Aviation Safety Investigation Report 199502434

Piper Aircraft Corp
Seneca

02 August 1995

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Aviation Safety Investigation Report

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Occurrence Number: 199502434 **Occurrence Type:** Incident
Location: Canberra, Aerodrome
State: ACT **Inv Category:** 4
Date: Wednesday 02 August 1995
Time: 1000 hours **Time Zone** EST
Highest Injury Level: None

Aircraft Manufacturer: Piper Aircraft Corp
Aircraft Model: PA-34-200T
Aircraft Registration: VH-BDT **Serial Number:**
Type of Operation: Non-commercial Practice
Damage to Aircraft: Minor
Departure Point: Canberra ACT
Departure Time: 0740 EST
Destination: Canberra ACT

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	ATPL	40.0	4200

Approved for Release: Tuesday, August 6, 1996

[redacted]

The flight was to be the first after the aircraft had recently completed a scheduled 100 hourly maintenance inspection.

Soon after departure from Canberra the pilot reported a gear unsafe warning to Air Traffic Control and requested that a visual check of the landing gear be carried out. ATC reported that all landing gear doors appeared to be closed.

The pilot continued the flight to Goulburn and completed aerial work in accordance with the flight plan. The aircraft did not land at Goulburn.

After departing the Goulburn circuit area the pilot carried out a normal extension and retraction of the landing gear to test the system. Normal indications were received.

During a practice ILS approach at Canberra the pilot again selected the landing gear down. The gear unsafe light and warning horn were activated and the nose landing gear "down" light had not illuminated. A check of the mirror on the aircraft, which is situated to enable the pilot to determine if the nose landing gear is down, confirmed that it had not extended.

The pilot requested a missed approach and a further circuit. During this period, attempts were made to lower the nose landing gear using the standard emergency extension method. The pilot then requested a departure from the circuit area so that further attempts could be made to rectify the problem. The aircraft was yawed vigorously and a number of abrupt 'pull up' manoeuvres were carried out to assist the extension of the nose landing gear. Throughout this time the pilot continued attempting to lower the nose landing gear by the emergency method, without success.

The aircraft returned to the circuit area and the pilot requested that the safety officer report on the current position of the nose landing gear. The safety officer indicated to the pilot that the nose landing gear doors were partially 'cracked'. The officer also reported that he could not see the nosewheel.

The pilot requested emergency services and an inspection of the grass strip parallel to runway 30 in preparation for an emergency landing. While this was being carried out the aircraft departed the circuit area to enable the pilot to carry out a further attempt to extend the nose landing gear, after which it returned to the airfield for a landing. Soon after the main wheels touched down the nose of the aircraft settled and slid along the grass for a short distance. Emergency shutdown procedures were completed. The pilot and passenger subsequently evacuated the aircraft without injury.

Examination of the aircraft revealed minor damage to the nose area and to both propellers. The aircraft nose was raised in preparation for relocation of the aircraft to a maintenance facility. The nose landing gear then extended immediately and locked down.

Examination of the nose landing gear revealed that a bolt in the centring spring assembly had been incorrectly re-installed after the aircraft had undergone recent maintenance. The bolt had been installed with the bolt head uppermost as is the case with all other Piper models with the same landing gear system. However, in the PA-34-200 Seneca and PA-34-200T Seneca II, this bolt is to be installed with the head down and the nut uppermost to prevent fouling on the nose gear door actuation aft tube assembly during retraction and extension.

The engineer concerned also stated that he had added an extra washer under the bolt head which further reduced the bolt's clearance from the aft tube assembly.

After re-assembly, the landing gear operation was tested with the aircraft on jacks but the error was not revealed during this test. Once airborne, however, the air loads affected the track of the nose landing gear sufficiently for the bolt to come into contact with the aft tube assembly and thus affect the extension cycle.

On 11 October 1988 the Piper Aircraft Corporation issued Service Bulletin, Number 893, to ensure installation of the correct type of bolt into position with the head down. The Service Bulletin also stated that a placard warning against incorrect installation must be placed on the nose landing gear leg where it would be seen.

In October 1992 the Australian Civil Aviation Authority issued an Airworthiness Directive - AD/PA-34/41. The AD refers to the Service Bulletin and explains that when the bolt is installed incorrectly, there is a significant risk of the nose landing gear failing to extend. The aircraft maintenance log book indicated compliance with this Airworthiness Directive.

On 2 February 1995 the CAA issued an Airworthiness Advisory Circular alerting operators to the risk of incorrect bolt installation and reminding all maintenance staff to refer and strictly adhere to the maintenance manual procedures and to ensure that the correct type of bolt was used and correctly fitted.

The familiarity with the bolt in a particular position in all other similar Piper aircraft may have led to a skill based error on the part of the engineer concerned.

The engineer stated that the bolt had been incorrectly installed before the recent maintenance work. The placement of the bolt with the head down is not in accordance with 'general engineering practice' that is taught to maintenence staff. It was most likely that, due to this learned behaviour, the re-assembly had been carried out without close reference to the aircraft maintenance manual and the engineer replaced the bolt in the position in which he had found it.

The placard, stating that the bolt must be installed with the head down, had not been placed in the correct position on the landing gear leg. The placard had been placed on the inside of one of the nose gear doors. The engineer who had last assembled the centring spring assembly stated that he did not see the incorrectly located placard.

Findings

1. The nose landing gear of the aircraft failed to extend.

2. The pilot carried out an emergency landing with the nose landing gear in the retracted position.

3. A bolt in the nose landing gear centring spring assembly had been re-installed in the incorrect position during recent maintenance.

4. The engineer had placed an extra washer under the bolt head which further reduced the bolt's clearance from the aft tube assembly.

5. The bolt had been installed incorrectly before recent maintenance work. The engineer re-installed the bolt in the position in which he had found it.

6. Post-maintenance ground tests of the landing gear operation indicated that it was functioning correctly.

7. A Service Bulletin, Airworthiness Directive and Airworthiness Advisory Circular had been issued alerting maintenance personnel to the potential problem.

8. A placard advising maintenance personnel to install the bolt with the head down and nut uppermost was installed in the incorrect position. The engineer did not see this placard.

9. The aircraft maintenance log book indicated compliance with the Airworthiness Directive.

10. The aircraft maintenance manual contained correct installation instructions for the bolt.

11. The incorrect installation of the bolt resulted in the centring spring mechanism coming into contact with the nose gear door actuation aft tube assembly during flight, thus preventing full extension of the nose landing gear.

Factors

1. The engineer did not comply with the instructions in the Aircraft Maintenance Manual and Airworthiness Directive in reference to the installation of the bolt in the centring spring assembly.

2. The engineer failed to see the placard which warns maintenance personnel to fit the bolt with the head down.