

MINISTRY OF WORKS COMMUNICATION AND TRANSPORT

CIVIL AIRCRAFT ACCIDENT NO. CAV/ACC/12/97

**REPORT ON THE ACCIDENT TO PIPER PA 34-200 AIRCRAFT
REGISTRATION NO. 5H-ZAK WHICH OCCURRED AT
ZANZIBAR INTERNATIONAL AIRPORT**

ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT NO: CAV/ACC/12/97

Aircraft type : Piper PA 34-200

Nationality : Tanzania

Registration : 5H-ZAK

Engines : Two Lycoming LIO-360-CIE6

Operator : ZANAIR Ltd.
P.O. Box 2113 Zanzibar, Tanzania

Crew : One pilot-Uninjured

Passengers : Five passengers - Uninjured

Place of Accident : Zanzibar International Airport
3NM SSE of Zanzibar Town (S 06 13, E39 13)

Date : 16 October 1997

Time : 1411 hours

ALL TIMES IN THIS REPORT ARE UTC

SYNOPSIS

On 16 October 1997 at 1220 hours 5H-ZAK took off from Zanzibar International Airport for a flight to Sadani. It had onboard one pilot and five passengers. The flight to Sadani was uneventful until on approach for landing at Sadani airstrip when the pilot noted the nose landing gear was not extending. His attempts to extend the landing gear using the emergency landing gear extension system did not bear any fruit. He then decided to divert to Zanzibar, on the understanding there were better emergency handling facilities. He also expected to be able to get assistance from his company headquarters. On arrival at Zanzibar and with the assistance of his Managing Director, who was also a pilot with a rating on the aircraft, the pilot tried several manoeuvres to have the nose gear extended to no avail. A decision therefore was made to make a two main gear emergency landing. The pilot briefed the passengers of the attempt and advised everybody that once the aircraft came to a standstill, everybody should evacuate the aircraft quickly. The aircraft finally touched down at 1410 hours and stopped some distance from the touch down point in the nose down attitude. Every person on board evacuated the aircraft without injuries and the rescue team was on hand to offer assistance if required. The aircraft sustained damage to both its propellers and the lower side of the nose section.

It is concluded that the accident was caused by the failure of the nose landing gear to extend normally and under emergency procedures. Improper installation of the nose gear actuator was identified as a causal factor.

1. *FACTUAL INFORMATION*

1.1 *History of the flight*

On 16 October 1997 at 1220 hours a seven seater twin engined Piper PA 34-200 Seneca I with Tanzanian Registration marks 5H-ZAK, took off from Zanzibar International Airport for a short flight to Sadani airstrip. It had on board one pilot and five passengers. The pilot said the flight to Sadani was normal. As he approached Sadani while turning base leg for Runway 07 and on selecting landing gear down for landing he noticed that only two green main landing gear down and locked light illuminated while the nose landing gear light remained off while the transit landing gear red light also remained on. It became apparent to him that his nose gear was not extending and he verified this by the use of a side mirror located on the inboard of the left engine nacelle. It was noted that the gear and the nose doors were fully up and remained flush with the aircraft belly. The pilot retracted the landing gear and tried the landing gear emergency extension system which also did not bear different results.

The pilot then decided to divert to Zanzibar on the knowledge there were more emergency handling facilities and he could get assistance from his parent company. He briefed his passengers of the situation and set course for Zanzibar. He subsequently retracted the landing gear and flaps. On his way to Zanzibar he requested the Zanzibar Tower to get in touch with his Managing Director, also a pilot type rated to fly the aircraft, for assistance in the situation.

When the aircraft checked zone boundary inbound Zanzibar, it was cleared for descend. The pilot requested to go down to 500 feet and pass overhead the airfield extend the gear so that it could be observed from below if the landing gear had extended. Meanwhile the Company's Managing Director had arrived at the airport and was in the Tower to offer assistance and advise.

People in the Tower ascertained that the two main gears appeared in their normal extended positioned but the nose gear remained up and the nose gear doors were closed.

The pilot with the assistance of his Managing Director, decided to try other attempts to dislodge the nose gear. The aircraft then proceeded to the east of Zanzibar airport and at 3500 feet, he attempted to subject the aircraft to G-forces during extensions. The dive/pull technique was tried to no avail. The pilot then advised the Tower that he had run out of any options and he was coming in for an emergency landing.

The aircraft positioned for long/high approach to runway 18, advised the passengers of what to do and to fasten their seatbelts tightly. The aircraft landed on its main wheels and the nose was held up for some distance to decay the speed till it was no longer possible to keep the nose up. The aircraft nose impacted the tarmac at 1411 hours and stopped shortly thereafter approximately 1200 metres from the threshold of runway 18 in a nose down attitude. There was no fire and all the occupants escaped without injuries.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal	-	-	-
Serious	-	-	-
None	1	5	

1.3 Damage to aircraft

The aircraft sustained substantial damage to its nose section, and both propellers.

1.4 Other damage

There was no third party damage.

1.5 Personnel information

The pilot Captain Innocent P. Mboya was born on 3rd September, 1996 at Arusha. He held a Commercial Pilot Licence No. HP-387 and Radio Operator's Licence No. H.686 granted on 22nd September, 1992 and kept current with his CPL. He held a current instrument rating which was to expire on 12th February, 1998.

He held the following ratings on his licence:

Group 1

Cessna 172, PA 34, PA 32, P68B, BN24MKIII-2 Cessna 402

Group 2

Nil

On the day of the accident the pilot had logged 2839:30 hours with over 1500 hours on the type.

1.6 Aircraft information

The aircraft, a Piper PA 34-200 Seneca I, serial number 34-7250101 powered by two Lycoming IO-360 Engines was manufactured by Piper Aircraft Corporation at Vero Beach Florida, USA in 1972.

It was first registered in the country on 25/5/93 and Certificate of Registration No. 385 with registration 5H-MTN in the name of ZATA Air, P.O. Box 513 Zanzibar was issued. The ownership changed to Mr. Carl Salisbury, P.O. Box 2113 Zanzibar and C of R No. 385-A was issued. It subsequently changed hands to ZANAIR Ltd. Of P.O. Box 2113 Zanzibar under a C of R No. 385-A1.

The aircraft Certificate of Airworthiness No. 339 granted on 28 May 1993 and was kept current through periodic renewals. At the time of the accident the C of A was valid till 24th November 1997. The aircraft was being operated in the Public Transport Category.

1.7 Weather information

The weather had no bearing on this accident.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Not applicable.

1.10 Aerodrome Information

Zanzibar International Airport is situated 3 nautical miles south south east of Zanzibar Municipality. There is one runway (18/36) which is of 2462 metres long and 45 metres wide. The runway surface is tarmac with white edge lighting and PAPI available.

1.11 Flight Recorder

Not required by regulations on this type of aeroplane and none was fitted.

1.12 Wreckage Information

1.12.1 The aircraft finally stopped in a nose down attitude standing on its two main landing gears and the nose facing in the direction 180°.

As the aircraft had stopped on the active runway, it was decided to remove it soon as the occupants disembarked. The rescue team, which included the Zanzibar Fire and Rescue Service, Zanair Engineering and Operations Section lifted the nose section of the aircraft off the runway in the process of moving the wreckage from

the runway. As soon as the nose left the runway, the nose landing gear extended and locked and the wreckage was towed away from the runway standing on its own three landing gears. The wreckage was pushed to the edge of the airport apron awaiting the arrival of the investigators from Dar es Salaam.

The lower section of the nose gear sustained damage on impact with the runway surface, both propellers blades were twisted towards the tip ends when they impacted the surface as the nose went down. There was evidence of some rivets pulling at the nose section attachment bulkhead consistent with shear load imposed on to the structure as the nose hit the surface.

1.12.2 ***The Accident site***

The aircraft landed on runway 18 of Zanzibar International Airport. The runway is of tarmac construction and did not suffer appreciable damage.

1.13 ***Medical and pathological information***

Not applicable.

1.14 ***Fire***

There was no fire.

1.15 ***Survivable aspects***

This was a survivable accident.

1.16 ***Tests and Research***

Not applicable.

1.17 ***Other information***

1.17.1

Close examination and investigation revealed that there was too much play at nose landing gear actuator attachment.

1.17.2 It was further evident that the attachment bolt was improperly installed to that it missed the bush bearing completely and the bearing/bush was located away from its proper location.

1.17.3 The required number of spaces (washers) installed on the attachment bolt were insufficient, which allowed the attachment bolt to move axially.

1.17.4 The axial movement of the bolt and the absence of the bush/bearing allowed the bolt cock in the hole as the actuator deployed.

1.17.5 The bolt axial and canted disposition interfered with the folding of the nose gear mechanical downlock blocking its movement to unfold, hence blocking the extension of the nose gear.

Maintenance Organisations

1.17.6 The initial acceptance Check III carried out on 10 November 1994 was carried out by Skytech Maintenance (K) Ltd. It then went to Aircraft Engineering (T) Ltd when the aircraft was operating with ZATA Ltd. up to 24 November 1995. It subsequently moved to Tanzanair up to 5th November 1996, and then moved back to Aircraft Engineering (T) to the date of the accident.

1.17.7 Among the requirements of an approved maintenance organisation is the position of the Chief Inspector, who is responsible for the quality audit program to comply with all maintenance procedures. Aircraft engineering has not filled this position for a long time and has no effective quality assurance team in place.

2. ANALYSIS

- 2.1 There was no evidence to indicate failure of the pilot to execute his proper functions and operate the aircraft in accordance with the approved pilot's operating manual/handbook.

- 2.2 It is evident from observation of the wreckage that proper maintenance and quality assurance procedures were not adhered to adequately such that the installation went unnoticed when the aircraft was in the hangar for a Check II a few days before the accident. The actuator attachment play was so noticeable by handling the actuator that it is difficult to imagine that if proper inspection procedures were adhered to, the anomaly could not have been noticed.

- 2.3 It is evident that for the span of three years from the time the aircraft was first registered in Tanzania, it had moved through three maintenance organisations each with different quality assurance procedures. Things turn to worse if an organisation does not have a qualified and well experienced Chief Inspector and Inspection Team to oversee the inspection work.

3. CONCLUSIONS

(a) Findings:

1. The pilot was properly licensed to conduct the flight.
2. The aircraft documents were in order.
3. The pilot could not extend the nose landing gear on his approach to Sadani.
4. The nose landing gear actuator was improperly re-installed on a previous check and was not noticed on subsequent checks including the last Check II done less than a week to the incident date.
5. The aircraft landed on its two main landing gears and stopped in a nose down attitude.

(b) Cause

The accident was caused by the failure of the nose gear to extend when the pilot selected "gear down" following improper re-installation of the nose gear actuator.

4. SAFETY RECOMMENDATIONS

It is recommended that:-

- 4.1. All maintenance personnel should adhere to the prescribed procedures in the approved maintenance publications, all inspections and quality control procedures must be adhered to before aircraft are released to service. This should include the use of adequately trained and well experienced personnel in the inspection and quality assurance departments, so that anomalies can be detected in time before aircraft are dispatched.

- 4.2 It is incumbent upon the DCA to encourage operators to deal with maintenance organisations who operate within the prescribed norms of maintenance procedures and adhere to the quality control assurance programs covered in the approved Company expositions.

- 4.3 It is incumbent upon the DCA to ensure that only properly established maintenance organisations are granted recognition as such.


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control interference or make any change to instruments, switches etc settings without the consent of the commander.

All public transport aircraft operators should include for every passenger, briefing card(s) for the aircraft and emergency informations.

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3. Conclusions

(a) Findings } *bold*

- (i) The commander was licensed but his medical certificate had expired for two months before the accident.
- (ii) The aircraft had been maintained in accordance with an approved maintenance schedule, and Certificates of Airworthiness and Maintenance were valid. *
- (iii) The left fuel tank was empty at the time of the accident.
- (iv) The commander made a successful emergency landing.
- (v) Sudden swaying to the left and sinking of the nose wheel in the soft ground resulted in the aircraft pivoting causing the right wing and propeller to strike ground.
- (vi) The company does not have in place a system of calculation and recording the fuel remaining at the end of a flight or flights.

(b) Causes } *bold*

The investigation identified the following factors:

- (i) An engine failure caused by fuel starvation.
- (ii) The sudden aircraft left sway immediately before stopping was due to the left rudder application by the passenger seated in the co-pilot position.
- (iii) The right wing tip and root damage was a result of the pivot actioning when the aircraft nose wheel sunk in ground.
- (iv) Non adherence to the company's operations manual policy on fuelling.