SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1422						
Classification	Serious Incident	**Date**	23 July 2023		**Time**	1449Z	
Type of Operation	Training Part 141						
Location							
Place of Departure	Lanseria International Airport (FALA), Gauteng Province	Place of Intended Landing	Lanseria International Airport (FALA), Gauteng Province				
Place of Occurrence	West of Runway 07 at FALA, GPS: 25°56'15.95" South 027°55'35.45" East at an elevation of 4 465 feet						
GPS Co-ordinates	Latitude	25º56'15.95" S	Longitude	027º55'35.45" E	Elevation	4 465 feet	
Aircraft Information							
Registration	ZS-PPB						
Make; Model; S/N	Piper; PA28-161 Warrior III (Serial Number: 28-7816457)						
Damage to Aircraft	None	Total Aircraft Hours	8 109.06				
Pilot-in-command							
Licence Type	Student Pilot Licence (A)	Gender	Male	Age	27		
Licence Valid	Yes	Total Hours	41	Total Hours on Type	41		
Total Hours 30 Days	8.0	Total Flying on Type Past 90 Days	15.8				
People On-board	1+0	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Sunday afternoon, 23 July 2023, a student pilot on-board a Piper 28-161 Warrior III aircraft with registration ZS-PPB took off from Lanseria International Airport (FALA) in Gauteng province with the intention to conduct circuit-and-landing exercises on Runway 07 (RWY 07). Clear weather conditions prevailed at the time of the flight. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended.

According to the student pilot, this was the third solo consolidation exercise after conducting the initial solo flight on 28 June 2023. On the day of the incident, the student pilot conducted three touch-and-go landings on RWY 07 with the flight instructor on-board. Thereafter, the flight instructor disembarked from the aircraft and the student pilot flew four circuits of touch-and-go landings. During the fifth touch-and-go landing, the student pilot stated that his approach was stable, and the wind direction was 340º at approximately 13 knots (kts).

The student pilot further stated that during the final approach, there was a crosswind from the right which was compensated for by the application of the right pedal to keep the aircraft on the centreline. The indicated airspeed (IAS) during approach was kept at 70 knots and was reduced to 65 knots

with stage 3 flaps (full flaps) at the threshold of RWY07. After touchdown whilst the student pilot was initiating a take-off run and selecting flaps (up position at 0º flaps) the aircraft lost directional control and veered off to the left of the runway and onto the grass area, after which he applied the brakes. The aircraft came to a stop a few metres from the runway edge before he shut down the engine.

After the incident, the air traffic control (ATC) officer activated the crash alarm and requested the Airport Rescue and Firefighting Service (ARFFS) to attend to the aircraft. The aircraft was not damaged, and the pilot was not injured.

After the incident, the instructor inspected the aircraft before taxiing it to the hangar after permission was granted by the Regulator (SACAA).

Figure 1: The aircraft after it vacated the runway. (Source: ARFFS)

How to fly a touch-and-go (Source: Approved Training Organisation Circuit Procedure)
Step 1 - The manoeuvre starts with a normal take-off, with the plan to remain in the circuit pattern. After your line-up checks and briefing are complete, you will get clearance, visually clear the runway and approach for traffic, and then roll onto the runway. Take-off power is applied, and a Vy climb is initiated.
Step 2 – You will remain in the circuit pattern. Maintain a Vy climb until circuit altitude, usually 1.000 feet AGL.
Step 3 - At circuit altitude minus 500 feet, you will turn into crosswind leg. Upon reaching circuit altitude, you will level off the plane and reduce power to a downwind cruise setting. Turn into the downwind leg parallel to the runway at the appropriate distance. There is no set distance from the

runway that this leg should be flown since larger and faster planes will want to fly wider patterns. Small aircraft are usually kept between a quarter to a half-mile from the runway. Never stray so far from the runway that you are beyond glide distance from it. As you fly the downwind leg, you will want to pay close attention to the other traffic in the vicinity. Is anyone else coming in to land? Exactly how this works will depend on whether you are at a controlled field or an uncontrolled field. Either way, you need to know if the runway is yours or you will be following someone. Abeam the numbers on the runway, begin with before landing (downwind) checks. Turn your base leg close enough that you can glide to the runway should the engine fail (once again, traffic dependent and whether you are in controlled airspace, ATC clearances, etc,). If you are following another plane, maintain your altitude longer and do not turn base until the other plane has passed you on their final approach. Once on the base leg, depending on the distance from the threshold, commence with the base checks. Use the following procedure: P – set power 1500-1800rpm or as required to enable a stable descent, A – hold S&L attitude, F – 2nd stage of flap, S – let speed decay to the required approach speed, A – lower nose to set a descent attitude and to maintain the approach speed, T – trim. Turn final so that you are aligned with the runway. Ensure you do not over or undershoot on the turn. If you do, keep the plane coordinated and always keep your traffic pattern turns to less than 30 degrees of bank. The circuit is no place to practise steep turns. Once established on final, add the final notch of flaps (dependent on prevailing winds) and slow to your plane's Vref speed. Reference the PAPI (when available) to fine-tune your descent angle. Use your pitch to control your airspeed to maintain Vref and your power to control your descent rate.

Step 4 - Maintain a stabilised approach until you are over your aim point on the runway. There, begin slowly reducing the power to idle. Manage the plane's momentum by slowly pitching up as the airspeed bleeds off. The goal of every landing should be to settle onto the main wheels with a nose-high attitude, touching down at an airspeed just above a stall.

Step 5 - After touchdown, let the plane lose speed as you roll down the runway. Put the nose wheel on the centreline. Once the plane's momentum has settled, ***raise the flaps, and smoothly apply full power. Transition into a take-off, rotate at Vr, and climb at Vy.***

Crosswind Factor (Source: E6B Computer)

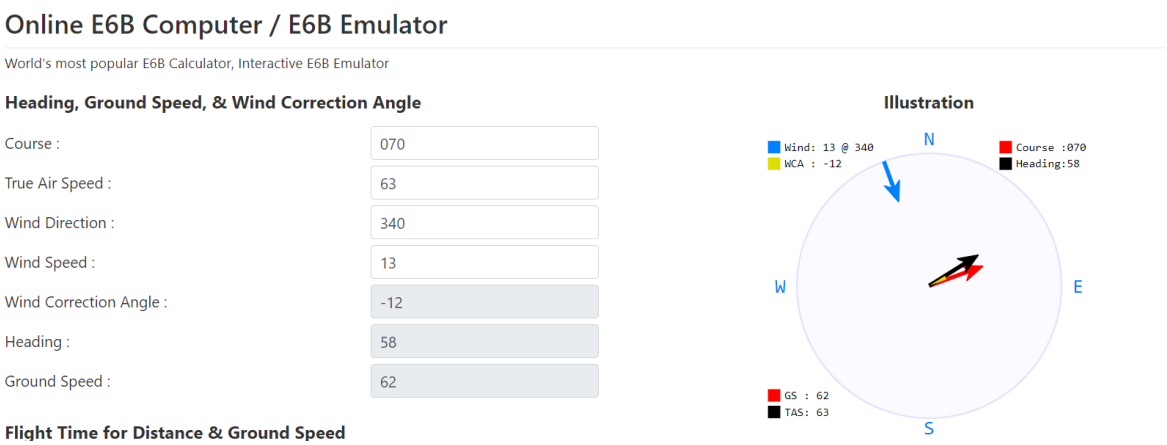

Illustration 1: Wind direction and runway heading. (Source: E6B Calculator | Flight Computer with Illustrations | Online Aviation Calculators (e6bx.com)).

Weather

The meteorological aerodrome report (METAR) below was obtained from the South African Weather Service (SAWS), issued on 23 July 2023 at 1500Z for FALA.

Wind Direction	330°	Wind Speed	10 kt	Visibility	9999m
Temperature	19°C	Cloud Cover	Unknown	Cloud Base	Unknown
Dew Point	08°C	QNH	1025 hPa		

Take-off Roll (Source: Airplane Flying Handbook [FAA-H-8083-3C])

Chapter 6

For take-off, the pilot uses the rudder pedals in most general aviation airplanes to steer the airplane's nose-wheel onto the runway centreline to align the airplane and nose-wheel with the runway. After releasing the brakes, the pilot should advance the throttle smoothly and continuously to take-off power. ***An abrupt application of power may cause the airplane to yaw sharply to the left because of the torque effects of the engine and propeller.*** *This is most apparent in high horsepower engines. As the airplane starts to roll forward, assure both feet are on the rudder pedals so that the toes or balls of the feet are on the rudder portions, not on the brake. Check the engine instruments for indications of a malfunction during the take-off roll.*

In nose-wheel type airplanes, pressures on the elevator control are not necessary beyond those needed to steady it. Applying unnecessary pressure only aggravates the take-off and prevents the

pilot from recognising when elevator control pressure is actually needed to establish the take-off attitude.

As the airplane gains speed, the elevator control tends to assume a neutral position if the airplane is correctly trimmed. At the same time, the rudder pedals are used to keep the nose of the airplane pointed down the runway and parallel to the centreline. ***The effects of engine torque and P-factor at the initial speeds tend to pull the nose to the left.*** *The pilot should use whatever rudder pressure is needed to correct for these effects or winds.*

After the incident, the chief flight instructor (CFI) flew a remedial flight with the student pilot for 0.4 dual hours before the student pilot was released to fly solo for a further 0.6 hours. The student pilot continued with his solo consolidation without incident, thereafter, progressed to the next exercise. At the time of the incident the student pilot was performing the flapless (0º) take-off.

Findings

1. The student pilot was issued a Student Pilot Licence on 16 January 2023 with an expiry date of 15 January 2024. The student pilot was issued a Class 1 aviation medical certificate on 6 January 2023 with an expiry date of 31 January 2024 with no medical restrictions. On the day of the incident, the student pilot had flown a total of 2.4 hours of which 0.9 were dual and 1.5 were solo hours.

2. The aircraft was registered to the present owner on 6 April 2018 as per the Certificate of Registration (C of R).

3. The last mandatory periodic inspection (MPI) on the aircraft was certified on 21 June 2023 at 8 015.7 airframe hours with an expiry date of 20 June 2024 or at 8 115.7 airframe hours, whichever comes first. The aircraft was flown a further 94.1 hours since the last MPI.

4. The aircraft's Certificate of Airworthiness (C of A) was initially issued on 26 November 2015. The C of A was reissued on 25 October 2022 with an expiry date of 30 November 2023.

5. The aircraft maintenance organisation (AMO) which conducted the last MPI was issued an AMO certificate on 19 June 2023 with an expiry date 30 July 2024.

6. According to the AMO, the aircraft underwent an MPI on 21 July 2023 and it was found that the tension on the rudder cables was out of limit (below 35 pounds (lbs) ±5 lbs) and the rod assembly for the nose wheel steering was lax. A serviceable rod was installed, and the cables were tensioned.

7. The history of the aircraft was reviewed, and it was found that the aircraft was involved in serious incidents in the past, which were assigned SACAA reference numbers: AIID/00738/2022 (Runway excursion on 4 March 2022), AIID/01946/2022 (Runway excursion on 2 September 2022), and AIID/02267/2022 (Gear unsafe after landing on 11 October 2022). Runway excursion on 5 March 2021 and 19 June 2023 were only recorded in the airframe logbook. After each of the above incidents, the aircraft was repaired and returned to service.

8. The ATO was issued the ATO certificate on 15 February 2022 with an expiry date of 28 February 2027.

9. The weather was not a factor in this incident.

10. The training manual states that '*flaps up should be selected before taking power'*, and during take-off, power was applied first before the flaps were selected to the up position.

Probable Cause

Loss of directional control after initiating take-off during the touch-and-go landing exercise. The loss of control was due to the application of power before selecting the flaps to the up position, this caused the aircraft to yaw sharply to the left because of the torque effects of the engine and propeller.

Contributing Factors

The following factors were identified during the interview with the CFI.

- Incorrect procedure used during take-off.
- Prolonged flight.

Safety Action

To mitigate the risks associated with runway excursion, the CFI conducted a roundtable safety meeting on 27 July 2023 with all instructors and student pilots to discuss safety matters with the emphasis on prioritising aviate, navigate and communicate (ANC) systemic approach during high workload situations, as well as the benefit of following procedures on the checklists. The maximum hours and the number of circuits a solo student pilot could fly were also discussed with the aim to minimise the possibility of prolonged flights.

On 1 August 2023, the ATO developed the touch-and-go procedure as part of the mitigation process to reduce the risk of runway excursions.

Safety Message and/or Safety Recommendation/s

None.

About this Report

The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation and that will determine the scope of an investigation. For this occurrence, a limited investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desk top enquiries to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar occurrence.

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

Purpose

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, 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

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Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa