AIRCRAFT INCIDENT SHORT REPORT

CA18/3/2/1246: ZS-IKJ, Hard landing

Date and Time	**:** 28 January 2019, 1009Z
Location	**:** Port Alfred, Eastern Cape
Aircraft Registration	**:** ZS-IKJ
Aircraft Manufacturer and Model	**:** Piper, PA28-180
Last Point of Departure	**:** Port Alfred Aerodrome (FAPA)
Next point of Intended Landing	**:** Port Alfred Aerodrome (FAPA)
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	**:** Port Alfred Aerodrome (FAPA) at the following GPS coordinates: S33°33'13" E026°52'44"
Meteorological Information	**:** Wind: 090°V100°/20G25 kt; Temperature 25°C; Dew point: 21°C; QNH: 1012 hPa; CAVOK
Type of Operation	**:** Training (Part 141)
Persons On-board	**:** 1 + 0
Injuries	**:** None
Damage to Aircraft	**:** Substantial

All times given in this report are Coordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to apportion blame or liability.

Disclaimer:

This report is produced without prejudice to the rights of the CAA, which are reserved.

1. SYNOPSIS

1.1 On 28 January 2019 at 0845Z, a pilot, being the sole occupant in the aircraft, departed Port Alfred Aerodrome (FAPA) with the intention of landing back at the same aerodrome on completion of a solo navigation training flight. The flight was conducted in accordance with CAR 2011, Part 141 (Aviation Training Organisations) as amended.

1.2 The pilot reported that the approach to FAPA Runway 10L was stable until just before touch down, when the headwind increased, causing the aircraft to balloon. The balloon effect was not corrected, and thus, a hard landing resulted, causing the aircraft's nose gear to collapse.

1.3 The aircraft came to a stop on the runway and the pilot disembarked the aircraft unassisted.

1.4 The aircraft sustained damage to the nose gear, propeller, engine cowling and engine. The pilot reported no injuries.

1.5 The investigation revealed that the aircraft was slow on approach and landed hard due to a high headwind. The failure to compensate for this increase in headwind resulted in a hard landing.

2. FACTUAL INFORMATION

2.1 On 28 January 2019 at 0845Z, a pilot, being the sole occupant of the aircraft, departed FAPA with the intention of landing back at the same aerodrome on completion of a solo navigation training flight. The flight was conducted in accordance with CAR 2011, Part 141 (Aviation Training Organisations) as amended.

2.2 The pilot reported that the approach to Runway 10L was stable until just before touch down, when there was a change in headwind speed, causing the aircraft to balloon. The balloon effect was not corrected, and thus, a hard landing resulted, causing the aircraft's nose gear to collapse.

Figure 1: Direction of the landing using Runway 10L and layout of FAPA Aerodrome (Source: Google Earth)

2.3 The effects of taking-off or landing into wind (source: https://www.experimentalaircraft.info/flight-planning/aircraft-performance-4.php):

2.3.1 Taking-off into the wind

Most aircraft accidents occur during take-off or landing phase of the flight. Collision with obstacles during climb out, runway overruns on landing occur every now and then. …we will take a look at various factors contributing to the performance of the aircraft in this part of the flight…

The effect of wind has on our aircraft is something we can influence to some extent. We can choose runways with the greatest wind component (when aircraft has more than one runway) and use the wind on our tail when flying to our destination. Wind speed and direction usually changes with altitude so that effect can be used too.

The last part of the flight (landing) can be the most demanding for a pilot, and during training he/she will spend a lot of time practising these to almost perfection.

2.3.2 Head and tail wind

Aircraft uses the flow of wind over the wings to generate the lift to be able to fly. A minimum amount is required to lift-off and usually the engine generates thrust to obtain this lift-off speed.

Head wind

By taking off into wind (the wind will generate part of the required lift), the aircraft lifts off sooner and this will result in lower ground speed and, therefore, a shorter take-off run for the aircraft to become airborne. This is, therefore, recommended.

Not only for safety reasons: A take-off that is abandoned will also use less runway to stop because ground speed is lower (check the ASDA distance during pre-flight). Climb into wind will result into a steeper climb, which is ideal for clearing obstacles in your climb out path.

Landing into wind has the same advantages, it uses less runway, ground speed is lower at touchdown (less wear and tear on the aircraft) and the runway is available sooner for the next aircraft when it gets a bit crowded.

A rule of thumb says that take-off and landing distances are reduced 1.5% for each knot of head wind up to 20 knots.

2.3.3 Turbulent gusting winds

During landing, you must add half the gust to your final approach speed. Thus, if tower reports 240 at 18 knots gust 28, it is advisable to add 5 knots to your speed.

2.4 The aircraft came to a stop on the runway and the pilot disembarked the aircraft unassisted.

2.5 The aircraft sustained damage to the nose gear, propeller, cowling and engine. The pilot was not injured.

2.6 The flight was conducted in visual meteorological conditions (VMC) by day. The wind reported by the air traffic controller (ATC) at the time of the incident was variable between 090° and 100° at 20 gusting to 25 knots.

2.7 The location of the incident was at the following GPS coordinates: S33°33'13" E026°52'44" at an elevation of 318ft above mean sea level (AMSL)

Figure 2: The damaged propeller (Source: 43 Air School)

Figure 3: The aircraft at the accident site (Source: 43 Air School)

3. FINDINGS

3.1 The pilot was issued with a student pilot licence (SPL) on 18 May 2017 with an expiry date of 11 July 2019. The last competency check had been carried out on 12 July 2018. The pilot had flown a total of 27.6 hours on the PA28-180. The conversion to the aircraft type had been completed on 24 July 2017. The pilot's total flying hours were 131.3.

3.2 The pilot was issued with a class 1 aviation medical certificate on 9 May 2018 and expiring on 31 May 2019.

3.3 The aircraft had a Certificate of Release to Service (CoRs), which was issued on 26 November 2018 with an expiry date of 25 November 2019 or at 16 774 airframe hours, whichever occurred first. The last maintenance check carried out was a mandatory periodical inspection (MPI) on 26 November 2018 at 16 674 airframe hours.

3.4 The aircraft was initially issued with a Certificate of Airworthiness (CoA) on 14 August 2012 with an expiry date of 31 August 2019.

3.5 The aircraft's nose gear collapsed due to a hard landing on touch down.

3.6 No injuries were reported and the aircraft sustained substantial damage.

3.7 FAPA is a manned and licensed aerodrome. The incident occurred on Runway 10L. The length of the runway is approximately 1 637m. The runway is a prepared, grass surface with positive slope of 0.01° in the direction of Runway 10L. The aircraft came to rest approximately 450m from the threshold of Runway 10L.

3.8 The wind reported by the air traffic controller (ATC) at the time of the incident was variable between 090° and 100° at 20 gusting to 25 knots. The South African Weather Service recorded winds of between 30 and 35 knots.

3.9 The investigation revealed that the aircraft was slow on approach and landed hard due to a high headwind. The failure to compensate for this increase in headwind resulted in a hard landing.

3.9 The flight was conducted in VMC by day.

4. PROBABLE CAUSE

4.1 The aircraft was slow on approach and landed hard due to a high headwind. The failure to compensate for this increase in headwind resulted in a hard landing.

5. CONTRIBUTING FACTOR

5.1 None

6. REFERENCES USED IN THE REPORT

6.1 Cessna 172 Pilot's Operating Handbook

6.2 South African Weather Service Report

6.3 https://www.faa.gov/news/safety_briefing/2010/media/MarApr2010-FlyingByTheNumbers.pdf

6.4 https://www.faasafety.gov/gslac/alc/course_content.aspx?cID=34&sID=170&preview=true

6.5 https://www.experimentalaircraft.info/flight-planning/aircraft-performance-4.php

7. SAFETY RECOMMENDATION

7.1 Safety message: Aviation training organisations (ATO) should ensure that students on solo flight master the effects of landing or taking-off in high winds before signing them off for any solo flight.

7.2 Safety message: In order to compensate for landing in a headwind, which is gusting,

the Federal Aviation Administration (FAA) suggests the following: "*The FAA Airplane Flying Handbook (FAA-H-8083-3A) recommends adding one-half of the reported surface-wind gust to the normal final-approach airspeed when landing in turbulent conditions to compensate for any sudden loss of headwind component.*"

8. ORGANISATION

8.1 This was a training flight carried out in accordance with SA CAR 2011, Part 141 (Aviation Training Organisations).

8.2 The ATO held the necessary certification to carry out training as per the SACAA Part 141 requirements. The ATO number is CAA0074.

9. TYPE OF SAFETY ACTION

9.1 None.

11. APPENDICES

11.1 Appendix A: (FAA Landing issues extract)

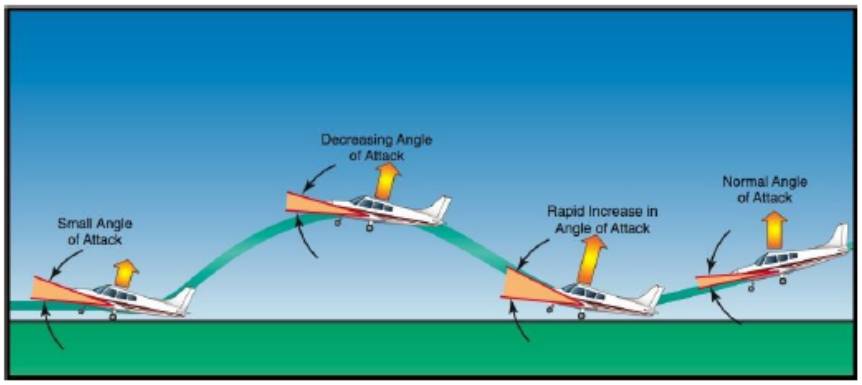
11.2 Appendix B: (FAA Flying Lesson 8 January 2008)

Appendix A

Bouncing During Touchdown

When the airplane contacts the ground with a sharp impact, it tends to bounce back into the air.

Though the airplane's tires and shock struts provide some springing action, the airplane does not bounce like a rubber ball. Instead, it rebounds into the air because the wing's angle of attack was abruptly increased, producing a sudden addition of lift.



The abrupt change in angle of attack is the result of inertia instantly forcing the airplane's tail downward when the main wheels contact the ground sharply.

Since a bounce occurs when the airplane makes contact with the ground before the proper touchdown attitude is attained, it is almost invariably accompanied by the application of excessive back-elevator pressure. This is usually the result of the pilot realizing too late that the airplane is not in the proper attitude and attempting to establish it just as the second touchdown occurs.

The corrective action for a bounce is the same as for ballooning and similarly depends on its severity. When it is very slight and there is no extreme change in the airplane's pitch attitude, a follow-up landing may be executed by applying sufficient power to cushion the subsequent touchdown, and smoothly adjusting the pitch to the proper touchdown attitude.

In the event a very slight bounce is encountered while landing with a crosswind, crosswind correction must be maintained while the next touchdown is made.

Extreme caution and alertness must be exercised any time a bounce occurs, particularly when there is a crosswind. Inexperienced pilots will almost invariably release the crosswind correction. When one main wheel of the airplane strikes the runway, the other wheel will touch down immediately afterwards, and the wings will become level. Then, with no crosswind correction as the airplane bounces, the wind will cause the airplane to roll with the wind, thus exposing even more surface to the crosswind and drifting the airplane more rapidly.

When a bounce is severe, the safest procedure is to EXECUTE A GO-AROUND IMMEDIATELY. The go-around procedure should be continued even though the airplane may descend and another bounce may be encountered.

(Source: Extracted from the Federal Aviation Authority lesson ALC-34: Manoeuvring: Approach and Landing)

Appendix B

FLYING LESSONS for January 8, 2008

suggested by this week's aircraft mishap reports

FLYING LESSONS uses the past week's mishap reports as the jumping-off point to consider what *might* have contributed to accidents, so you can make better decisions if you face similar circumstances. In almost all cases design characteristics of a specific make and model airplane have little direct bearing on the possible causes of aircraft accidents, so apply these *FLYING LESSONS* to any airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence.

FLYING LESSONS is an independent product of MASTERY FLIGHT TRAINING, INC. www.thomasplumer.net

This week's lessons:

Bounced landings result from one of three conditions:

1. The pilot does not arrest descent by flaring, the airplane impacts hard and then rebounds from the surface;
2. The pilot attempts to touch down at too great an airspeed, while the wing is still developing excess lift, and the aircraft skips back into the air; or
3. The pilot relaxes elevator pressure at the point of touchdown, reducing the wing's angle of attack from a stalled condition to one that generates enough lift to put the airplane momentarily back into the air.

There are three main hazards with bounced landings:

1. Aircraft damage resulting from the initial impact, usually limited to blown tires or damaged landing gear components. This can also cause loss of directional control and additional damage or injury.
2. Damage to additional aircraft components as a result of "hopping" or "dropping in" on subsequent touchdowns. This often causes propeller strikes [and costly engine teardowns], more substantial landing gear damage, and in some models buckled engine compartment firewalls and other structural items.
3. Runway overrun from a bounced landing where the pilot recovers and makes a smooth, subsequent touchdown, but in a position where there is insufficient runway remaining to come to a stop.

In pre-solo Air Force pilot screening training we were initially required to go around any time we bounced a landing… to avoid a pilot-induced oscillation or close-to-the-ground stall, as well as to ensure we did not recover from the bounce only to run off the end of the runway afterward. Closer to our first solo we were taught to recover from a bounce by adding a little power and lowering the angle of attack, then transitioning into a flare. If we bounced a second time, however, we had no choice (under Air Force rules) but to lower the nose, power up and go around for another landing. I still adhere to this two-bounces-go-around philosophy (although I've not needed to use it for a long time).

Airspeed control is the key to a smooth, accurate landing. Too fast on short final can be as disastrous as too little airspeed. Focus on proper airspeed control on every landing so you'll be less likely to bounce one in.

(Source: FAA Flying lessons 8 January 2008)