



AIB Bulletin

AIB Bulletin No. 4/00	Ref: CAV/CC/4/00	Category: 1.2
Aircraft Type & Reg.	Cessna 425 5H-SCB	Serial No. 0183
No. & type of Engines:	2 PT6A-112	
Year of Manufacture:	1983	
Date and Time (UTC):	12 June 2000 at 1515 hours	
Location:	Nzasa Vibula Village near Chanika, Kisarawe District, 12.4 nm DME bearing 240° from Dar es Salaam	
Type of Flight:	Air Charter	
Persons on Board:	Crew - 1	Passengers - 7
Injuries:	Crew - Nil	Passengers - 2 Serious
Nature of Damage:	Aircraft destroyed by impact with the ground and vegetation.	
Commander's Licence:	CPL	
Commander's Age:	57 years	
Commander's Experience:	5416 hours of which 123 were on type	
	Last 90 days	102 hrs
	Last 28 days	8 hrs
Information Source:	Telephone call from Rescue Co-ordination Centre.	

ALL TIMES UTC

The Bulletin contains facts relating to the accident which have been determined up to the time of issue. This information is published to inform the public and the aviation industry of the general circumstances of the accidents at the preliminary/stage and must necessarily be regarded as tentative and subject to alteration or correction if additional evidence becomes available.

Short extracts can be published without specific permission providing that the source is duly acknowledged.

The aircraft took off from Dar es Salaam International Airport at 0516 hours (0816 local time) for a flight to Ifakara. It was carrying one pilot and seven passengers. The flight was being conducted under instrument flight rules and the estimated time of arrival was 0615 hours, cruising at FL200. The endurance was 0330 hours.

The aircraft landed at Ifakara at 0605 hours. All the passengers disembarked here for business in the town. Five of the passengers later returned to Ifakara airport for a flight to Mikumi while the remaining two travelled to Mikumi by road.

5H-SCB left Ifakara at 1200 hours with six occupants and landed at Mikumi 20 minutes later. The two passengers who arrived at Mikumi by road re-joined the flight here and the aircraft took off for Dar es Salaam at 1440 hours. The estimated flight time was 35 minutes.

A passenger, who was a frequent flier, said that the flight from Mikumi to Dar es Salaam was normal. Some of the passengers, having worked hard in Ifakara and Mikumi were dozing and others were talking. The cruising altitude was observed by one passenger to be 8500 feet. When asked why he did not climb further, the pilot said that flying time to Dar es Salaam was too short for high altitude.

When the aircraft was descending for Dar es salaam it started shaking violently, fumes and sparks were seen to emanate from the right engine. There was also a smell of fuel inside the aircraft, according to the passenger. He started getting worried about the risk of fire. Asked what the problem was the pilot said there was a problem with the right engine.

The pilot was seen to be busy with the controls and at the same time he was talking to the Tower on the radio. The passengers therefore decided not to disturb him.

Another passenger said he did not worry much about the loss of one engine since the flight was close to Dar es Salaam and he knew that the aircraft could fly to destination on one engine. However, the aircraft started losing altitude and the pilot later advised them that he was going to force - land.

Villagers who were at the top of a hill at Vibula Nzasa reported to have heard the engines coughing and seeing the aircraft being "blown by wind as if it had lost power". They later saw it dive into a valley.

The pilot said that he raised the Dar es Salaam Approach on reaching the TMA. Descent was initiated at 15 minutes to Destination and the aircraft was cleared to FL 30 with instructions to wait at this level for further descent clearance.

The pilot further testified that shortly after descending through 4000 feet and was about 30nm DME from the Dar es Salaam **DV** VOR a "big bang" or "knock" from the right engine was heard followed by heavy vibration and rapid loss of torque.

He subsequently shutdown the engine and feathered its propeller. Full power was then applied on the left engine to maintain height and speed.

The pilot said that as he flew further on the left engine there was a rapid rise in the inter-turbine temperature (ITT) causing him to throttle back. This operation caused a loss of speed and altitude. Whilst transiting 2000 feet the pilot advised the Dar Approach that he had lost an engine. The left engine temperature continued to rise and, according to the pilot, he had to keep reducing power to avoid overboosting the engine which could have caused a fire.

As the aircraft descended to below 1000 feet the pilot declared "FULL EMERGENCY" and decided to force-land. He raised the Dar Approach and gave position 13nm DME bearing 242 degrees. He reported to have selected gear down and later shut down the remaining engine.

At this time the pilot decided to force land at what appeared to be a level grass field located in a valley. The time was 1523 hours. However, as he came close to the aiming point he realised that it was a cluster of banana trees and he had to take evasive action by deviating to the left. In the process he lost control and moments later he heard two bangs. The aircraft came to rest after hitting some trees.

Four passenger in the middle seats were the first to disembark. The pilot and other passengers then realised that the two passengers in

the rear seats were injured. They helped to unstrap and disembark them. One passenger had sustained head injuries and was bleeding.

The pilot then walked to a nearby village and hired three bicycle riders to cycle to Chanika town. They were to report the accident to the Police Station and to bring two vehicles to the crash site. Chanika was 30 minutes away. The bicycles left for Chanika at about 1530 hours.

The Police at Chanika were already aware of the accident, therefore the bicycle riders were advised to wait for the rescue parties from Dar es Salaam which were already on the way. A convoy of 10 vehicles led by two ambulances arrived at the crash site at 1645 hours. At this time the villagers in the area had already brought beds for the wounded.

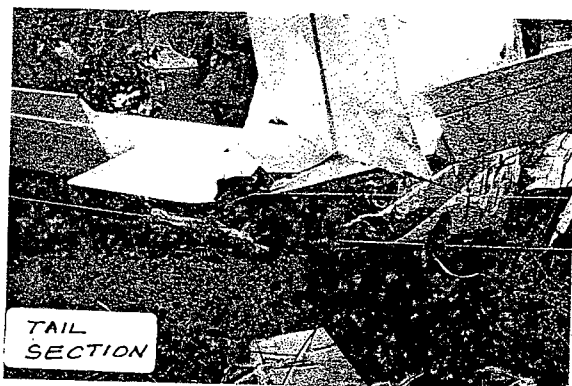
EXAMINATION OF THE WRECKAGE



The wreckage came to rest in a banana/maize plantation which was overgrown with tall grass and a few tall trees. It was pointing in the direction 133 degrees.

It was evident from the wreckage trail that the aircraft rotated through 74 degrees when it collided with the last tree in the accident sequence. The impact marks were clearly visible on the right engine.

Examination of the ground impact marks and the damage to the aircraft showed that the aircraft was side slipping to the left at the first impact with the ground. It landed on the right wing bounced on the right main landing gear and nose followed by the tail section, the left main, and the left wing. The left main landing gear collapsed and the nose section partially separated.



Most of the impact loads were taken by the wings, the engines, the propellers, the belly, the tail section and the nose.

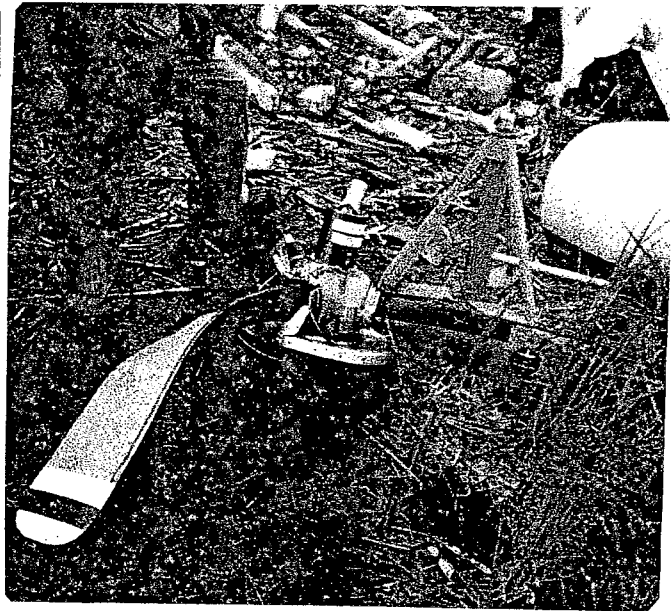
The cabin sustained relatively little damage. The damage to the cabin was confined to the distortions in the floor. There was no fire.

Two passengers who were in the back seats were seriously injured. One passenger was shot upwards on impact causing his head to collide with the reading light and the air conditioning vent. He also sustained injuries to his upper arm and the waist. It is considered that this passenger had not tightened his seat belt correctly. This passenger as well as six others on the flight did not take bracing positions before the force landing.

The other passenger suffered injuries to his waist and the back. It is considered that the long moment arm of the back seats was a factor in the injuries to the two passengers in the back seats. The injuries most probably occurred when the nose hit the ground after the aircraft had pivoted on the right main landing gear.

THE PROPELLERS

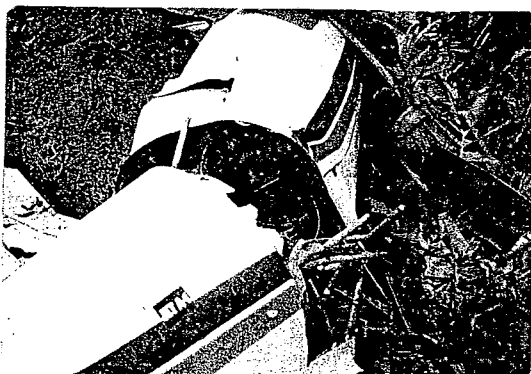
The damage to both propellers indicated that they were not under power at the time of impact.



The right propeller was feathered but the left propeller was in fine pitch.

THE ENGINES

Both engines were almost completely detached from their wing positions and were all found pointing to the left.



It is considered that the engines detached when the wings collided with the ground and trees.

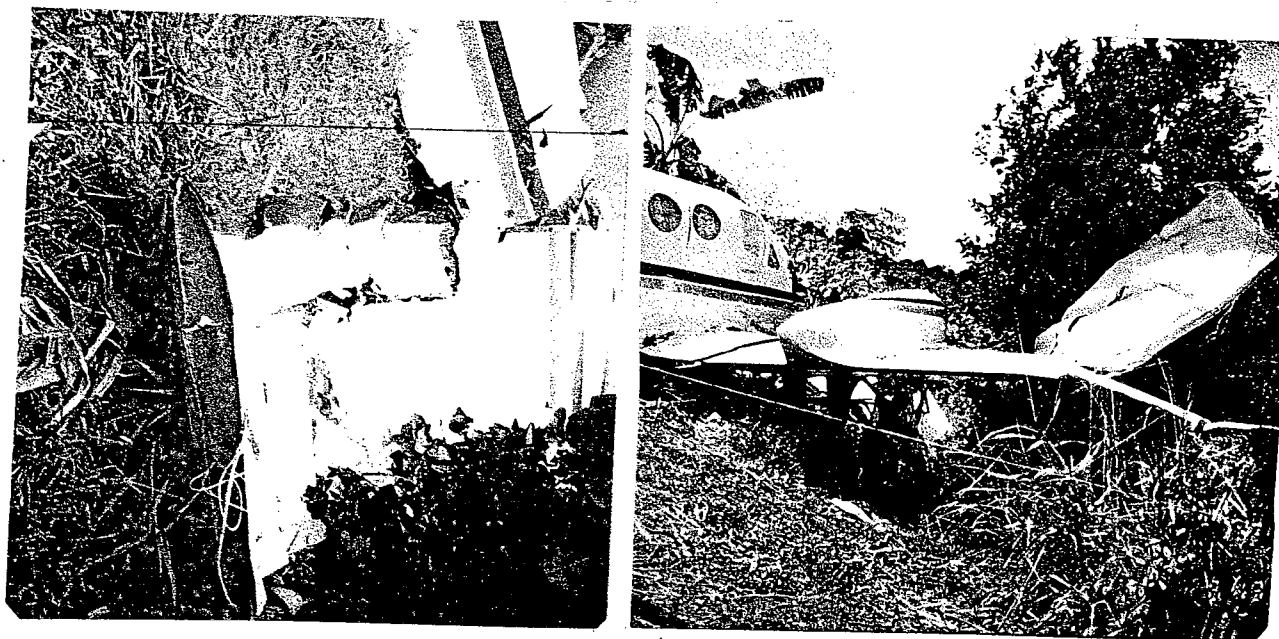
THE LANDING GEAR

The right main landing gear was found to be down and locked. It was still supporting the weight of the aircraft at the accident site. The left main landing gear appears to have collapsed under the weight of the aircraft on impact with ground. The nose landing gear had its actuator sheared off. This would indicate that it was still in the transit position at the time of impact.

The pilot himself testified that he selected gear down shortly before touchdown. The nose landing gear could also have stopped in transit when the last engine stopped in flight.

THE WINGS

Much of the damage to the right wing occurred to the section five feet outboard of the engine which was bent upwards as a result of the ground impact. The aileron was partially detached. The flap which was up at the time of the accident sustained no externally visible damage. The wing root was also damaged.



The left wing impacted the ground in the accident sequence and collided with most of the vegetation. It also scraped the ground before the aircraft came to rest. This was because the left main gear collapsed probably in the second impact with ground. The left wing was completely destroyed in the accident and its engine separated.

FUEL

There were no signs of fuel spillage at the crash site. There was also no fuel in the aircraft tanks.

Investigations were therefore made into the aircraft fueling records.

The pilot, who had flown this aircraft on the last trip which was made on the day before the accident (11 June 2000) testified that he had between 600 and 700 pounds of fuel remaining in the aircraft tanks when he landed at Dar es Salaam. Two company technicians told this pilot that another company pilot had left verbal instructions for the aircraft to be refueled to 450 lb in each tank for a total fuel load of 900 lb. This was in preparation for the next day's flight.

It has been proved that the pilot refueled the aircraft on 11 June 2000 between 1325 and 1330 hours from Air BP vehicle No.2. 200 litres of JET A-1 were filled in 5H-SCB tanks, receipt No. 62398. The aircraft was later parked in the company hangar till the following day.

There was no further refueling of the aircraft on 12 June 2000. The fuel on board the aircraft at the time of take-off from Dar es Salaam was estimated as follows:

Fuel remaining from the previous flight	650 lb
200 litres added on 11.6.2000 @ 1.8 lb	<u>360</u>
Fuel load at the time of take-off	1010 lb

Calculations for the fuel burn for the sectors DAR ES SALAAM/IFAKARA/MIKUMI/DAR ES SALAAM was based on the following parameters:

Aircraft weight at Take off from Dar es Salaam
Temperature at Dar, Ifakara & Mikumi Airports

7900 lb
25 degrees C

Cruising Levels:

Dar - Ifakara	FL 200
Ifakara - Mikumi	FL 85
Mikumi - Dar	FL 95

Power - Maximum Recommended Cruise power
Wind - Zero wind.

The fuel burn based on the given assumptions should be about 1130 pounds.

The Company Operations Manual requires the aircraft to carry, in addition to the sector fuel, some fuel for diversion to alternate airfield and 45 minutes for holding at destination airport. If Zanzibar is taken as the alternate airfield for the Mikumi - Dar es Salaam flight, then an extra 350 lb is required for the total fuel uplift of $1130 + 350 = 1480$ lb or roughly, 1500 lb.

The "coughing" sound of the engine and the subsequent smell of fuel were signs of fuel running out.

It is thus conclusive the fuel uplift from Dar es Salaam was 120 lb short of the sector fuel requirement. The fuel tanks should have been at the point of exhaustion at the time of the accident.