

MINISTRY OF COMMUNICATIONS AND TRANSPORT  
ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT NO. CAV/ACC/1/81

REPORT ON THE ACCIDENT TO A CESSNA A 185 F  
AIRCRAFT REGISTRATION NO. 5H-MRN WHICH  
OCCURED ON 8/1/1981 AT ARUSHA AIRPORT  
(REF. POINT  $03^{\circ}22'S/36^{\circ}38'E$ , ELEVATION 4550 FT)

MAY 1981

CIVIL AIRCRAFT ACCIDENT REPORT NO: CAV/ACC/1/81

AIRCRAFT TYPE : A CESSNA A 185F  
NATIONALITY AND REGISTRATION MARKS : 5H-MRN  
ENGINE : CONTINENTAL IO-520-D  
REGISTERED OWNER : MINISTRY OF AGRICULTURE,  
BIRD CONTROL UNIT,  
P.O. BOX 9071, DAR ES SALAAM  
OPERATOR : KILIMO ANGA,  
P.O. BOX 7100, ARUSHA  
CREW : 1 PILOT  
PASSENGERS : NONE  
PLACE OF ACCIDENT : RWY 09, ARUSHA AIRPORT  
DATE : 8.1.1981  
TIME : 0910 HRS

ALL TIMES IN THIS REPORT ARE GMT

SYNOPSIS

After veering to the grass edge on the right hand side of RWY 09 during a take-off roll bound for TPC Arusha Chini, the pilot decided to go round and return to Arusha Airport to check what he suspected to be a defective rudder control system. Having satisfied himself with the serviceability of the rudder control system, he decided to get airborne again. However, on this second take-off roll, the aircraft veered off the RWY to the left, colliding with several Airport fence posts and barbed wire. The aircraft incurred substantial damage. There were no injuries and there was no fire.

1. FACTUAL INFORMATION

1.1 HISTORY OF THE FLIGHT

The pilot stated that on 8.1.1981 he was to proceed to TPC, Arusha Chini on a sugar-cane plantation spray mission. Having started the engine and done all his necessary checks, he entered and back-tracked to the threshold of RWY 09 where he did his "vital actions before take-off" checks and selected a 20° flap setting.

At 0855 hours, the pilot commenced his take-off roll which was initially normal. However, after some 200 metres when the speed had picked up and that before he could lift the tail wheel, the aircraft swerved to the right in a westerly direction where it continued its roll on the grass for about 60 metres. He further stated that because the rudder was not responding, he decided to concentrate on lifting the aircraft off the ground.

Eventually when the aircraft got airborne, the pilot steered and flew it above the centre of the RWY.

Because of this incident, he decided to go round and land to check what he suspected to be a defective rudder control system. His climb, turns and approach were normal. However, after a three-point landing, the aircraft bounced once, swayed slightly to the right but the pilot managed to correct this before coming to a halt some 400 metres from RWY 09 threshold. Here he carried out checks (while inside the aircraft) on the rudder control system. Having satisfied himself that all was in order, he decided to go up again.

At approximately 0910 hours, the pilot, with the aircraft tail wheel locked, commenced his second take-off roll from the point he had stopped as he stated he still had ample runway length left.

As he was about to lift the tail wheel at approximately 55 kts, the aircraft veered off the RWY; this time to the left in the North-Westerly direction. He further stated that full rudder application to the right did not correct this. At this juncture he stated that he decided to close the throttle to abort the take off.

The aircraft continued its roll in this direction, colliding with the Airport fence post which ripped off the port horizontal stabilizer and elevator tips. This initial impact immediately altered the aircraft's course to a Northerly direction where it again changed course to a Westerly one upon entering the Dodoma Road, which runs parallel to the RWY. Continuing with its roll on the road, for about 90 metres, the aircraft's No. 4 spray atomiser under the starboard mainplane was caught by the fence barbed wire. This action once again changed the heading of the aircraft to a South-Westerly direction and back towards the RWY grass edge. Because of this latter change in the direction of motion, the starboard main leg aligned directly with one of the fence posts which instantly ripped off the leg. The empty spray tank was then next to be ripped off by the ground with which it came directly in contact. The main wreckage then continued to drag itself on the ground in this direction for some 40 metres purely by inertia before coming to a halt facing a Southerly direction.

The pilot attributed the cause of the accident to "turbulent air over the stationary micronair fan blades set at 40° and a 20° flap setting for take off. The rudder pedals at a certain speed during take off run were unserviceable".

The aircraft damages were the direct result of it colliding with the fence posts and barbed wire. There were no injuries and there was no fire.

1.2 INJURIES TO PERSONS

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

1.3 DAMAGE TO AIRCRAFT

The aircraft was substantially damaged.

1.4 OTHER DAMAGE

Fence barbed wire and 5 fence posts broken.

1.5 CREW INFORMATION

(a) Born on 23.11.43 at Bagamoyo, the Pilot held a private Pilot's Licence No. 2037 (T 250) issued on 23.11.70. The licence has since been kept current with the present validity due to expire on 26.2.82. The licence is rated for all single engined aeroplanes under 12500 lbs (5682 kg approx.) M.T.W.A. He also held a Radio Telephony Operator's Licence No. 2170 (T 195) issued on 23.11.70 and kept valid in line with the PPL.

(b) Experience

Although at the time of the accident, the pilot claimed a total of 1651.1 hours flying experience to his credit as ~~follows~~, of these a total of about 125 hours could be authenticated:-

Multi engine

Day : Dual - 30.18  
Second pilot - 13.18

Single engine

Day : Solo - 1280.5  
Dual - 319.7

Experience on type (Cessna A 185F)

Pilot in command - 348.0 hours

Pilot under supervision - 15.0 hours

NOTE: This is the 4th accident involving this pilot with similar types of aircraft. The last one was on 17.2.80, the second one was on 10.8.1979 and the first one on 21.5.1977.

1.6 AIRCRAFT INFORMATION

- (a) The aircraft, a Cessna A 185F, Serial No. 185-03574, arrived in Tanzania with an FAA Export Certificate of Airworthiness No. E 171094 dated 31.3.1978. On 2.3.1979 a certificate of Registration No. 244 was issued. A certificate of Airworthiness No. 197 was issued on 24.3.1979 and has since been kept current. Both certificates were issued in the Aerial Work Category.

At the time of the accident, the aircraft had flown a total of 396.10 hours since manufacture.

The engine, a continental IO-520-D, Serial No. 566644 had completed 404.55 hours since ~~new~~ manufacture.

The propeller, A McCauley D2A34C58/90AT-8, Serial No. 7710382 had also completed 404.55 hours since ~~new~~ manufacture.

(b) Maintenance History

The aircraft was maintained by Kilimo Anga to their approved Maintenance Schedule ref. MOA/MS/Issue 1. All maintenance required by this schedule was up to date. Airframe total hours since last check 1 - 30.00. Airframe total hours since last check 2 - 185.00.

All FAA Airworthiness Directives and DCA Notices applicable to the aircraft, its engine, propeller and equipment had been complied with.

(c) Aircraft weight and centre of Gravity Limits

The aircraft weight and centre of gravity were within the prescribed limits.

1.7 METEOROLOGICAL INFORMATION

The Directorate of Meteorology gave the actual wind conditions at 0912 hours as: Velocity 9 kts and direction 130°. This, however, was not considered contributory to the accident.

1.8 AIDS TO NAVIGATION

Not applicable.

1.9 COMMUNICATIONS

Not applicable.

1.10 AERODROME AND GROUND FACILITIES

Arusha Airport, located at 0322 S/3638 E, has a 1594 x 40 metres RWY identified as 09/27, with the former having a slope gradient  $^{\circ}/_{\circ}$  of + 0.82. The RWY surface is bitumen and the Airport is owned and maintained by the Tanzania Government.

1.11 FLIGHT RECORDER

Not fitted and none required to be fitted.

1.12 WRECKAGE

(a) The aircraft which ended up facing the South sustained the following damage:-

- L.H. horizontal stabilizer and elevator ripped off about midway.
- R.H. rear fuselage hit by a fence post and pushed in about 30 cm deep between sta. 140.00 and 172.00.
- R.H. wing tip buckled at the tip.
- R.H. main leg ripped off following failure of the bolt.
- R.H. main plane drag strut almost sheared.
- R.H. horizontal stabilizer buckled.
- R.H. leg housing failed.
- Both propeller blades bent about 12 cm from tips and one blade sheared off about 6 cm from tip.

(b) Position of Controls/Instruments

- Master switch - OFF
- Auxilliary fuel pump - OFF
- Throttle - CLOSED
- PITCH - INCREASE
- Mixture - LEAN
- FUEL SELECTOR - BOTH TANKS
- COWL FLAPS - FULL OPEN
- Elevator trim - TAKE-OFF
- Tail wheel lock - ON
- Fuel tanks - EMPTY (drained after the accident)
- Flaps - 20 $^{\circ}$
- Rudder trim - SLIGHTLY NOSE LEFT FROM NEUTRAL
- DRM Compass - 230 $^{\circ}$ .

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

Not applicable.

1.14 FIRE

There was no fire.

1.15 SURVIVAL ASPECT

The accident was survivable. Both doors did not jam. Life saving equipment present were life belts and a fire extinguisher.

1.16 TESTS

Functional checks carried out on the rudder control system, tail wheel lock and the tail wheel all proved satisfactory.

2. ANALYSIS

- (a) The pilot claimed that on both occasions (during the take-off roll) he applied the appropriate rudder to regain directional control and that there was no response. Examination and functional checks of the rudder control system after the accident revealed no defect in the system.
- (b) From the point the aircraft left the RWY on the second take-off roll until it collided with the first fence post which tore off the left horizontal stabiliser and elevator tips was a distance of approximately 90 metres. For most of this distance the tail wheel was already raised as there was no track mark left by this. The track marks left by the main wheel tyres were straight and faint on the grass area which was virtually dry at this time of the year. This suggests that:- (i) there was no attempt made to steer the aircraft back to the RWY, (ii) no brakes were applied and (iii) there was no reduction in the throttle power setting. Clearly had any of these two latter actions been taken, the aircraft would have settled more firmly on the ground. The net result would have been more pronounced track marks from the main tyres and the tail wheel would certainly have assumed its normal position.

After colliding with the first fence post, the aircraft's course was altered to a Northerly direction bringing it on the Dodoma Road which as stated before runs parallel

to the RWY. It continued its roll on this road for approximately 90 metres before the No. 4 spray atomiser on the starboard wing was caught by the fence barbed wire, again altering the aircraft's direction to a South-Westerly direction. Throughout this sector there was no evidence of any application of the brakes.

Following the change of direction to South-Westerly, the starboard main leg was sheared off by one of the fence posts; the spray tank which then came in contact with the ground was also torn off. The main wreckage then continued to move in this direction through its inertia for a distance of approximately 40 metres.

- (c) The propeller received blade damage consistent with high power developed at the time the aircraft tore through the fence on both occasions and when the propeller struck the ground.
- (d) Witness reports also stated that the sound of the engine at the time, was that of an engine developing high power from the beginning of the take off roll until it came to a halt.
- (e) All in all, the aircraft, from the point it left the RWY until it came to a halt, travelled through a zig zag distance of some 220 metres. It is therefore difficult to conceive how it could have covered this distance under idling power let alone with brakes applied; certainly not after all these collisions and changes in direction of motion. Unless the engine was still developing high power.
- (f) The pilot also attributed the cause of the accident to "the drag caused by turbulent air over the stationary micronair fan blades being set at 40° and a 20° flap setting for take-off". All this did was simply to create equal drag on both wings on a straight roll/direction which would naturally have increased the take-off run.

### 3. CONCLUSIONS

#### 3.1 FINDINGS

- (a) The pilot was not properly licensed. Para 2(b) (i) of the 3th Schedule of the Air Navigation Regulations stipulates that the holder of a PPL shall not fly an aircraft on Aerial Work duties.

- (b) Examination of the pilot's personal log book revealed a number of fake entries. Out of a grand total of 1651.1 hours claimed by the pilot, about 125 of these could not, however, be authenticated. It is surprising that these same entries had been "verified as correct" by the Directorate of Civil Aviation.
- (c) Since his last accident on 17.2.1980, the pilot had been stopped from flying. Following a directive from the Ministry of Agriculture, an FAO pilot/instructor, then attached to Kilimo Anga, was detailed to conduct refresher /proficiency training for the pilot. This commenced on 27.12.1980 and since then the pilot had received approximately 4 flight hours of such instructions. The instructor, however, had not authorised the pilot to undertake operational spray missions until the pilot had received additional training. On the day of the accident, the instructor, who was returning with another student pilot from a cross country flight to Tanga, was to accompany the pilot to TPC, Arusha Chini. It does therefore appear that this Solo flight was unauthorized.
- (d) The pilot failed to take appropriate action to regain directional control.
- (e) The aircrafts documents were in order.
- (f) The aircraft was properly loaded.
- (g) There was no pre-accident malfunction of any part of the aircraft.
- (h) The aircraft damages were the direct result of it colliding with the fence posts and barbed wire.
- (i) The propeller received blade damage consistent with high power developed at the time of collision.
- (j) All maintenance required by the relevant approved maintenance schedule had been carried out.
- (k) All FAA Airworthiness Directives and DCA Notices applicable to the aircraft, its engine, propeller and equipment had been complied with.
- (l) The rudder trim control was observed, after the accident, to have been set to slightly nose left, when in fact this should have been to slightly nose right.