

MINISTRY OF COMMUNICATION AND TRANSPORT

ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT NO. CA/ACC/4/96

REPORT ON THE ACCIDENT TO CESSNA F406 AIRCRAFT REGISTRATION
5H-TZD WHICH OCCURRED ON 24 APRIL 1996 AT PALAPALA HILLS,
ULUGURU MOUNTAINS MOROGORO REGION TANZANIA

(06 51 26.4 S 037 43 18.1 E)

TANZANIA ACCIDENT INVESTIGATION BRANCH
AIRCRAFT ACCIDENT REPORT NO. CAV/ACC/4/96

AIRCRAFT Type : Cessna F406 Caravan II
Nationality : Tanzania
Registration : 5H-TZD
PLACE OF ACCIDENT : Papapala hills, Morogoro, Tanzania
(06 51 26.4 S 037 43 18.1E)
REGISTERED OWNER : International Netherlands Aviation
Lease B.V. Karspeldreef 14, 1101 CK
AMSTERDAM (Lessor)
Nordic Aviation Contractors
K.S. Skive Lufthavn DK-7840
HOJSLEV, DENMARK (Lessee)
Tanzanian Air Services Ltd
P. O. BOX 364 DAR ES SALAAM
(Sublessee/Operator)
OPERATOR : Tanzanian Air Services (See above)
CREW : One-killed
PASSENGERS : Nil
DATE OF ACCIDENT : 24 April 1996

SYNOPSIS

On 24 April 1996 at 0418 hours the aircraft took off from Dar es salaam International Airport on a Charter flight to Tabora via Morogoro. The pilot was the only occupant. The estimated time of arrival at Morogoro was 0449 hours. The endurance was 0530 hours. 5H-TZD maintained communications with the Dar es salaam Tower on 118.3 MHz and was cleared to flight Level 60 to the TMA boundary. At 0440 hours 5H-TZD advised that he was estimating TMA at 0441 hours at FL60. The estimate for Morogoro was revised to 0451 hours and was to call on "top of descent". No further transmission was heard from the aircraft.

The wreckage of the aircraft was discovered by villagers on top of Palapala Mountains (Uluguru Mountain Range) on 5 May 1996 after extensive search. The aircraft was completely destroyed by impact and the subsequent fire. The body of the pilot was also recovered from the wreckage.

It is concluded that the accident was caused by the aircraft colliding with high ground approximately 5 N.M. short of the runway. The decision of the pilot to initiate descent in weather conditions which allowed no visual contact with the high terrain was the major contributory factor.

1. FACTUAL INFORMATION

1.1 History of the flight

The aircraft was operating a company charter flight. It took off from Dar es salaam International airport at 0418 hrs for a flight to Morogoro where it was to pick passengers destined for Tabora. The pilot was the only occupant. At 0419:49 hrs 5H-TZD passed to the Dar Control Tower his estimates for TMA as 0439 hrs and Morogoro 0449 hrs. At 0425:13 hrs the aircraft reported to be maintaining flight lever 60 and the Dar es Salaam Approach (which was then combined with the Tower advised him to maintain FL 60 and to report on checking the TMA boundary.

Subsequent to this and at about the same time 5H-TZD contacted the Military base located at Ngerengere on 118.25 MHz and requested permission to transit the Military area (HT) P6 (A) UNLI/GND. Permission was not granted because the area was active. (The pilot subsequently advised Ngerengere that he was to proceed to Morogoro by flying south of the Prohibited Area. The last communication between the aircraft and Ngerengere took place at 0439 hrs when the aircraft was south of Ngerengere.

At 0440.08 hrs 5H-TZD called on 118.3 MHz (the Dar es Salaam Tower frequency) advising that he was transmitting blind and revised the TMA estimate to 0441 hours FL60. The ETA for Morogoro was also revised to 0451 hours. He was to call on Top of Descent. At 0440:31 hrs the Dar Tower acknowledged the transmission. Subsequent to this a sound which resembled a series of clicks of the mike was heard in the Dar Tower. There was no further Communication between 5H-TZD and the Dar es Salaam Tower.

At 0850 hrs the owner of the aircraft telephoned the Dar es salaam Control Centre to alert that 5H-TZD had not landed at Morogoro.

The Dar ACC instituted an ALERT PHASE and activated the Rescue Coordination Centre.

The wreckage of this aircraft was discovered by villagers on top of Palapala mountains on 5 May, 1996. The search and rescue effort took 11 days because of adverse weather conditions, the thick tropical vegetation at the crash site and the fact that the route of the aircraft was not known.

1.2 Injuries to persons

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

1.3 Damage to aircraft

The aircraft was completely destroyed by impact and the subsequent fire.

1.4 Other damage

Nil

1.5 Personnel information

The pilot, Capt Richard R. Mutayoba was born at Bukoba, Tanzania on 27 October 1952. He held an Airline Transport Pilot's Licence No. HP62 granted on 7 August 1984.

By the time of the accident he had logged at total of 8922.40 hours broken down as follows:

<u>Capacity</u>	<u>Day</u>	<u>Night</u>
P1	6560.65	260.05
P2/3	2047.20	54.50

He had the following ratings to his Licence:

Group 1

Cessna 150, 310, 402, 406

Beechcraft B55 Baron

DHC-6 Twin Otter

Group II

HS 748

1.6 Aircraft information

The aircraft, a Cessna F406 Caravan II serial Number 0029 powered by two PT6A-112 engines was manufactured by the Reims Aviation, France in 1988. It was first registered in Tanzania on 17 October 1995. A Certificate of Registration No.429 was issued in the name of:

- (1) International Netherlands Aviation Lease B.V Karspel
dreef 14, 1101 CK, AMSTERDAM (Lessor)
- (2) Nordic Aviation Contractors
K.S. Skive Lufthavn DK-7840
HOJSLEV, DENMARK (Lessee)
- (3) Tanzanian air Services Ltd
P.O. Box 364 DAR ES SALAAM
(Sublessee/Operator)

A Tanzania Certificate of airworthiness No.383 was issued on 19 October 1995 in the public transport category to expire one year later.

1.6.1 Loading

The aircraft was carrying only one person and 0530 hours fuel. there was no baggage on the flight. This loading is within the aircraft flight envelope.

1.7 Meteorological Information

The weather information was given by the MET Department at Dar es Salaam as follows:

- 1.7.1 EN-ROUTE WEATHER INFORMATION ON 24 APRIL 1996 AT 0400 HRS AS RECEIVED FROM THE MET OFFICE AT DAR ES SALAAM AFTER THE ACCIDENT.

Visibility

- (i) Horizontal visibility below 1600ft was more than 10km;
Horizontal visibility above 1600 ft not provided.

(ii) vertical visibility was poor

Clouds

- Broken overcast i.e (i) Few cumulus
(ii) Scattered altocumulus

Winds

- (i) Light winds below 1,000ft i.e 00-15 knots.
(ii) Strong easterlies above 1,000ft at 20-40 knots.

Weather

Moderate continuous rain and thunderstorms.

- 1.7.2 Weather observed at Morogoro Meteorological Station located at 2 km south of the airport on 24 April 1996 from 0300 to 0600 hours.

METAR HTMG 0300 04005 9999 BKNO16 BK N080 1016
 " " 0400 00000 9999 BKNO16 BK N080 1016
 " " 0500 00000 0000 VC RA BKNO16 SCT080 1017
 " " 0600 00000 9999 RA SCT016 SCT 018CB BK N080 1017

The Morogoro weather station is at a lower level than the Uluguru Mountains so the weather at high elevation (Uluguru Mountains) was more active with poor horizontal and vertical visibility; there was rain and thunderstorms.

The weather in the Ngerengere area (The Military zone) was reported by the Ngerengere weather station to be overcast, cloud base 1000 ft, visibility less than 5km. A spokesman for the Military at Ngerengere testified that the weather in the region at the material time had deteriorated to the extent that all flying activities had to be suspended.

The villagers who were near the foot of the Palapala mountain reported that there were thick, low clouds and heavy rains on the morning of 24 April 1996. Visibility was poor.

It was determined by the investigation panel that the pilot did not request or obtain enroute weather forecast or weather briefing prior to departure.

1.8

Aids to Navigation

There were no navigational aids at Morogoro airstrip. The Dar es Salaam International Airport was equipped with the following navigational aids.

NDB (DM, DR, DS), VOR/DME, ILS and RADAR.

The RADAR, DME and NDB (DS) were not working on the day of the accident.

The aircraft was equipped with the following radio navigational aids:

ADF, airborne weather radar, VOR-ILS, DME and GPS. The Managing Director of the company said that in the absence of ground based radio navigation aids at Morogoro and on the Dar es Salaam - Morogoro route, the company relied on the GPS for navigation.

1.9

Communications

Conversation between 5H-TZD and the Dar es Salaam Tower was initiated at 0412:44 hrs (See Appendix 1) At this time the Tower was combined with the Approach and was operating on 118.3MHz.

At 0416.45 hrs the aircraft was cleared to Morogoro Flight level 60 Terminal Boundary (TMA). At 0419.43 hrs 5H-TZD gave the estimate for the TMA as 0439 hrs and Morogoro 0449 hrs.

At 0425:13 hrs 5H-TZD reported to be maintaining FL 60. Subsequent to this the aircraft raised the Ngerengere Tower and requested permission to transit the Military Area HTP6 to Morogoro. Permission was not granted. At 0439 hrs the aircraft advised the Ngerengere Tower that it was proceeding to Morogoro flying south of HTP6.

That was the last communication with Ngerengere.

At 0440:08 hrs 5H-TZD raised the Dar es salaam Tower again on 118.3 MHz and advised that he was maintaining FL60 transmitting blind. He estimated to check the TMA at 0441 hrs. The ETA for Morogoro was revised to 0451 hrs. The pilot also advised that he will call on Top of Descent.

Responding to the transmission the Dar es Salaam Tower advised that he was being heard on the frequency. The Dar es Salaam Tower transferred him to the Dar es Salaam Control Centre on 123.3 MHz. No further transmission from 5H-TZD was picked by either the Dar es Salaam Tower or the Dar es Salaam Area Control Centre (ACC).

There was a relay station at Bondwa (Mt. Uluguru) whose frequency was 123.3 MHz for communication with ACC. This station was not working at the time of the accident.

1.10 Aerodrome information

Not applicable

1.11 Flight Recorders

Not required by the regulations. None fitted.

1.12 Wreckage and impact information

Palapala hills are part of the Uluguru mountain ranges overlooking Morogoro town. They are located 5 nautical miles south west of Morogoro airport. The elevation is 5440 feet which is 3695ft above the elevation of Morogoro airport. The vegetation is thick tropical forest.

There are large tall trees with heavy undergrowth. The elevation of the crash site as measured by the GPS was 5230ft. The direction of the wreckage corridor was north west indicating that the aircraft was on a direct track to Morogoro airport.

The wreckage was distributed over a length of 150 metres along the hill slopes in a thick tropical forest. The aircraft collided with tall trees before impact with the ground.

The first aircraft part to be found on the wreckage distribution corridor was identified as the left horizontal stabilizer. It was located about 80 metres short of the main wreckage. It was evident from the marks on the leading edge that it had collided with trees and separated.

Much of the aircraft including the wings, the engines and parts of the fuselage were located around the ground impact crater. Fire damage was localised to sections of the fuselage and wings. Some vegetation at the crash site was burnt.

1.12.1 The Propellers

All the propeller blades separated from their hubs and parts of these were recovered from various positions along the wreckage trail. All the propeller blades had fractured on impact with trees in the accident sequence. It was evident from the pattern of the fractures that the propellers were rotating under power at the time of impact.

1.12.2 The engines

Both engines were located within the main wreckage. The damage to the compressor blades in both engines was consistent with the engines having been rotating at high power setting at the time of sudden stoppage. There was no evidence of engine failure in flight.

1.12.3 The wings

The wings were also part of the main wreckage. All the spars were found broken at a number of points. This occurred on collision with trees and the ground. Fire was localised on the wing sections which contained fuel.

1.12.4 The tailplane

It was evident from the wreckage distribution that the tail plane was the part of the aircraft which first collided with the trees. The horizontal stabilizer was the first part of the aircraft to be found along the wreckage trail. It was located 80 metres short of the main wreckage.

1.16 Tests and research

Not done

1.17 Other information1.17.1 The Air Traffic Services flight plan

On the evening of 23 April 1996 one of the company Operations officer prepared a flight plan for the following day's flight and submitted it to the Dar es Salaam air Traffic Services reporting office (Briefing Office). He omitted to sign this but the plan was approved by the briefing officer on duty.

The omission of the signature was later noted by the head of the ATS reporting office at Dar International Airport who inserted the name of another operations officer in the company (who frequently visited the office) before it was forwarded to the communications office.

The flight plan was addressed to the Aerodrome Control and the Approach Control at Dar es Salaam the Dodoma Tower as well as the Tabora Tower. It intimated that 5H-TZD would operate a charter flight from Dar es Salaam to Morogoro and Tabora and that it would cruise at flight level 60 on the Dar es Salaam-Morogoro sector. The aircraft, according to the flight plan, was to fly both sectors under instrument flight rules (IFR). The estimated flying time for the first leg was 25 minutes. The Morogoro-Tabora sector was to be flown at FL100.

The aircraft was airborne at 0418 hours and was therefore expected to land at Morogoro at 0443 hours. The alternate aerodromes were Dar es salaam and Dodoma.

There was no indication of the route to be flown but from the given flying time (25 minutes) it is evident that the intention was to fly on a direct track to Morogoro (through the prohibited area).

1.17.2 The Ngerengere prohibited Area HTP6

The last 58.5 nautical miles of the direct track to Morogoro lie within the prohibited area of the Ngerengere Military Airwing base (Appendix B). Permission to fly the direct track is granted on local arrangement by Ngerengere on request whenever the area is not active. This granting of permission is not co ordinated by the Tower or the Dar Control. The operator (Tanzanair) said that 95 percent of their requests to overfly the area are consented. Such requests are made when the aircraft is already airborne.

In the case of 5H-TZD the request was made seven minutes after take-off from Dar es Salaam. When the pilot failed to obtain permission to overfly the area he chose to circumnavigate it by flying south of the Prohibited Area. The Uluguru mountains are located along this southern track. The highest peak is 3681 feet high above sea level.

There are two possible routings to Morogoro from Dar es Salaam; the one to the north of the prohibited area and the other to the south of it, (see Appendix B).

In accordance with the application of the climatological Method as defined in the Aeronautical Information Publication (TANZANIA) the southern route would require higher level than FL60 and this should be FL120.

The term "Prohibited Area" is itself a misnomer as it is evident that the area can be used by civilian aircraft on request. A military prohibited area should be a no-fly zone to civil aircraft. Morogoro airport is just outside the Western end of the "prohibited area", but inside the Restricted area HTR7 which is contiguous to the prohibited area.

2.

ANALYSIS

There is no evidence that any pre-crash defect or malfunction of the aircraft, its engines or its flying controls contributed to the cause of the accident. In the examination of the wreckage at the crash site all the major aircraft parts were accounted for. The possibility of an in flight breakup was therefore ruled out.

The distribution of the wreckage indicated that the initial impact with the trees was made by the tail plane. This would indicate that the aircraft was in a nose up attitude at the time of impact with the trees. There was also evidence that the engines were rotating at high power prior to sudden stoppage. There was severe rotational damage to the compressor blades and the throttle levers in the quadrant were found in the fully forward position.

This evidence points to the fact that the aircraft was climbing when it first collided with trees.

Since the elevation of the crash site was 5230 feet and the aircraft was climbing at the time of impact with the trees it should follow that the aircraft had already descended from the reported cruising altitude of 6,000 feet. If this was the case then the pre-impact climb out should have been initiated by the pilot after sensing high ground ahead.

In the absence of a flight recorder, it was not possible to ascertain the lowest altitude to which 5H-TZD had descended before the final climb out was initiated.

It is evident from the first estimates transmitted to the Dar Tower at 0419.43 hrs that the anticipated flying time to Morogoro was 31 minutes. The flying time to check the TMA was estimated at 21 minutes and the aircraft should have reached Morogoro in the next 10 minutes. This information should imply that the pilot should have chosen initially to fly south of the prohibited area (Appendix B). Had he chosen the direct track he should have expected to check the TMA in 12 minutes.

At 0440:31 hrs the Dar es Salaam Tower transferred the aircraft to the Dar es Salaam Control Centre on 123.3 MHz. This frequency uses the Bondwa relay station which was unserviceable at the time. 5H-TZD did not report checking the TMA nor did he call on top of descent. Even if the pilot effected transmission on 123.3 MHz, he could not have been heard by the Dar Centre because of the unserviceable relay station at Bondwa.

There were no navigational aids at Morogoro which could have enabled 5H-TZD to carry out an instrument approach or instrument landing. In the absence of radar coverage it is also not possible that further radio communication with the Dar es Salaam Centre would have assisted the approach and landing at Morogoro in bad weather. It is therefore considered that the loss of Communications was not a significant factor in this accident.

2.1

Reconstruction of the possible flight path

The most probable track taken by 5H-TZD (Appendix B) was plotted on a basic assumption that the aircraft flew on bearing 252 degrees for 23 minutes checking the TMA at 0441 hours subsequent to which the heading was changed to 308 degrees.

The operator said that the pilot had frequently flown to Morogoro and he always flew south of the prohibited area when the direct track was not permitted.

It is evident from Appendix B that although permission to overfly HPT6 was not granted 5H-TZD overflowed the prohibited area. The crash site was located in the HPT6 on a direct track to Morogoro airport and 5 nautical miles short of the runway. A person who was at the foot of Mount Uluguru in Morogoro town reported to have heard the aircraft sound at 0450hrs. Some people who were at Pangawe (5 miles east of the Morogoro airport) also reported to have heard the sound of an aircraft at about 0500hrs. This would suggest that the aircraft actually arrived at Morogoro and possibly made a missed approach and crashed when it was making a second attempt to land at Morogoro.

However none of the people living near Morogoro airport testified to have heard aircraft at the Material time. It was thus not possible to establish whether 5H-TZD actually reached Morogoro airport or not. If the pilot had actually reached Morogoro airport and made a missed approach, it is unlikely that he would have made the second approach from the mountainous region in the south east.

The flight plan was filed by the company operations officer on 23 April, 1996. According to this flight plan the aircraft was to cruise at FL60 on the first leg of the flight. This level is unsafe for the chosen track since the highest terrain lying 5 nautical miles on either side of the track is 8681ft. The permanent safe level for the IFR flight should have been FL 120.

The operator whose operations officer filed the flight plan said that he did not consider FL60 as safe for the flight to Morogoro. The DCA Briefing Officer was supposed to check the flight plan for the minimum safe altitude before accepting it. When interviewed by the investigation panel the officer was not conversant with minimum safe altitudes, nor did he consider it as part of his responsibility to know such information.

The Dar es Salaam Approach Controller who cleared the aircraft for the IFR flight at FL60 said that his clearance was valid up to the TMA.

The minimum enroute safe level for the Dar es Salaam-TMA sector is (FL 40). For the flight beyond the TMA the minimum safe level was (FL120). The last communication between 5H-TZD and the Approach took place one minute before checking the TMA. The pilot reported to be maintaining FL60 and was to call on top of descent. It would appear therefore that FL60 was maintained till when 5H-TZD started descent to Morogoro.

It is also apparent that while the Dar es Salaam Approach could receive the aircraft transmission the aircraft itself did not receive the Dar es Salaam Approach after 0425:20 hours.

2.2

The weather

The pilot did not obtain weather information prior to departure nor did he make inquiries about the enroute weather during the flight. The enroute weather was reported by the Ngerengere weather station at the material time to be so bad that flying activities in the area had to be suspended. If this was the case then the weather around Uluguru mountains should be expected to be even more active.

2.3

Use of GPS

The aircraft was equipped a GPS which, in the absence of other navigational aids in the area, was being used for navigation in conditions of bad weather.

The GPS manual cautions that the equipment calculates the geometric height above sea level and could vary significantly from altitude displayed by pressure altimeters in aircraft. "NEVER use GSP altitude for vertical navigation".

The Directorate of civil Aviation had also issued a notice to operators instructing that every aircraft equipped with the GPS to install a placard which reads: "The GPS should not be used for primary navigation". Such placard was installed in 5H-TZD.

2.4 Regulations and Flight Rules

The responsibility of the pilot to the preparation for flight is defined under Regulation 31 of the Tanzania Air Navigation Regulations and stipulates that:

2.4.1 The commander of an aircraft registered in Tanzania shall satisfy himself before the aircraft takes off:-

(a) that the flight can safely be made taking into account the latest information available as to the route and aerodromes to be used, the weather reports and forecasts available, and any alternative course of action which can be adopted in case the flight cannot be completed as planned.

(b) in case of an aeroplane, that, having regard to the performance of the flying machine in the conditions to be expected on the intended flight, and to any obstructions at the places of departure and intended destination and on the intended route, it is capable of safely taking off, reaching and maintaining a safe height thereafter, and making a safe landing at the place of intended destination.

2.4.2 This regulation is supplemented by section RAC 3-1.1 para 2.2 of the Tanzania AIP which stipulates that

Service to IFR flights may include, in addition, information concerning:

a) weather conditions reported or forecast at destination or alternate aerodromes, as available;

b) collision hazards to aircraft operating outside controlled or advisory airspace.

NOTE No separation service is given outside controlled and advisory airspace. The information given under (b) will relate only to known IFR aircraft the presence of which might constitute a collision hazard to the aircraft informed. It will sometimes be based on data of doubtful accuracy and completeness, and the ATS cannot assume responsibility for its provision at all times, nor for its accuracy.

3. CONCLUSIONS

(a) Findings

- (i) The pilot was properly licensed to conduct the flight
- (ii) The aircraft was well maintained and its documents were in order.
- (iii) The operator filed a flight plan with an unsafe cruising altitude for IFR flight to Morogoro for the track flown. This was accepted and endorsed by the Air Traffic Services without query.
- (iv) The pilot did not obtain any weather information for his flight
- (v) The weather conditions did not allow safe visual approach and landing at Morogoro.
- (vi) The pilot was using the GPS for navigation in bad weather conditions.
- (vii) The pilot initiated descent when he had no visual contact with the terrain
- (viii) The aircraft collided with high ground following premature descent some five nautical miles short of Morogoro airport.
- (ix) The aircraft was on direct track to Morogoro airport when it collided with high ground.

(b) Cause

The accident was caused by the aircraft colliding with high ground in bad weather.

(c) Contributory Factors

- (i) The pilot's decision to initiate descent in weather conditions which allowed no visual contact with the terrain,
- (ii) the pilot's decision to rely on the GPS as a means of navigation into Morogoro,
- (iii) the failure of the pilot to obtain enroute & destination weather information relevant to his flight,

- (iv) the pilot's decision to fly the mountainous southern track instead of the northern track in adverse weather conditions,
- (v) the pilot's decision to continue with the flight in bad weather instead of or diverting to his alternate.

4. SAFETY RECOMMENDATIONS

It is recommended that:

- 4.1 The TMA should be separated from the boundary of the prohibited area by a distance of 5 nautical miles.
- 4.2 ATS should establish internal routes from the east to airfields within the restricted area (HTP7).
- 4.3 The prohibited area (HTP6) should be modified to allow easier access from Dar es salaam to towns in Central Tanzania.
- 4.4 Pilots should refrain from flying into bad weather.
- 4.5 The GPS should not be used as a primary means of navigation till when it is approved.
- 4.6 The responsibility of officers accepting flight plans should be clearly defined.
- 4.7 Civil aircraft should not cross the prohibited area
- 4.8 Pilots are reminded that it is incumbent upon them to obtain weather briefing before undertaking all flights.

J. Nyamwihura
Inspector Of Accidents.

Accident Investigation Branch
MINISTRY OF COMMUNICATION & TRANSPORT

TRUE EXTRACT OF CONVERSATION AS EXTRACTED
FROM TAPE BETWEEN PILOT OF 5H-TZD AND DUTY
ATCO ON 24TH APRIL, 1996 (ON 118.3 MHZ)

0412:44: 5HTZD: Tower, 5HTZD.

0412:48: DAR TWR: 5HTZD, Tower

0412:51: 5HTZD: Good morning, Request taxi FL 60
Morogoro, ONE on board endurance 0530

0413:04: TWR: -ZD taxi holding point runway 23. the
surface is calm, QNH ee - standby for
the QNH.

0413:13 5HTZD: Holding point 23. -ZD.

0414:07: TWR: -ZD, check the QNH 1014

0414:12: 5HTZD: 1014. -ZD.

0416:36: 5HTZD: Dar es Salaam TWR. ZD.

0416:39: TWR: -ZD, Tower.

0616:41: 5HTZD: ZD, requesting ATC and ready for take
off.

0416:45: TWR: -ZD line up. and you are cleared to
Morogoro level 65, correction 60 TMA
boundary., after departure runway 23
right turn.

0416:55: 5HTZD: Lining up; Dar es salaam, Morogoro FL
60 TMA; take off 23 right turn; -ZD.

0417:02: TWR: Read back is correct; and the surface
wind is calm runway 23, cleared to
take off.

0417:11: 5HTZD: -ZD.

0419:26: TWR: 5-ZD airborne at 0418; I am
requesting you to check for me if the
DV VOR and DM and DR are serviceable.

0419:39: 5HTZD: They are already checked;
serviceable; all of them.

0419:43: 5H-TZD Thank you; ee standing by for forward
estimates.

0419:49: TWR: Roger estimating the TMA 0439;
Morogoro 49 -ZD.

0419:59: TWR: Roger, roger report maintaining FL 60
or checking the TMA bounding.

0419:03: 5HTZD: -ZD; WILCO.

0425:08: 5HTZD: Dar es Salaam; 5-ZD.

0425:10: TWR: -ZD; Approach.

0425:13: 5HTZD: -ZD maintaining 60.

0425:16: TWR: Maintain Level 60, report the TMA
boundary.

0425:20: 5HTZD: -ZD.

0440:08: 5HTZD: Approach; 5-ZD transmitting blind 123
ee revised estimate Morogoro 51, call
you Top of descend; -ZD.

0440:31: 5HTZD: 5-ZD roger, reading you five, try to
call eer Dar Control 123.3.

0440: "5HTZD": (click of mike heard).