AIRCRAFT ACCIDENT INVESTIGATION BOARD

FINAL AIRCRAFT ACCIDENT REPORT FOR A PIPER PA-32-300 CHEROKEE SIX, 9J – RDN THAT OCCURRED IN MULOBEZI, WESTERN PROVINCE, ZAMBIA ON 27th FEBRUARY, 2022

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INTRODUCTION

On 27th February, 2022 an accident involving a Piper PA -32-300 aircraft was reported to the Director General, Civil Aviation Authority (CAA) by Taurus Aviation, who immediately relayed the information to the Aircraft Accident investigation Board (AAIB). The aircraft involved was a Piper PA 32-300 cherokee six, National Registration Marks 9J-RDN, Manufacturer's Serial Number 32-40030, belonging to Taurus Aviation, which was reported to have crashed 652m from Mulobezi airstrip runway 03 in Western Province.

The interim Director Aircraft Accident Investigation Board immediately constituted an investigation team comprising 4 staff pertaining to the domains of operations and engineering to travel to the accident scene.

SYNOPSIS

On February 27, 2022 a Piper PA-32-300 operated by Taurus Aviation departed Siandunda airstrip located within the Livingstone Control Zone for Harry Mwanga Nkumbula International Airport at 07:15 hours local time. On-board were 01 pilot plus 03 passengers. The aircraft was flown at cruise FL085 and upon arrival in Mulobezi area, the pilot proceeded into a short scenic flight around Mulobezi district before landing at about 08:10 hours local time. The aircraft was parked at the airstrip waiting for the next departure time. At About 13:30 hours local time, the pilot plus three passengers prepared to depart Mulobezi airstrip for a flight to Livingstone and the planned cruising level was FL075. The aircraft took off using runway 03 and shortly after take-off on initial climb out experienced engine rough running which was immediately followed by an engine failure. The aircraft crashed about 652m away from the threshold of Mulobezi airstrip and finally rested upside down opposite its final flight path. The aircraft was extensively damaged and is beyond economical repair. No post-crash fire broke out. The investigation team concluded that the cause of the accident was due to the pilots inadequate training on both the technical and operational requirements of the aircraft type. Further, other possible contributory and latent factors were identified.

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1. FACTUAL INFORMATION

1.1 History of the Flight

On 27th February, 2022 the aircraft left Siandunda Airstrip in the HMKIA control zone at about 07:15 hours local time and was headed for Mulobezi Airstrip in Mulobezi, Western Province. On Board were one (01) pilot plus three (03) passengers. The aircraft was flown at cruising level FL085 with flight plan ZXZP001 filed on 26th February, 2022 with HMKIA. The aircraft was flown on a planned track 314(M^{o}) distance 66NM. Around 08:10 hours local time, the pilot proceeded into a short scenic flight around Mulobezi district before landing at Mulobezi Airstrip. After landing, the pilot and passengers proceeded to conduct their business at Taurus Sawmills (formerly Mulobezi sawmills). At About 13:00 hours local time, the pilot and three passengers returned to the airstrip and prepared to depart from Mulobezi for a flight to Livingstone. The Flight plan to be used was ZXZP002 filed with HMKIA and the planned cruising level was FL075. According to the Pilot and witness statements, the pilot performed pre-flight checks and set the aircraft to take-off from runway 03 with flaps 25 degrees and full power for take-off (rolling take-off). At About 13:30 hours local time the aircraft lifted off and continued its initial take-off climb out. During initial climb out, the aircraft experienced engine rough running to which the pilot decided to switch fuel tanks in order to rectify the problem. The pilot mentioned to the passengers that they were having engine trouble and at this point the engine went off. Due to their low altitude and engine failure, the pilot did not try to restart the engine but instead looked for a place to land the aircraft. The aircraft veered to the left, crashed about 652m away from the threshold of Mulobezi airstrip and finally rested upside down opposite its final flight path. The pilot and passengers evacuated the aircraft with minor injuries and the pilot went back to secure the aircraft by switching off the magnetos and master switch.

Meteorological flight conditions at the point of departure were forecasted as follows:

a) Surface wind – Moderate
b) Temperature – Unknown
c) Weather – Cavok (Ceiling and Visibility OK)
d) QNH – Set to airfield elevation by pilot

1.2 Personnel Information

The Pilot-In-Command has a Private Pilot License issued by the Zambia Civil Aviation Authority. He is rated on single engine aircraft with 400 hours total time logged.

Types in Group 1

a) C 206
b) C 172
c) PA 32-300
d) PA 28

1.3 Aircraft Information

The Piper PA 32-300 Cherokee Six, S/N 32-40030 is a single engine aircraft with Lycoming six cylinder engine type IO-540-K1A5 with a variable pitch propeller. It has dual controls.

The aircraft was issued with a Certificate of Airworthiness (C of A) on 18th June, 2021 and was confirmed airworthy. This aircraft was flown by other pilots during the period of validity of its C of A.

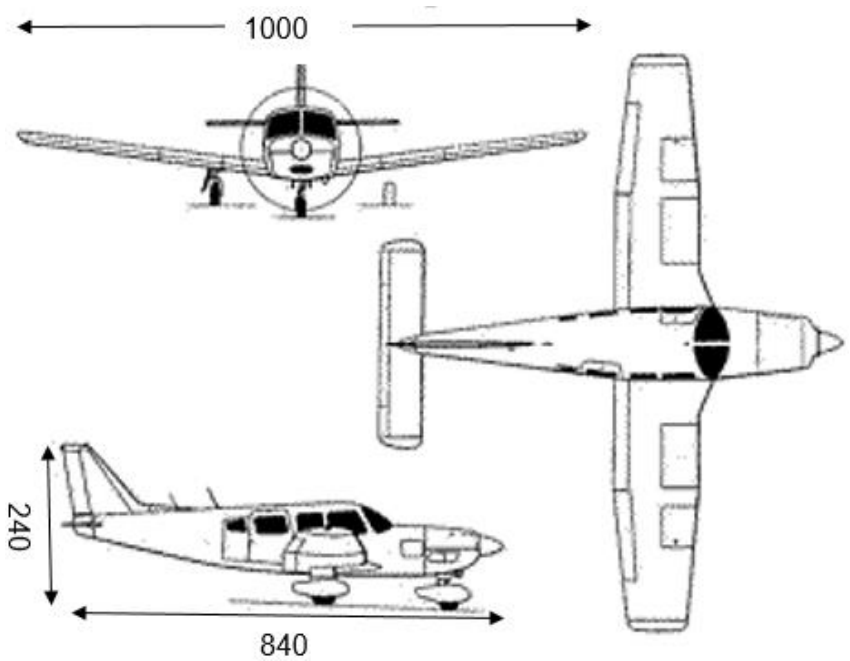
The aircraft had the following documents on board;

a) Certificate of Release to Service	
b) Aircraft Flight Manual	
c) Certificate of Reinsurance	Valid until 6th September, 2022.
d) Certificate of Airworthiness	Valid until 9th July, 2022.
e) Radio license	Valid until 31st January, 2023.
f) Certificate of Registration	Issued on 10th October, 2016.
g) Weight Schedule	Date of Approval 5th May, 2021 Empty weight 2054 Lbs (Max AUW 3400lbs)
h) First Aid Kit	Valid at the time of investigation
i) Fire Extinguisher	Valid at the time of investigation

The Piper PA-32-300, Registration number 9J-RDN, S/N 32-40030 has the following Technical Specifications:

Exterior

- Exterior Height: 7ft 11In(240cm)
- Wing Span: 32ft 10In (1000cm)
- Length: 27ft 8In (840cm)



Interior

- Cabin Height: 4ft 0In(121cm)
- Cabin Width: 4ft 1In (124cm)
- Cabin Length: 9ft 11In(305cm)

Occupancy

- Crew: 1
- Passengers: 5 or 6

Operating Weights

- Max T/O Weight: 3440 Lb (1,560 kg)
- Max Landing Weight: 3440 Lb (1,560 kg)
- Operating Weight: 3400 Lb (1,542 kg)
- Empty Weight: 1856 Lb (842 kg)

- Fuel Capacity: 84 gal
- Payload Useful: 1544 Lb (705 kg)

Range

- Max Range: 730 NM (1,361km)
- Service Ceiling: 16250 ft (4,950 m)

Distances

- Take off Distance: 700 ft (213 m)
- Landing Distance: 630 ft (192 m)

Performance

- Rate of Climb: 1050 ft/min (5.3 m/s)
- Max Speed: 151 kts (280 km/h)
- Normal Cruise: 146 kts (272 km/h)

Power Plant

Engine: 1

Type: IO-540-K1A5
Manufacturer: Lycoming
Serial Number: RL-14262-48A
Date of Manufacture: 7/10/2005
TBO: 2000 Hrs.
TSO: 65 Hrs 35 Min

Propeller: 1

Type: HC-C2YK-1BF
Manufacturer: Hartzell
Serial Number: CH36068B
Date of Manufacture: ---
Number of Blades: 2
TBO: 2000 Hrs
TSO: 154 Hrs 45 Min

1.4 Injuries to Persons

There were no fatalities. All on board survived the accident but the passengers sustained minor injuries. They all evacuated the aircraft safely without assistance from third parties.

1.5 Damage to the Aircraft

The aircraft was extensively damaged and is beyond economic repair as detailed below:

a) Nose landing gear detached from the Airframe (Fig.1)
b) Right hand main landing gear detached from the wing tearing off the attachment area (Fig.2)
c) Right wing tip detached from the wing (Fig.3)
d) Left wing compressed, folded in several sections and partially split at the wing root area with some pieces of frames broken off and spread around the accident scene (Fig.4)
e) The tail cone around the base of the fin dented and tip of the fin slightly damaged (Fig.5)
f) Propeller blade tips bent backwards and scratched (Fig.6)

1.6 Meteorological Information

The meteorological information based on pilot account with no sources of reported met data at Mulobezi Airstrip was clear sky with light winds.

1.7 Aerodrome Information and Facilitation – Mulobezi Airstrip

a)	Coordinates	S16º 46' 34.8" E 025º 11' 09.5"
b)	Elevation	3,175 FT
c)	Length	1200 Meters
d)	Width	30 Meters
e)	Orientation	03/21
f)	Surface	Gravel/grass
g)	ATM	Uncontrolled
h)	Aids to Navigation	Nil
i)	Communications	Nil

The air field has no Navigation aids and therefore landing was purely on Visual Flight Rules (VFR) in uncontrolled airspace.

1.8 Flight Recorders

The Piper PA-32-300 is not equipped with a flight data and voice recorder.

1.9 Wreckage and Impact Information

After clearing the trees, the aircraft veered to the right where it hit a shrub and flipped on its back and bending the left wing forward as it came to rest upside down facing opposite its final flight path among the shrubs.

1.10 Fire

There was no evidence of post-crash fire.

1.11 Survival Aspects

All on board survived the accident sustaining minor injuries and evacuated the aircraft safely with the help of the pilot.

1.12 Examinations (Tests and Research)

The cockpit was critically analyzed. The levers were fully forward, and flaps fully deployed at 40º setting.

Further examination of the aircraft and engine by Corporate maintenance and the AAIB investigation team revealed the following:

S/N	COMPONENT	STATE FOUND		COMMENT
01	Propeller (fig.6)	Both propeller blades had paint scratched on upper surface tips, bent and folded backwards at the tips		This indicates that the propeller was still spinning at impact.
02	Fuel Divider (Fig.7)	Diaphragm clean and not collapsed		Fuel system not blocked and fuel was flowing.
03	Spark Plugs (Fig.8)	Top Left	clean	All top spark plugs were firing. Bottom spark plugs found clean indicate firing, however, the plugs found with oil could be a result of the leaning position of the aircraft as oil remaining in the pipes collects and settles in its circulation process. Further, this could also be a result of residue oil settling due to sudden stoppage.
		Top Right	clean	
		Bottom left	1 had oil	
		Bottom right	All had oil	
04	Throttle, Mixture and Propeller levers	All links connected		This indicates that the throttle, mixture and propeller controls were working and responsive.
05	Fuel Selector	Link connected		This indicates that the fuel selector was working.
06	Injectors	Fuel present		Injectors were serviceable at the time of the accident.
07	Fuel Filter	Clean		No blockage on fuel filter.
08	Air Filter	Clean		No blockage on air filter.
09	Magnetos	Driving mechanisim intact		Magnetos were mechanically intact. Further, physical examination of the spark plugs indicate that they were serviceable.

1.13 Organization and Management

The PIC is a Zambian citizen who resides in Livingstone. He is a businessman and listed Director of Taurus Sawmills. He acquired his PPL in order to operate the aircraft belonging to Taurus Aviation. All three passengers are South African Nationals, two of whom are shareholders of Taurus Sawmills. The aircraft was used to ferry the passengers to various places for private business engagements.

1.14 Additional Information

The Investigating Team received additional information relating to this accident from the pilot, one passenger and other relevant witnesses interviewed.

a) Pilot In-Command (PIC)

The pilot reports that on 27th February, 2022 he started his flight duties at Siandunda airstrip with a pre-flight check of the aircraft. He also mentioned that during pre-flight check, a return flight plan referenced as ZPZX001(outbound) and ZPZX002(Inbound) was filed by phone with Livingstone's Harry Mwanga Nkumbula International Airport briefing office. He further stated that fuel tanks were dipped using a dipstick and found 40 litres on the left outboard tank, 70 litres on the left inboard tank, 90 litres on the right inboard tank and 50 litres on the right outboard tank. The total fuel onboard the aircraft was about 250 litres. He also checked the oil quantity which was at 7 quarts, to which he topped up with 1 quart. Upon completing the Pre-flight, the pilot plus 3 passengers boarded the aircraft after which he proceeded into a start-up, taxi and ground run (engine check-up). Having been satisfied that the aircraft was okay, at about 07:15 hours local time he departed Siandunda airstrip, normally and had an uneventful climbing out into a heading for Mulobezi. The planned cruising altitude was FL085 and a track of 314 (Mº). He further explained that the climb out and flight at planned cruising altitude FL 085 with 314 (Mº) as the planned track and he also stated that the flight was normal. Upon arrival into the Mulobezi area, the pilot took about 10 minutes of sightseeing before the aircraft landed at Mulobezi airstrip at about 08:10 hours local time and parked the aircraft there. Accompanied by the passengers, they went about their business in Mulobezi and returned to the airstrip at around 13:00 hours local time in preparation for a flight back to Siandunda airstrip. At about 13:30 hours local time, a pre-flight check was completed followed by an engine and take-off run. He stated that just after the aircraft got airborne, he felt the engine rough running. At that point, he decided to switch engine fuel source from left inboard tank to the right inboard tank which did not stop the engine rough running. He later told his passengers that the aircraft was experiencing engine problems to which the passenger seated next to him confirmed that the engine had gone off. He stated that after the engine failed, he did not try to attempt a restart because they were at low speed and altitude. Therefore, there wasn't enough time for the aircraft to respond. Further, he added that an emergency landing space was identified to save the aircraft from extensive damage. The aircraft was maneuvered to the forced landing site where it crashed, flipped, and rested on its back facing the opposite direction to the direction of flight. Upon realizing they had crashed; he secured the aircraft by switching off the magnetos and master switch. He then exited the aircraft wreckage using the front door whilst the rear-seated passengers exited from the rear door. After evacuating the aircraft wreckage and conducting a headcount, he confirmed that only 2 passengers had suffered minor injuries whilst himself and another passenger had minor abrasions.

He further stated that he had noticed that prior to the accident, the aircraft had experienced engine rough running several times and the aircraft would struggle to maintain 1000 RPM at idle. His observation was that the aircraft would run smoothly between 1200 – 1300 RPM at idle. He also mentioned that this was reported to the maintenance organisation and shared by the previous owner during aircraft handover.

b) Aircraft Maintenance Organisation

i. Quality Assurance Manager

She stated that she received a call from the accountable manager informing her of the accident. She immediately contacted the CAA who informed her to contact the AAIB. She further stated that she knew the history of the aircraft very well prior to the accident. The aircraft had a check I inspection from 4th February to 8th February, 2022. She mentioned that the aircraft engine was overhauled following the 12 year rule in 2020. She stated that from the time of the check I inspection to the accident, there were no engine problems with the aircraft. She further stated that she did not receive a report of engine related defects from the pilot.

ii. Avionics Engineer

He stated that on the day, he received information of the crash from his accountable manager. He informed the AAIB that the aircraft was sold to Tauras Aviation with 15 total flying hours on the engine. He further stated that the aircraft underwent a Check I inspection before it left the maintenance facility. He stated that he was not aware of any engine defects with the aircraft, from its release till the date of the accident. He stated that if a report of engine defects was made, there should be documentation to support it.

iii. Accountable Manager (Airframes and Engines – Engineer)

He stated that on Sunday 27th February, 2022 he received a call from the previous owner of the aircraft informing him of the accident. Not sure of the location, he informed his quality assurance manager, the CAA and ultimately the AAIB. He stated that the Quality Assurance Manager got in contact with the pilot who mentioned that the aircraft experienced engine failure. He stated that the aircraft had recently undergone a Check I inspection in which the pilot reported defects to do with stall warning and alternator. He stated that the stall warning on the aircraft was visual and not aural as is the design of the aircraft, whilst the alternator switch was popped out on the circuit breaker and needed to be pushed back in. He further stated that there were no known defects with the engine from the time the aircraft was released until the date of the accident. He further stated that he felt that the pilot was not very familiar with the aircraft systems.

c) Previous Owner of the Aircraft

He stated that he received a phone call from the current owner of the aircraft and was given details of the accident, such as the events, time, survival aspect and injuries to persons. He stated that at the time of sale on 24th January, 2022 there were no known

problems with the aircraft. He stated that he felt the sale was done a little too quick, as he wasn't given the opportunity to orient the pilot to the aircraft. He mentioned that the current owner may not have understood the procedures of the aviation industry and as such could have pushed the pilot "a bit too much." He further stated that he knew the pilot was fairly new and had little experience on the particular aircraft type therefore, he felt he should not have been flying into strip runways. He stated that from his experience with the aircraft he has never attempted to take off at midday due to the risks involved arising from the density altitude and wondered why the pilot decided to take-off at that time. He added that for short field strip runway take-offs for this type of aircraft, it is advisable that it is done in ground effect which means that the aircraft would after lift off maintain level flight to gain enough air speed to climb out. Further, he stated that in the event that the engine shuts off mid flight, the propeller will stop rotating and impact the ground in the horizontal position. In addition, he stated that from his assessment of the pictures he saw of the propeller, he was of the opinion that the engine could have been running when the aircraft impacted the ground.

d) Flight Instructor/Examiner to PIC at Issuance of Zambian PPL

He stated that the PIC approached him to be his instructor in order to validate his South African PPL to a Zambian PPL. He stated that he conducted ground school first and later completed the 5 hours minimum for licence and type conversion. This conversion training was endorsed by the CAA. The last actual flight was conducted on 3rd February, 2022. He mentioned that he was fully satisfied and confident with the PIC who completed the flight tests in a satisfactory manner. At the time of these training flights he stated that the aircraft was in very good condition. He further informed the investigation team that he had a verbal agreement with the PIC to conduct another training exercise involving strip landing and take-offs, as this was not a requirement in the intial conversion examination. He stated that he was disappointed when he heard about the accident as the PIC did not follow up on their verbal agreement for strip landing and take-off training. He mentioned that although it was not an offence by law for the PIC to fly into such short field airstrips with little experience, he believd it was unwise. Finally, he stated that he believed that because Taurus Aviation did not have an AOC there was no guidance or procedure as to how a new pilot is inducted as is the case with many private operators. He stated that this was a gap because private owners did not have the umbrella of an AOC for guidance.

2. ANALYSIS

2.1 Crew Resource Management

The Crew Resource Management (CRM) reveals that the pilot had minimal experience at gravel and soft field airstrips. This statement is supported by narration from the PICs flight examiner who indicated that he had not been trained for this. Further, the aircraft tech log indicated that this was his first ever flight into Mulobezi airstrip a gravel, soft and short airfield. The PIC could have further enhanced his remote and strip landing exercises by enganging a resource person to familiarise him with such operations.

2.2 Engine Failure

The investigation team's analysis of the reported engine failure is as follows:

a) **Fuel Starvation** – there could have been fuel starvation on the initial engine rough running on initial take-off climb due to the fact that the fuel tank selected may have had very low fuel quantities. Reference is made to Piper Cherokee Six Pilot's Information Manual Accepted on 10 July, 2017 by the CAA, **Section 3.9 Engine Power Loss During Take-off** on paragraph 5 which states "If engine failure was caused by fuel exhaustion, power will not be regained after switching fuel tanks until the empty fuel lines are filled. This may require upto ten seconds." This caused an engine fuel starvation as he should have strived to gain up to at least 300 ft AGL which would have given him the recommended ten seconds after switching tanks required to refill fuel lines and regain power before the aircraft completely loses altitude.

   The fuel selector linkage was okay – which indicates that the fuel selector was working.
   Fuel flow divider was found clean and the diaphragm did not collapse – this indicates that there was no blockage and fuel was flowing.
   The mixture and throttle linkages were still connected – this indicates that the throttle, mixture and propeller controls were working and responsive.
   The fuel filter was found clean – this indicates that there was no blockage in the fuel system.

b) **Ignition system failure** – The investigation finds that the ignition system did not fail as the top spark plugs were serviceable. The bottom plugs were found with oil and the investigation team concludes that this was due to residual oil which had settled as a result of the position of rest or sudden stoppage. The high tension power cables were found intact. In addition, the driving mechanism of the magnetos was found to be in working order.

c) **Air starvation** – there was no air starvation to the engine as the air filter was was found clean and there was no blockage in the air induction system.

d) **Mechanical linkages** – the three power levers (propeller , throttle and mixture) were connected and functioning normally.

e) **Propellers** – the investigation finds that the state of the propeller as evidenced by the the tips whose paint was scratched from leading to trailing edge and bent backwards in the same pattern indicates that the engine was still running at impact.

From the theorectical analysis of forces that act on a rotating propeller the investigation team further adds the following:

i. Centrifugal forces – (causes great stress to a propeller) which tries to pull the blade out of the hub.
ii. Thrust bending force – which attempts to bend the propeller blades forward at the tips.
iii. Torque bending force – which occurs as air resistance opposes the rotational motion of the propeller and tends to bend the blades in the opposite direction of rotation.
iv. Aerodynamic twisting – which tends to increase the propeller's blade angle.
v. Centrifugal twisting – which tends to reduce the propeller's blade angle.
vi. Blade vibration – resulting from mechanical and aerodynamic forces as thrust is produced.

2.3 Maintenance

The aircraft was fully serviceable with a valid C of A. However , the pilot indicated that the engine had a history of rough running and high RPM. The investigation team did not find any record of rough running or high RPM from the aircraft Tech Log and Engine Logbook. Further, this is confirmed by the maintenance organisation personel, the previous owner of aircraft and the PICs flight instructor's accounts.

2.4 Weather

The weather was relatively clear skies with moderate winds and area QNH being set to airfield elevation by the pilot.

The temperature was not recorded but it was normal daytime temperature ranges for February, 2022 in Mulobezi.

2.5 Observations by the Investigation Team

The team notes the following time line of events as evidenced from documents:

DATE	EVENT	COMMENT
24.01.2022	Aircraft sale	Taurus Aviation purchases 9J-RDN
03.02.2022	Flight for PIC during conversion exam on 9J-RDN	The PIC has his last flight to meet the minimum 5 hours requirement to be issued a Zambian PPL at conversion from his South African PPL.
04.02.2022	Maintenance Organisation receives 9J-RDN	The maintenance organisation is informed of two defects with aircraft which are the stall warning and alternator.
06.02.2022 to 08.02.2022	Maintenace and ground run of 9J-RDN	Stall warning is checked and found satisfactory, while alternator circuit breaker is popped out and reset in. Further, the aircraft is ground run and found satisfactory.
08.02.2022	PIC receives Zambian PPL	CAA issue PIC with Zambian PPL

09.02.2022 to 20.02.2022	PIC flies to various destinations	PIC flies to HMKIA, Siandunda, Lanseria, Sir Seretse Khama Airport, PG Matante Airport, Wonderboom Airport and Pietermaritzburg Airport.
27.02.2022	Day of accident	PIC flies from Siandunda airstrip to Mulobezi airstrip for the first time.

3. CONCLUSION

3.1 Findings

a) Failure to record fuel replenishments in the aircraft Tech Log pages serial 0051 dated 9th February, 2022 to serial 0053 dated 27th February, 2022.
b) The fuel tank quanitites could not be verified as there was no record of replenishment as per finding (a).
c) The engine failure emergency procedure was not followed as per Cherokee Six 300 Pilots Information Manual. The pilot switched tanks before gaining sufficient altitude when he experienced rough running according to his statement.
d) The engine may have been starved of fuel during the initial engine rough running arising from the pilots action of switching tanks.
e) The pilot was unfamiliar with strip runway operations on this particular type of aircraft.
f) The pilot had inadequate knowledge on the aircraft operating system.
g) The pilot was checked out after the minimum 5 hours conversion training.

3.2 Causes / Contributing Factors

The main cause of this accident from submitted reports and all related documentation gathered, indicate that the pilot training and experience was inadequate for both the technical and operational requirements of this aircraft type.

Human Factors also played a role in this accident mainly due to both organizational arrangements put in place to train the pilot prior to the flight and unfamiliarity with unpaved strip runway operations procedures as exhibited in the instructor's account.

4. SAFETY RECOMMENDATIONS

The Investigation Team recommends the following;

4.1 To Taurus Aviation

AAIB/SR/2022/032
Taurus Aviation Management is recommended to ensure that fuel replenisnment procedures and documentation are followed by pilots in line with their training and ZCARS Part 9 Section 9.2.2.8.

AAIB/SR/2022/033
Taurus Aviation Management is recommended to ensure that their pilots undergo minimum flight training skills test with a qualified instructor for take-off and landings from unpaved strip runways in accordance with ZCARS part 2 before they are assigned tasks in remote unpaved short field runways.

AAIB/SR/2022/034
Taurus Aviation Management is recommended to introduce scheduled flight safety awareness meetings to discuss aviation safety including aviation emergency procedures.

4.2 To the Civil Aviation Authority

AAIB/SR/2022/035
The Civil Aviation Authority is recommended to conduct random aircraft tech log record spot checks on Taurus Aviation and other private operators.

AAIB/SR/2022/036
The Civil Aviation Authority is recommended to include take-offs and landing on unpaved short field runways within the 5 hours minimum conversion training requirement for Pilots (ZCARS part 2) for aircraft with maximum mass of below 2,250kg.

Fig.1: Nose Landing Gear Detached from the Airframe

Fig.2: Right Hand Main Landing Gear Detached from the Wing

Fig.3: Right Wing Tip Detached from the Wing

Fig 4: Left Wing Compressed, Folded in Several Sections and Partially Split at the Wing Root Area with Some Pieces of Frames Broken off and Spread.

Fig.5: The Tail Cone Around the Base of the Fin Dented and the Tip of the Fin Slightly Damaged

Fig.6: Propeller Blades Bent Backwards and Scratched at the Tip

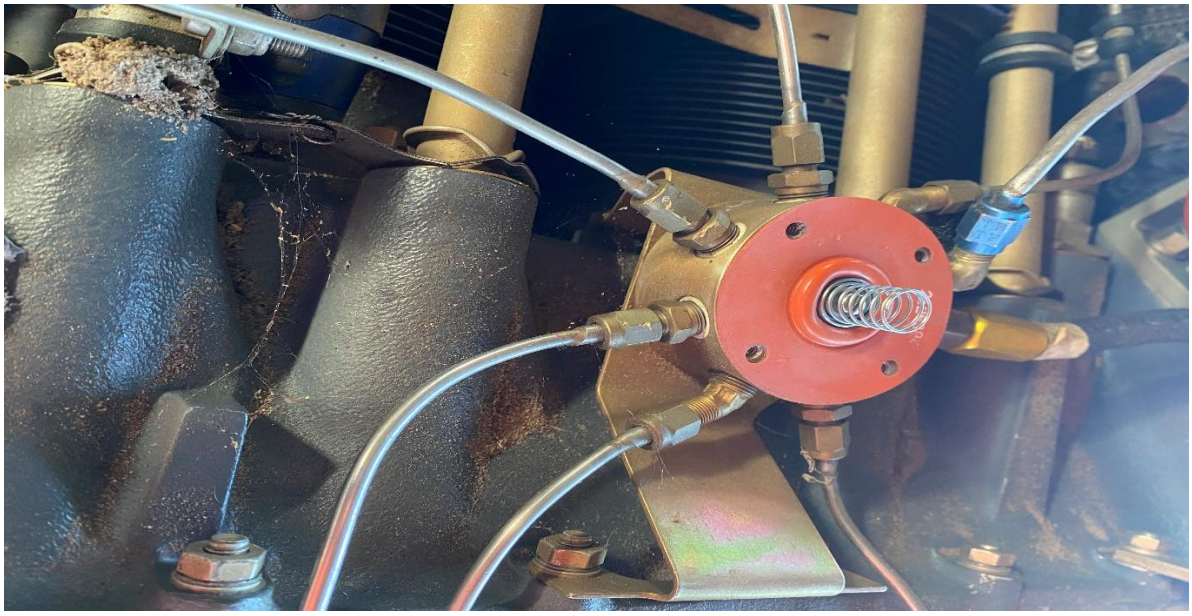


Fig.7: Fuel Flow divider and diaphragm intact

Fig.8: Some Spark Plugs Found with and without Oil

APPENDIX A – GLOSSARY

AAIB – Aircraft Accident Investigation Board
AGL – Above Ground Level
AOC – Air Operator Certificate
ATM – Air Traffic Management
AUW – All-Up Weight
C 172 – Cessna 172 aircraft
C 206 – Cessna 206 aircraft
CAA – Zambia Civil Aviation Authority
CAVOK – Ceiling and Visibility OK
CPL – Commercial Pilot Licence
CRM – Crew Resource Management
FL – Flight Level
FT – Feet
gal – Gallons
HMKIA – Harry Mwaanga Nkumbula International Airport
Hrs – Hours
Kg – Kilograms
Km/h – Kilometers Per Hour
KKIA – Kenneth Kaunda International Airport
Kts – Knots
Lb – Pounds
m – Meters
Mº - Magnetic Degrees
MTOW – Maximum Take Off Weight
NM – Nautical Miles
PA 32-300 – Piper PA 32-300 Aircraft
PA-28 – Piper PA 28 aircraft
PIC – Pilot in Command
PPL – Private Pilot Licence
RPM – Revolutions Per Minute
TBO – Time Before Overhaul
TSO – Time Since Overhaul
UTC – Universal Time Coordinated
VFR – Visual Flight Rules
ZCARs – Zambia Civil Aviation Regulations