

MINISTRY OF COMMUNICATIONS AND TRANSPORT
ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT NO. CAV/ACC/3/81

REPORT ON THE ACCIDENT TO PIPER PA-23-250 AZTEC
AIRCRAFT REGISTRATION NUMBER 5H-TAM
WHICH OCCURRED ON 31ST MAY, 1981
AT DAR ES SALAAM INTERNATIONAL AIRPORT, DAR ES SALAAM TANZANIA
(LAT 06°52'S; LONG 39°12'E)

AIRCRAFT ACCIDENT REPORT NO. CAV/ACC/9/80

AIRCRAFT : Piper PA 23-250 Aztec F
ENGINES : Two Lycoming 10-540-C4B5
REGISTERED OWNER : Tanzania Aviation Ltd.
P.O.Box 25,
DAR ES SALAAM.
OPERATOR : Tanzania Aviation Ltd.
CREW : One Pilot - Uninjured.
PASSENGERS : NIL
PLACE OF ACCIDENT: Dar es Salaam International Airport,
Tanzania.
(Lat 06°52'S, Long 39°12'E)
DATE AND TIME : 31st May, 1981 at 0757.

ALL TIMES IN THIS REPORT ARE GMT

SYNOPSIS

The aircraft was returning from a charter flight to Kilwa with no passengers or baggage. Whilst landing at Dar es Salaam International Airport, the nose gear collapsed and the aircraft came to an abrupt stop on the runway.

FACTUAL INFORMATION

1. History of the Flight

On May 31st, 1981 5H-TAM departed Dar es Salaam International Airport at 0610 hours on a charter flight to Kilwa.

The aircraft landed at Kilwa at 0705 hours uneventfully. Five passengers disembarked and the pilot immediately took-off for Dar es Salaam.

The pilot noticed nothing untoward during the flight from Kilwa to Dar es Salaam. At 0751 hours 5H-TAM made contact with the Dar es Salaam Control Centre on 119.1 MHz and was cleared to land at 0756 hours. 5H-TAM made a straight-in approach and at 0757 hours relayed the following information:

"Affirmative: "My nose wheel tyre was not down and locked on landing, it got collapsed."

On realising that the nose gear had collapsed the pilot carried out the engine shutdown drill. The aircraft was observed by the Tower to make a short roll before coming to an abrupt stop on the runway.

1.2 INJURIES TO PERSONS :

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Non-Fatal	-	-	-
None	1	-	-

1.3 Damage to Aircraft :

The nose gear actuator rod was broken. Both propellers were bent. There was substantial damage to the front fuselage ~~under~~ structure

1.4 Other damages :

Nil

1.5 Personnel Information :

The pilot, Mr. J.R. Mulimba, was born on 15th March, 1951 at Musoma. He held a Commercial Pilots Licence No.HP-125 issued on 8th March, 1980 with his initial I/R done on 4th September, 1980. His CPL and I/R expire on 14th December, 1981 and 3rd October, 1981 respectively. He also held a Flight Radio Telephony Operator's Licence No.X-87 kept valid in-line with his CPL.

Ratings :

The pilot was rated for the following aircraft types in group one (I): Piper PA-18 and PA-23 Landplanes. He was also rated to fly HS 748 in group two (II). His Instrument Rating was current at the time of the accident.

Experience :

At the time of the accident the pilot claimed a total number of 825.15 hours broken down as follows:-

Day	P1	P2	Night	P1	P2
	425.50	170.25		25.35	51.35

He had logged 38.55 hours on the type.

1.6

Aircraft Information :

The aircraft, a Piper PA 23-250 Aztec F Serial No.27-7754014 powered by two Lycoming IO-540-C4B5 engines was manufactured by Piper Aircraft Corporation at Lockhaven, USA in 1977. This aircraft arrived in Tanzania in possession of an export C of A number E.142597 and a USA Registration No.62776. The aircraft registered in Tanzania as 5H-TAM on 23rd August, 1977 in the name of Tanzania Aviation Limited, P.O.Box 25 Dar-es-Salaam, Tanzania.

1.6.1

Loading and C of G Disposition :

The aircraft was properly loaded and its Centre of Gravity was within the prescribed limits.

1.7

Meteorological Information :

The weather at Dar es Salaam International Airport at the time of the accident was reported as being partly cloudy. The prevailing weather conditions did not have any bearing on the cause of the accident.

1.8

Aids to Navigation :

Not applicable.

1.9

Communications :

The aircraft had no communication problems with the Dar-es-Salaam Tower. However, only the transmission from the aircraft to the Tower could be heard on the transcript of the tape recordings made during the investigation. This was because the receiver of the No.1 recording bay could not record the weak signals transmitted by the Tower to the aircraft in the circuit. This defect was only internal and has since been rectified.

1.1.10

Aerodrome Information :

Runway 23 at Dar es Salaam International Airport is of tarmac and in good condition.

1.11

Flight Recorders :

Not required by Regulation. None fitted.

1.12 Wreckage Information :

The aircraft was found in the middle of the runway resting on the main wheels and the nose of the aircraft in contact with the runway. All propeller blades were bent as they struck the runway. The nose gear actuator rod had broken at the threads near the eye end. The aircraft sustained substantial damage to the cone and the front fuselage under structure.

1.13 Medical and Pathological Information :

Not applicable.

1.14 Fire :

There was no fire.

1.15 Survival Aspects :

The pilot was strapped in his seat and suffered no injuries. The accident was fully survivable.

1.16 Tests and Research :

Checks were carried out on the aircraft's hydraulic system and the gear extension/retraction mechanism. No defects could be found in the hydraulic system. Gear Cycling tests were conducted with the following results :-

DOWN Selection

- 1st Starboard leg down and locked
- 2nd Port leg down and locked
- 3rd Nose leg lagged behind but lowered eventually and locked.

UP Selection

- 1st Nose
- 2nd Port main
- 3rd Starboard main.

The exercise was repeated several times with similar results. No leaks were apparent in the system. All the three gear "down and locked" lights illuminated as expected. The landing gear power configuration horn sounded when gear was unlocked down with power below 14Hg.

Metallurgical tests carried out at the University of Dar-es-Salaam indicated the actuating cylinder at which the ball joint at the end of the piston rod broke off met engineering drawing requirements for rod diameter, material strength, hardness, microstructure and chemical composition. /5...

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Metallographic inspection did not reveal any signs of fatigue fracture. The tests confirmed that the piston rod joint failed in bending under a single application of a large force.

2. ANALYSIS AND CONCLUSIONS :

2.1 Analysis :

Examination of the collapsed nose gear and the broken actuator showed that the piston rod fractured after it had extended by 11.2cm. Its full extension to locking position is supposed to be 17.5cm. From the above it was apparent that the nose wheel touched the ground whilst in transit, having extended by some 64% of its full travel.

The aircraft's gear extension/retraction mechanism is operated by one hydraulic pump driven by the port engine. On selecting "gear down" the gear locks down in 15 to 20 seconds. In flight this process takes longer particularly with the nose gear which extends in opposition to the aerodynamic forces. The basic nose gear locking structure is a triangular frame on two fuselage mounting points with one collapseable member which locks rigid through a geometric lock. In the normal landing configuration, all the landing loads are carried by this frame. There is no load on the actuator. For this reason therefore, the actuator is not designed to carry landing loads. However, when landing is attempted with the nose gear partially extended and unlocked, the landing load on the nose gear is transmitted to the actuator tending to push the piston rod back into retraction position. In this case the actuator is subjected to compressive and bending loads. This fact is supported by metallurgical tests which showed that the actuator piston rod actually failed in bending. It should be noted that the good mounting position of the actuator would, in any case, expose it to small direct bending loads so that the loads taken in the process are mainly compressive. However, excessive compressive stress to an extending actuator can cause buckling of the piston rod than can result in bending fracture as was the case with the accident aircraft. From the above, it is probable that the pilot lowered the gear just before landing after he was alerted by the power configuration horn as a result of which the aircraft landed when the nose was still in the process of extension.

3(a) Conclusions:

- (1) The pilot was properly licenced.
- (2) The aircraft documents were in order
- (3) The aircraft was in possession of a valid certificate of Airworthiness and had been properly maintained
- (4) The pilot failed to satisfactorily complete his pre-landing checklist items by lowering the gear too late.

(b) Cause :

The accident was caused by the pilot selecting gear down too late in the landing sequence to allow sufficient time for the nose leg to become extended to its locking position before touchdown.

4 Safety Recommendations :

This was the third accident of this nature involving TAL aircraft. The Company should revise its operation procedures involving training in the proper drill for landing.



(Charles Nawa)
CHIEF INSPECTOR OF ACCIDENTS