Air Accident Investigation Unit Ireland

FACTUAL REPORT

ACCIDENT

Piper PA 16 Clipper, EI-AEL

Abbeyshrule Airfield

14 June 2017

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.

Extracts from this Report may be published providing that the source is acknowledged, the material is accurately reproduced and that it is not used in a derogatory or misleading context.

[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 14 June 2017, appointed John Owens as the Investigator-in-Charge to carry out an Investigation into this Serious Incident. For administrative reasons, the Investigation was subsequently re-assigned to Leo Murray for completion and publication of a Report.

Aircraft Type and Registration:	**Piper PA 16 Clipper, EI-AEL**	
No. and Type of Engines:	**1 x Lycoming O-320-A2A**	
Aircraft Serial Number:	**16-186**	
Year of Manufacture:	**1949**	
Date and Time (UTC)[4]:	**14 June 2017 @ 10.30 hrs**	
Location:	**Abbeyshrule Airfield, Co. Longford**	
Type of Operation:	**General Aviation**	
Persons on Board:	**Crew - 1**	**Passengers - 1**
Injuries:	**Crew - Nil**	**Passengers - Nil**
Nature of Damage:	**Substantial**	
Commander's Licence:	**Private Pilot Licence (Aeroplanes), issued by the UK Civil Aviation Authority (CAA)**	
Commander's Age:	**74 years**	
Commander's Flying Experience:	**1,889 hours, of which approximately 1,450 were on type**	
Notification Source:	**Airfield Operator**	
Information Source:	**AAIU Field Investigation, AAIU Report Form submitted by the Commander**	

[4] **UTC**: Co-ordinated Universal Time. Times in this Report are quoted in UTC; to obtain local time add 1 hour.

SYNOPSIS

Following touchdown on runway (RWY) 29 at Abbeyshrule, the aircraft had slowed and was taxiing along the runway towards the club apron situated on the south side of the airfield. As it passed the northerly taxiway, the aircraft veered to the right and departed from the paved surface. Although the aircraft was significantly damaged, there were no injuries to the two occupants.

1. FACTUAL INFORMATION

1.1 History of the Flight

The aircraft, with the Pilot and one passenger on board, was on a private flight from Letterkenny (EILT) to Abbeyshrule (EIAB). On arrival overhead EIAB the Pilot made an advisory call on the airfield frequency. After observing the windsock, the Pilot positioned on a left downwind for RWY 29 before turning left onto final approach. The Pilot reported that his approach and touchdown were normal and that there was a crosswind from the left. Following landing, the Pilot decelerated to taxi speed and continued along the runway. As the aircraft approached the first taxiway intersection on the right, it experienced a '*strong gust of wind*' from the left which resulted in it leaving the paved surface. As the aircraft swerved, the left wingtip struck the runway and the left undercarriage leg collapsed. The aircraft continued through long grass and nosed-down as it entered the adjoining field sustaining substantial damage (**Photo No. 1**).

Photo No. 1: Final position of aircraft facing southwest (windsock in background).

The adjoining field, which lies parallel to the northern side of the runway, is bounded by a wire fence and lies lower than the runway surface and grass flight-strip area. Neither occupant was injured and both exited the aircraft without assistance.

1.2 Aircraft information

The Piper PA 16 Clipper is a high-wing, three-place aircraft of tail-wheel configuration. EI-AEL was built by Piper Aircraft Corporation in 1949 and was originally fitted with a 115 hp Lycoming O-235-C1 engine. Subsequent to its importation to Ireland from the United Kingdom in March 2014, the aircraft was converted to a 150 hp Lycoming O-320-A2A engine, installed in accordance with an STC[5].

EI-AEL was operated on a Flight Permit under the auspices of the Irish Light Aviation Society (ILAS). The most recent Flight Permit was issued by the IAA on 26 May 2017 and was valid at the time of the accident.

1.3 Damage to Aircraft

The aircraft sustained substantial damage. As the aircraft swerved, the left wingtip struck the runway and the left undercarriage leg collapsed. The aircraft nosed-down, causing damage to the propeller, engine bearer and cowling (**Photo No. 2**).

Photo No. 2: Damage to undercarriage, wing, cowling and propeller.

As the propeller was rotating under engine power at the time, the engine likely sustained shock-loading. The right wing strut was buckled and the left wing showed rippling on the upper surface. A section of fabric on the left wing was damaged as a result of fuel spillage.

[5] **STC**: Supplemental Type Certificate.

1.4 Meteorological Information

Met Éireann, the Irish Meteorological service, provided the Investigation with the following aftercast for the Abbeyshrule area at 12.00 hrs on 14 June 2017:

There was a moderate to fresh southerly flow over the country that had developed in advance of a frontal band which was approaching from the West. The High Resolution Visible satellite image from 12.00 hrs, showed Ireland covered by pre-frontal mid to high level cloud (mostly cirrostratus, altocumulus and alto stratus). The imagery showed that the stable southerly airflow was generating mountain waves across the country, which had the potential to cause some light or moderate turbulence at and above around 5,000 ft.

Wind (at surface):	170 degrees at 12 kts
Wind (at 2,000 ft)	200 degrees at 25 kts
Visibility:	30 km
Weather:	Light rain in vicinity of Aerodrome
Cloud:	'Few' (FEW) cloud at 3,000 ft, 'Scattered' (SCT) at 6,000 ft
Surface Temp/Dew Point:	Temp 17 ˚C, Dew Point 11 ˚C
Mean Sea Level Pressure:	1012 hectoPascals (hPa)
Freezing Level:	10,000 ft
Other Comments:	There were no SIGMETs[6] issued or valid in the Shannon FIR[7] at 12.00 hrs

1.5 Pilot Information

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At the time of the accident, the Pilot held an EU Part FCL Private Pilot Licence (Aeroplanes) issued by the Civil Aviation Authority (CAA) of the United Kingdom. A Class 2 Medical Certificate pertaining to this Licence was issued on 3 April 2017 and valid until 25 April 2018.

The Pilot had a total of 1,889 hours flight time, with approximately 1,450 on the Piper PA 16. He had completed 14 hours flying in the previous 90 days and 7 hours in the previous 28 days prior to the accident.

1.6 Tail-wheel Aircraft

Unlike tricycle aircraft which are directionally stable on the ground, tail-wheel aircraft can suffer directional instability due to the centre of gravity being behind the main wheels. Taxiing tail-wheel aircraft requires precise use of the rudder by the pilot to maintain directional control as any tendency for the aircraft to deviate from the centreline can increase rapidly unless corrected by appropriate rudder input. The tendency to deviate from a straight line may result in what is termed a '*ground-loop*', where directional control of the aircraft is lost and the aircraft swings rapidly to the left or right.

Tail-wheel aircraft have an exaggerated tendency to 'weathervane', or turn into wind, when operated on the ground in crosswind conditions. This tendency is greatest when taxiing with a direct crosswind, a factor that makes directional control more difficult sometimes requiring the use of differential braking when tail-wheel steering alone proves inadequate to counteract the 'weathervane' effect.

[6] **SIGMET**: Significant Meteorological Report.
[7] **Shannon FIR**: Shannon Flight Information Region.

Chapter 13 of the FAA's '*Airplane Flying Handbook*' (FAA-H-8083-3B) provides guidance regarding the roll-out on landing in a tail-wheel configured aircraft:

> *'Any difference between the direction the airplane is traveling and the direction it is headed (drift or crab) produces a moment about the pivot point of the wheels, and the airplane tends to swerve. Loss of directional control may lead to an aggravated, uncontrolled, tight turn on the ground, or a ground loop. The combination of inertia acting on the CG and ground friction of the main wheels during the ground loop may cause the airplane to tip enough for the outside wingtip to contact the ground and may even impose a sideward force that could collapse on landing gear leg'. 'Particularly during the after-landing roll, special attention must be given to maintaining directional control by the use of rudder and tailwheel steering while keeping the upwind wing form rising by use of aileron. Characteristically, an airplane has a greater profile or side area behind the main landing gear than forward of it. With the main wheels acting as a pivot point and the greater surface area exposed to the crosswind behind the pivot point, the airplane tends to turn or weathervane into the wind.'*

The amount of rudder authority is dependent on the speed of the aircraft, which lessens as the aircraft is slowed to taxi speed. Directional control on the ground requires appropriate use of the rudder and control stick to keep the aircraft straight with adequate pressure on the tail-wheel, while preventing the into-wind wing from lifting. When a deviation from the intended direction occurs, the Pilot must respond with appropriate use of rudder input, firstly to stop the swing and then further input to bring the aircraft back towards the centre-line. Excessive rudder application, in response to a directional upset, can result in a rapid swing in the opposite direction. Due to the directionally-unstable nature of tail-wheel aircraft, this can result in the aircraft departing the runway in a direction opposite to the initial upset.

2. AAIU COMMENT

The aircraft had landed and was subsequently taxiing along the runway towards the apron turn-off. The Pilot stated that the aircraft was caught by a '*strong gust of wind*'. As the wind was from the left, this upset would have tended to swing the aircraft to the left; subsequent application of right rudder possibly contributed to the aircraft swinging in the opposite direction which, due to the nature of tail-wheel geometry, caused the aircraft to deviate off the paved surface.

Due to their geometry, tail-wheel aircraft are prone to directional instability on the ground. Landing in a crosswind, particularly a gusting crosswind, produces dynamic conditions which can result in loss of directional control on the ground, even for pilots experienced in tail-wheel operations. In this case, directional control was lost subsequent to an initial gust being experienced. The attempt to counteract the gust led to a swerve in the opposite direction, with the turn tightening sufficiently for the left wingtip to strike the runway. The forces were such that the left undercarriage leg collapsed during the excursion. The long grass of the overrun area beside the runway and the significant drop into the adjacent field caused the aircraft to nose-over, resulting in the subsequent damage.

This Investigation does not support 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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