002	**Ref: EW/G2001/02/02**	**Category: 1.3**
Aircraft Type and Registration:	Piper PA-34-200T, G-BMUT	
No & Type of Engines:	2 Continental piston engines	
Year of Manufacture:	1975	
Date & Time (UTC):	3 February 2001 at 1330 hrs	
Location:	Newcastle Airport	
Type of Flight:	Flight Test	
Persons on Board:	Crew - 2	Passengers - Nil
Injuries:	Crew - None	Passengers N/A
Nature of Damage:	Both propellers blade tips bent, underside of forward fuselage and nose landing gear	
Commander's Licence:	Private Pilots Licence with IMC and Night Rating	
Commander's Age:	58 years	
Commander's Flying Experience:	974 hours (of which 223 were on type)	
	Last 90 days - 18 hours	
	Last 28 days - 4 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

History of the flight

The two pilots travelled together by car to Newcastle International Airport with the intention of flight testing Seneca G-BMUT. A number of repairs had been carried out on the aircraft since it had last flown, including the replacement of the nose-wheel centering spring assembly and work on a number of the cockpit instruments. During the journey they discussed the weather. The clouds were clearing and the forecast indicated that the weather would improve as the day progressed.

On arrival at Newcastle the two pilots checked the weather which was reported as Runway Visual Range 1,000 meters with cloud broken at 700 feet and further cloud at 1,500 feet, cloud tops at

4,500 feet with an improvement expected during the next hour. The planned flight was to be of approximately 30 minutes duration, climbing to the north of the airport to test the instruments and the aircraft performance generally. They inspected the aircraft and taxied it a short distance to refuel.

At the refuelling point the remainder of the pre-flight inspections were carried out. The weather had by now improved to a visibility of 3,000 meters with a cloud base of 800 feet. Following normal engine starts the aircraft taxied to holding point Foxtrot for Runway 25. After holding for 10 minutes it was further cleared to backtrack and line up Runway 25. On clearance to take-off, the pitot heat was switched on, take-off power selected and all instruments were checked and indicating normal.

As the aircraft accelerated down the runway the Air Speed Indicator (ASI) showed an acceleration to 55-60 kt but the indicated speed then ceased to rise. The commander assessed that they had reached about 85-90 kt and considered it too late to abort the take-off. He lifted off and at a height of 200 feet selected the landing gear up. At this point the commander noticed that his ASI was now indicating 40 kt and on checking established that the second ASI on the co-pilot's panel was on the low speed stop.

The commander informed ATC that he had a problem and was carrying out a low level circuit to land on Runway 25. The aircraft was turned to the right and positioned downwind at a height of 900 feet and the landing gear was selected down. The two main landing gear (MLG) green lights illuminated but the nose landing gear (NLG) green light was unlit and the red gear in transit light remained on. ATC were informed of developments and, after a low fly past, they confirmed that the nose gear was not down although the doors were open. A further flight past the tower confirmed that the main gears appeared down but the nose gear was up.

The commander, who was flying the aircraft by reference to power settings and attitude, positioned the aircraft to the north of the Runway 25 downwind position, at about 1,000 feet, remaining just clear of cloud and within 'gliding distance' for a return should any other problems develop. Several attempts were made to extend the nose gear by recycling the landing gear selector, using the emergency extend device and manoeuvring, but to no avail.

Following a change of radio frequency ATC informed the crew that they were trying to contact an engineer who had worked on the aircraft and other Seneca experienced personnel at Oxford. The commander was then asked if he could accept a climb to FL60. Having agreed to climb, the aircraft was positioned about 15-20 miles north of Newcastle at FL60 and cleared cloud at 4,500 feet. A hand held global positioning system (GPS) receiver carried by one of the pilots was used to give a guide to airspeed. Further manoeuvring in positive and negative g failed to dislodge the NLG.

After approximately one hour of flight and further discussions with ATC the crew decided to return to Newcastle for a landing on the main wheels only. The aircraft was vectored for an ILS approach to Runway 25 and became visual with the runway at about 1,200 feet. The co-pilot monitored the speed throughout using the GPS receiver. After touch down on the main wheels the co-pilot shut down both engines as the aircraft's nose sank to the ground and the commander braked gently to a stop. Both occupants vacated the aircraft without injury. Damage was caused to the nose wheel doors, forward fuselage and the propellers as these had both continued to rotate during the landing.

Aircraft Examination

It was established that the nose landing gear had been unable to extend because the tail of the bolt attaching the forward end of the centering spring assembly to the nose leg was 'latched' over the door actuation aft tube assembly, Figures 1-2 *(jpg 69kb)*. On landing gear retraction, the bolt tail had fouled and deflected the aft tube assembly forward, allowing the tail of the bolt to 'sit' above the tube as it sprung back. Further checks revealed that an incorrect hexagonal bolt had been used which had been installed 'upside-down' (ie head uppermost), Figure 3 *(jpg 93kb)*, relative to Service Manual and Service Bulletin instructions and warnings. A retraction test had not been carried out following the replacement of the NLG centering spring.

Maintenance Instructions

The Piper Seneca II service manual contains instructions relating to the installation of the NLG with a note identifying the orientation and washer arrangement of the centering spring attachment bolt, as follows:

> *7.8 ASSEMBLY OF NOSE GEAR OLEO*
>
> *Install nose gear centering spring assembly (11) (see latest revision of Piper Service Bulletin 893) NOTE*
>
> > *Ascertain that bolt is installed with the head down and washers are arranged as shown in Figure 7-1. (Figure 2) (jpg 105kb)*

Piper Service Bulletin No 893 (dated 11 October 1988), which the manufacturer considers as mandatory and referred to above, contains specific instructions and warnings for the installation of the subject attachment bolt, as follows:

> *COMPLIANCE TIME*
>
> *At next regularly scheduled inspection event but not to exceed one hundred hours of operation.*
>
> *PURPOSE:*
>
> *Field reports indicate that a hex-head bolt attaching the nose gear centering spring rod-end to the nose gear strut may come in contact with the nose gear door actuation aft tube assembly.*
>
> *This Service Bulletin provides illustrations and the instructions necessary to replace the hex-head bolt with a clevis bolt. When accomplished, this will provide adequate clearance between the bolt head and the tube assembly.*
>
> *INSTRUCTIONS:*
>
> *1. Locate and inspect nose gear centering spring assembly for proper bolt and washer installations and alignment to centering bracket. NOTE: Refer to sketch 'A' attached. [Shows installation as in Figure 2].*

2. If clevis head bolt, Piper Part Number 400-910 is installed, check for proper installation per Sketch 'A'. If correct, no further action is necessary, proceed to step 7.

3. If hex-head bolt is installed, remove and replace with a clevis head bolt, Piper Part Number 400-910, and ensure that a maximum of one washer, Piper Part Number 62833-123, is installed under the head. Install bolt per illustrations in Sketch 'A'.

4. Place aircraft on jacks and perform:

(A) Retraction test - observe nose gear for proper centering during retraction cycle.

(B) With gear retracted, check for sufficient clearance between centering spring rod end attach bolt and aft nose gear door actuator tube.

Pitot/static system

During preparation of the aircraft for a ferry flight to Leeds Bradford, where further rectification was planned, it was not possible to achieve an ASI indication above 40 kt using a pitot/static test set due to a number of system leaks. The system was rendered serviceable for the ferry flight following replacement of some of the flexible pitot/static lines and, subsequently, further replacements were necessary to achieve a long term fix.