CIVIL AIRCRAFT ACCIDENT REPORT NO.CAV/ACC/1/88

AIRCRAFT TYPE	:	F27 FOKKER FRIENDSHIP
NATIONALITY AND REGISTRATION MARKS	:	5H-MPT
ENGINES	:	TWO ROLLS ROYCE DART 536
REGISTERED OWNER	:	AIR TANZANIA CORPORATION P.O.BOX 543, DAR ES SALAAM, TANZANIA.
OPERATOR	:	SAME AS REGISTERED OWNER
PILOTS	:	TWO - UNINJURED
CABIN CREW	:	TWO - UNINJURED
PASSENGERS	:	ONE - SLIGHTLY INJURED 46 - UNINJURED
OTHERS	:	N/A
PLACE OF ACCIDENT	:	DAR ES SALAAM INTERNATIONAL AIRPORT, DAR ES SALAAM TANZANIA (06°52'S, 39°12'E)
TIME	:	0500 HOURS
DATE	:	JANUARY 31, 1988

ALL TIMES IN THIS REPORT ARE UTC

SYNOPSIS :

The aircraft was operating a scheduled flight from Dar-es-Salaam to Mombasa via Zanzibar. It was carrying 47 passengers and a crew of four.

On the final approach to Zanzibar airport the pilot lowered the gear and noticed that the left main gear could not lock. He decided to turn back to Dar es Salaam where he could have better facilities for emergency landing. The aircraft made a successful touch down at Dar es Salaam airport and during the landing roll the left main gear collapsed.

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The aircraft subsequently veered to the left and came to rest on a patch of grass at the edge of the runway. One passenger was slightly injured but the aircraft sustained substantial damage. Examination of the wreckage showed that the centre pivot bolt in the down lock strut joint of the left main gear had broken and one part was missing.

1. FACTUAL INFORMATION :

1.1 History of the Flight

The aircraft took off from Dar es Salaam at 0425 hours on a scheduled flight (Flight TC 640) to Mombasa, Kenya, with a stopover at Zanzibar. It was carrying 47 passengers, two pilots and two cabin crew. The initial phase of the flight was uneventful. On the final approach to Zanzibar the pilot lowered the gear and noticed that the left main gear could not lock. He subsequently noticed that its lock strut had separated. He therefore decided to turn back to Dar es Salaam International airport where he could have better facilities for emergency landing.

When 5H-MPT flew past the Dar es Salaam Tower, the pilot was informed by the company engineers in the Tower that one of the lock strut linkages had separated from the left main leg. The pilot subsequently decided to make an emergency landing on runway 05. The aircraft made an initial touchdown on the right main gear and successfully settled on the three legs for a while during the landing roll.

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While the speed was reducing during the landing roll, the left main gear collapsed causing the aircraft to veer to the left of the runway centreline. It came to rest on a patch of grass 16 metres from the edge of the runway.

One passenger was slightly injured and another was found to be suffering from shock. The aircraft sustained substantial damage.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor/None	4	1/46	-

1.3 Damage to Aircraft

The aircraft sustained substantial damage to the left propeller, engine, the left wing and landing gear.

1.4 Other Damage

The aircraft damaged the runway surface and broke some runway lights.

1.5 Personnel Information

The Commander :

The Commander was born on July 9, 1949 at Mwanza, Tanzania. He held an Airline Transport Pilot's Licence No.HP-1 issued on March 12, 1979. His licence has been kept current through periodic renewals accompanied by medical check-ups. At the time of the accident his licence was valid up to June 12, 1988.

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His licence had the following ratings :

Group 1 : F27 Fokker Friendship

Group 2 : PA-23, PA-31 and DH6

He also held a Radio Operators Licence No.H-443 granted on October 16, 1982 which was kept valid in line with his other licence.

At the time of the accident he claimed a total flying experience of 8,899 hours broken down as follows :-

P 1 Day 8199 hours

P 1 Night 489 hours

P 2 Day 202 hours

P 2 Night 9 hours

His experience on the type was 2,537 hours.

The Co-pilot

The Co-pilot was born on March 2, 1953 at Old Moshi, Tanzania. He held an Airline Transport Pilot's Licence No.HP-188 which was granted on August 9, 1984. His licence had since been kept current. By the time of the accident his licence was valid up to April 16, 1988.

The licence had the following ratings :

Group 1 : NIL

Group 2 : Cessna 401/402, DHC-6 and F-27.

Be also held a Radio Operator's Licence No.H-375 which was granted on May 4, 1981 and had since been kept current along with his ALTP.

In his latest application for licence renewal he claimed a total experience of 2,757 hours broken down as follows : -

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There was no evidence to suggest that there was fuel in the jerry cans, and in any case, the planned flight could have been accomplished by using the fuel in the wing tanks which was uplifted from Mwanza.

There were four passengers whose estimate for average weight is 150lb (68 kg) and One Pilot weighing 170lb (77 kg). The aircraft was refuelled at Mwanza to full tanks (1280 lb) for the flight to Rubondo. The fuel burn for the 25 minute flight to Rubondo was estimated at 100 lb (45 kg).

The aircraft weight at take off from Rubondo was estimated from the foregoing information as follows :

	lb	
Empty Weight	4375	
Pilot	170	
Passengers (4)x150	600	
Fuel (1280-100)	1180	
Six jerry cans (empty)	30	
Baggage	220	
	6575	(2989 kg)

Given that the airfield elevation is 3720 feet (1691 metres), temperature 25°C and allowing the standard rough field factor of 5% with zero wind, the required minimum ground run as estimated from the Manufacturer's (Cessna 402C (1980) Information Manual, should be 2400 feet (730 metres). The distance to clear a 50 - feet obstacle should be 2900 feet (880m). The accelerate stop distance is 4200 feet (1280m). /is

1.7 Meteorological Information :

It was a bright sunny day. The temperature was estimated at about 25°C.

1.8 Aids to Navigation :

Not applicable.

1.9 Communications :

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1.10 Aerodrome Information :

Rubondo airstrip, elevation 3720 feet (1130 metres), has a single runway 06/24. Its surface is rough and it becomes soft during rainy seasons. It is located in a forest overlooking Lake Victoria.

The Rubondo airfield is not licenced with DCA. By time of the accident the regulation which restricted unlicenced airfields to aircraft below 2730 kg (6000 lb) had already been lifted. The information which was available to the investigation team (and also to the 5H-GTS Commander) gave the usable runway length as 900 metres (2950 feet). The investigators measured this runway on March 4, 1988 and found that the actual length was exactly 800 metres (2600 feet).

Visual inspection of the area beyond the runway 06 threshold showed that length of runway was about 1000 metres (2953 feet) but the last 200 metres had been outgrown by elephant grass and small trees.

Rubondo airfield is owned by the Tanzania National Parks. It is not registered with the Directorate of Civil Aviation and is therefore not controlled by the Department. Operators use the airstrip at their own risk. Information about the airfield is sent to DCA by its owners and DCA circulates the information by way of NOTAMS. The erosion of the runway length by tropical vegetation was not reported to DCA.

1.11 Flight Recorders :

Not required by regulations - None fitted.

1.12 Wreckage :

The aircraft was completely destroyed by impact and the subsequent fire. The main wreckage (the fuselage) came to rest in a palm forest about 1000m ahead of the runway 06 threshold. It was completely burnt. Some seats were found torn off the floor and one seat belt was bloodstained and broken. There was evidence that the belt broke under tension overload. A cockpit clock had stopped at 12.15 (p.m.).

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The wings had detatched after impact with palm trees and both engines separeted. The propeller blades were found slightly twisted in the direction of rotation.

1.13 Medical and Pathological Information :
Not applicable.

1.14 Fire
Fire broke out on impact with the ground. The fire was so severe that eye witnesses failed to approach the burning wreckage. The palm trees around the accident site were burnt and several snakes in that area were killed.

1.15 Survival Aspects :
The aircraft came down at high speed and was brought to rest almost instantaneously by impact with strong palm trees. Some seats were found torn off the floor and at least one seat belt was found broken under tension. It is considered that the impact forces which were severe enough to tear seats from the floor and brake seat belts could not have been safely taken by the occupants.

In any case, the occupants could not have survived the subsequent fire. It is therefore considered that this was not a survivable accident.

1.16 Other Information :
The aircraft was carrying six German fuel cans (jerry cans) which were found among the debris. It was initially thought that the pilot had taken extra fuel in jerry cans for his planned flight because there was no fuel at Kigoma.

The six jerry cans were found open and empty. Reports from Mwanza said that no fuel was filled in the jerry cans during the refuelling stop-over at Mwanza. There is no fuel at Arusha. It was therefore not possible to establish conclusively the presence of fuel in the cans.

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The ICAO Regulations classify aircraft fuel among the dangerous goods. While Tanzania is an ICAO Contracting State, the absence of fuel on many airfields has made the government re-assess compliance with this regulation. Operators can carry return fuel among aircraft baggage provided prior permission is sought from DCA.

The jerry cans were found alongside the cockpit debris located ahead of the main fuselage wreckage. It was therefore presumed that they were in the forward baggage hold.

2. ANALYSIS :

There was nothing in the aircraft recent technical history which could have contributed to this accident. The Pilot was himself medically fit and had nothing in his medical records which would have caused his incapacitation shortly after lift off. There was also no evidence that the aircraft centre of gravity was outside the required limits.

The configuration of the aircraft during the attempted take-off and climb out could not be determined due to its complete destruction.

The positions of controls in the cockpit could not be relied upon because the wreckage had already been tempered with.

The damage to both propellers was consistant with the engines developing minimal power at impact. There was no evidence of engine failure. It is propable therefore, that the Pilot may have throttled back when he relialised that impact was imminent. This theory is enhanced further by the change of engine sound which was heard shortly before impact.

The accident happened during a rainy season and there had been heavy rains at the Island. While the temperature was high on the day of the accident, the ground was still soft from previous rains.

It is considered therefore that the standard rough field factor of 5% used in performance calculations is conservative, and the actual figure may have been about 10% or so.

Performance calculations on the Cessna 402 show that on the assumptions set out in section 1.6, the aircraft would have required a minimum ground run of 730 metres, which represents over 90% of the usable length of the runway.

Any adverse factors such as the presence of a tail wind, a higher-than-standard rough field factor, the erosion of take-off margin at the start of the take-off run, etc. should necessarily lengthen the required ground run. Should this be the case, the aircraft would reach the end of the runway before attaining the rotation speed. The presence of small trees in the area straight ahead of the runway threshold makes an aborted take-off dangerous. It is, however, considered prudent to abort take-off and risk damage to the aircraft in overshoot rather than attempt a take-off in a partially stalled condition.

On the basic assessment that the aircraft required a minimum ground run of almost the entire runway length, the propeller-chopped elephant grass evidence (at the end of runway 06), is consistent with aircraft being rotated near the runway threshold. While the rotation may have been initiated following the attainment of the take-off speed, it is also quite possible that this may have been made as the only possible alternative when the entire usable length of the runway was already covered without attaining the take-off speed.

3. CONCLUSIONS :

a) Findings :

(i) The aircraft was properly maintained and its documents were in order.

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

(iii) The Pilot was given wrong information about the runway length.

(iv) Take-off was initiated from a runway which was not long enough to allow a safe execution of an aborted take-off.

b) Cause

The accident was caused by the failure of the aircraft to accelerate shortly after lift off. The aircraft may have been rotated in a partially stalled condition when it came at the end of the runway.

4. SAFETY RECOMMENDATIONS :

4.1 DCA should regularly verify information given on unlicenced airfields.

4.2 The operator should fix minimum lengths of runways from which he can operate various models of his aircraft.

4.3 The areas ahead of the runway thresholds at Rubondo should be cleared of the small trees which had grown by the time of the accident.

CHIEF INSPECTOR OF ACCIDENTS :