AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

			Reference:	CA18/2/3/10114	
Aircraft Registration	**ZS-MRL**	**Date of Accident**	9 February 2022	**Time of Accident**	1430Z
Type of Aircraft	Beechcraft Baron 58		**Type of Operation**	Private (Part 91)	
Pilot-in-command Licence Type	Private Pilot Licence		**Age**	50	**Licence Valid**	Yes
Pilot-in-command Flying Experience	**Total Flying Hours**		1584.35	**Hours on Type**	152
Last Point of Departure	Saldanha Aerodrome (FASD), Western Cape Province				
Next Point of Intended Landing	George Aerodrome (FAGG), Western Cape Province				
Damage to Aircraft	Substantial				

Location of the accident site with reference to easily defined geographical points (GPS readings if possible)

During take-off on Runway 20 at Saldanha Aerodrome at Global Positioning System (GPS) coordinates determined to be 32°57'48.0'' South 017°58'12.0'' East at an elevation of 50 feet (ft)

Meteorological Information	Surface wind: 315° at 13 knots; Temperature: 23.8°C						
Number of People On-board	1 + 0	**Number of People Injured**	0	**Number of People Killed**	0	**Other (On Ground)**	0

Synopsis

On Wednesday, 9 February 2022, a pilot on-board the Beechcraft Baron 58 aircraft with registration ZS-MRL intended to fly from Saldanha Aerodrome (FASD) to George Aerodrome (FAGG). Both aerodromes are located in the Western Cape province. The flight was to be conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that after take-off from Runway 20 at FASD, he advanced the gear lever to the retracted position, but did not obtain the gear-up lock indication on the cockpit panel. He then routed to Langebaanweg Military Airforce Base (FALW) after making a request from air traffic control (ATC) if he could fly past the control tower at low-level to confirm if the landing gear was down (extended). The ATC advised him that the landing gear appeared to be down. After the ATC's confirmation, the pilot opted to return to FASD. Before landing the aircraft, he engaged the emergency gear extension crank to ensure that the landing gear was down and in the locked position, but still could not obtain the three greens (indication lights) in the cockpit.

The pilot decided to continue with the landing on Runway 20. However, shortly after touchdown, the landing gear collapsed. The aircraft skidded on its underbelly along the runway surface before it came to rest on the grass on the left-side of the runway edge. The aircraft sustained substantial damages, but the pilot was not injured. Post-accident examination of the landing gear revealed that the gear motor burned out, causing the gear circuit breaker to trip.

Probable Cause

The landing gear collapsed during the landing roll because it was not in the down and locked position due to the gear motor that burned out.

SRP Date	20 September 2022	Publication Date	22 September 2022

Occurrence Details

Reference Number	**:** CA18/2/3/10114
Occurrence Category	**:** Category 2
Type of Operation	**:** Part 91 (General Aviation and Operating Flight Rules)
Name of Operator	**:** Private
Aircraft Registration	**:** ZS-MRL
Aircraft Make and Model	**:** Beechcraft Baron 58
Nationality	**:** South African
Place	**:** Saldanha Aerodrome (FASD)
Date and Time	**:** 9 February 2022 at 1430Z
Injuries	**:** None
Damage	**:** Substantial

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 9 February 2022 at 1440Z. The AIID appointed an investigator-in-charge (IIC) who conducted the investigation remotely. The occurrence was classified as an accident according to Annex 13 definitions. Notifications were sent to the State of Registry/Operator/Design/Manufacturer in accordance with (IAW) ICAO Annex 13 Chapter 4. The States informed did not appoint accredited representatives and/or advisors.

Notes:

1. *Whenever the following words are mentioned in this report, they shall mean the following:*
   Accident — this investigated accident
   Aircraft — the Beechcraft Baron 58 involved in this accident
   Investigation — the investigation into the circumstances of this accident
   Pilot — the pilot involved in this accident
   Report — this accident report

Disclaimer

This report is produced without prejudice to the rights of the AIID, which are reserved.

Table of Contents

Abbreviation	Description
°	Degrees
°C	Degrees Celsius
ACCID	Accident
AFM	Aircraft Flight Manual
AIID	Accident and Incident Investigations Division
AMO	Aircraft Maintenance Organisation
ATC	Air Traffic Control
CAA	Civil Aviation Authority
C of A	Certificate of Airworthiness
CAVOK	Cloud and Visibility OK
AMSL	Above Mean Sea Level
CAR	Civil Aviation Regulation
C of R	Certificate of Registration
CVR	Cockpit Voice Recorder
CRS	Certificate of Release to Service
FDR	Flight Data Recorder
FACT	Cape Town International Airport
FAGG	George Aerodrome
FALW	Langebaanweg Military Airforce Base
FASD	Saldanha Aerodrome
Ft	Feet
GPS	Global Position System
hPa	Hectopascal
IAW	In Accordance With
IIC	Investigator-in-charge
kt	Knots
m	Metres
METAR	Meteorological Aerodrome Report
MPI	Mandatory Periodic Inspection
NDB	Non-Directional Beacon
NM	Nautical Mile
MHz	Megahertz
QNH	Altitude Above Mean Sea Level
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
Z	Zulu (Term for Universal Co-ordinated Time - Zero Hours Greenwich)

FACTUAL INFORMATION

1.1 History of Flight

1.1.1 On Wednesday, 9 February 2022, a pilot on-board the Beechcraft Baron 58 aircraft with registration ZS-MRL intended to fly from Saldanha Aerodrome (FASD) to George Aerodrome (FAGG). Both aerodromes are located in the Western Cape province. The flight was planned to be conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2 The pilot stated that after take-off from Runway 20 at FASD, he advanced the gear lever to the retracted position, but did not obtain the gear-up and locked indication on the cockpit panel. He then routed to Langebaanweg Military Airforce Base (FALW) and requested air traffic control (ATC) if he could fly past the tower at low-level to confirm if the landing gear was down (extended) because he had no indication on the cockpit panel that showed its status (if it was extended or retracted).

1.1.3 The ATC advised the pilot that the landing gear appeared to be down. The pilot then opted to return to FASD. Upon arrival at FASD, he engaged the emergency gear extension crank to ensure that the landing gear was in the down and locked position, but still could not obtain the three greens indication in the cockpit panel. The pilot then decided to continue to land the aircraft on Runway 20. However, shortly after touchdown, the landing gear collapsed. The aircraft skidded on its underbelly along the runway surface before it came to rest on the grass area on the left-side of the runway edge. The aircraft sustained substantial damages to the propeller, wings and the underbelly, but the pilot was not injured.

1.1.4 The accident occurred at Global Positioning System (GPS) co-ordinates determined to be S32°57'48.0" E017°58'12.0", at an elevation of 50 feet (ft).

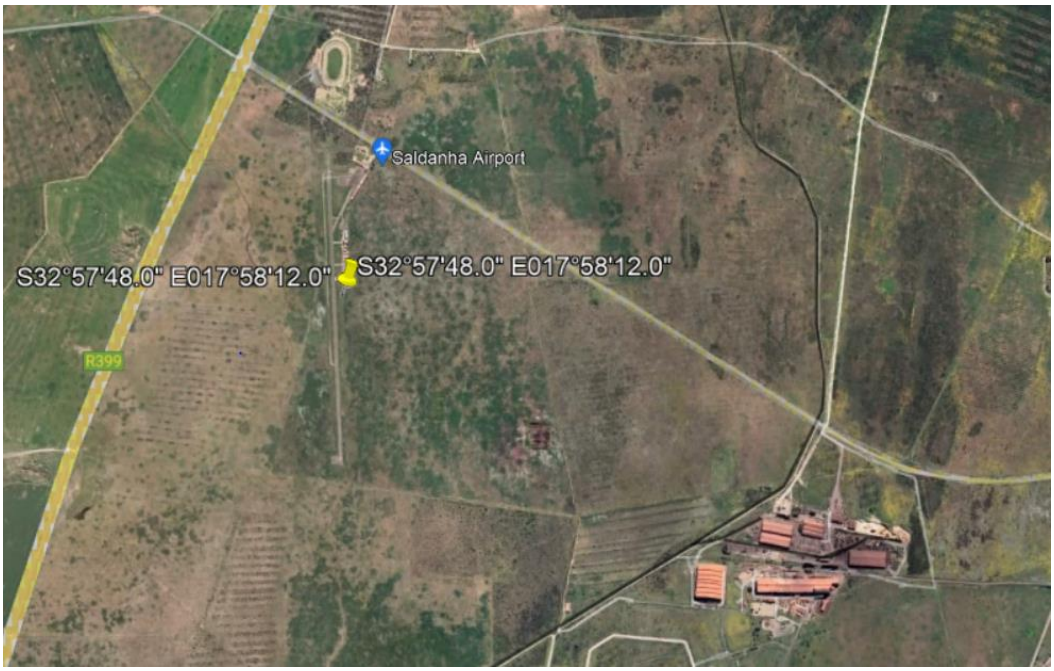

Figure 1: Aerial view of FASD runway. (Source: Google Map)

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	1	-	-	1	-
Total	1	**-**	-	1	**-**

1.3 Damage to Aircraft

1.3.1 The aircraft sustained substantial damages to the propeller, wings and the underbelly during the accident sequence.

Figure 2: The aircraft on the side of the runway post-accident. (Source: Owner)

1.4 Other Damage

1.4.1 None.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	50
Licence Type	Private Pilot Licence (PPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Night				
Medical Expiry Date	31 December 2022				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	1584.35
Total Past 24 Hours	2.7
Total Past 7 Days	10.8
Total Past 90 Days	32.55
Total on Type Past 90 Days	32.55
Total on Type	152

1.5.1 The pilot was issued a Private Pilot Licence (Aeroplane) on 9 September 2021 with an expiry date of 30 September 2023. The pilot had a Class 2 aviation medical certificate issued on 1 September 2021 with an expiry date of 31 December 2022.

1.6 Aircraft Information

1.6.1 The Beechcraft Baron 58 is a light, twin-engine piston aircraft designed and produced by Beechcraft Aircraft Corporation. The accident Beechcraft Baron 58 was fitted with Continental IO-550-C49B engines.

Airframe:

Manufacturer/Model	Beechcraft Aircraft Corporation / Beechcraft Baron 58	
Serial Number	TH-1156	
Year of Manufacture	1980	
Total Airframe Hours (At Time of Accident)	4736.9	
Last MPI Inspection (Hours & Date)	4728.8	10 December 2021
Airframe Hours Since Last MPI	8.1	
CRS Issue Date	30 July 2021	
C of A (Issue Date & Expiry Date)	17 February 2012	28 February 2022
C of R (Issue Date) (Present Owner)	10 December 2020	
Operating Category	Part 91	
Type of Fuel Used	Avgas 100LL	
Previous Accidents	None	

1.6.2 On 10 December 2021, a 100-hour mandatory periodic inspection (MPI) was certified on the aircraft at 4728.8 airframe hours. The aircraft flew a further 8.1 hours since the last MPI.

1.6.3 The aircraft was issued a Certificate of Release to Service (CRS) on 30 July 2021 with an expiry date of 29 July 2022 or at 4730 airframe hours, whichever occurs first.

1.6.4 The aircraft was initially issued the Certificate of Airworthiness (C of A) on 17 February 2012. The latest reissued C of A had an expiry date of 28 February 2022.

Engine:

Manufacturer/Model	Continental IO-550-C49B
Serial Number	1040523
Hours Since New	129.1
Hours Since Overhaul	N/A

Manufacturer/Model	Continental IO-550-C49B
Serial Number	1040535
Hours Since New	129.1
Hours Since Overhaul	N/A

Propeller:

Manufacturer/Model	Hartzell/PHC-J3YF-2UF
Serial Number	ED5923B
Hours Since New	300.4
Hours Since Overhaul	109.1

Manufacturer/Model	Hartzell/PHC-J3YF-2UF
Serial Number	ED5925B
Hours Since New	300.4
Hours Since Overhaul	109.1

1.7 Meteorological Information

1.7.1 The weather information below was obtained from the Meteorological Aerodrome Report (METAR) that was issued by the South African Weather Service (SAWS) on 9 February 2022 at 1430Z, recorded at Cape Town International Airport (FACT) weather station in the Western Cape province.

Wind Direction	315°	Wind Speed	13kt	Visibility	9999m
Temperature	23.8°C	Cloud Cover	Nil	Cloud Base	3500 feet
Dew Point	16.1°C	QNH	1006.3hPa		

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 navigation system was unserviceable prior to the accident.

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 prior to the accident.

1.10 Aerodrome Information

1.10.1 The accident occurred on Runway 20 at FASD at GPS co-ordinates determined to be S32°57'48.0" E017°58'12.0", at an elevation of 50ft.

Aerodrome Location	Saldanha Aerodrome
Aerodrome Status	Licensed
Aerodrome GPS coordinates	S32°57'48.0" E017°58'12.0"
Aerodrome Elevation	50 feet (AMSL)
Runway Headings	02 / 20
Dimensions of Runway Used	Runway 20 - 1422m X 25m
Surface of Runway Used	Asphalt
Approach Facilities	NDB
Radio Frequency	124.8 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 During landing on Runway 20, the undercarriage collapsed, and the aircraft skidded on its underbelly before it came to rest on the left-side of the runway.

Figure 3: The skid marks on Runway 20. (Source: Owner)

1.13 Medical and Pathological Information

1.13.1 None.

1.14 Fire

1.14.1 There was no evidence of a pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was considered survivable as there was no damage to the cockpit and cabin areas.

1.15.2 The pilot was properly restrained as he had made use of the aircraft's safety harness.

1.16 Tests and Research

1.16.1 Following the accident, the aircraft was recovered to the aircraft maintenance organisation (AMO) at Wonderboom Aerodrome (FAWB) in Gauteng province for examination. It was found that the landing gear motor had burned out, which caused the gear electric motor circuit breaker to trip. The investigation was unable to determine the cause of the gear electric motor failure. The mechanical gear box and the relay were found to be in good condition. The manual gear extension was tested; however, the gear did not properly lock into position.

Description and Operation of the Landing Gear (Source: Beechcraft Baron 58 Maintenance Manual)

The landing gear system is operated through adjustable linkage connected to an electromechanical actuator assembly mounted behind the forward spar carrier thru. The actuator assembly is driven by a 14 or 28 volt electric motor controlled by the landing gear position switch mounted near the lower

centre of the instrument panel, the limit switches are mounted adjacent on the left hand-side of the actuator assembly.

The landing gear motor, dynamic brake relay, limit switches and actuator assembly are accessible by removing the front seats and spar cover.

The landing gear may be operated electrically UP or DOWN and also may be lowered manually by tripping the landing gear motor circuit breaker and extending the hand crank located on the actuator assembly then turning clockwise (average 50 turns to full down and locked), this should be done in an emergency only. The landing gear circuit consists of the landing gear position switch, UP and DOWN limit switches, two ground safety switches, resettable circuit breaker, drive motor and a dynamic brake relay.

When the landing gear switch is placed in the UP position and the aircraft is airborne. The two safety switches become latched, then dynamic brake is activated applying power to terminal 1 of the relay, which applies power to the UP windings of the drive motor and arming the braking circuit in the relay. As the landing gear UP limit switch is tripped, the dynamic brake power relay relaxes and applies a ground to the opposite winding thru terminal 2 of the dynamic relay to the drive motor, this creates a braking action within the drive motor.

Manual landing gear extension system:

In the event of landing gear malfunction in-flight, the gear may be manually extended, but not retracted by a hand crank at the rear of the pilot's seat.

1.16.3 The following information is an extract from the Pilot's Operating Handbook (POH):

Landing gear manual extension
Reduce airspeed before attempting manual extension of the landing gear.

1. *Landing gear motor circuit breaker - PULL*
2. *Landing gear handle - DOWN*
3. *Remove cover from handcrank at rear of front seats.*
   Engage handcrank and turn counterclockwise as far as possible (approximately 50 turns). Stow handcrank.
4. *If electrical system is operative, check landing gear position lights and warning horn (check landing gear relay circuit breaker engaged.)*

CAUTION

The manual extension system is designed only to lower the landing gear; do not attempt to retract the gear manually.

WARNING

Do not operate the landing gear electrically with the hand crank engaged as damage to the mechanism could occur. After emergency landing gear extension, do not move any landing gear controls or reset any switches or circuit breakers until the airplane is on jacks, as failure may have been in the gear-up circuit and the gear might retract with the airplane on the ground.

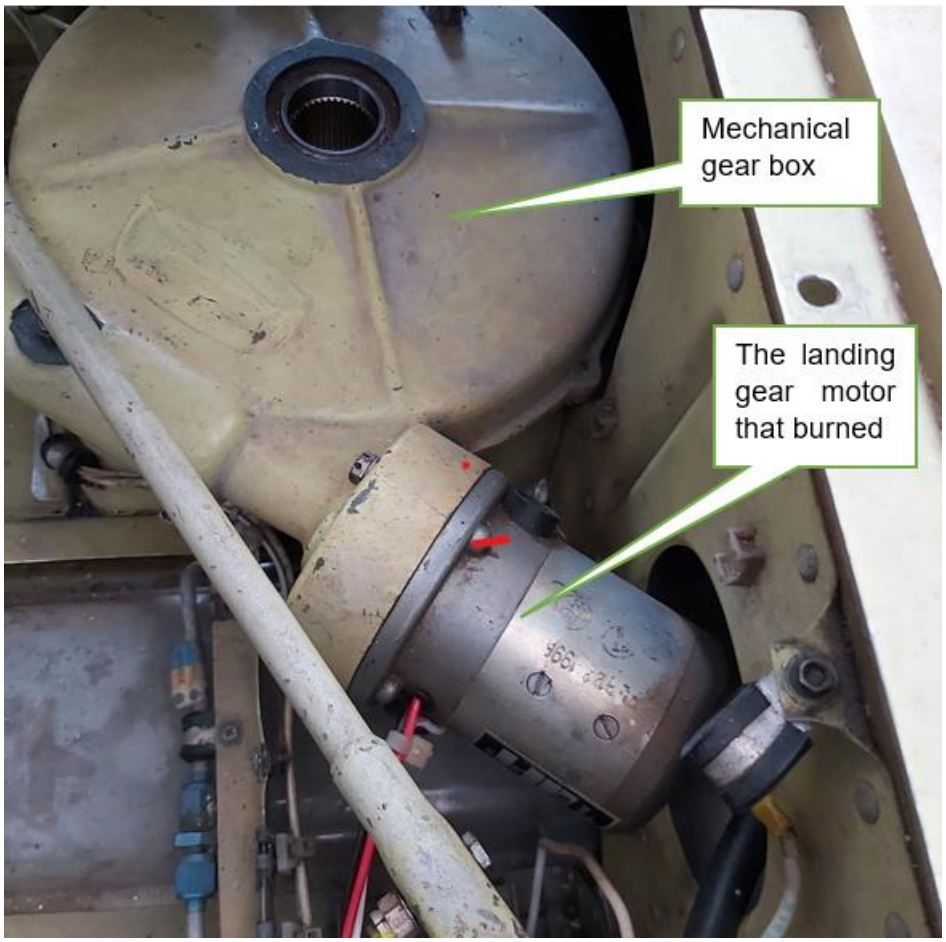

Figure 4: The landing gear motor.

1.17 Organisational and Management Information

1.17.1 This was a private flight conducted in accordance with (IAW) the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.17.2 The AMO that carried out the last MPI prior to the accident flight was in possession of an approved AMO certificate that was issued on 10 December 2021 with an expiry date of 30 November 2022.

1.18 Additional Information

1.18.1 None.

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

Man

2.2.1 The pilot was initially issued a Private Pilot Licence (PPL) on 9 September 2021 with an expiry date of 30 September 2023. The pilot was issued a Class 2 medical certificate on 1 September 2021 with an expiry date of 31 December 2022.

Machine

2.2.2 The last MPI was certified on 10 December 2021 at 4728.8 airframe hours. The aircraft had accumulated a further 8.1 airframe hours since the last inspection. The landing gear motor burned out, which caused the gear circuit breaker to trip. The investigation was unable to determine the cause of the electric motor failure.

2.2.3 The aircraft was initially issued a C of A on 17 February 2012. The latest reissued C of A had an expiry date of 28 February 2022. The aircraft was issued a Certificate of Registration (C of R) on 10 December 2020.

Environment

2.2.4 Fine weather conditions prevailed at the time of the flight. Therefore, the weather did not contribute 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

3.2.1 The pilot was initially issued a Private Pilot Licence (PPL) on 9 September 2021 with an expiry date of 30 September 2023. The pilot was issued a Class 2 aviation medical certificate on 1 September 2021 with an expiry date of 31 December 2022.

3.2.2 The aircraft was initially issued a C of A on 17 February 2012. The latest C of A had an expiry date of 28 February 2022. The aircraft was issued a C of R on 10 December 2020.

3.2.3 The AMO that certified the last MPI prior to the accident flight had an approved AMO certificate that was issued by the Regulator on 10 December 2021 with an expiry date of 30 November 2022.

3.2.4 The last MPI was carried out on 10 December 2021 at 4728.8 airframe hours. The aircraft had accumulated a further 8.1 airframe hours in operation since the last inspection.

3.2.5 The aircraft was issued a Certificate of Release to Service (CRS) on 30 July 2021 with an expiry date of 29 July 2022 or at 4730 airframe hours, whichever occurs first.

3.2.6 The landing gear motor burned out, which caused the gear circuit breaker to trip.

3.2.7 The flight was conducted under the provisions of Part 91 of the CAR 2011 as amended.

3.2.8 Fine weather conditions prevailed at the time of the flight. The weather had no bearing to this accident.

3.3. Probable Cause

3.3.1 The landing gear collapsed during the landing roll because it was not in the down and locked position due to the gear motor that burned out.

3.4. Contributory Factor/s

3.4.1. None.

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. None.

5. APPENDICES

5.1. None.

This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa