MINISTRY OF COMMUNICATION AND TRANSPORT

ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT NO: CAV/ACC/14/97

REPORT ON THE ACCIDENT TO PIPER PA31-350 AIRCRAFT REGISTRATION NO. 5H-AZM WHICH OCCURRED ON 1 NOVEMBER 1997 BETWEEN NAIROBI AND ZANZIBAR

TANZANIA ACCIDENT INVESTIGATION BRANCH
AIRCRAFT ACCIDENT NO. CAV/ACC/14/97

Aircraft type	:	Piper PA 31-350 Navajo Chieftain
Nationality & Reg. Marks	:	5H-AZM
Engines	:	Two Lycoming TIO-540-J2BD
Operator	:	Air Zanzibar P.O.Box 1784 Zanzibar, Tanzania
Crew	:	Pilot One - not found to date, pressumed dead
Passengers	:	Nil
Place of accident	:	Unknown : Aircraft not found
Date	:	1 November 1997
Time	:	Exact time not known. The aircraft could not have stayed in air beyond 1316 hrs.

ALL TIMES UTC

SYNOPSIS

On 01 November 1997 at 0946 hours 5H-AZM took off from Nairobi Wilson airport for a visual flight rules flight to Zanzibar International Airport, Tanzania. It was carrying one pilot and some cargo. There were no passengers.

The flight plan indicated that the aircraft had 0330 hours of fuel on departure. The pilot planned to fly a direct route to Zanzibar with Dar es salaam International airport as his alternate aerodrome. After take off from Nairobi Wilson, the flight transited the southern axis lane of the Nairobi control Zone to the zone boundary. The pilot checked the Nairobi zone boundary with Nairobi Wilson Tower and was instructed by air traffic control to contact the Nairobi Control Centre. No contact was reported established by Nairobi Control with 5H-AZM.

5H-AZM contacted the Kilimanjaro Control Tower at 1020 hours and passed his ownward estimates as Flight Information Region 1025 hours and arrival Zanzibar 1140 hours.

5H-AZM was advised that there was no reported traffic for the flight in the Kilimanjaro Terminal Control area at the VFR flight level 115 and at the same time instructed the aircraft to contact Dar es salaam Control on 119.6 MHz when in range. No further transmission was received from the aircraft. It also failed to arrive in Zanzibar.

Unfruitful formal search (involving communications, aerial and ground searches) was mounted on 03 November 1997 along the probable route area in Kenya and Tanzania. The formal search was terminated on 04 December 1997 and thereafter the missing aircraft incident was considered to be an accident.

1 FACTUAL INFORMATION

1.1 History of the flight

The aircraft was flying to its base in Zanzibar after repairs and C of A renewal had been carried out at Nairobi Wilson airport, Kenya.

Prior to the flight the aircraft was refuelled from a mobile bowser, 470 litres of avgas were uplifted. The aircraft subsequently taxied from the apron of the maintenance hangar to the holding point of runway 07.

One observer who was at the premises of the maintenance company said that 5H-AZM was seen airborne only a short time after it had left the apron. (International flights always take longer than local flights because they spend time clearing customs).

The aircraft was airborne at 0946 hours and was flying under visual flight rules. The transcript of the conversation between 5H-AZM and the Wilson Tower could not be obtained. However, it was confirmed that on transiting the Southern Axis lane of the Nairobi control zone the pilot checked the Nairobi Wilson Tower. He was instructed by air traffic control to contact the Nairobi Control Centre. However there is no record that contact was established between 5H-AZM and the Nairobi Control Centre.

At 1020 hours the pilot raised the Kilimanjaro Control Tower and reported that he was flying flight level 115, estimated FIR 1025 and ETA (Zanzibar) 1140 hours. 5H-AZM was subsequently advised that there was no traffic for the flight at the moment and that he should maintain VFR and contact Dar es salaam Approach on 119.6 MHz when in range. There were no further communications between the aircraft and any station.

That the aircraft was missing became evident when a client of this operator, who was expecting to use 5H-AZM contacted the Air Zanzibar head office in Zanzibar on 02 November 1998. The head office contacted the maintenance company in Nairobi and learnt that the aircraft had taken off for a direct flight to Zanzibar on the previous day.

1.2 **Injuries to persons**

INJURIES	CREW	PASSENGERS	OTHERS
Fatal	Unknown, presumed dead	-	-
Serious	Unknown	-	-
None	Unknown	-	-

1.3 **Damage to Aircraft**

The damage to the aircraft could not be assessed because it was not found.

1.4 **Other damage**

Not applicable.

1.5 **Crew Information**

The pilot, Captain Robin Campbell Peter Hendricks was born on 5 February 1941 at Alton, England, U.K. He held an Airline Transport Pilot's Licence No. HP333, Full Insructors Rating and Flight Radio Telephony Operator's Licence No. H-601. The Licences were granted on 10 April 1990 and both were kept valid concurrently.

He was rated to fly the following aircraft is command:

Beechcraft BE 58

Cessna 206, 310, 402 and 404

Piper PA 31, 32 and 34

BN2A MK 111- 2 Trisländer. He was also instrument rated and held a full Instructor's Rating.

In his latest records he claimed a total flying experience of 9969 hours

1.6 **Aircraft Information**

The aircraft, a Piper PA31-350 Navajo Chieftain Serial No. 31-8052207 powered by two Lycoming TIO-540 J2BD and LTIO-540 J2BD engines was constructed by the Piper Aircraft Corporation at Lock haven, Penyslavania, USA in 1980.

It was registered in the country as 5H-AZM and a Certificate of Registration No. 417 was granted on 17 November 1994 in the name of Air Zanzibar Ltd P.O.Box 1784 Zanzibar.

A Certificate of Airworthiness No. 371 was granted on 28 November 1994 to expire one year later. It was subsequently kept valid through periodic renewals. The current validity was due to expire on 13 August 1998.

The aircraft was being operated in the Public Transport Category.

1.6.1 **Loading and C of G Disposition**

A spokesman for the maintenance company at Nairobi Wilson airport said that shortly before departure 5H-AZM was refueled. At the Pilot's request, 200 litres were added to each inboard tank and 35 litres were added to each outboard tank for a total uplift of 470 litres. This information was supported by a receipt from Kenya Shell limited, the company which refueled the aircraft.

There was also a load of two propeller blades and one hub as well as a time-expired Cessna 310 engine.

From the foregoing information the aircraft weight at the time of take - off was estimates as follows:

Aircraft empty weight	5121 lb	(actual)
Fuel (main tanks)	600	approx.
Outboard tanks	264	approx
Pilot and Bags	160	approx
Two prop blades & one prop hub	55	approx
Time-expired 310 engine	400	approx
Ramp weight	6 700 lb	
Maximum allowed take-off weight	7 000 lb	

The aircraft take-off weight was therefore within the aircraft envelope.

1.7 The weather

The weather information obtained from the Directorate of Meteorology indicated that on 01 November 1997 there was rain starting 1000 hours to 1100 hours over Nairobi and around Kilimanjaro International Airports.

From 1000 hours to 1200 hours weather conditions were as follows:
The surface wind was easterly at 5 knots in Kilimanjaro and Nairobi.
Clouds over Nairobi area were reported as FEW008 and BKN022

Around Tanga area surface wind was southerly at 5knots and clouds were reported as BKN 020.

1.8 Aids to Navigation

The aircraft was equipped with VOR/DME, Weather radar and a GPS

1.9 Communications

It was not possible to obtain the tape transcripts of conversations between the aircraft and the Nairobi Wilson Tower and also the Kilimanjaro Control Tower.
Reports from Nairobi Wilson confirmed that 5H-AZM maintained two way communication with the Wilson Tower till when it reached the Nairobi zone boundary. At this point it was instructed by ATC to contact the Nairobi Control Centre. The contact was not established.
At 1020 hours the aircraft established a two-way VHF contact with the Kilimanjaro Control Tower on 120.1 MHz. 5H-AZM advised that he was on a VFR flight from Nairobi Wilson to Zanzibar at Flight Level 115 with estimates for the FIR 1025 hours and the estimated time of arrival (at Zanzibar) being 1140 hours. He further reported one soul on board and a fuel endurance of 0300 hours.

The Kilimanjaro approach advised that there was no traffic for the flight at that moment and hence he was to maintain VFR and contact the Dar es salaam Approach on 119.6 MHz when in range.

Reports from Kilimanjaro said that at the material time the VHF radio contact was maintained by means of a standby set powered by in-built batteries as mains and standby power supply was not available since 0855 hours. Tie line and telephone facilities were unserviceable for the same reason, hence estimates were not relayed to the next control unit.

The details of the flight plan filed at Nairobi were not transmitted to Zanzibar or the alternate aerodrome (Dar es salaam). The departure signal was also not transmitted. Hence Zanzibar remained unaware of the expected arrival of 5H-AZM.

1.10 **Aerodrome Information**

Not applicable

1.11 **Flight recorder**

Not required by regulations. None fitted.

.1.12 **Wreckage Information**

Not applicable

1.13 **Medical and Pathological Information**

At the medical examination for the renewal of his licence on 15 September 1997 he was assessed as fit for class I.

1.14 **Fire**

Not applicable

1.15. **Survival aspects**

The aircraft has not been found six months since it disappeared during the flight from Nairobi to Zanzibar. If the pilot force-landed anywhere either on land or ditched in the sea, it is unlikely that he could still be alive for this length of time.

1.16 **Tests and Research**

Not applicable.

2. ANALYSIS

It has been established that 5H-AZM actually took of from Wilson airport in Nairobi at 0946 hours on 01 November 1997 for a direct VFR flight to Zanzibar. The flight plan showed that the expected flying time was 0140 hours and the fuel endurance was 0330 hours.

Working on the information given in the flight plan, 5H-AZM should have landed at Zanzibar International Airport at about 1126 hours (1426hrs local time). It is also not possible that the aircraft could have been in air beyond 1316 hours (1616 hrs local time) without further refueling. However, no search and rescue operation was initiated when the aircraft failed to arrive at Zanzibar. Zanzibar and Dar es salaam were unaware of the flight because there was no communication concerning this aircraft from either Nairobi or Kilimanjaro.

The Kilimanjaro Approach attributed the failure to relay the 5H-AZM estimates to power failure which started at 0855 hours.

The reason for Nairobi failing to transmit the flight plan details and the departure signal to Dar es Salaam ACC and Zanzibar has not yet been made clear.

2.1 Conduct of the flight

The commander of the aircraft did not report any emergency to the Wilson Tower on take off or at any time during the flight. He was subsequently advised to contact the Nairobi ACC. There is no record that contact was established. However, the pilot raised the Kilimanjaro Tower and passed his estimated at 1020 hours. At this time he had been airborne for 34 minutes. His position should have been (03.00S 3745E) as shown on the map of appendix 1. This location is just beyond the eastern tip of mount Kilimanjaro (elevation 19340 ft)

The aircraft did not effect any communications with any station beyond this point. There are a number of hypothesis which have been put forward as possible explanations for the disappearance of 5H-AZM.

2.1.1 It was considered that the aircraft may have diverted left of its direct route due to bad weather and collided with mount Kilimanjaro. It was cruising at 11500 feet while the mountain is 19340 feet tall. This could also account for the revision of ETA from 1126 to 1140 hours.

It was raining at the material time. If the aircraft was to go down in thickly wooded areas around the mountain, it would not be easy to locate the wreckage except by chance.

On the other hand, if he had been anywhere north of the mountain at 1020 hours when he called Kilimanjaro, it is unlikely that he could have been heard clearly on the radio. For this reason it is considered that the aircraft should have been on the eastern (or western) side of the mountain when it contacted Kilimanjaro.

2.1.2 Another possibility is one of the pilot falling asleep or becoming incapacitated in flight while the aircraft was on the autopilot. In this case the aircraft would continue flying along the route till it ran out of fuel. Given that the fuel endurance was 0330 hours the aircraft should come down into the sea about 60 miles east of the coast of Mozambique or 80 miles south east of Mtwara. See appendix 1

Since the en route weather was not good, it is unlikely that the pilot could have had the confort of falling asleep at the controls.

3. CONCLUSIONS

(a) Findings

(i) The pilot was properly licenced to undertake the flight.

(a) The aircraft was maintained according to the approved maintenance schedule.

(iii) The aircraft documents were in order.

(iv) The aircraft took off from Nairobi for Zanzibar. It did not arrive.

(v) The aircraft made its last communication with the Kilimanjaro Control Tower at 1020 hours.

(vi) The aircraft has not been found to-date. The report is being written (SIX MONTHS AFTER THE OCCURRENCE) in accordance with the ICAO Recommended practices.

(b) Probable cause

It was not possible to arrive at any probable cause of the accident because neither the aircraft nor the pilot could be found.

4. SAFETY RECOMMENDATIONS

(i) In view of the extensive but unfruitful aerial search over thickly wooded areas and the sea, it is recommended that the emergency locator beacon should be made a mandatory equipment on all Tanzania - registered aircraft.

(ii) Telephone lines should be made serviceable in all Control Towers.

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APPENDIX 1 : Probable route of 5H-AZM