PRELIMINARY ACCIDENT REPORT

Accident and Incident Investigations Division

Accident
- Preliminary Report -
AIID Ref No: CA18/2/3/10362

Figure 1: The file picture of the accident aircraft. (Source: www.flightzone.co.za)

Description:

On Saturday afternoon, 2 September 2023, a pilot on-board the Apollo T aircraft with registration ZU-IHA was engaged in a sport parachute drop operation overhead New Tempe Aerodrome (FATP) in Bloemfontein, Free State province, when the accident occurred. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 105 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot reported that the aircraft took off from Runway 10 at 1602Z with seven (7) parachutists and climbed to 11 000 feet (ft) above ground level (AGL). He then routed towards the drop zone abeam FATP where all parachutists safely jumped out of the aircraft. As the aircraft was descending and at 1 600ft AGL left downwind for Runway 01, the engine lost power with no warnings on the instrument panel. The pilot followed the in-flight engine failure checks and made an emergency radio call on FATP frequency 131.3-Megahertz to inform other aviators in the vicinity of his position that he will be performing a forced landing. The pilot landed on an open field approximately 0.83 nautical miles (nm) west of FATP. The aircraft sustained damage to the nose landing gear strut and the propeller blades. The pilot was unharmed.

Occurrence Details

Reference Number	**:** CA18/2/3/10362
Occurrence Category	**:** Category 1
Type of Operation	**:** Private (Part 105)
Name of Operator	**:** Parker A B and Van Beusekom C
Aircraft Registration	**:** ZU-IHA
Aircraft Make and Model	**:** Apollo T
Nationality	**:** South African
Place	**:** Open field near New Tempe Aerodrome (FATP)
Date and Time	**:** 2 September 2023, 1618Z
Injuries	**:** None
Damages	: 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 promoting aviation safety and reducing aviation accidents or incidents' risk and not apportioning 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 involving the Apollo T aircraft which occurred on an open field near New Tempe Aerodrome (FATP), Free State province, on 2 September 2023 at 1618Z. The occurrence was classified as an accident according to the CAR 2011 Part 12 and ICAO STD Annex 13 definitions.

The AIID has appointed an investigator-in-charge to conduct the investigation. Notifications were sent to the State of Registry, Operator, Design and Manufacturer in accordance with the CAR 2011 Part 12 and ICAO Annex 13 Chapter 4. The States did not appoint an accredited representative and/or advisor. The AIID will lead the investigation and issue the final report of this accident in accordance with the CAR 2011 Part 12 and ICAO Annex 13.

The information contained in this preliminary report is derived from the information gathered during the on-going investigation into the occurrence.

The AIID reports are made available to the public at:
http://www.caa.co.za/Pages/Accidents%20and%20Incidents/Aircraft-accident-reports.aspx

Notes:

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

2. *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

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Abbreviation	Description
°C	Degree Celsius
A/C	Aircraft
AAD	Automatic Activation Devices
AMSL	Above Mean Sea Level
AGL	Above Ground Level
AIID	Accident and Incident Investigations Division
AMO	Aircraft Maintenance Organisation
AIP	Aeronautical Information Publication
AP	Approved Person
ATF	Authority to Fly
ACCID	Accident
C of R	Certificate of Registration
EMM	Engine Maintenance Manual
CAA	Civil Aviation Authority
CAR	Civil Aviation Regulations
CVR	Cockpit Voice Recorder
FABL	Braam Fisher International Airport
FATP	New Tempe Aerodrome
FAWB	Wonderboom Aerodrome
FCU	Fuel Control Unit
FDR	Flight Data Recorder
Ft	Feet
GPS	Global Positioning System
Hp	Horsepower
hPa	Hectopascal
IAW	In Accordance With
IIC	Investigator-in-charge
IOC	Investigator-on-call
ITT	Interstage Turbine Temperature
Kts	Knots
Kts	Knots
M	Metre
MHz	Megahertz
N/a	Not Applicable
NM	Nautical Miles
RPM	Revolutions per Minute
QNH	Query: Nautical Height
SACAA	South African Civil Aviation Authority
SAHPA	South African Hang-Gliding Association
SAWS	South African Weather Services
SOP	Standard Operating Procedures
STC	Supplementary Type Certificate
VMC	Visual Meteorological Conditions
PSI	Pounds Per Square Inch
Z	Zulu (Term for Universal Co-ordinated Time - Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1. On Saturday afternoon, 2 September 2023, a pilot reported at New Tempe Aerodrome (FATP) in Bloemfontein, Free State province, to prepare for the sport parachuting drop flight overhead the same aerodrome. The Apollo T aircraft with registration ZU-IHA was to be utilised for this operation. Upon arrival at the operator's facility at FATP, the pilot carried out a pre-flight inspection of the aircraft and nothing abnormal was found. The pilot stated that the aircraft had 107 litres (l) of Jet A1 fuel. Once the aircraft was ready, the pilot alerted the seven (7) skydivers, who had just completed inspecting their gear in accordance with (IAW) the standard operating procedures (SOP) of the South African Hang Gliding and Parachute Association (SAHPA), to ensure that the parachutes were all fitted with serviceable automatic activation devices (AAD) and that the altimeters were serviceable. Visual meteorological conditions (VMC) by day prevailed at the time of the flight which was conducted under the provisions of Part 105 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2. The pilot reported that he started the engine and allowed it to warm up. At 1602Z, he taxied the aircraft to the threshold of Runway 10 and communicated his intentions on FATP frequency 131.3-Megahertz (MHz). Thereafter, he increased the engine power to 2 000 revolutions per minute (RPM) / N2. The engine torque indicated 105 pounds per square inches (psi); the interstage turbine temperature (ITT) was at 600ºC; and the N1 (engine power) was at 101 percent (%). After verifying that the engine parameters were within the acceptable limits, the pilot released the park brake and commenced with the take-off run. The aircraft rotated and climbed to 11 000 feet (ft) above ground level (AGL). The pilot then retarded the power lever to 1 900 RPM whilst routing in the direction of the drop zone where all seven parachutist jumped out safely.

1.1.3. During this time, the engine instruments indicated normal with positive oil pressure and fuel flow. As the aircraft was in descent at 1 600ft AGL left downwind for Runway 01, it lost engine power which occurred without warning on any of the instruments. The pilot followed the in-flight engine failure checks and, thereafter, made an emergency radio call on FATP frequency 131.3-MHz to alert other aviators in the vicinity about his predicament and position, and that he will be performing a forced landing. The pilot landed on an open field approximately 0.83 nautical miles (nm) west of FATP. The aircraft sustained damage to the nose landing gear strut and propeller blades. The pilot disembarked from the aircraft unharmed. The flight's duration was 0.27 hours.

1.1.4. The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be South 29º02'14.0" East 026º08'24.1", at about 4 526 feet (ft) above mean sea level (AMSL).

Figure 2: The view of the accident site and the runway used for take-off. (Source: Google Earth Map)

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	1	-	7	8	-
Total	**1**	**-**	**7**	**8**	**-**

1.3 Damage to Aircraft

1.3.1 The aircraft sustained substantial damage.

Figure 3: The aircraft post-accident. (Source: Pilot)

1.4 Other Damage

1.4.1 None.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	61
Licence Type	Private Pilot Licence (PPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Night and test pilot (Class 2)				
Medical Expiry Date	30 November 2023 (Class 2)				
Restrictions	Suitable corrective lenses				
Previous Accidents	None				

Flying Experience:

Total Hours	7 641.0
Total Past 90 Days	86.5
Total on Type Past 90 Days	86.5
Total on Type	1 259.1

1.5.1 The pilot was initially issued a Private Pilot Licence (PPL) on 28 July 2005. His last licence validation was on 13 May 2023 with an expiry date of 31 May 2025.

1.5.2 The pilot was issued a Class 2 aviation medical certificate on 28 November 2022 with an expiry date of 30 November 2023.

1.5.3 The pilot's file at the South African Civil Aviation Authority (SACAA) facility revealed that the pilot had a maintenance licence that was issued IAW the CAR Part 66.04 on 15 February 2023 with an expiry date of 14 February 2025. The AP had A, C and W ratings endorsed on his licence. In addition, the AP had the aircraft type and engine model endorsed on his approved person certificate.

1.6 Aircraft Information

1.6.1 Aircraft Description (Source: Pilot's Operating Handbook [POH])

The Apollo T is formerly a single engine, six seat, light utility Aermacchi AL-60 Trojan aircraft manufactured by Lockheed Corporation in the United States of America (USA). The aircraft was initially powered by a Lycoming IO-720-A1A 8-cylinder fuel injected engine rated at 400 horsepower (hp) and was later fitted with a Diemech M601D

turboprop engine rated at 650hp, driving the Avia V508D 3-bladed aluminium alloy variable pitch propeller.

Airframe:

Manufacturer/Model	Lockheed Corporation / Apollo T	
Serial Number	AC001	
Year of Manufacture	2015	
Total Airframe Hours (At Time of Accident)	1 884.0	
Last Annual Inspection (Date & Hours)	18 August 2023	1 869.4
Hours Since Last Inspection	14.6	
CRS Issue Date	18 August 2023	
Authority to Fly (Issue Date & Expiry Date)	11 December 2022	31 January 2024
C of R (Issue Date) (Present Owner)	18 September 2015	
Type of Fuel Used	Jet A1	
Operating Category	Private (Part 105)	
Previous Accidents	Nil	

1.6.2 Engine (Source: Engine Maintenance Manual [EMM])

The Diemech M601D engine is a two-spool engine comprising a gas generator that drives a power turbine, which drives a reduction gearbox. The gas generator compressor consists of two axial flow stages and one centrifugal stage. Inlet air enters the compressor section radially just forward of the accessory section and travels forward through the compressor. The exiting compressor air enters an annular combustor to mix with fuel for the combustion process. The gas generator turbine nozzles then direct the expanded flow path gases to the gas generator turbine, which directs the exiting gases to the power turbine for the final power extraction before exiting the engine forward of the compressor inlet.

The power turbine drives the propeller by means of the reduction gearbox. The accessory gearbox, which is located on the aft end of the engine drives all engine accessories by a direct shaft coming from the compressor spool. Typical engine accessories are the main fuel pump, fuel control unit, starter/generator, hydraulic pump, and the propeller governor, which is driven by the reduction gearbox located at the front of the engine.

The oil system is a circulatory pressure system with an integral oil tank incorporated into the accessory gearbox. This system provides lubrication for all areas of the engine and il pressure for the torque meter and propeller pitch control.

The powerplant is controlled by three sets of levers. The power lever controls the power output of the engine and the propeller blade angles in Beta and reverse. The propeller lever controls the propeller speed via the primary propeller governor and emergency

propeller feathering. The condition lever actuates the fuel shutoff valve and if an emergency circuit is on, controls the engine power.

1.6.3 *Fuel supply*

Fuel enters the fuel system of the engine through the fuel/oil heat exchanger and the fuel filtering set. The fuel/oil heat exchanger warms up the fuel so that its temperature in operation will not decrease below zero (0) °C. Thus, ice formation in fuel is prevented; otherwise, ice in fuel will result in fuel filter clogging. The fuel filter set assures clean fuel at the fuel pump entry. The fuel filter is complemented with the by-pass valve, which opens when the fuel pressure drop in the fuel filter exceeds the adjusted level. There is a signaller of impending by-pass valve intervention that at a higher-pressure loss of the fuel filter provides for signalisation by a warning lamp. Fuel filter with signaller of impending by-pass is mounted on the fuselage fire wall. The fuel/oil heat exchanger, fuel filter and the signaller of impending by-pass valve intervention are mounted to the engine nacelle firewall. Fuel is fed by the fuel transfer tube from the FCU to the fuel distributor, and further, it is injected into a spray ring into the combustion chamber.

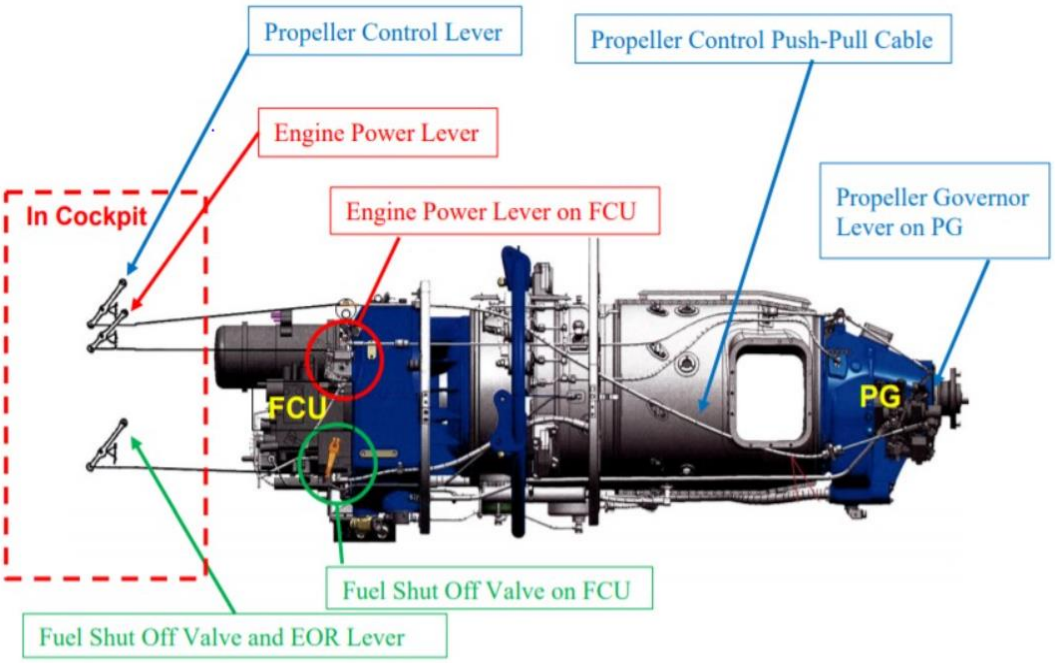

Figure 4: Engine control schematic (propeller not shown).

Engine:

Manufacturer/Model	Diemech Turbines / Diemech M601D
Serial Number	901003
Part Number	Unknown
Hours Since New	831.4
Hours Since Overhaul	TBO Not reached (3 000 flight hours)

Propeller:

Manufacturer/Model	Avia propeller Ltd / Avia V508D
Serial Number	01065713
Part Number	Unknown
Hours Since New	6 063.3
Hours Since Overhaul	63.3

1.7 Meteorological Information

1.7.1 The weather information below was obtained from Bram Fischer International Airport (FABL) forecast.

Wind Direction	290º	Wind Speed	02kt	Visibility	9999m
Temperature	23ºC	Cloud Cover	CAVOK	Cloud Base	NIL
Dew Point	8ºC	QNH	1019 hPa		

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 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 aerodrome information IAW the Aeronautical Information Publication (AIP).

Aerodrome Location	New Tempe (FATP)	
Aerodrome Co-ordinates	S29º02’14.0” E026º08’.24.1”	
Aerodrome Elevation	4 526 feet AMSL	
Runway Dimensions	1 200 x 15m and 1 300 x 10m	
Runway Designations	10/28	01/19
Runway Used	10	
Runway Surface	Asphalt	
Aerodrome Status	Licensed	
Approach Facilities	Runway lighting	

1.11 Flight Recorders

1.11.1 The aircraft was not 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 pilot performed a forced landing on an open field approximately 0.83 nautical miles (nm) west of FATP. The nose gear collapsed during the landing roll which resulted in the aircraft propeller blades striking the ground. The aircraft came to rest in an upright position. The airframe and the cockpit cabin area remained intact. The aircraft sustained damage to the nose gear strut, the engine intake, the lower engine cowling and the propeller blades.

Figure 5: The aircraft at the accident site. (Source: Pilot)

1.13 Medical and Pathological Information

1.13.1 Not applicable.

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 because the cockpit structure had remained intact and the pilot had made use of the aircraft safety harness.

1.16 Tests and Research

1.16.1 Post-accident examination of the aircraft's technical records indicated that the aircraft was compliant with all applicable airworthiness requirements. The aircraft had been correctly maintained and was appropriately certified for release to service prior to the accident flight.

1.16.2 There were no open or deferred maintenance items listed in the aircraft's flight folio before the accident flight. Visual inspection of the aircraft indicated nothing abnormal. The engine power lever was correctly connected to the fuel control unit (FCU) with no evidence of restrictions when examined from the cockpit. The fuel condition lever showed nothing abnormal. The oil and fuel systems were generally intact with no evidence of leakages. The aircraft fuel tanks contained approximately 60 litres (l) of Jet A-1 fuel. The fuel was of the correct grade.

1.16.3 The propeller blades were properly fitted to the flange and the spinner was generally intact. An external visual examination revealed that the propeller governor was undamaged. When one blade was rotated around its span axis, all other blades rotated in unison, consistent with internal mechanical integrity. There was no evidence of blade twisting along the span axis, which is normally observed when the propeller is being driven with engine under power during landing.

1.16.4 The aircraft was recovered to Wonderboom Aerodrome (FAWB) in Gauteng province for further investigation.

1.17 Organisational and Management Information

1.17.1 This was a private flight conducted under the provisions of Part 105 of the CAR 2011 as amended.

1.17.2 The last 100-hour annual inspection that was conducted on the aircraft prior to the accident flight was certified on 18 August 2023 at 1 869.4 airframe hours by the approved person (AP) certified by SACAA. The accident occurred at 1 884.0 total airframe hours, meaning that the aircraft was flown a further 14.6 airframe hours since the last annual inspection.

1.7.3 The aircraft was issued a Certificate of Release to Service on 18 August 2023 with an expiry date of 5 August 2024 or at 2 000 airframe hours, whichever occurs first.

1.18 Additional Information

1.18.1 To be covered in the final report.

1.19 Useful or Effective Investigation Techniques

1.19.1 To be covered in the final report.

2. FINDINGS

2.1 General

From the available evidence, the following preliminary findings 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 conclusions 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.

2.2 Findings

2.2.1 The pilot was initially issued a Private Pilot Licence (PPL) on 28 July 2005. His last licence validation was issued on 13 May 2023 with an expiry date of 31 May 2025.

2.2.2 The pilot was issued a Class 2 aviation medical certificate on 28 November 2022 with an expiry date of 30 November 2023.

2.2.3 The flight was conducted under visual flight rules (VFR) by day. The aircraft was operated under the provisions of Part 105 of the CAR 2011 at the time of the accident.

2.2.4 The aircraft was issued a Certificate of Registration (C of R) on 5 December 2022.

2.2.5 The aircraft was issued the Authority to Fly (ATF) certificate on 11 December 2022 with an expiry date of 31 January 2024.

2.2.6 The last 100-hour annual inspection conducted on the aircraft before the accident was certified on 18 August 2023 at 1 869.4 airframe hours.

2.2.7 The aircraft was issued a Certificate of Release to Service (CRS) on 18 August 2023 with an expiry date of 5 August 2024 or at 2 000 airframe hours, whichever occurs first. The aircraft was flown a further 14.6 airframe hours since the last annual inspection.

2.2.8 The aircraft was maintained by the AP certified by SACAA.

2.2.9 The AP was issued an approved person certificate on 15 February 2023 with an expiry date of 14 February 2025.

3. ON-GOING INVESTIGATION

3.1 The AIID investigation is on-going and the investigator will be looking into other aspects of this occurrence which may or may not have safety implications.

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