SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-40

AIRCRAFT ACCIDENT SHORT REPORT

CA18/3/2/1245: ZS-LCU, Nose gear collapse during take-off roll

Date and time	**:** 19 January 2019, 0830Z
Location	**:** Potchefstroom, North West
Aircraft registration	**:** ZS-LCU
Aircraft manufacturer and model	**:** Cessna Textron, C210N
Last Point of departure	**:** Potchefstroom Aerodrome (FAPS)
Next point of intended landing	**:** Potchefstroom Aerodrome (FAPS)
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	**:** S26°40'17" E027°04'44", Potchefstroom Aerodrome (FAPS)
Meteorological Information	**:** Wind: 290°/04 kt, Temperature 23 °C, Dew point: 12°C, QNH: 1015 hPa, CAVOK
Type of operation	**:** Private (Part 91)
Persons on board	**:** 1 + 3
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 interests of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to establish blame or liability.

Disclaimer:

1. SYNOPSIS

1.1 On 19 January 2019 at 0830Z, a pilot accompanied by three passengers had planned to depart from Potchefstroom Aerodrome (FAPS) for a pleasure flight in the area. The pilot reported that he lined up for take-off using Runway 21 and began the take-off roll. As the aircraft reached approximately 50 knots, the nose gear collapsed, causing the propeller and nose cowling to impact the runway.

1.2 The aircraft came to a stop on the runway and all the occupants disembarked unassisted. The aircraft sustained substantial damage and none of the occupants reported any injuries.

1.3 The flight was conducted in visual meteorological conditions (VMC) by day.

1.4 The incident occurred at the following GPS coordinates: S26°40'05" E027°04'57" at an elevation of 4 489ft above mean sea level (AMSL) at Potchefstroom Aerodrome (FAPS).

1.5 The investigation revealed that during a take-off roll, the nose gear collapsed resulting in the propeller and nose section striking the runway surface. The cause of the nose gear collapse was probably due to the landing gear lever inadvertently placed in the up position.

Figure 1: Direction of take-off and layout of FAPS Aerodrome (Source: Google Earth)

2. FACTUAL INFORMATION

2.1 On 19 January 2019 at 0830Z, a pilot accompanied by three passengers had

planned to depart from Potchefstroom Aerodrome (FAPS) with the intention of landing back at the aerodrome. The flight was conducted privately in accordance with CAR 2011, Part 91 (General Aviation and Operating Flight Rules).

2.2 The pilot reported that he lined up for take-off using Runway 21 and began the take-off roll. As the aircraft reached 50 knots, the aircraft's nose pitched down, causing the propeller and nose cowling area to impact the runway.

2.3 The aircraft came to a stop on the runway and all the occupants disembarked unassisted. The aircraft came to rest on Runway 21 perpendicular to the first taxiway turnoff. This is approximately 550m from the threshold of Runway 21. To facilitate the reopening of the runway, the aircraft was recovered to the owner's hangar at the aerodrome.

2.4 The aircraft sustained damage to the nose gear doors, propeller and cowling, and none of the occupants on-board reported any injuries.

2.5 The flight was conducted in visual meteorological conditions (VMC) by day.

2.6 The incident occurred at the following GPS coordinates: S26°40'05" E027°04'57" at an elevation of 4 489ft AMSL at FAPS.

2.7 The aircraft landing gear system was maintained in accordance with the required prescripts, and the retraction system was tested five times during the last mandatory periodic inspection (MPI) in accordance with the Cessna 210 Series Service Manual with no fault evident. The last maintenance was an MPI, which included a 50-hour and a 100-hour check, carried out 3.1 hours prior to the accident flight. The aircraft had carried out four retractions since its last MPI and all operations were normal. The gear collapsed before rotation speed was achieved and over speed condition can be excluded. On inspection of the landing gear system after the nose gear collapse, no evidence of any landing gear mechanical or electrical system failures were found that could have attributed to the collapse.

Figure 2: Damage to the nose gear doors, cowling and exhaust

Figure 3: Damage to the propeller

2.8 A review of the pilot's documents revealed that his class 2 aviation medical certificate had expired on 31 December 2018. The pilot subsequently renewed his aviation medical certificate on 29 January 2019, which was 29 days after the expiry of his medical and 10 days after the accident.

CAR 2011, Part 61.01.6 states the following: **Medical requirements and fitness** "*(2) The holder of a pilot licence issued in terms of this Part may not exercise the privileges of that licence—(a) unless that person holds an appropriate valid medical certificate issued in terms of Part 67 and complies with all medical endorsements on that medical certificate;*". The pilot conducted this flight without a valid medical certificate.

CAR 2011, Part 67.00.6 states the following: "**Period of validity of medical certificates** *(6)(a) The holder of a medical certificate shall, at least 15 days immediately preceding the date on which such medical certificate expires, apply for the extension of such medical certificate.(b) Notwithstanding the provisions of sub regulations (1), (2), (3), (4) and (5), the Director may, on such conditions as he or she considers necessary, extend the medical certificate for a period not exceeding 30 days."* The pilot did not submit any application to the director to request an extension of the medical certificate expiry date.

3. FINDINGS

3.1 The pilot held an invalid private pilot licence issued on 1 May 2018 with an expiry date of 31 May 2019. The last skills test was carried out on 1 May 2018 with an expiry date of 31 May 2019. The pilot flew 90.2 hours on the C210N. The conversion to the aircraft type was completed on 1 May 2018. The pilot had 1 600.61 total flying hours.

3.2 The pilot held an expired Class 2 aviation medical certificate, which was issued on 4 December 2017 and expired on 31 December 2018. The pilot had renewed his medical on 29 January 2019, which is 10 days after the incident and 29 days after it had expired. According to CAR 2011, 61.03.5 (1) "*The holder of a PPL(A) may not exercise the privileges of that licence unless he or she—(a) is in possession of a valid medical certificate, issued to him or her in terms of Part 67*".

3.3 The aircraft was issued with a certificate of release to service (CoRs) on 14 December 2018 with an expiry date of 13 December 2019 or at 3439,2 tachometer hours (whichever occurs first). The last maintenance check carried out was a MPI on 14 December 2018 at 3389.2 hours. The aircraft had flown 3.1 hours since the last MPI. The last MPI included 50-hour and 100-hour checks. On completion of the MPI, the Cessna Service Manual for the aircraft requires that the system be operated five times, which was carried out fault free. (Refer to Appendix B)

3.4 The aircraft was initially issued with a certificate of airworthiness on 20 March 2003, with an expiry date of 31 March 2019. The aircraft was issued with a certificate of registration on 28 March 2018.

3.5 The landing gear system had no defects listed in the flight folio preceding the flight. Since the last MPI, the aircraft had completed four retractions with no fault. The extension and retraction test performed in the presence of two

investigators after the incident at the owner's hangers revealed no anomaly. The down lock mechanism was intact and operating normally.

3.6 FAPS Aerodrome is unmanned and is a registered aerodrome. Runway 21 is 1489m long and 30m wide with an asphalt surface. The aircraft came to rest 505m from the threshold of Runway 21.

3.7 The aircraft nose gear collapsed during the take-off roll, causing the propeller and nose cowling to strike the runway.

3.8 The aircraft sustained substantial damage and none of the occupants on-board reported any injuries.

3.9 The weather did not contribute to the accident. The conditions at the time were: wind 210°/7 knots, temperature: 29°C, dew point: 8°C, QNH: 1018 hPa.

3.10 The flight was conducted in visual meteorological conditions (VMC) by day.

3.11 The investigation revealed that during a take-off roll, the nose gear collapsed resulting in the propeller and nose section striking the runway surface. The cause of the nose gear collapse was probably due to the landing gear lever inadvertently placed in the up position.

4. PROBABLE CAUSE

4.1 During a take-off roll, the nose gear collapsed resulting in the propeller and nose section striking the runway surface. The cause of the nose gear collapse was probably due to the landing gear lever inadvertently placed in the up position.

5. CONTRIBUTING FACTOR

5.1 Poor or incorrect pre-flight inspection.

6. REFERENCES USED IN THE REPORT

6.1 Cessna 210 Pilots Operating Handbook

6.2 South African Weather Service website

6.3 Aeronautical Information Publication AD2-FAPS-1 15 January 2015

6.4 Cessna Model 210 and T210 Series Service Manual

7. SAFETY RECOMMENDATION

7.1 None.

8. ORGANISATION

8.1 The flight was conducted as a private flight in accordance with Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

9. ADDITIONAL INFORMATION

9.1 None

10. TYPE OF SAFETY ACTION

10.1 None.

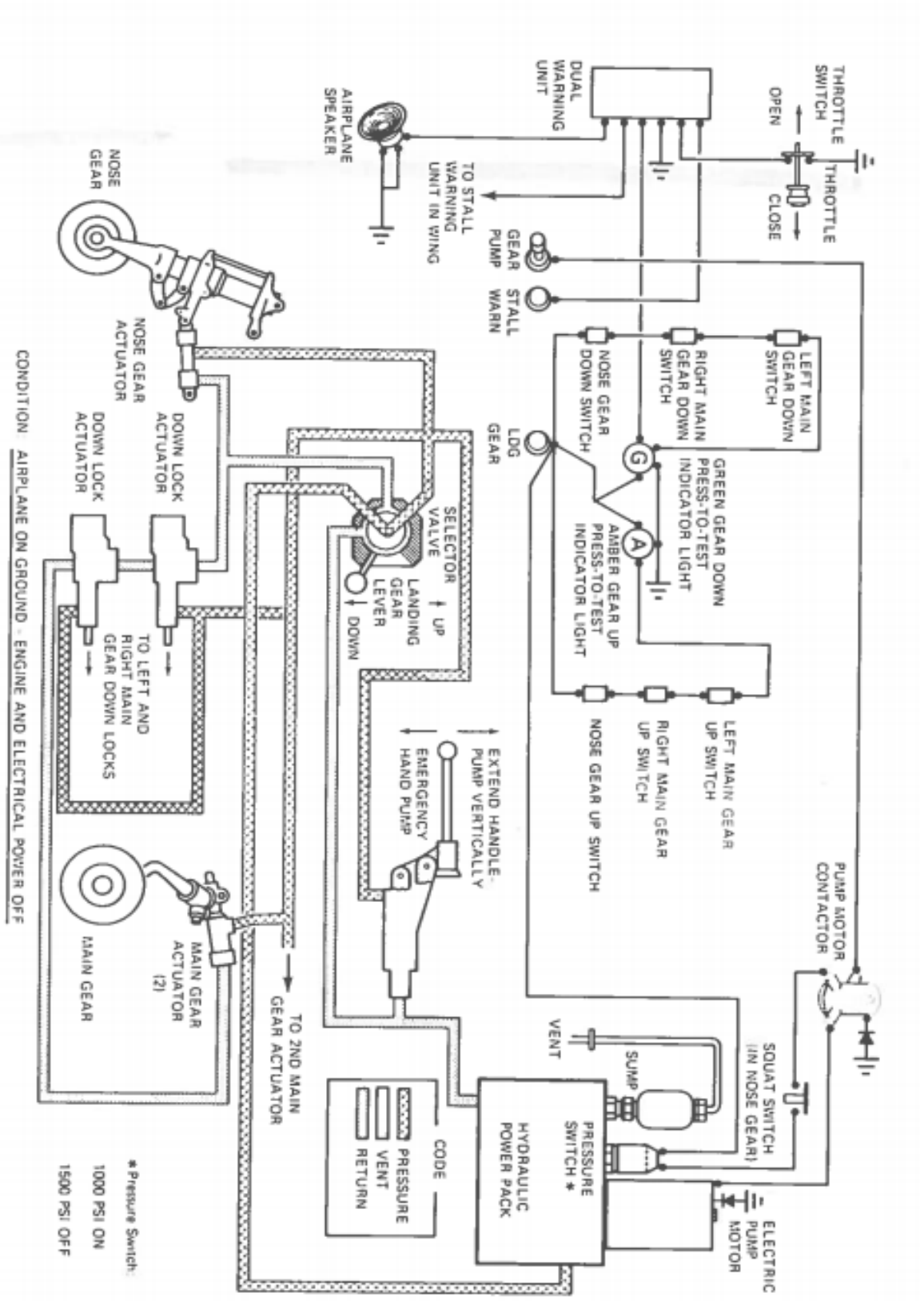
11. SAFETY MESSAGE

11.1 None

12. APPENDICES

12.1 Appendix A: C210 Landing gear schematic
12.2 Appendix B: MPI check sheets for the landing gear system

Appendix A



(Source: Extract from C210 POH Airplane and System Descriptions page 7-34)
(For reference purposes only)

Appendix B

	SPECIAL INSPECTION ITEM	EACH 200 HOURS	EACH 100 HOURS	EACH 50 HOURS
7. Fuel selector valve and placards				•
8. Auxiliary fuel pump and throttle switches				•
9. Engine-driven fuel pump				•
10. Fuel quantity indicators and sensing units				•
11. Fuel lines, check valve and vapor return line				24
12. Turbocharger vent system				•
13. Engine primer				•
14. Perform a fuel quantity indicating system operational test. Refer to Section 16 for detailed accomplishment instructions.				32
LANDING GEAR				
1. Brake fluid, lines and hose, linings, discs, brake assemblies and master cylinders				19
2. Main gear wheels				•
3. Wheel bearings				10
4. Main gear springs				•
5. Tires				•
6. Torque link lubrication				•
7. Parking brake system				•
8. Nose gear strut and shimmy dampener (service as required)				•
9. Nose gear wheel				•
10. Nose gear fork				•
11. Nose gear steering system				•
12. Parking brake and toe brakes operational test				•
LANDING GEAR RETRACTION SYSTEM				
NOTE When performing an inspection of the landing gear retraction system, the aircraft must be placed on jacks and an external power source of at least 60 Amps should be used to prevent drain on the aircraft battery when operating the system.				
1. Operate the landing gear through five fault-free cycles.				•
2. Check landing gear doors for positive clearance with any part of the landing gear during operation, and for proper fit when closed.				•
3. Check all hydraulic system components for security, hydraulic leaks and any apparent damage to components or mounting structure.				19

	SPECIAL INSPECTION ITEM	EACH 200 HOURS	EACH 100 HOURS	EACH 50 HOURS
Check doors, hinges, hinge pins and linkage for evidence of wear, other damage and security of attachment.				
5. Inspect internal wheel well structure for cracks, dents, loose rivets, bolts and nuts corrosion or other damage.				
6. Check electrical wiring and switches for security of connections, and switch operation. Check position indicator lights for proper operation. Check wiring for proper routing and support.				
7. Perform operational check and ensure proper rigging of all systems and components including downlocks, uplocks, doors, switches, actuators and power pack (observing cycle time).				
8. Check main gear strut to pivot attachment.				
9. Check condition of all springs.				
10. Hydraulic fluid contamination check.				
11. Clean power pack self-relieving check valve filter.				12
12. Landing gear and door manifold solenoids (mounted on top of gear and door manifolds).				
13. Hydraulic Pressure check primary and thermal relief valves and pressure switch.				28 30
AIRFRAME				
1. Aircraft exterior				
2. Aircraft structure				
3. Windows, windshield, doors and seals				
4. Seat stops, seat rails, upholstery, structure and mounting				
5. Seat belts and shoulder harnesses				26
6. Control column bearings, sprockets, pulleys, cables, chains and turnbuckles				
7. Control lock, control wheel and control column mechanism				
8. Instruments and markings				
9. Vacuum system air filter				
10. Magnetic compass compensation				13
11. Instrument wiring and plumbing				29
12. Instrument panel, shock mounts, ground straps, cover, decals and labeling				
13. Defrosting, heating and ventilating systems and controls				
14. Cabin upholstery, trim, sun visors and ashtrays				
15. Area beneath floor, lines, hose, wires and control cables				
16. Lights, switches, circuit breakers, fuses, and spare fuses				