



**LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL**

<b>Reference Number</b>	CA18/2/3/10598						
<b>Classification</b>	Accident		<b>Date</b>	23 August 2025		<b>Time</b>	0803Z
<b>Type of Operation</b>	Private (Part 91)						
<b>Location</b>							
Place of Departure	Vereeniging Airport (FAVV), Gauteng Province		Place of Intended Landing	George Airport (FAGG), Western Cape Province			
Place of Occurrence	On a private farm, south of Thembaletu township in George, Western Cape Province						
GPS Co-ordinates	Latitude	34° 01' 05.30" S	Longitude	22° 29' 59.48" E	Elevation	484ft	
<b>Aircraft Information</b>							
Registration	ZS-IZN						
Make; Model; S/N	Rockwell 500S Shrike Commander (Serial Number: 500S-3132)						
Damage to Aircraft	Substantial		Total Aircraft Hours	277.2			
<b>Pilot-in-command</b>							
Licence Type	Private Pilot Licence (PPL)		Gender	Male		Age	41
Licence Valid	Yes	Total Hours	168		Total Hours on Type	22	
Total Hours 30 Days	10		Total Flying on Type Past 90 Days	22			
<b>People On-board</b>	2+0	<b>Injuries</b>	1	<b>Fatalities</b>	0	<b>Other (on ground)</b>	0
<b>What Happened</b>							
<p>On Saturday morning, 23 August 2025, two pilots on-board a Rockwell 500S Shrike Commander twin-engine aircraft, registered ZS-IZN, took off on a private flight from Vereeniging Airport (FAVV) in Gauteng province to George Airport (FAGG) in Western Cape province. A flight plan was filed for the flight. The flight was conducted under instrument flight rules (IFR) by day and in accordance with the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011, as amended.</p> <p>According to the pilot flying (PF), a pre-flight inspection was conducted with no abnormalities noted. The aircraft was refuelled with 560 litres (L) of Aviation Gasoline (Avgas) from the storage drums in the hangar in Vereeniging. The PF stated that he had obtained a weather briefing which showed no significant weather along the route. As per the advice of the safety pilot (the second pilot on-board), the PF had filed the flight plan in the same format that was used in a previous flight on 21 August 2025. The flight plan details were as follows:</p>							

(FPL-ZSIZN-IG  
-AC50/L-V/C  
-FAVV0400  
-N0190F100 DCT BLV DCT FAGA DCT FAGR DCT  
-FAGG0330 FAPE  
-DOF/250823 REG/ZSIZN OPR/ [REDACTED] RMK/SARNML  
REFID220801029)

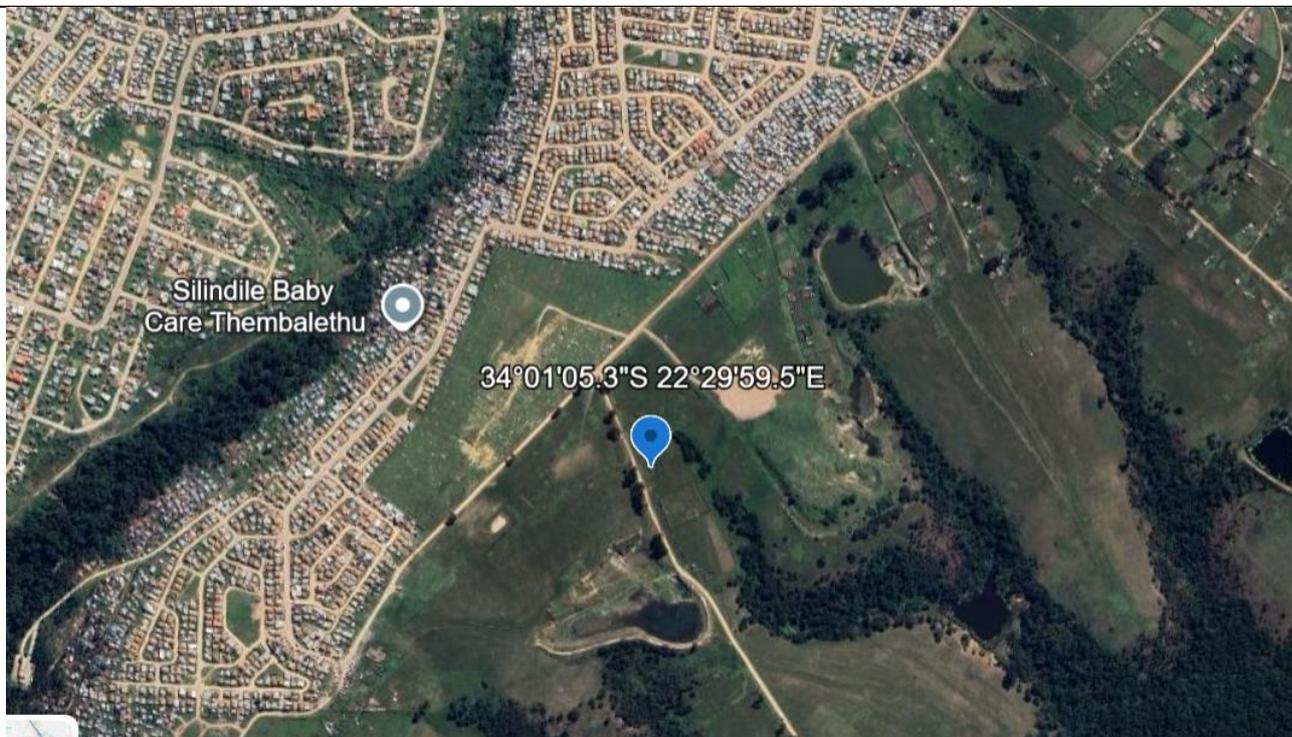
The take-off and initial leg of the flight to Bram Fischer International Airport (FABL) were uneventful. Whilst overhead FABL, the PF queried whether fuel uplift was required, to which the safety pilot responded that the fuel levels were still sufficient; he advised the PF to continue with the flight to FAGG.

After approximately 3 hours and 50 minutes of total flight time (as per the air traffic control [ATC] recordings), the safety pilot requested an Instrument Landing System (ILS) approach to Runway 29 at FAGG on frequency 118.9-Megahertz (MHz). The request was acknowledged by FAGG Approach. Approximately 40 minutes prior to the estimated time of arrival at FAGG whilst the aircraft was approximately 180 kilometres out, the low fuel warning light illuminated in the cockpit. Despite the activation of this warning system (intended to alert pilots of fuel management) the PF asked the safety pilot to confirm if they were still okay. The safety pilot's response was that all was good and that they would make it. Thus, the crew continued with the flight, opting not to divert or conduct a precautionary landing.

The ATC routed the aircraft overhead the airport, out to sea, and on to final approach for Runway 29. Whilst on approach at a height of approximately 3000 feet (ft), the aircraft's dual engines failed. The PF handed the control of the aircraft to the safety pilot who initiated a glide and executed a forced landing on a private farm, south of Thembaletu township in George. The aircraft sustained substantial damage during the landing sequence.

Emergency services were promptly notified and they swiftly responded to the scene. The PF was seriously injured; he received first aid treatment before being transported to a local hospital. The safety pilot had no visible injuries but was also transported to the hospital for medical evaluation.

The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 34°01'05.30" South 22°29'59.48" East, at an elevation of approximately 584 ft.



**Figure 1:** The approximate location of the accident site. (Source: Google Earth)



**Figure 2:** The aircraft at the accident site.

### History of Previous Flights

On Thursday, 21 August 2025, the aircraft took off from FAVV to FAGG. The pilot had a Private Pilot Licence (PPL) and was the PF. Due to limited experience with long-distance flights, the PF had requested the assistance of a pilot with an Airline Transport Pilot Licence (ATPL) to act as a safety pilot for the duration of the flight (at a fee).

Approximately 40 minutes prior to arrival at FAGG, the low-level fuel warning light illuminated, indicating a critically low fuel quantity. Despite the warning, the PF continued with the flight to FAGG. According to the ATC recordings, during the approach phase, the safety pilot requested an ILS approach from ATC on frequency 118.9-MHz, which was acknowledged. The aircraft landed without incident. After landing, the aircraft was refuelled with 541 litres (L) of Avgas. This suggested that the fuel levels had reached a critically low state; the fuel capacity of the aircraft is 560L. Later, the aircraft departed from FAGG to FAVV with no further incident.

#### Post-accident Investigation

The investigating team conducted an on-site inspection. It was found that the aircraft had sustained severe damage to the outboard leading edges of both wings due to impact with a pole. The fuel tanks had remained intact with no sign of rupture or leakage. The cabin structure was largely intact; however, the underbelly sustained substantial damage. *The cockpit was equipped with multiple fuel-related indicators, including fuel quantity, fuel pressure and fuel flow gauges, as well as a low fuel warning light. These systems provided real-time fuel status to the flight crew throughout the flight.* The aircraft was powered, and the fuel quantity gauge was checked; it indicated empty. The fuel caps were found secure and locked; however, after they were removed for visual inspection, no fuel was found in both tanks (Figure 3). The fuel drain points were found closed; after they were opened, fuel did not discharge from the system. Both engines were manually rotated using the propellers, and no mechanical anomalies were noted.



**Figure 3:** The empty fuel tank.

According to the Aero Commander 500S Pilot's Operating Handbook (POH) , the low fuel warning light is designed to activate when 30 to 45 minutes of fuel remains in the tanks at normal cruise power settings. This equates to approximately 30L to 60L (8 to 16 US gallons) of usable fuel.

#### Pilot Flying

- The investigating team established that on 21 and 23 August 2025, the PF conducted an ILS approach even though he did not have the required instrument rating, thereby, contravening Part 61.11.1 Subpart 11 of the Civil Aviation Regulations.

#### *INSTRUMENT RATING*

##### *General*

**61.11.1 (1)** *Except when receiving flight training, undergoing a skills test or in special VFR operation, no person shall act as pilot of an aircraft in accordance with instrument flight rules (IFR).*

- On 21 and 23 August 2025, the provisions of Part 91.07.12 of the CAR 2011 as amended were not complied with.

#### Safety Pilot

##### **CAR 61.01.8 (9) Safety pilot time**

*Any pilot acting as safety pilot in terms of regulation 91.07.32, occupying a pilot seat, with an appropriate valid category, class or type rating, may log the flight as co-pilot. The flight time acquired may not be credited towards the experience requirements for a higher-grade pilot licence or a rating. The remarks column must be marked "SAFETY PILOT".*

#### Expectations from a Safety Pilot

(Source: [Safety Pilot Explained: How to Log Your Time and Stay Legal - Pilot Institute](#))

*A safety pilot is a licensed pilot who acts as an extra pair of eyes and ears in the cockpit. They are there to ensure safety when another pilot's vision is restricted, like when you are in a simulated instrument flight. Unless something goes wrong, it is not their job to take over. Instead, they monitor the airspace, communicate with air traffic control if necessary, and step in to prevent potential hazards. They act in the capacity of a backup pilot. They are always ready to assist while you focus on honing your skills.*

#### Fuel Quantity Assessment

The exact quantity of fuel on-board at the time of departure from FAVV could not be determined. The crew neither physically verified the fuel quantity nor allowed the fuel to settle in the respective tanks prior to departure. Consequently, the fuel quantity calculations presented below are based on the indication when low-level fuel warning illuminated, which corresponded to approximately 60L of fuel on-board.

1. Fuel burn in 40 minutes

$$\text{Fuel burn} = 121.1 \text{ L/hr} \times 0.67 \text{ hr}$$

$$\text{Fuel burn} \approx 81.1 \text{ L}$$

2. Remaining fuel

$$\text{Remaining fuel} = 60 \text{ L} - 81.1 \text{ L}$$

$$\text{Remaining fuel} \approx -21.1 \text{ L}$$

3. After the low fuel warning; the aircraft continued to fly for approximately 30 minutes before it ran out:

$$121.1 \text{ L/hr} \times 0.50 \text{ hr} \approx 60.55 \text{ L} \text{ (30 minutes)}$$

### Fuel Quantity

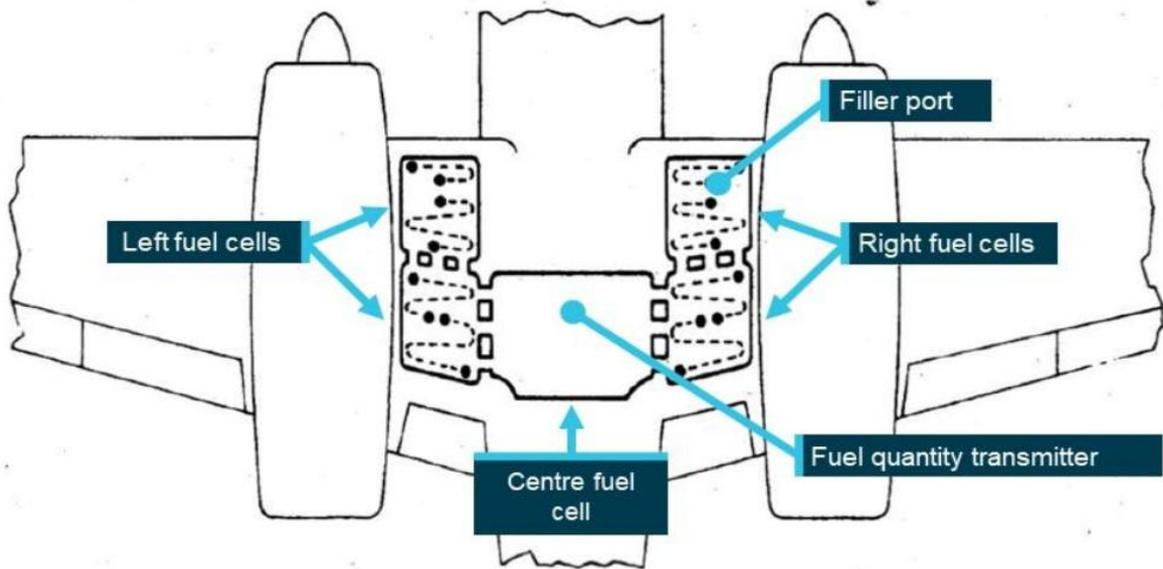
The investigation determined that the aircraft did not carry sufficient fuel to complete the remaining 40 minutes of flight to FAGG. The shortfall in fuel was primarily attributed to inadequate pre-flight fuel management. Specifically, the pilots did not conduct a physical verification of the actual fuel quantity prior to departure from FAVV as well as did not allow sufficient time for the fuel to settle in the tanks to obtain an accurate quantity reading. Consequently, the fuel on-board was less than the amount required for the duration of the planned flight. Approximately 30 minutes after the activation of the low-level fuel warning, the aircraft experienced complete fuel exhaustion which resulted in engine failure (stoppage) and contributed directly to the accident.

Aircraft Flight Manual, dated 29 May 1992, stated the following:

***SPECIAL ADDENDUM – FUELLING***

**WARNING**

*This aircraft is equipped with multiple interconnected fuel tanks. To assure proper fuel level, it is necessary for fuelling personnel to allow extended fuelling time for fuel to flow and equalise level among the interconnected tanks.*



**Figure 5:** Fuel tank internal layout. (Source: Pilot's Operating Handbook)

## Findings

### Man

Pilot Flying

1. The pilot flying (PF) had a Private Pilot Licence (PPL) that was initially issued by the Regulator (SACAA) on 25 July 2012. His latest licence validation was conducted on 20 June 2025 after which the licence was reissued with an expiry date of 31 May 2026. The aircraft type was endorsed on the pilot's licence.
2. The PF had a Class II aviation medical certificate that was issued on 8 May 2025 with an expiry date of 30 September 2027.
3. The PF was appropriately licensed to conduct the flight under the prevailing conditions. However, he was not rated or authorised to fly an instrument landing system (ILS) approach.
4. The PF had 22 flight hours on type and a total flight time of 168 hours; this indicated limited experience on the aircraft type. The PF was not yet familiar with the refuelling procedure, including the requirement to physically verify the fuel levels and to allow sufficient time for fuel to settle in the various tanks of the aircraft type as stipulated in the AFM.
5. On two occasions, the PF conducted flights under IFR even though he did not have the required instrument rating; this was in contravention of Part 61.11.1, Subpart 11 of the Civil Aviation Regulations (CAR) 2011, as amended.
6. On two occasions, the PF did not comply with the provisions of Part 91.07.12 of the CAR 2011, as amended.

### Safety Pilot

7. The safety pilot had an Airline Transport Pilot Licence (ATPL) that was initially issued on 29 August 2024. The latest ATPL had an expiry date of 31 August 2025. The aircraft type was endorsed on the pilot's licence.
8. The safety pilot had a Class I aviation medical certificate that was issued on 18 May 2025 with an expiry date of 30 June 2026.
9. The safety pilot had an instrument rating that was issued on 29 August 2024 with an expiry date of 31 August 2025.
10. The safety pilot had approximately 400 flight hours on type and a total flight time of approximately 3 100 hours; this indicated that he had sufficient experience. The safety pilot was familiar with the refuelling procedure, including the requirement to physically verify fuel levels and allow sufficient time for the fuel to settle in the tanks as stipulated in the AFM. However, on two occasions, the safety pilot departed on a flight without verifying or confirming the actual quantity of fuel on-board.

### Aircraft

11. The aircraft Certificate of Registration (C of R) was issued to the current owner on 20 December 2011. The Certificate of Airworthiness (C of A) was initially issued on 4 October 2011. The latest C of A was issued on 22 October 2024 with an expiry date of 31 October 2025.
12. The last annual inspection of the aircraft was certified on 25 April 2025 at 251.7 total airframe hours. At the time of the accident, the aircraft had a total of 277.2 airframe hours. Therefore, the aircraft had accrued 25.5 hours since the said inspection.
13. The aircraft was issued a Certificate of Release to Service (CRS) on 25 April 2025 at 251.7 airframe hours with an expiry date of 6 March 2026 or at 3605.5 airframe hours, whichever occurs first.
14. No fuel receipts were available as the fuel was uplifted directly from the drums in the hangar.
15. The fuel tanks were found empty after they were inspected at the accident site.
16. The flight departed from FAVV without meeting the minimum fuel planning and carriage requirements as prescribed in the CAR Part 91.

17. At the time of the flight, the two pilots were the only occupants, and there was no cargo on-board. The estimated weight was well below the maximum take-off weight. Therefore, the weight was not considered a contributing factor to this accident.
18. The aircraft was operated with insufficient fuel to complete the planned flight; this resulted in both engines ceasing operation in-flight. No evidence of fuel leakage or mechanical failure within the fuel system was identified during the post-accident inspection. The fuel tanks were intact, and the system components functioned normally.
19. The investigation determined that the accident was caused by fuel exhaustion which led to dual engine failure during the final approach to FAGG. Despite activation of the low-fuel warning system approximately 40 minutes prior to the estimated arrival time, the flight crew did not take corrective action to address the critically low fuel state.

#### **Probable Cause(s)**

In-flight engine stoppage due to fuel exhaustion which was caused by incorrect assessment of available fuel quantity on-board. This led to an unsuccessful forced landing.

#### **Contributing Factors**

- Inadequate pre-flight fuel planning  
The flight was commenced without sufficient consideration of the actual fuel requirements, including reserves for alternate routing.
- Non-compliance with regulatory requirements  
The flight departed without meeting the minimum fuel planning and carriage requirements as prescribed in Part 91 of the Civil Aviation Regulations 2011, as amended.
- Absence of fuel management during flight  
Fuel levels were not monitored effectively in-flight, and no in-flight fuel checks or recalculations were performed to assess the remaining endurance against the remaining flight time.

#### **Safety Action(s)**

None.

#### **Safety Recommendations**

- It is recommended that the pilot undertakes a refresher training course to reinforce comprehensive understanding of flight planning regulations, fuel reserve requirements, and in-flight fuel management procedures. This training should emphasise practical modules on calculating fuel requirements and applying effective fuel monitoring techniques during flight.
- The SACAA regulations define the logging of flight time by a safety pilot; however, there are no guidelines that outline the responsibilities of a safety pilot. It is recommended that a technical standard, with supporting technical guidance material, is developed for the industry.

#### **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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**This report is issued by:**

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