



**AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY**

				<b>Reference:</b>		<b>CA18/2/3/10568</b>	
<b>Aircraft Registration</b>	<b>ZU-IMP</b>	<b>Date of Accident</b>	22 March 2025		<b>Time of Accident</b>	1300Z	
<b>Type of Aircraft</b>	Impala Mk I		<b>Type of Operation</b>		Private (Part 94)		
<b>Pilot-in-command Licence Type</b>		Commercial Pilot Licence (CPL) Aeroplane	<b>Age</b>	59	Licence Valid	Yes	
<b>Pilot-in-command Flying Experience</b>		<b>Total Flying Hours</b>		1 896.2 (Fixed Wing)	<b>Hours on Type</b>	26	
<b>Last Point of Departure</b>		Saldanha/Vredenburg Airport (FASD), Western Cape Province					
<b>Next Point of Intended Landing</b>		Saldanha/Vredenburg Airport (FASD), Western Cape Province					
Damage to Aircraft		Destroyed					
<b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b>							
Approximately 400m from Runway 20/02 at Saldanha/Vredenburg Airport (FASD), Western Cape Province							
<b>Meteorological Information</b>		Surface Wind: 340°/13kt; Temperature: 23°C; Dew Point: 5°C; Cloud Cover: SCT006; Cloud Base: 2000ft					
<b>Number of People On-board</b>	1+0	<b>Number of People Injured</b>	0	<b>Number of People Killed</b>	1	<b>Other (On the Ground)</b>	0

**Synopsis**

On 22 March 2025, a pilot on-board an Aermacchi MB-326 Impala Mk1 aircraft with registration ZU-IMP was engaged in an aerobatic display at the West Coast Airshow, held at Saldanha/Vredenburg Airport, Western Cape province, when the accident occurred. The aircraft was operated as part of an authorised aerobatic display.

During the execution of one of the aerobatic manoeuvres, the aircraft’s nose pitched down. Subsequently, the aircraft descended rapidly and impacted the ground within the aerobatic display area, followed by a post-impact fire; the aircraft was destroyed. Emergency services responded immediately; however, the pilot was fatally injured. The investigation found that the aircraft was operated at a low airspeed during which it exhibited characteristics consistent with an aerodynamic stall, followed by a nose-down attitude and the subsequent descent towards the ground.

**Probable Cause**

The aircraft entered an aerodynamic stall during a low-level aerobatic manoeuvre which was conducted with the landing gear and flaps extended. The low altitude made recovery impossible and, hence, the resultant ground impact.

**Contributory Factors**

- Execution of the aerobatic manoeuvre at low altitude.
- Aircraft configuration with landing gear and flaps extended, resulting in increased aerodynamic drag.
- Insufficient altitude available to effect recovery from the aerodynamic stall.

SRP Date	9 June 2026	Publication Date	11 June 2026
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## Occurrence Details

**Reference Number** : CA18/2/3/10568  
**Occurrence Category** : Category 1 (Accident)  
**Type of Operation** : Private (Part 94)  
**Name of Operator** : Sakoi  
**Aircraft Registration** : ZU-IMP  
**Aircraft Make and Model** : Aermacchi, Impala MK1  
**Nationality** : South African  
**Place** : Approximately 400m from Runway 20/02, Saldanha/Vredenburg Aerodrome (FASD)  
**Date and Time** : 22 March 2025 at 1300Z  
**Injuries** : Fatal  
**Damage** : Destroyed

## Purpose of the Investigation

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 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.*

*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.*

## Investigation Process

The Accident and Incident Investigations Division (AIID) was notified of the occurrence on 22 March 2025 at 1315Z. The occurrence was classified as an accident according to the CAR 2011 Part 12 and the International Civil Aviation Organisation (ICAO) STD Annex 13 definitions. Notifications were sent to the State of Registry, Operator, and Design and Manufacturer in accordance with the CAR 2011 Part 12 and the ICAO Annex 13 Chapter 4. The States did not appoint an accredited representative and/or advisor. Investigators were dispatched to the accident site.

### Notes:

- Whenever the following words are mentioned in this report, they shall mean the following:  
Accident — this investigated accident  
Aircraft — the Impala MK1 involved in this accident  
Investigation — the investigation into the circumstances of this accident  
Pilot — the pilot involved in this accident  
Report — this accident report*
- Photos and figures used in this report were taken from different sources and may have been adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report were limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows, or lines.*

## Disclaimer

*This report is produced without prejudice to the rights of the South African Civil Aviation Authority (SACAA), which are reserved.*

## Table of Contents

Synopsis .....	1
Occurrence Details .....	2
Purpose of the Investigation .....	2
Investigation Process.....	2
Disclaimer .....	2
Contents Page .....	3
Abbreviations .....	4
1. FACTUAL INFORMATION .....	5
1.1. History of Flight .....	5
1.2. Injuries to Persons .....	11
1.3. Damage to Aircraft.....	11
1.4. Other Damage .....	12
1.5. Personnel Information.....	12
1.6. Aircraft Information .....	14
1.7. Meteorological Information .....	16
1.8. Aids to Navigation.....	16
1.9. Communication .....	16
1.10. Aerodrome Information .....	16
1.11. Flight Recorders .....	17
1.12. Wreckage and Impact Information.....	17
1.13. Medical and Pathological Information.....	22
1.14. Fire .....	22
1.15. Survival Aspects .....	22
1.16. Tests and Research.....	23
1.17. Organisational and Management Information .....	23
1.18. Additional Information .....	23
1.19. Useful or Effective Investigation Techniques.....	23
2. ANALYSIS.....	23
3. CONCLUSION .....	26
3.2. Findings .....	26
3.3. Probable Cause/s .....	28
3.4. Contributory Factor/s .....	29
4. SAFETY RECOMMENDATIONS.....	29
5. APPENDICES.....	30

<b>Abbreviation</b>	<b>Description</b>
°	Degrees
°C	Degrees Celsius
a/c	Aircraft
AIID	Accident and Incident Investigations Division
AMO	Aircraft Maintenance Organisation
ATF	Authority-to-Fly
ATPL	Airline Transport Pilot Licence
CAR	Civil Aviation Authority
C of R	Certificate of Registration
CPL	Commercial Pilot Licence
CRS	Certificate of Release to Service
CVR	Cockpit Voice Record
DAE	Display Authorisation Examiner
FASD	Saldanha/Vredenburg Airport
FCC	Flight Command Committee
FDD	Flight Display Director
FDSO	Flight Display Safety Officer
ft	Feet
FW	Fixed Wing
g	Force of gravity acting through an aircraft
H	Helicopter
m	Metres
METAR	Meteorological Aerodrome Report
QNH	Altitude Above Mean Sea Level
RWY	Runway
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
UTC	Co-ordinated Universal Time
VMC	Visual Meteorological Conditions
Z	Zulu (Term for Universal C-ordinated Time – Zero Hours Greenwich)

## 1. FACTUAL INFORMATION

### 1.1. History of Flight

- 1.1.1. On Saturday, 22 March 2025, a pilot on-board the Aermacchi MB-326 Impala MK1 aircraft with registration ZU-IMP was engaged in the West Coast Saldanha Airshow aerobatic display flight held at Saldanha/Vredenburg Airport (FASD) in Western Cape province. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011, as amended.
- 1.1.2. The airshow was originally planned to begin at 0700Z; however, because the weather conditions in the morning were unfavourable (due to low visibility, rain, clouds or wind), the airshow was delayed by five hours; it only began at 1200Z once the weather conditions had improved for safe flying and proper viewing.
- 1.1.3. The ZU-IMP was one of the aircraft scheduled for aerobatic display and was third in line. The aircraft was refuelled to capacity with Jet A-1 fuel. The capacity of the tanks was 425 litres (L).
- 1.1.4. The pilot had attended the required safety briefing as per the Safety Air Events Handbook, as well as submitted a flat display sequence (which he was going to perform). He also signed an indemnity form which acknowledged the conditions associated with participating in special air events. According to available information, the pilot was issued a Temporary Display Flight Validation clearance for Special Air Events with a 200 feet (ft) low level limit that was signed on the day of the airshow (22 March 2025).
- 1.1.5. The description of the aerobatic flat display sequence was as follows:
- Top view entry from 45°manoeuvre
  - Slow flypast aileron roll (flaps and gear down)
  - Steep turn (flaps and gear down)
  - Inverted flypast
  - Level slow roll
  - Steep turn
  - High speed flypast (roll)
- 1.1.6. The aircraft took off as per the airshow programme slot (from Runway 02 at approximately 1255Z). After take-off, the pilot flew towards the north, made a turn approximately 200ft AGL, and executed a flypast towards the south; he then conducted an inverted manoeuvre with the gear and flaps extended (dirty roll). At this point, the aircraft's speed was slow and the nose faced up; thereafter, the nose pitched down. The speed deteriorated even

further with the nose still facing down. The pilot levelled the position of the aircraft; whilst still in level position, the right wing dipped and touched the ground. The aircraft then skidded on its belly for about 120 metres (m) during which some of the aircraft parts detached from the fuselage before it stopped. Thereafter, fire erupted and consumed about 80 percent of the aircraft (from the nose towards the tail section). The aircraft was destroyed, and the pilot was fatally injured.

- 1.1.7. A video footage from the airshow organisers was handed over to the Accident and Incident Investigations Division (AIID); it was reviewed in the presence of AIID by pilots who were rated on the aircraft type (Aermacchi MB-326) and who had previously flown a similar type. The footage depicted the pilot when he initiated an inverted left roll with the aircraft configured for landing (landing gear extended and flaps down) at an altitude of less than 200ft AGL. The aircraft appeared to be flying at a low airspeed, followed by what seemed like an aerodynamic stall and a pitched-down nose; it then descended towards the ground. Thereafter, the right wing dipped and struck the ground; dust ensued and engulfed the aircraft as it tumbled forward until it rested. Moments later, white smoke followed by thick black smoke and fire engulfed the aircraft. The video footage did not show the pilot ejecting from the aircraft.
- 1.1.8. The first eyewitness who was attending the airshow stated that the ZU-IMP pilot performed a “dirty roll” (with the landing gear and flaps extended) manoeuvre to demonstrate the aircraft’s capabilities. At the top of the roll, the aircraft’s nose pitched down. As the aircraft continued to roll to level-wings position, it lost significant altitude. The aircraft appeared to stall, the nose pitched down and the aircraft disappeared behind the hangars. Moments later, white smoke followed by thick black smoke emanated from behind the hangars.



**Figure 1:** The aircraft in a nose-down attitude with the undercarriage and flaps extended (dirty roll manoeuvre). (Source: Airshow video footage)



**Figure 2:** The right wing begins dipping to the right. (Source: Airshow video footage)



**Figure 3:** The right wing dipping right. (Source: Airshow video footage)



**Figure 4:** The right wing impacts the ground. (Source: Airshow video footage)



**Figure 5:** The aircraft impacts the ground. (Source: Airshow video footage)



**Figure 6:** The aircraft disintegrates. (Source: Airshow video footage)



**Figure 7:** Post-impact fire eruption. (Source: Airshow video footage)

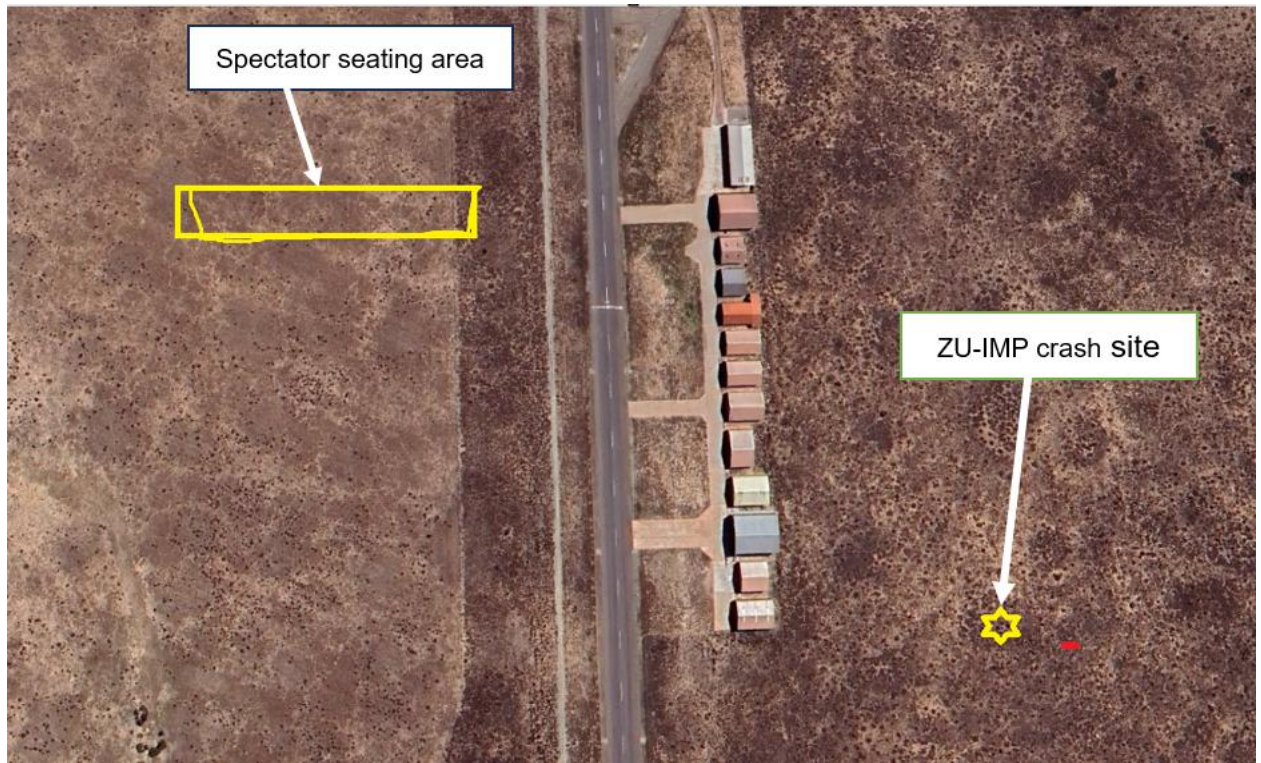
1.1.9. The second eyewitness who was with the Flight Command Committee at the airshow stated: *“I glanced at the marksmen display and the next act was the Impala ZU-IMP aircraft. I handed the display sequence which the pilot had given during the briefing to the Flight Display Safety Officer (FDSO). As far as I can remember, it was before 1300Z when the pilot commenced the display. During the performance, the aircraft did a flypast from left to right, followed by a turn and another flypast from right to left. I observed the pilot perform a roll during which the undercarriage was visible. Afterward, it appeared (as though) the pilot rolled back, and the nose of the aircraft pointed downward as it began to lose altitude. I then saw the aircraft fly over the hangars, and the next moment, an explosion occurred, followed by thick smoke. The FDSO activated the Joint Operation Centre (JOC), I overheard someone nearby mention that it was 1259Z. The crash alarm was activated, and emergency services were dispatched. Despite the swift response, the pilot succumbed to his injuries and the aircraft was destroyed.”*



**Figure 8:** Thick smoke billowing from behind the hangars. (Source: Eyewitness)

1.1.10. According to the second eyewitness, the Flight Display Director (FDD) and FDSO regrouped at the JOC; the FDD suspended further flying at 1316Z and the airshow was terminated.

1.1.11. The accident occurred during daylight approximately 400 metres (m) from the left of FASD Runway 02 at Global Positioning System (GPS) co-ordinates determined to be 32°57'47" South 017°58'20" East, at an elevation of 33ft.



**Figure 9:** The layout, seating arrangement and the approximate accident site at the airshow.  
(Source: Event organiser)

## 1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	1	-	-	1	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	-	-	-	-	-
<b>Total</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>-</b>

Note: Other means people on the ground.

## 1.3. Damage to Aircraft

1.3.1. The aircraft was destroyed by impact forces and post-impact fire.



**Figure 10:** The wreckage after the fire was extinguished.

#### 1.4. Other Damage

1.4.1. Vegetation (grass) was destroyed by post-impact fire.

#### 1.5. Personnel Information

Nationality	South African	Gender	Male	Age	59
Licence Type	Commercial Pilot Licence (CPL) Aeroplane Airline Transport Pilot Licence (ATPL) Helicopter				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Class 1 Test Pilot (FW and H) rating and Flight Instructor rating				
Medical Expiry Date	31 July 2025				
Restrictions	Corrective lenses				
Previous Accidents	None				

Note: Previous accidents refer to past accidents the pilot was involved in, when relevant to this accident.

#### **Flying Experience:**

Total Hours	1 896.2 (FW) and 4 317.2 (H)
Total Past 24 Hours	Unknown
Total Past 7 Days	Unknown
Total Past 90 Days	11
Total on Type Past 90 Days	2
Total on Type	26

1.5.1. The flying hours depicted in the table above were obtained from the Temporary Display Flight Validation clearance form.

1.5.2. The pilot had two licence categories: a Commercial Pilot Licence (CPL) for aeroplanes and an Airline Transport Pilot Licence (ATPL) for helicopters.

- 1.5.3. Both licences were initially issued on 3 December 2013 under the provisions of Part 61 of the CAR 2011. The licences were revalidated on 12 July 2024 with an expiry date of 31 July 2025.
- 1.5.4. The pilot had a Class 1 medical certificate that was issued on 3 July 2024 with an expiry date of 31 July 2025.
- 1.5.5. The pilot's most recent aviation medical examination was conducted on 3 July 2024. At the time of issue, no history, symptoms or clinical evidence of medical condition was reported by the pilot or identified by a Designated Aviation Medical Examiner (DAME).

Pilot Experience (Aerobatics)

- 1.5.6. According to available information, the pilot had extensive helicopter flying experience, including significant exposure to advanced aircraft handling and display flying during his military service.
- 1.5.7. Available information showed that this was the pilot's first participation in a civilian air display. As per the Temporary Display Flight Validation clearance, the pilot was expected to conduct a flat display profile; however, observations indicated an aerobatic manoeuvre performance instead.
- 1.5.8. Based on the SACAA database, the pilot did not have a valid aerobatic rating in terms of Part 61 of the CAR 2011 (CAR). Part 61 Subpart 27 states:

*Requirements for an aerobatics rating (Graduate) 61.27.1*

*(1) An applicant for an aerobatics rating (Graduate) must—*

*(c) have completed the aerobatics training course prescribed in South African Civil Aviation Technical Standards (SA-CATS) 61;*

*(e) have passed the skills test demonstrating to an aerobatics examiner, as appointed by an approved or designated aerobatics sport controlling body and ratified by the Director, that he or she can fly a linked sequence of spin, loop, stall turn and roll in a safe and controlled manner*

*(2) The skills test referred to in Subregulation (1) must have been passed within 30 days immediately preceding the date of application.*

*(3) The application must be accompanied by the skills test report as prescribed in Document SA-CATS 61 and the prescribed fee, which shall be not more than the fee prescribed in Part 187, if set by an issuing authority other than the Director.*

- 1.5.9. The SACAA did not receive the pilot's application for Display Authorisation prior to the airshow.

1.5.10. According to available information, the pilot was issued a once-off Temporary Display Flight Validation clearance which was signed by a duly approved Display Authorisation Examiner (DAE) for the pilot to participate in the airshow. However, this constituted non-compliance with the applicable regulatory requirements as the pilot did not have a valid aerobatic rating at the time.

Display Authorisation Examiner

1.5.11. The DAE was initially issued an ATPL (Aeroplane) on 23 November 2010. The licence was revalidated on 1 December 2024 with an expiry date of 31 December 2025.

1.5.11. The DAE was issued a Class 1 medical certificate on 30 August 2024 with an expiry date of 31 August 2025.

1.5.13. The DAE stated that, in addition to the standard briefings and discussions conducted during the pilot's validation, pre-reading study material was provided to the pilot prior to the flight. Thereafter, the DAE conducted 1.9 hours of flight instruction with the pilot, covering the various individual manoeuvres and sequences in accordance with the prescribed training syllabus.

## 1.6. Aircraft Information (Source: Pilot's Operating Handbook)

1.6.1. *The Impala Mk I is a tandem-seat jet trainer powered by a single Viper-22 (Armstrong-Siddeley) turbojet engine. It features a low-wing configuration with a straight-wing design optimised for stability and ease of handling. The aircraft is also equipped with a tricycle landing gear, which enhances ground handling and pilot visibility. Originally developed in Italy by Aermacchi, it was later produced under license by Atlas Aircraft Corporation in South Africa. The Mk I variant was primarily used for pilot training.*



Figure 11: The file picture of the ZU-IMP aircraft. (Source: [www.Planespotters.net](http://www.Planespotters.net))

**Airframe:**

Manufacturer/Model	Aermacchi MB-326/Impala Mk I	
Serial Number	479	
Year of Manufacture	1964	
Total Airframe Hours (At Time of Accident)	3 515.1	
Last Inspection (Date & Hours)	13 September 2024	3 505.8
Airframe Hours Since Last Inspection	9.3	
CRS Issue Date	13 September 2024	
ATF (Issue Date & Expiry Date)	23 May 2024	31 May 2025
C of R (Issue Date) (Present Owner)	7 September 2024	
Operating Category	Airshow	
Type of Fuel Used	Jet A-1	
Previous Accidents	None	

Note: Previous accidents refer to past accidents the aircraft was involved in, when relevant to this accident.

- 1.6.2. The ZU-IMP was a civilian-registered aircraft (Atlas MB-326M Impala Mk I) formerly operated by the South African Air Force (SAAF) as aircraft number 479. After it was retired at SAAF, it was acquired by private owners and soon became a regular feature in the South African airshows, showcasing the aircraft's agility and performance.
- 1.6.3. According to the aircraft maintenance records, Martin Baker Type MK ASO6A ejection seats were fitted to the aircraft. Both ejection seats – front seat serial number (S/N) 1217 and rear seat S/N 1219 – were removed from the aircraft for mandatory periodic inspection (MPI) maintenance on 26 October 2024. The seats were reinstalled on 11 December 2024.
- 1.6.4. According to the safety team at the airshow, all safety pins associated with ejection system were removed in preparation for the flight, and no abnormalities were reported with the system during the pre-flight checks.

**Engine:**

Manufacturer/Model	Viper-22 (Armstrong-Siddeley engine)
Serial Number	TO-282
Part Number	14974
Hours Since New	865.
Hours Since Overhaul	Not yet reached

## Weight and Balance

Item	Weight (kg)
Basic Empty Weight	3.050kg
Pilot	90kg
Fuel onboard	425kg
Max Take-off weight	5.300kg

1.6.5. The aircraft was operating within the prescribed weight and balance limitations as specified in the manufacturer's documentation. The total weight, including fuel, occupant, additional equipment and/or payload did not exceed the maximum allowable take-off weight (MTOW).

## 1.7. Meteorological Information

1.7.1. The weather information was obtained from the South African Weather Service (SAWS) website issued for 22 March 2025.

Wind Direction	340°	Wind Speed	13kt	Visibility	9 999m
Temperature	23°C	Cloud Cover	SCT	Cloud Base	2000ft
Dew Point	5°C	QNH	1011hPa		

## 1.8. Aids to Navigation

1.8.1. The aircraft was equipped with standard navigational equipment as approved by the Regulator (SACAA). There were no records indicating that the navigational equipment was unserviceable before the flight.

## 1.9. Communication

1.9.1. The aircraft was equipped with a standard communication system as approved by the Regulator. There were no recorded defects with the communication system before the flight.

## 1.10. Aerodrome Information

1.10.1. FASD, located in Vredenburg, Western Cape in South Africa is a mid-size public use airport. It features a single asphalt Runway 02/20 and is 1419m in length.

Aerodrome Location	Vredenburg Bay, Western Cape Province
Aerodrome Status	Licensed
Aerodrome GPS coordinates	32°58.23' South 17°58.18' East
Aerodrome Elevation	164ft
Runway Headings	021°/201°
Dimensions of Runway Used	4655 x 82 feet / 1419m x 25m
Heading of Runway Used	021°
Surface of Runway Used	Asphalt
Approach Facilities	Lights
Radio Frequency	A/C must obtain clearance from Langebaan Military Approach air traffic control 0122.5 MHz or Tower air traffic control 120.8 / 128,8 MHz

### 1.11. Flight Recorders

1.11.1. The aircraft was neither equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was it required by regulation to be fitted to the aircraft type.

### 1.12. Wreckage and Impact Information

1.12.1. The accident occurred at FASD, approximately 400m to the left of Runway 02. After ground impact, a force exceeding 12g was recorded on the detached G-meter instrument, consistent with a high-energy crash. *An aircraft G-meter (or accelerometer) is a flight instrument that measures the acceleration forces acting on an aircraft along its vertical axis, it helps pilots monitor structural load limits and maintain safety, particularly during aerobatics, turbulence, or unusual attitude recovery. In simple terms, a G meter measures how many times the force of gravity the airplane is subjected to, where 1 G is straight and level, unaccelerated flight.* (Source: <https://www.aopa.org>).

1.12.2. The accelerometer, which records changes in the acceleration force was located approximately 5m to the right of the main wreckage. Its displacement from the wreckage suggested that it was either forcibly ejected due to the impact forces or it detached as the structure around it was destroyed.



**Figure 12:** The detached accelerometer (G-meter) found near the wreckage.

1.12.3. The aircraft impacted the ground with the right wing first. It skidded approximately 130m from the first point of impact to its resting position, where it rested on its belly. The resting position was oriented 175 degrees magnetic heading. Approximately two-thirds of the airframe was destroyed because of the impact. The post-impact fire consumed the fuselage from the nose to the mid-section. The detached components were found scattered along the impact trajectory which suggested that they had separated from the aircraft either during the initial impact or as the wreckage travelled (tumble) forward.



**Figure 13:** The wreckage post-accident with hangars in the background.

1.12.4. The canopy was found approximately 50m behind the main wreckage which suggested that it separated either in-flight or during the impact sequence. Its position, relative to the rest of the debris, suggested that it may have been dislodged due to aerodynamic forces, structural failure or during ground contact.



**Figure 14:** The recovered jettisoned canopy.

1.12.5. The right wing separated from the main fuselage when the aircraft skidded after the crash. The wing skin was severely torn, exposing internal components including ribs and spars. Jagged and bent metal edges suggested a high-stress separation after high impact with the ground; it was located approximately 60m behind the main wreckage which suggested that it detached due to impact forces or structural failure as the aircraft was still in motion on the ground. The position of the wing, in relation to the rest of the wreckage, indicated that it might have broken off whilst the aircraft was tumbling forward.



**Figure 15:** The right wing showing structural failure and the damaged hydraulic line.

1.12.6. Large sections of the panels were charred and melted, which indicated exposure to intense heat. Some areas were completely blackened and fused together because of the

fire. The burn patterns on the aircraft were uneven due to heat exposure, with some instruments retaining partial structure whilst others were destroyed. Most dials, screens and switches were either missing, warped or burnt beyond recognition. Some circular instrument housings remained intact, but their glass and internal mechanisms were either shattered or melted. The right-most section was almost entirely reduced to ashes, which suggested higher heat concentration. The instrument panel was fragmented, which meant that it broke upon impact. The level of fire damage suggested that the cockpit was engulfed in flames post-impact, likely caused by residual fuel or electrical system ignition.



**Figure 16:** The damaged instrument panels.

1.12.7. The aircraft was equipped with a ballistic recovery system (BRS). The main rear parachute and rocket motor assembly were recovered at the accident site. The rear parachute was found intact and still packed (see Figures 17 and 18), and the rocket motor had not fired (see Figure 19). Figure 20 shows a fired rocket motor.



**Figures 17 and 18:** The front and the rear seat.

1.12.8. Examination of the wreckage and available evidence did not reveal an attempt made to activate the ballistic recovery system.



**Figures 19 and 20:** The rocket motor assembly which was not fired (left), and one that was fired (right).

### **1.13. Medical and Pathological Information**

1.13.1. The pilot's recent aviation medical examination was conducted on 3 July 2024. At that time, no history, symptoms or clinical evidence of underlying medical conditions was reported by the pilot or identified by the DAME.

1.13.2. The post-mortem examination determined that the pilot sustained multiple traumatic injuries consistent with high-energy impact. Evidence of vital reactions confirmed that the injuries were sustained ante-mortem. The cause of death was attributed to multiple injuries sustained during impact. A cardiovascular pathological finding identified during the examination was medically recognised as capable of causing sudden incapacitation.

### **1.14. Fire**

1.14.1. There was a post-impact fire. The Airport Rescue and Firefighting (ARFF) personnel responded swiftly to the accident site; however, due to the intensity of the fire, approximately half of the fuselage had already been consumed.

### **1.15. Survival Aspects**

1.15.1. The accident was not survivable due to the severity of the impact and the subsequent fire. The cockpit structure sustained catastrophic damage upon impact with the ground and compromised its integrity.

1.15.2. The pilot was equipped with the required safety equipment, including a fire suit and helmet, at the time of the display.



**Figure 21:** The cockpit structure.

## **1.16. Tests and Research**

1.16.1. None.

## **1.17. Organisational and Management Information**

1.17.1. The special event was granted approval by the Regulator on 19 March 2025, following the submission of the required documentation and safety plans by the event organisers.

1.17.2. The event, originally scheduled for 0700Z, was delayed by approximately five hours due to reduced visibility and a low cloud base. It commenced at 1200Z once the weather conditions met operational and regulatory requirements.

## **1.18. Additional Information**

1.18.1. The aircraft was destroyed during the accident sequence. The destruction was caused by ground impact and post-impact fire. The detached components scattered along the impact trajectory over a considerable distance.

1.18.2. The accident site had to be tested by a radiologist to determine the level of radiation before approval was granted to commence with the accident investigation.

1.18.3. As per the CAR Part 1: *“an aerobatic flight means manoeuvres intentionally performed by the pilot in command (PIC) of an aircraft and involving an abrupt change in attitude of the aircraft, an abnormal attitude or an abnormal variation in speed, not necessary for normal flight”*.

## **1.19. Useful or Effective Investigation Techniques**

1.19.1. None.

## **2. ANALYSIS**

### **2.1. General**

From the available evidence, the following analysis was made with respect to this accident. This shall not be read as apportioning blame or liability to any organisation or individual.

## 2.2. Analysis

### Pilot

2.2.1. This was the pilot's first participation in a civilian air display. Whilst the pilot possessed extensive prior flying experience, including exposure to aerobatic and display flying in a military environment, civilian air displays operate under specific planning constraints, sequencing, and regulatory expectations that might differ from military display practices.

The intended profile for the flight was a flat display; however, recorded observations indicated aerobatic manoeuvres performance instead. This deviation from the planned display sequence suggested that the display profile was altered during the flight. The reason for this change could not be determined from the available information.

2.2.2. At the time of the occurrence, the pilot did not have a valid aerobatic rating as required under Part 61 of the Civil Aviation Regulations (CAR), 2011. Although a Temporary Display Flight Validation clearance was issued by the Display Authorisation Examiner (DAE) in accordance with the Special Events Handbook, the absence of the required aerobatic rating meant that the authorisation did not comply with applicable CAR requirements as stated in SA-CATS Part 61.

2.2.3. From an operational and regulatory perspective, the absence of documented aerobatic competency approval was considered relevant to the investigation as the flight was conducted without formal regulatory confirmation of the pilot's aerobatic authorisation. The investigation noted a discrepancy between the applicable provisions of the Special Events Handbook and the authorisation process followed for the event.

2.2.4. The DAE had a valid licence and medical certificate at the time of the accident.

### Medicals

2.2.5. The pilot's most recent aviation medical examination was conducted on 3 July 2024. At that time, no history, symptoms or clinical evidence of cardiac disease was reported or identified.

2.2.6. The post-mortem examination confirmed that the pilot sustained multiple traumatic injuries consistent with high-energy impact. Vital reactions (physiological responses of the body which occur only when a person is still alive) established that the injuries were sustained while the pilot was alive, and the cause of death was attributed to impact-related trauma.

2.2.7. Medical findings indicated a possibility of incapacitation that might have contributed to the accident. However, the investigation team could not conclusively establish a direct causal

relationship between the identified cardiac pathology and the accident as available evidence suggested that the aircraft remained under apparent control until ground impact. The investigation considered the probability that the incapacitation occurred during or after the impact sequence.

## Aircraft

2.2.8. Maintenance documentation, certification records and wreckage examination revealed no evidence of pre-impact mechanical or structural failure. The aircraft was airworthy, properly maintained and operated within the prescribed limitations at the time of the accident. Technical malfunction was, therefore, considered unlikely to have contributed to the accident.

2.2.9. The manoeuvre was conducted at low altitude with the aircraft in high-drag (dirty) configuration, and with the landing gear and flaps extended. *This configuration increases aerodynamic drag and might adversely affect aircraft energy state, roll response characteristics, and available recovery margins.*

2.2.10. The progressive drop of the right wing was indicative of a possible aerodynamic stall of the right wing, reduced roll control effectiveness, or an asymmetric aerodynamic condition. The altitude at which the manoeuvre was executed provided limited height above ground level, thereby, significantly reducing the available margin for recovery once control was compromised.

2.2.11. A review of the video evidence indicated that the time interval between the initial right-wing drop and ground impact was brief. The limited time available would have reduced the opportunity for effective corrective action prior to impact.

2.2.12. Available evidence, including eyewitness statements and the observed flight profile, indicated that the aircraft remained under apparent control during the final phase of flight until impact with the ground. The aircraft's trajectory and attitude changes were consistent with controlled flight, and no evidence was identified to indicate a total loss of controllability prior to the accident sequence.

2.2.13. The aircraft was equipped with a ballistic recovery system. Examination of the parachutes and rocket motor assembly recovered at the accident site confirmed that the system had not been activated. The parachute remained packed; although some rocket motors exhibited evidence of ignition, others did not, indicating that the activation sequence was incomplete and that the ballistic recovery system did not deploy.

2.2.14. Although the possibility of a system malfunction could not be entirely excluded, examination of the recovered components and available evidence did not identify any anomalies or failures that would have prevented normal operation or resulted in the non-deployment of the system. No evidence was found to indicate a pre-impact malfunction of the ballistic recovery system or its associated activation components.

#### Weather

2.2.15. The meteorological conditions were suitable for air display operations. However, the scattered cloud base at approximately 2 000ft above ground level may have imposed limitations on vertical manoeuvres. The surface wind of 13 kts was within the acceptable limits and would have not adversely affected display operations. Whilst the cloud base may have influenced the vertical extent of manoeuvres, the prevailing meteorological conditions were not considered a contributing factor to this accident.

### 3. CONCLUSION

#### 3.1. General

From the available evidence, the following findings, causes and contributing factors were made with respect to this accident. These shall not be read as apportioning blame or liability to any organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusion heading:

- **Findings** — are statements of all significant conditions, events, or circumstances in this accident. The findings are significant steps in this accident sequence, but they are not always causal or indicate deficiencies.
- **Causes** — are actions, omissions, events, conditions, or a combination thereof, which led to this accident.
- **Contributing factors** — are actions, omissions, events, conditions or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident occurring, or would have mitigated the severity of the consequences of the accident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability.

#### 3.2. Findings

##### Pilot

3.2.1. The pilot had a valid Commercial Pilot Licence (Aeroplane) and an Airline Transport Pilot Licence (Helicopter) that was issued in accordance with Part 61 of the Civil Aviation

Regulations, 2011. Both licences were valid until 31 July 2025. The pilot also had a Class 1 medical certificate, valid until 31 July 2025 and with no restrictions.

- 3.2.2. The pilot had a Class 1 Test Pilot rating and was endorsed as a flight test instructor.
- 3.2.3. The pilot submitted a flat display sequence that was signed by the DAE on the day of the airshow.
- 3.2.4. The pilot submitted a Temporary Display Authorisation signed by the DAE on the day of the event; however, no Display Authorisation was issued and approved by the Regulator.
- 3.2.5. At the time of the accident, the pilot did not have a valid aerobatic rating as required under Part 61 of the Civil Aviation Regulations (CAR), 2011. A Temporary Display Flight Validation clearance was issued by the Display Authorisation Examiner (DAE) in accordance with the Special Events Handbook.
- 3.2.6. This discrepancy indicated that the Special Events Handbook was inconsistent with the mandatory licensing requirements under the CAR, which remained applicable and not superseded by the handbook.

#### Medicals

- 3.2.7. Medical examination identified cardiac pathology that may have resulted in the pilot's incapacitation.
- 3.2.8. It was considered probable that incapacitation might have occurred during or subsequent to the impact sequence.

#### Mission

- 3.2.9. This was a private air display flight conducted at the airshow at Saldanha/Vredenburg Airport.

### Aircraft

3.2.10. Maintenance documentation, certification status and wreckage examination indicated no pre-impact mechanical or structural failure. The aircraft was airworthy, properly maintained and operated within limitations at the time of the occurrence.

3.2.11. The aircraft remained under apparent control until ground impact.

3.2.12. The aircraft was equipped with a ballistic recovery system. Examination of the rear main parachute and rocket motor assembly confirmed that the system was not activated as the parachute remained packed and most rocket motors showed no evidence of ignition. There was no indication that the activation mechanism had been engaged prior to impact.

### Organisation

3.2.13. The special air event was approved by the Regulator on 19 March 2025 following submission and evaluation of the required documentation, including safety plans and operational procedures, confirming compliance with the regulatory requirements and inclusion of appropriate risk mitigation and emergency arrangements.

3.2.14. The event, originally scheduled for 0700Z, was delayed by approximately five hours due to reduced visibility and a low cloud base. It commenced at 1200Z once the weather conditions met operational and regulatory requirements.

3.2.15. The delay was co-ordinated with the event organisers and the regulatory authority, and all participants were briefed on the revised schedule.

### Weather

3.2.16. The meteorological conditions were considered suitable for air display operations.

3.2.17. Scattered clouds were reported with a base of approximately 2 000ft above ground level which may have imposed limitations on vertical manoeuvres.

3.2.18. The surface wind of 13 kts was within the acceptable operational limits and was not considered to have had an adverse effect on the conduct of the display.

## **3.3. Probable Cause**

3.3.1. The aircraft entered an aerodynamic stall during a low-level aerobatic manoeuvre that was conducted with the landing gear and flaps extended. The low altitude available made

recovery impossible and, hence, the resultant ground impact.

### **3.4. Contributory Factors**

- 3.4.1. Execution of the manoeuvre at low altitude.
- 3.4.2. Aircraft configuration with landing gear and flaps extended, resulting in increased aerodynamic drag.
- 3.4.3. Insufficient altitude available to effect recovery from the aerodynamic stall.

## **4. SAFETY RECOMMENDATIONS**

### **4.1. General**

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The AIID expects that all safety issues identified by the investigation are addressed by the receiving States and organisations.

### **4.2. Safety Recommendation/s**

- 4.2.1. It is recommended that the South African Civil Aviation Authority (SACAA) reviews and update the Aeronautical Information Circulars (AICs) 19-1 that are applicable to special events.
- 4.2.2. It is recommended that the South African Civil Aviation Authority (SACAA) reinforces compliance with display authorisation requirements by implementing stricter monitoring and enforcement measures for participation in airshows and public aviation events.

#### Rationale

Investigation established that the pilot participated in an airshow without the SACAA-issued Display Authorisation. Although the pilot was validated for a flat display sequence on the day by a DAE, the sequence contained aerobatic manoeuvres which would have required an associated verification and validation by the Regulator prior to his participation in the event.

#### Recommended Actions

- 1. Conduct regular audits of airshow organisers to ensure that all participating pilots have valid display authorisation appropriate to the aircraft type and display manoeuvres.

2. Enhance education and awareness campaigns targeting both pilots and event organisers regarding the legal and safety implications of operating without a DA.
3. Encourage event organisers to co-ordinate with the SACAA and relevant oversight bodies well in advance to verify compliance with all safety and regulatory requirements.

#### Operator Responsibility for Wreckage Post-investigation

It is recommended that the following suggestion is included in the manual of procedure for the airshows to ensure maintenance of a safe environment following an aviation accident:

All owners and operators participating in an airshow display should maintain responsibility to take custody and arrange for proper handling, storage or disposal of the aircraft wreckage once the official investigation at the accident scene is concluded. This includes the availability of specialists on-site to contain live canisters and radioactive material.

**Note:** Safety recommendations were issued with the preliminary report.

## **5. APPENDICES**

5.1. None.

**This report is issued by:**

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