SOUTH AFRICAN CIVIL AVIATION AUTHORITY

AIRCRAFT INCIDENT SHORT REPORT

CA18/3/2/1229: ZS-VRA, Nose landing gear collapse during landing because the emergency landing gear extension T-handle was not pulled as required by POH.

Date and time	**:** 10 November 2018, 0758Z
Location	**:** Progress Aerodrome, Port Elizabeth (FAPZ)
Aircraft registration	**:** ZS-VRA
Aircraft manufacturer and model	**:** Vulcanair P.68R
Last point of departure	**:** Progress Aerodrome, Port Elizabeth (FAPZ)
Next point of intended landing	**:** Progress Aerodrome, Port Elizabeth (FAPZ)
Location of incident site with reference	**:** Progress Aerodrome, Port Elizabeth (FAPZ)
to easily defined geographical points	**:** 33°55'30"S 025°22'20"E elevation 740,feet AMSL
(GPS readings if possible)	
Meteorological Information	**:** Surface wind: 250°/10 kt, temperature: 20°C, visibility: +10 km
Type of operation	**:** Training (Part 141)
Persons on board	**:** 1+2
Injuries	**:** None
Damage to aircraft	**:** The aircraft sustained minor damage.

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 Saturday 10 November 2018 at 0700Z the instructor and two student pilots took off from Progress Aerodrome, Port Elizabeth to Port Elizabeth International Airport for circuit training with the intention to land back at FAPZ. This was a training flight under the provisions of CAR 2011, Part 141 as amended. Fine weather conditions prevailed at the time leading to the incident. During the second circuit whilst conducting the downwind checks at FAPE, the instructor noticed a landing gear unsafe warning indication. According to the instructor the nose gear and both main gears indicated red. The instructor stated that he then recycled the landing gear, the nose gear and right hand main gear indicated red unlocked (UNLKD). The left-hand landing gear showed green locked (LKD). The hydraulic pump ON was still illuminated at this stage, and he decided to pull the circuit breaker due to the 30 second limitation on the pump operation. According to the instructor the landing was aborted and the aircraft routed back to FAPZ where the aircraft is based.

1.2 According to the one of the student pilots he had a similar landing gear unsafe indication experience when he flew the aircraft on 08 November 2018. The instructor acknowledged that there was a history of unreliable landing gear position indication which was highlighted to the maintenance engineers to inspect and rectify. On the day of the incident, the aircraft flew overhead the runway at FAPZ and the instructor requested two observers on the ground to confirm the position of the landing gear. After the observers confirmed that the landing gear was down, the instructor stated that he deemed it unnecessary to do an emergency landing gear extension. A normal approach was carried out at 0758Z for runway 25 at FAPZ and on touchdown the nose gear collapsed resulting in contact with the runway surface. The aircraft skidded on its nose section until it came to a halt a short distance from the point where the nose gear collapsed.

1.3 The aircraft sustained minor damage to the nose landing gear doors and rod ends. None of the occupants sustained injuries.

1.4 This investigation revealed that the nose gear collapsed during landing as a result of extended nose gear not locked. The failure of the down lock mechanism was undetermined as the system operated normal during testing.

2. FACTUAL INFORMATION

2.1 On Saturday 10 November 2018 the instructor stated that he carried out a pre-flight inspection of the aircraft and no defects were observed, specifically with the landing gear. Both instructor and student indicated that the aircraft had 58 USG of fuel on board before departure. At 0700Z the instructor, a student pilot and a passenger took off from Progress Aerodrome in Port Elizabeth (FAPZ) to Port Elizabeth International Airport (FAPE) for circuit training, which included touch-and-go landings with the intention to land back at FAPZ. This was a training flight under the provisions of CAR 2011, Part 141 as amended. Fine weather conditions prevailed at the time leading to the incident.

2.2 The aircraft routed to FAPE and after joining right base runway 26 the crew noticed that the indication showed right hand UNLKD, left hand LKD and nose LKD. The landing gear was recycled and three green and LKD were indicated. According to the instructor, the student pilot executed a touch-and-go landing at FAPE uneventfully.

2.3 During the second circuit, on the downwind checks, the pilot noticed a landing gear unsafe warning indication. According to the instructor the nose gear and both main gear indicated red. The instructor stated that he then recycled the landing gear and the nose and right hand main gear indicated red UNLKD. The left hand landing gear showed green LKD. The hydraulic pump ON was still illuminated at this stage, and he decided to pull the circuit breaker due to the 30 second limitation on the pump operation. According to the pilot, the landing was aborted and the aircraft routed back to FAPZ where the aircraft is based.

2.4 Enroute back to FAPZ the instructor discussed an emergency event model with the student pilot. A decision was made by the instructor to confirm with observers (the cadet and a student) on the ground by radio that the landing gear was down by doing a slow fly-past at FAPZ. The instructor confirmed that the observers informed them that the landing gear was down. After the observers at FAPZ confirmed that the landing gear was down, the instructor stated that he deemed it unnecessary to do an emergency landing gear extension. According to the student pilot, they had a similar experience with the landing gear indication on 8 November 2018 when he flew the aircraft with the instructor for the first time. The instructor acknowledged that there was a history of unreliable landing gear position indication, which was highlighted to the maintenance engineers to inspect and rectify. The crew reported the defect on the Progress Flight Academy Defect report sheet. The AMO reported that they reset the switch to rectify the defect before the next flight.

2.5 The before-landing checklist in the POH requires the crew to ensure that the 3 green landing gear position indicator lights are on and that the red light is off. If the landing gear does not extend the landing gear emergency procedures in the POH instruct that the landing gear lever must be in the down position and the hydraulic circuit breaker must be pulled. The pilot must then lift the emergency T-handle safety guard and pull the emergency gear extension T-handle. To ensure the landing gear is down the pilot must check that the 3 green landing gear position indicator lights are on and that the red light is off. Before the landing the indication in the cockpit was one green only. The LKD indication was also red. The emergency gear extension T-handle was not pulled for the landing.

Fig. 1: Picture of the landing gear indication prior to landing (Picture courtesy of the Pilot)

2.6 According to the instructor a normal approach was carried out at 0758Z for runway 25 at FAPZ, and on touchdown the nose landing gear collapsed back into the wheel well as the nose wheel came into contact with the runway surface. The aircraft skidded on the underside of the nose until it came to a halt a short distance from the point where the nose gear failed. The aircraft incurred minor damage to the landing gear door and rod ends. No occupant sustained any injuries.

2.7 On 08 November 2018, the pilot reported a problem with the landing gear system indication. The AMO tested the system on the ground and only the right main gear was not showing green light indication. The AMO found a gap between a down switch sensor and the lever the sensor was adjusted. On the same day following a flight, the crew reported two greens and on inspection by the AMO, it was found that the switch had gone over the lever and the issue was resolved on ground. There was no evidence of a dual inspection done on the maintenance carried out on the lock mechanism as required by the CAR's.

2.8 According to the AMO they stated that during recovery the tail of the aircraft was pushed down, the undercarriage lever was confirmed in the down position and the hydraulic circuit breaker was pushed in. The nose gear extended normally and the main gear locked down normally. Three green lights were observed in the cockpit, the hydraulic pump switched off normally. The aircraft was towed back in the hangar.

2.9 The incident occurred during daylight conditions at a geographical position that was determined to be 33°55'30"South 025°22'20"East at an elevation of 740 ft.

2.10 Post-incident inspection by the AMO revealed no malfunctions with the hydraulic landing gear system. No leaks were visible during the operation of the landing gear. The damage sustained by the aircraft was minor which was limited to the nose landing gear doors and rod ends.

3. FINDINGS

3.1 The instructor was issued with an airline transport pilot licence which was issued on 27 July 2018 with an expiry date of on 31 July 2019 and the aircraft type was endorsed on his licence.

3.2 The instructor was issued with an aviation medical certificate on 2 July 2018 by a designated aviation medical examiner with an expiry date of 31 January 2019.

3.3 The instructor had accumulated a total of 3200 flying hours which included 7 hours on the type during the past 90 days.

3.4 The instructor discussed an emergency event model in accordance with the approved TPM with the student pilot once they noticed the unsafe landing gear indication.

3.5 The emergency landing gear extension was never activated as required by the Pilot Operating Handbook when an unsafe landing gear warning indication was displayed in the cockpit.

3.6 The aircraft operated within its weight and balance limitations.

3.7 The aircraft had a valid certificate of airworthiness which was issued on 29 October 2015 with an expiry date of 31 October 2019.

3.8 The last scheduled maintenance inspection that was carried out on the aircraft prior to the incident flight was certified on 12 September 2018 at 996,6 airframe hours. An additional 30,4 hours were flown with the aircraft following the inspection. The aircraft was issued with a certificate of release to service on 12 September 2018 which expires on 11 September 2019.

3.9 The maintenance carried out on 08 November 2018 was not conducted in accordance with the best practice of ensuring correct fitment and troubleshooting where a dual (duplicate) inspection is required.

3.10 The incident was survivable as the cockpit/cabin area remained intact and no injuries were reported.

3.11 No malfunctions with the hydraulic landing gear systems were found by the AMO. The system tested normally and no leaks were visible during the operation.

3.12 The investigation revealed that the nose gear collapsed on landing as a result of the extended nose gear not locked. The failure of the down lock mechanism was undetermined as the landing gear extension and retraction system operated normal during the testing post the accident.

4. PROBABLE CAUSE

4.1 The nose gear collapsed on landing as a result of the extended nose gear not locked. The failure of the down lock mechanism was undetermined as the system operated normal during testing.

5. CONTRIBUTING FACTORS

5.1 The emergency gear extension was not activated as required by pilots operating handbook (POH).

6. REFERENCES USED ON THE REPORT

6.1 Vulcanair Aircraft P.68R Pilot's operating handbook and airplane flight manual.

Fig. 2: Aircraft as it came to rest (Photograph courtesy of Progress Flight Academy)

Fig. 3: Minor damage to the nose landing gear doors and rod ends
(Photograph courtesy of Progress Flight Academy)

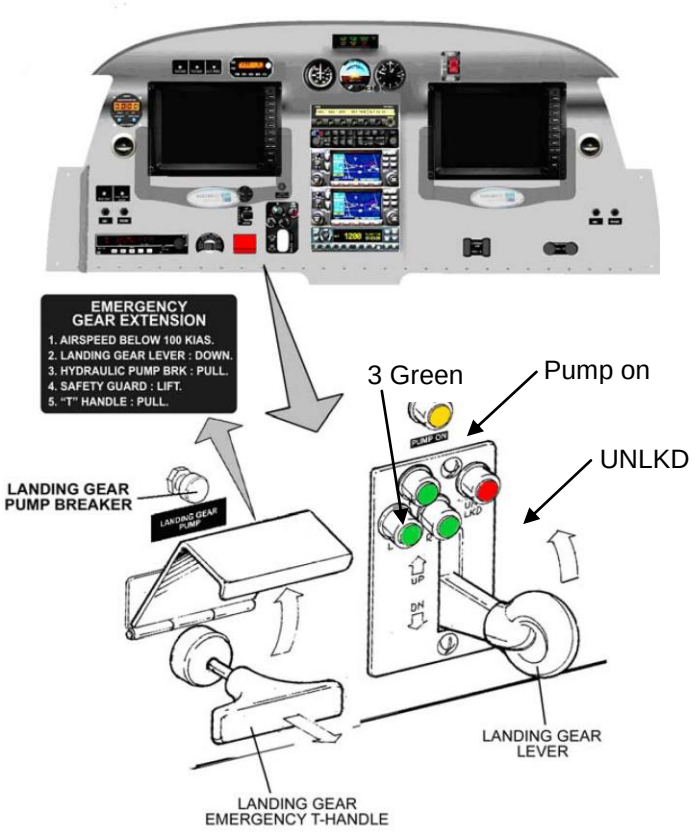

Figure 4: Cockpit layout with landing gear indication and normal/emergency extension (Source: Vulcanair P.68R POH)

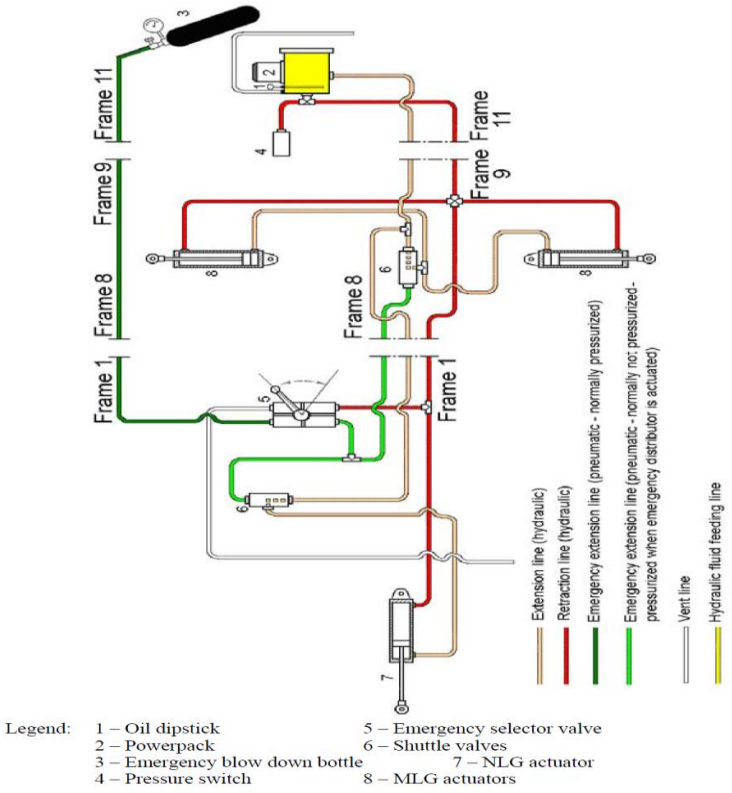

Figure 5: Schematic of the Vulcanair P.68 landing gear hydraulic system and emergency pneumatic system. **(Source:** Vulcanair P.68R POH)

7. SAFETY RECOMMENDATION

7.1 Safety Message: The Aircraft Maintenance Organisation need to ensure that maintenance performed by their personnel complies with manufacturer´s maintenance instructions and Civil Aviation Maintenance Requirements as outlined in CAR Part 43. The landing gear defects occurred three times prior to the accident, and it does appear that the defect was not cleared.

7.2 Pilots to adhere to the manufacturer's requirements when they are faced with emergency during the operation of the aircraft.

8. ORGANISATION

8.1 None