AIRCRAFT INCIDENT SHORT REPORT

CA18/3/2/1217: ZS-WZP, Runway excursion after an aborted take-off

Date and time	:	1 September 2018. 1406Z
Location	:	9,2 nm north-east of Delmas, Gauteng
Occurrence type	:	Serious Incident
Aircraft registration	:	ZS-WZP
Aircraft manufacturer and model	:	Atlas Angel X328
Last Point of departure	:	Private Airstrip, Dwarsfontein Farm, Gauteng
Next point of intended landing	:	Private Airstrip, Dwarsfontein Farm, Gauteng
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	:	9,2 nm north-east of Delmas town, GPS coordinates: S26° 02' 47.60" E028° 48' 39.15"
Meteorological Information	:	METAR FAOR 011400Z: wind: 320°/9 kts, temperature: 24°C, dew point: -4°C, QNH 1023, CAVOK
Type of operation	:	Commercial Operation of a Non-Type Certificated Aircraft (Part 96)
Persons on board	:	1 + 8
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 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 1 September 2018, a pilot accompanied by eight skydivers were engaged in a sky diving operation.

1.2 The aircraft began a take-off roll at a private airstrip near Delmas in Gauteng, the pilot rotated the aircraft approximately halfway down the runway. After rotation, the pilot noticed that the gas generator speed (N_1) had dropped to 92%. The standard take off N_1 is between 96% and 100%. The pilot deemed this power setting insufficient for the climb, due to the weight of the aircraft.

1.3 The pilot elected to abort the take-off and landed on the remaining runway available resulting on the aircraft exiting the runway and impacting the perimeter fence.

1.4 The aircraft sustained damage to its propeller, landing gear, fuselage and none of the occupants on board sustained any injuries.

Figure 1: The aircraft at the incident site

1.6 The investigation revealed that the aircraft experienced loss of engine power during take-off and as a result, the pilot decided to abort take-off. There was insufficient runway length available and the aircraft overshot the runway and collided with a perimeter fence.

2. FACTUAL INFORMATION

2.1 On 1 September 2018, at 1406Z, a pilot accompanied by 8 skydivers began a take-off roll on runway 09 at a private airstrip on the farm Dwarsfontein near Delmas in Gauteng.

2.2 The intention of the flight was to carry out a parachute dropping exercise. This was carried out under the provisions of Commercial Operation of a Non-Type Certificated Aircraft (Part 96).

2.3 Approximately halfway down the runway, the pilot began to rotate the aircraft, during rotation the pilot carried out a crosscheck of the aircraft instrumentation and noticed on the digital instrument display that the gas generator speed (N_1) had decreased to 92%. The standard take off N_1 is between 96% and 100%. The pilot deemed the power insufficient for a safe climb.

Figure 2: The cockpit layout of the Atlas Angel (World Air News November 2009, Page 8)

2.4 The pilot elected to abort the take-off and landed the aircraft on the remaining runway. The aircraft overshot the runway and impacted a perimeter fence near the threshold of runway 27.

2.5 The pilot stated that the aircraft sustained damage to its propeller, landing gear and fuselage.

2.6 None of the occupants on board sustained injuries.

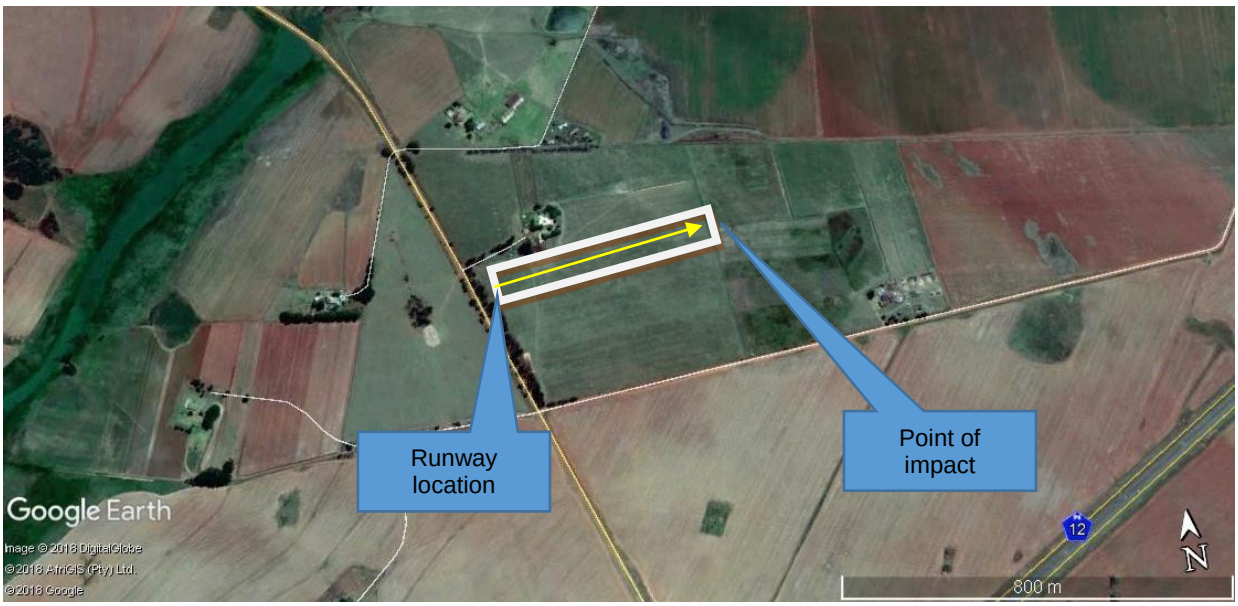


Figure 3: The runway location and the point of impact (Google Earth)

3. FINDINGS

3.1 The pilot in command (PIC) was issued with a commercial pilot licence (CPL), and his last competency check was carried out on 13 November 2017 and expires on 31 December 2018. The aircraft type rating was endorsed on her licence.

3.2 The pilot was issued a Class 1 aviation medical certificate on 24 July 2018 and expires on 31 July 2019.

3.3 The aircraft had a certificate of release to service (CoR) issued on 6 February 2018 with an expiry date of 6 February 2019 or at 1414. 5 Hobbs hours whichever occurs first.

3.4 The aircraft had a valid authority to fly which was issued on 19 July 2016 and expires on 31 July 2019.

3.5 The METAR for FAOR (O.R. Tambo International Airport) at the time of the incident was wind: 340^0/08kts, clouds: CAVOK and QNH: 1023. FAOR is approximately 23 nm to the west of Delmas.

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

3.7 The runway that was used for the operation is located on a private farm. The field elevation is 5 015 ft. above mean sea level. Runway 09 is approximately 1000m in length and is made up of sand and grass. The pilot rotated the aircraft at approximately 500m down the runway and landed the aircraft at approximately 250m from the opposite threshold runway 27. There is no separation between the runway threshold and the perimeter fence. The airfield is not registered.

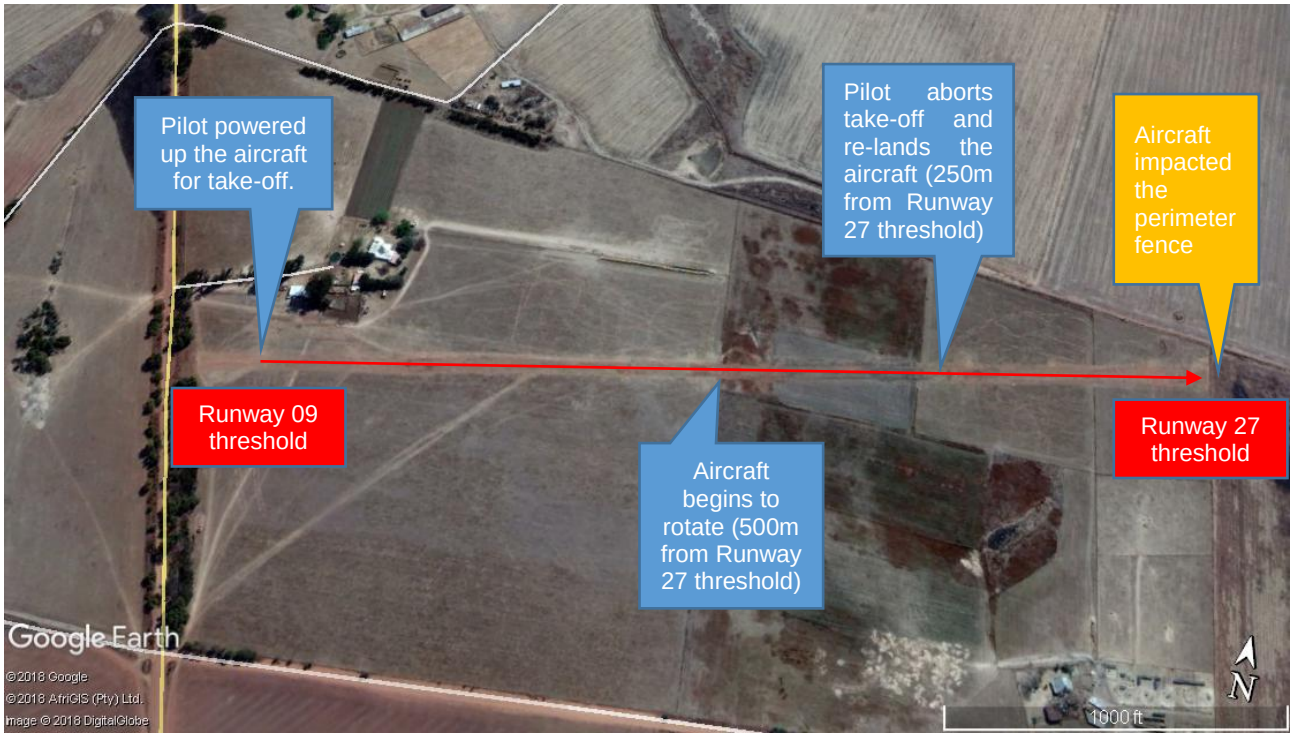


Figure 4: Approximated sequence of events leading to the runway excursion (Google Earth)

Figure 5: The runway surface texture (photo provided by the pilot)

3.8 The flap configuration prior to beginning the take-off roll was set at 33° position, which is position 1.

3.9 The aircraft is fitted with a digital engine instrument display. This instrument is split into 6 separate segments and simultaneously displays the following engine perimeters:

- ITT – Inter turbine temperature – degrees Celsius
- N1 – gas generator speed – percentage of maximum
- Prop – propeller – revolutions per minute
- Torque – engine torque – pounds per square inch
- Oil pressure – oil pressure – pounds per square inch
- Voltage – busbar voltage – volts

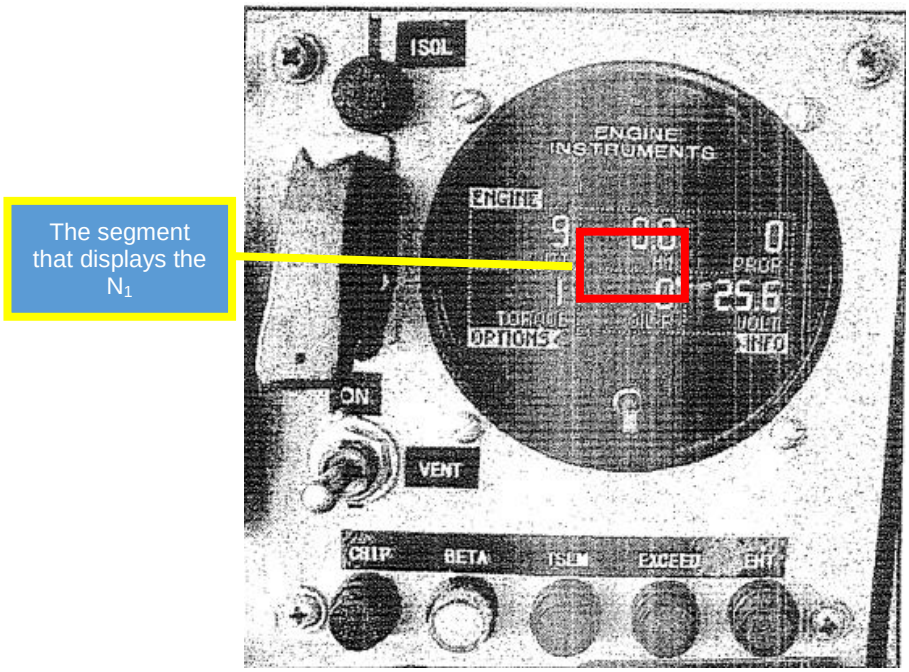


Figure 6: Digital engine instrument display (Atlas Angel POH)

3.10 After the incident, the engine was inspected and the bleed valve on the compressor case was found to have remained in the open position. This caused the air in the compressor to be dumped back into the compressor inlet, leading to a loss of power.

3.11 The engine manufacturer states that, *"Only in the case when there is a suspicion on bleed valve piston sticking (this can occur when the engine is operated in very polluted environment), the function of the axial compressor bleed valve is to be checked when the engine is at rest according to the smooth travel of the piston inside the valve body." (General Electric H series and M601-Series Maintenance Training Manual (Manual Number 0130201) page 51 revision 17.12.2012)*

3.12 Clarity was obtained from the manufacturer of the engine as to what would be deemed a polluted environment. The manufacturer described a polluted environment as an environment, which includes dust, ash, fuel gases and sand. The manufacturer recognize dust as a valid risk causing flow path contamination."

3.13 The engine fitted to the aircraft is used in an experimental non-type certified category. This allows an authorized person (AP) to maintain the aircraft and its components including the engine.

3.1.14 Below is the photo of the engine with the bleed valve identified as item 7.

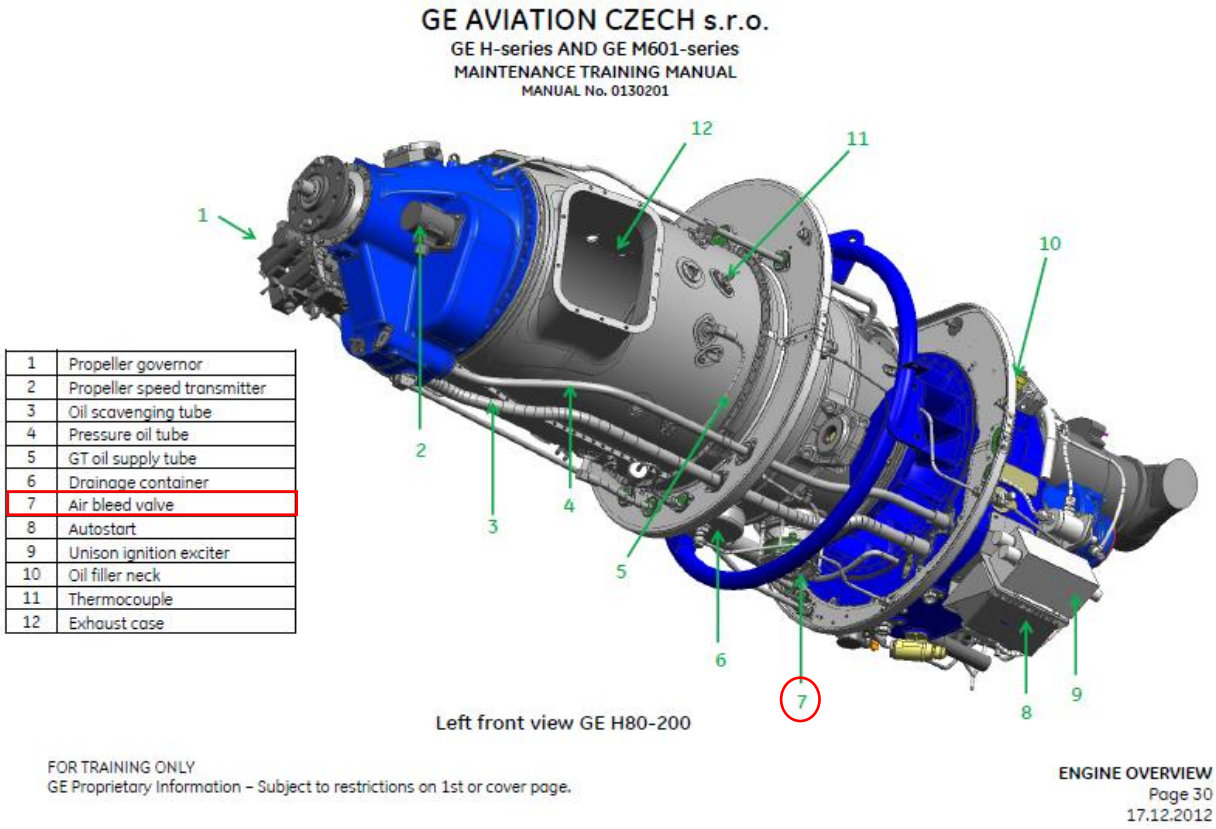


Figure 7: Location of the air bleed valve (General Electric H series and M601-Series Maintenance Training Manual revision 17.12.2012 (Manual Number 0130201) page 30.)

4. PROBABLE CAUSE

4.1 The aircraft experienced loss of engine power during take-off and as a result, the pilot aborted the take-off. There was insufficient runway length available and aircraft overshot the runway and collided with a perimeter fence.

5. CONTRIBUTING FACTOR

5.1 A contaminated bleed valve due to a lack of a compressor wash following operations in contaminated areas caused the engine power loss.

6. REFERENCES USED IN THE REPORT

6.1 South African Weather Services

6.3 General Electric H series and M601-Series Maintenance Training Manual (Manual Number 0130201)

6.4 South African Civil Aviation Regulations (SACARs), 2011

6.5 Birth of an angel, World Air News, November 2009

7. SAFETY RECOMMENDATION

7.1 None

8. ORGANISATION

8.1 The manufacturer has stated that the current definition of “polluted environments” is under review to increase the clarity of the term in maintenance and training manuals.

9. SAFETY MESSAGE

9.1 All operators operating in the contaminated areas such as the following, sea, dust, ash, flue gases and sand carry out a compressor wash in line with manufacturer’s recommendations. Doing compressor wash may remove any dirt picked up during operation, increase efficiency and longevity of the engine.

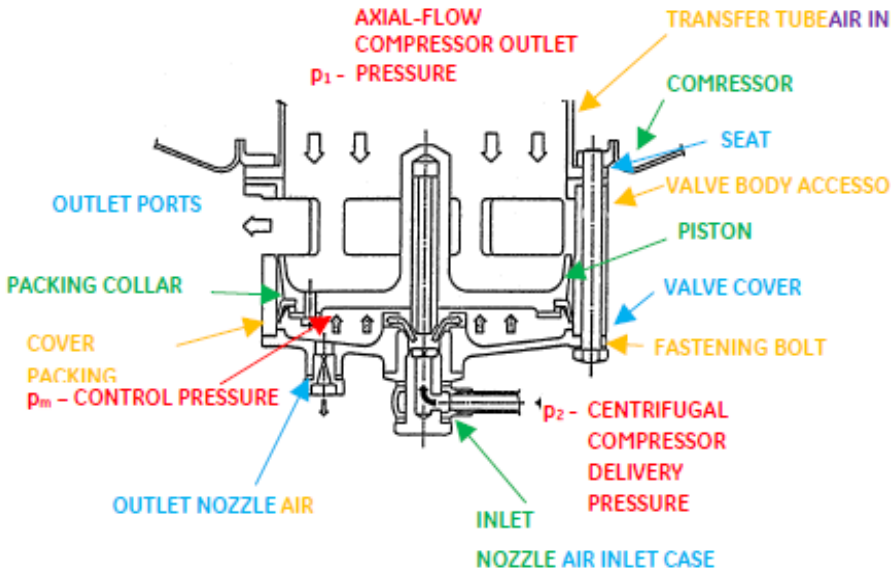
10. APPENDICES

10.1 Appendix A (Bleed valve description and operation)

10.2 Appendix B (Extract from the authorised person report)

The compressor bleed valve automatic operation follows from the principle of a pressure difference control. This is set-up by a pair of control nozzles located in the valve cover. Air is fed to the valve at the p2 pressure by a tube from the centrifugal compressor discharge. Air is discharged from the valve operation space through the outlet nozzle to the compressor inlet duct. Suitably arranged flow sections of the inlet and outlet control nozzles make it possible to achieve the required control pressure in the operating space. The valve is fully closed when the control pressure pm is greater than the axial-flow compressor discharge pressure p1. The valve piston travels proportionally to the pm/p1 ratio variation with the compressor speed; from fully open to fully closed position. As mentioned above, the time behaviour and the value of the pm control pressure is a function of crossectional area of control nozzles. The point of valve closing can be therefore adjusted by change in cross sectional area of one or both nozzles (for a given corrected speed of compressor). It is the cross sectional area of the outlet nozzle that is usually adjusted. Increasing the outlet nozzle cross sectional area results in valve closing at higher compressor speed and vice versa.

At GE H and GE M601 engine models the required range of corrected gas generator speed is 90 to 93%. This adjustment is carried out at the engine manufacturer. No check of this adjustment is necessary during engine operation. But if the compressor bleed valve is replaced by another one, this adjustment must be carried out (the outlet and inlet nozzle from the original bleed valve are installed into the new one).



Air bleed valve used on GE M601 engines

Appendix B

To whom it may concern

Incident ZS-WZP

The Walter 601 engine is known to be prone for compressor stalls in dusty conditions. ZS-WZP operates on a dirt runway and it being winter time as well as dry conditions will increase the possibilities of compressor stalls. We have experienced similar problems with Walter engines in the past and with a proper bleed valve and compressor wash these problems were eliminated.

In my personal opinion, the bleed valve did not close properly due to the dusty conditions and thus caused the compressor stall. I suggest than in future, all aircraft operating in dusty conditions need to be compressor and bleed valve washed with every 25 hour service.

Subsequently, I have already implemented this rule on all fitted with Walter 601 engines, services by us.

Yours truly