Air Accident Investigation Unit Ireland

SYNOPTIC REPORT

SERIOUS INCIDENT
Piper PA 34-220T Seneca III, G-BMJO
Cork Airport, Ireland
19 February 2012

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Foreword

This safety investigation is exclusively of a technical nature and the Final Report reflects the determination of the AAIU regarding the circumstances of this occurrence and its probable causes.

In accordance with the provisions of Annex 13[1] to the Convention on International Civil Aviation, Regulation (EU) No 996/2010[2] and Statutory Instrument No. 460 of 2009[3], safety investigations are in no case concerned with apportioning blame or liability. They are independent of, separate from and without prejudice to any judicial or administrative proceedings to apportion blame or liability. The sole objective of this safety investigation and Final Report is the prevention of accidents and incidents.

Accordingly, it is inappropriate that AAIU Reports should be used to assign fault or blame or determine liability, since neither the safety investigation nor the reporting process has been undertaken for that purpose.

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[1] **Annex 13**: International Civil Aviation Organization (ICAO), Annex 13, Aircraft Accident and Incident Investigation.
[2] **Regulation (EU) No 996/2010** of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.
[3] **Statutory Instrument (SI) No. 460 of 2009**: Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulations 2009.

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In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No 996/2010 and the provisions of SI 460 of 2009, the Chief Inspector of Air Accidents on 19 February 2012, appointed Mr Leo Murray as the Investigator-in-Charge to carry out an Investigation into this Serious Incident and prepare a Report.

Aircraft Type and Registration:	Piper PA 34-220T Seneca III, G-BMJO
No. and Type of Engines:	2 x Continental (L)TSIO-360-KB
Aircraft Serial Number:	34-8533036
Year of Manufacture:	1985
Date and Time (UTC)[4]:	19 February 2012 @ 16.02 hrs
Location:	Cork Airport (EICK), Co. Cork, Ireland
Type of Operation:	Licence Skill Test (LST)
Persons on Board:	Crew - 2
Injuries:	Crew - Nil
Nature of Damage:	Substantial
Commander's Licence:	Commercial Pilot Licence (Aeroplanes)
Commander's Details:	Male, aged 58 years
Commander's Flying Experience:	2,100 hours, of which 705 were on type
Notification Source:	Airport Duty Manager, EICK
Information Source:	AAIU Field Investigation AAIU Incident Report Forms

[4] **UTC**: Coordinated Universal Time (same as local time on the date in question).

SYNOPSIS

The aircraft was engaged on a Licence Skill Test (LST) at the time of the occurrence. Following navigation and general handling air work, the aircraft positioned back to EICK to carry out some circuits. On the third circuit to Runway (RWY) 25, the aircraft touched down heavily and bounced. This was followed by a series of pilot-induced oscillations resulting in a propeller strike to the left propeller. There were no injuries to the two occupants.

1. FACTUAL INFORMATION

1.1 History of the Flight

At the time of the occurrence the aircraft was engaged on an LST for the issue of a Commercial Pilot Licence. A candidate on an LST is not given guidance by an examiner, including guidance on handling techniques, as this is one of the flight skills that is being assessed.

The crew consisted of an Authorised Examiner[5] as Pilot-in-Command (PIC) and the Test Candidate. The flight departed RWY 35 at 14.00 hrs, with the Candidate as Pilot Flying (PF) and proceeded to the north where the navigation components of the test were conducted. Following a further period of general handling, the aircraft returned to the airfield for circuit work to RWY 25. On the third circuit, the Candidate was required to demonstrate a short field approach and landing. Winds were light with no crosswind component on RWY 25. On this landing, the aircraft made heavy contact with the runway and bounced. This bounce was followed by a series of longitudinal oscillations resulting in the left propeller striking the runway surface. The aircraft was brought to a stop close to the RWY 07 threshold. Following communication with the Tower Controller the Examiner exited the aircraft to check for a possible blown tyre due to hard braking that was made. As the only damage obvious at the time was a flat spot on the right main tyre, the aircraft was taxied back to the flying club ramp with the Cork Airport Fire Service (AFS) in attendance. Following shutdown, damage to the tips of the blades on the left propeller was noted by the pilots.

1.2 Field Investigation

Two Inspectors of Air Accidents travelled to EICK the following day, where the aircraft, which had been secured in a hangar overnight, was inspected. This inspection revealed damage to the tips of the three propeller blades of the left engine (**Photo No. 1**), with consequent shock loading to that engine.

[5] **Authorised Examiner**: Authorised by the Irish Aviation Authority.

Photo No. 1: Detail of damage to one of the left propeller blades

The nose gear and its down lock mechanism were inspected and revealed no damage or obvious distortion. The inspection also noted that the right main tyre exhibited a flat spot (**Photo No. 2**); the left main tyre showed evidence of heavy braking but was still serviceable. A CCTV[6] recording was obtained from the area of the flying club apron which briefly shows the aircraft airborne late in the landing sequence.

Photo No. 2: Flat spot on right main tyre

Runway 25 is 4,000 feet in length and is equipped with Precision Approach Path Indicators (PAPI) for visual approach guidance.

[6] **CCTV**: Closed-circuit television.

The Investigation reviewed the aircraft maintenance documents and found that the aircraft was properly maintained. Both pilots were properly qualified and licenced for the type of flight undertaken.

1.3 Examiner Interview

The Examiner gave the Investigation a detailed description of the pre-flight preparations and the flight itself. The Test Candidate had prepared all operational paperwork for the flight, including navigation log, weather briefing, NOTAMs[7], weight and balance, performance calculations and flight plan.

Weather conditions were good for the flight. Following departure, the flight proceeded north and exited the Cork Control Zone to conduct the required navigation components of the test. A navigation diversion, general handling and simulated instrument flying exercises were completed before the aircraft returned to EICK.

Two circuits were completed to RWY 25; the first with standard landing flap of 25 degrees, followed by a circuit with a flaps-up approach and landing. For the third circuit, a short field approach and landing was planned with flap 40 setting. The wind was reported by the Tower as 250 degrees at 5 knots (kts). Using the standard 1,000 ft point for touchdown, the Examiner recalled that the approach speed was normal but that the Test Candidate made a heavy landing resulting in a bounce. The Examiner could feel the beginning of pilot induced oscillation as the aircraft sank and bounced again and he took control from the Test Candidate.

The Examiner applied power to stabilise the aircraft, however it landed heavily again for a second touchdown. At this stage, he was not happy to go-around as he did not know what damage, if any, had occurred. The aircraft bounced again, once or twice, he could not recall which, so he applied maximum brakes to bring the aircraft to a halt on the western side of the main runway intersection. Here, with the engines still running, he exited the aircraft to check for any obvious damage while the Test Candidate remained on the controls and on the brakes. As he only saw a flat spot on one tyre he considered it safe to taxi back to the flying club apron. The taxi-in was accomplished under AFS supervision. Following engine shut-down it became apparent to the Examiner that the three left engine propeller blades had made contact with the runway.

1.4 Test Candidate Interview

The Test Candidate had accumulated 220 flying hours since he commenced pilot training in January 2009 at EICK. He began his multi-engine training in December 2011 and had completed 6 hours dual for his Multi-Engine Piston (MEP) Rating and a further 10 hours training prior to the LST.

[7] **NOTAMs**: Notices to Airmen.

The Test Candidate also gave a detailed description of the flight. Returning to EICK for circuit work, he queried if he would use RWY 35 but the Examiner advised that circuit traffic was now using RWY 25. The first two circuits were carried out as requested, with the third circuit set up for a short field approach and landing. He completed the landing checklist and had flap 40 selected at a height of approximately 400 feet, with three whites and one red light indicating on the PAPI. On passing the threshold he levelled the aircraft with slight rearward pressure on the control column. He felt that he was slightly high in the flare and the aircraft '*bumped on the ground and bounced*'. The unexpected bounce startled him and he applied full throttle for a go-around. At this point the Examiner told him to close the throttles. He stated that in maybe a half a second, as the aircraft momentarily accelerated, it bumped on the runway again and bounced higher this time; he closed the throttles and tried to maintain the centre line.

The Examiner took control and tried to stabilise the aircraft but the Test Candidate was not sure exactly when this occurred.

The Test Candidate thought that there may have been at least four bounces but could not be certain. He did not recall any unusual contact sounds or noise as the aircraft settled on the runway. Once stopped, the Examiner asked him to take the controls and remain on the brakes while he left the aircraft to carry out an external safety check.

1.5 Go-around considerations

The FAA[8] *Airplane Flying Handbook*, *Transition to Multiengine Airplanes* identifies that if a go-around is initiated from a low airspeed, the initial pitch up to a climb attitude must be tempered with the necessity to maintain adequate flying speed throughout the manoeuvre. Examples of where this applies include go-arounds initiated from the landing round-out or recovery from a bad bounce as well as a go-around initiated due to an inadvertent approach to a stall. The first priority is always to maintain control and obtain adequate flying speed. A few moments of level or near level flight may be required as the airplane accelerates up to climb speed.

2. ANALYSIS

As this was a flight test and not an instructional flight, the purpose was to assess the capabilities of the Test Candidate in the operation of the aircraft to commercial flight standards. A candidate is assessed on required navigational and handling tasks according to the test syllabus, the timing and order of which is decided by the examiner.

It must be emphasised that on an LST a candidate will not be given guidance by the examiner, including guidance on handling techniques, as this is one of the flight skills that is being assessed. When a sudden and unexpected event occurs, such as a bounced landing, the examiner will allow the candidate some time to correct the flight path without intervention. Had the flight been an instructional detail, an instructor would likely have intervened earlier, either by verbal instruction or assuming control.

[8] **FAA**: Federal Aviation Administration.

During landing, pilot-induced oscillation is insidious, in that while an initial bounce may not be particularly high, it can be difficult to resolve without precise handling. If appropriate power is applied and the aircraft is stabilised at the correct airspeed and attitude, a safe and controlled landing can be accomplished. However, the time taken to achieve this will increase the landing distance, possibly by a significant margin. If this initial recovery is misjudged, a second or further bounces of increased magnitude may occur resulting in pilot-induced oscillation with larger control inputs being applied following each bounce.

Following the initial flare, the airspeed would have decayed such that a go-around manoeuvre with application of full power might have led to control difficulty considering the necessity to maintain adequate flying speed; there was also the concern that the aircraft may have suffered damage which could have adversely altered its performance. Consequently, the Examiner judged that the safest course of action under the circumstances was to continue with the landing.

At some point in the landing sequence, the touchdown attitude was such that the left propeller came into contact with the runway surface. Due to the increasing severity of the oscillations, this was probably late in the sequence. Subsequent hard braking locked the right main wheel as evidenced by the wear spot on the tyre.

3. CONCLUSIONS

(a) Findings

1. The aircraft was properly maintained.

2. There was no pre-existing fault with the nose landing gear that could have contributed to the left engine propeller strike.

3. Weather conditions were not a factor in this event. Winds were light with no crosswind component on RWY 25.

4. In attempting to carry out a short-field landing, the Test Candidate positioned the aircraft slightly high on the approach; subsequent handling resulted in a heavy touchdown and bounce followed by a series of pilot-induced oscillations.

5. The Examiner intervened and took control of the aircraft.

6. At some point in the landing sequence, the touchdown attitude was such that the left propeller came into contact with the runway surface. Due to the increasing severity of the oscillations, this was probably late in the sequence.

(b) Probable Cause

A heavy touchdown and bounce led to pilot-induced oscillations which culminated in the left propeller striking the runway.

4. SAFETY RECOMMENDATIONS

This Investigation does not sustain any Safety Recommendations.

- END

In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010, and Statutory Instrument No. 460 of 2009, Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulation, 2009, the sole purpose of this investigation is to prevent aviation accidents and serious incidents. It is not the purpose of any such investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

AAIU Reports are available on the Unit website at www.aaiu.ie

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