



AIRCRAFT ACCIDENT INVESTIGATION REPORT

**ETHIOPIAN AIRLINES B767 (ET-AIZ) AIRCRAFT ACCIDENT
IN THE FEDERAL ISLAMIC REPUBLIC OF THE COMOROS,
IN THE INDIAN OCEAN ON NOVEMBER 23,1996**

**ETHIOPIAN CIVIL AVIATION AUTHORITY
FLIGHT SAFETY DEPARTMENT
P.O.Box 978
ADDIS ABABA - ETHIOPIA**

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PREFACE

For the investigation of this accident the Direction Generale de l'Aviation Civile des Comores (the State of Occurrence) and the Civil Aviation Authority of Ethiopia (the State of Registry) have signed a memorandum of understanding on the 3rd of December 1996. The State of Occurrence delegated the whole of the investigation to the State of Registry in accordance with Annex 13, to the Chicago Convention on international civil aviation chapter 5, section 5.1.

As stated in the Memorandum of Understanding, the Ethiopian Civil Aviation Authority has ensured the active participation of the specialists provided by the Direction Generale de l'Aviation Civile des Comores in the investigation.

All times in this report are Universal Time Coordinate (UTC). The times indicated in the Cockpit Voice Recorder (CVR) script are in minutes and seconds from the beginning of the tape.

The investigation committee would like to thank the following individuals and their respective organizations that offered assistance in the investigation. Mr. Roger Lambo from ICAO Eastern and Southern African Regional Office, Nairobi. Mr. Peter Sheppard from Air Accident Investigation Branch (AAIB), London. Mr. John A. Hamilton from Boeing Commercial Airplane Group, Air Safety Investigation, Seattle.

Mesfin Fikru

Investigator-In-Charge

Ethiopian Civil Aviation Authority

ACCIDENT SUMMARY

On Saturday, November 23, 1996, Ethiopian Airlines Flight No. 961, a Boeing 767-200 ER, registration ET-AIZ was on a regularly scheduled international passenger flight from Bole International Airport, Addis Ababa, Ethiopia to Abidjan with intermediate stops at Nairobi, Brazzaville and Lagos. There were 163 passengers and 12 crew members on board.

According to the cabin crew's report, twenty minutes after takeoff at about 0829 UTC, one of the hijackers stood up from his seat and ran up the aisle to the cockpit, and the other two followed him heading for the cockpit. While rushing to the cockpit one of the hijackers said *"Every body should be seated, I have a bomb !"*

Then they opened the cockpit door and stormed in. They declared to the pilots that they were eleven, and beat the First Officer and forced him out of the cockpit. They then grabbed at the fire axe and fire extinguisher bottle from their respective stowages and ordered the pilot-in-command to change destination and fly to Australia.

The pilot-in-command explained to the hijackers that he had not enough fuel to reach Australia and demanded to make a refueling stop at Mombassa.

The hijackers refused the refueling stop and continued arguing with the pilot-in-command until eventually the aircraft ran out of fuel. At this time the aircraft was descending to the Indian Ocean over the Comoros Islands. The aircraft brushed the water in a left-wing-low attitude and then was held in a straight and level attitude. After hitting a reef with its belly, it broke into four sections.

The aircraft was destroyed on impact. The accident occurred at 1220 UTC during daylight hours at coordinates of 11° 22S latitude and 43° 18E longitude. Of the 175 occupants 6 crew members and 119 passengers were fatally injured in the accident. Six crew members and 38 passengers sustained serious injuries, 2 passengers sustained minor injuries and 4 passengers received no injury.

The Investigation Committee has determined that the cause of the accident was unlawful interference by hijackers which resulted in loss of engines power due to fuel exhaustion.

As a result of the investigation, the Committee has issued recommendations, based on this report, so that all concerned will take the appropriate action as soon as possible.

**ETHIOPIAN AIRLINES B767-260ER, ET-AIZ AIRCRAFT ACCIDENT IN THE
FEDERAL ISLAMIC REPUBLIC OF THE COMOROS, IN THE INDIAN OCEAN
ON NOVEMBER 23, 1996. REPORT NO. AI-3/96 RELEASED
BY CIVIL AVIATION AUTHORITY, ETHIOPIA**

1. FACTUAL INFORMATION

1.1 History of the flight

On Saturday, November 23, 1996, at approximately 1220 UTC, Ethiopian Airlines Flight No. 961, a Boeing 767-200 ER, registration ET-AIZ ditched in the Indian Ocean at Comoros Islands. Flt. No. 961 was a scheduled international passenger flight from Bole International Airport, Addis Ababa, Ethiopia to Abidjan with intermediate stops at Nairobi, Brazzaville and Lagos. There were 163 passengers and 12 crew members on board.

The flight plan for ET-961 was a repetitive flight plan "ETH B767 ADD 0745 F390 0460 NBO 0155". The flight was delayed waiting for a connection flight and departed Addis at 0809 UTC. The takeoff and the en-route climb to the planned cruising altitude of 39000 ft. were uneventful.

According to the Cabin Crew's report, 20 minutes after takeoff at about 0829 UTC, one of the hijackers stood up from his seat and rushed to the cockpit, and the other two followed him. While rushing to the cockpit one of the hijackers said *"Everybody should be seated, I have a bomb"*.

Then they opened the cockpit door and stormed in. They declared to the pilots that they were eleven, started shouting, and beat the First Officer forcing him out of the cockpit. They then grabbed at the fire axe and fire extinguisher bottle from their respective stowages and ordered the pilot-in-command to change destination and fly to Australia. The pilot-in-command explained to the hijackers that he had not enough fuel to reach Australia and demanded for a refueling stop.

Ignoring his request for a refueling stop, the hijackers insisted that they had learned from the ETHIOPIAN inflight magazine "Selamta" that the B767 can fly 11 hours without refueling. The Pilot-in-command (PIC) tried to explain the difference between what is written in the magazine and the condition in which they were actually in. He explained to the hijackers that he had fuel to take them to Nairobi and further to Mombassa only. He pointed to the fuel quantity indicator on the fuel management panel and indicated what an 11 hour fuel endurance was and what he actually had, but still, they insisted that if their demand was not met, they would destroy the aircraft along with the passengers with a bomb which they said they had in their possession.

One of the hijackers whom the Pilot-in-command suspected to be the leader had the fire axe and a bottle of whisky. The other one was wearing a glove in which, he said, he had a bomb and in the other hand he had a bottle of whisky. The third one had the fire extinguisher.

Two of the hijackers came out of the cockpit and stood by the left forward entry door and ordered every one to look down and stop talking.

While two of the Hostesses (Tehut and Tsegereda) were seated on seats 2F and 2G, one of the hijackers ordered Tsegereda to come and set up the forward attendant panel so that he could make an announcement to the passengers. The announcement was made in three languages, Amharic, English and French, and its content was that they had assumed control of the aircraft, that their destination was altered and that they had one bomb and would not hesitate to use it.

As the Pilot-in-command realized that the hijacking action had begun, he informed Addis Area Control Center on 125.1 MHz that the aircraft had been hijacked, and that he was being ordered to fly to Australia. After which, the pilot was not allowed to make any communication.

At 0830, Addis Ababa Area Control Center called Nairobi Area Control Center to advise that ETH 961 was diverting to Mombassa and that the aircraft was under unlawful interference.

The ETH 961 blip first appeared on radar of NACC at 08:51:30 UTC squawking A2000, maintaining flight level 390 at position 35 nm on a bearing of 060° from position Rudolf and was heading 170° m (about 342 nm on a bearing 010° from JKIA). The flight maintained this heading and checked Nairobi FIR at 0855 UTC.

The leader of the hijackers ordered the Pilot-in-command to phone to Australia. The Pilot-in-command said that there was no telephone on board. When the hijacker threatened to beat him, he then asked for the phone number. The hijacker asked for Ethiopian Flight time table and flipped through some pages and showed the General Sales Agent Office telephone number in Australia to the Pilot-in-command. At 0857 ETH 961 contacted Nairobi and transmitted the message to be relayed to Australia. During this time the pilot had the opportunity to transmit the message and inform NACC of his flight level, position, fuel endurance and heading (see Appendix A).

The NACC requested if Flt. 961 intended to land in Mombassa. The Pilot-in-command asked the hijacker if they were willing to land in Mombassa, but they refused.

According to the tape script the Pilot-in-command said *"..... I just wanted our hijackers to hear what you are communicating and if you have anything to say go ahead and tell them..... "* and NACC said *"I am advising you that with 2 (two) hours fuel you will be unable to reach your destination and probably you will ditch in the ocean, the best solution is for your to land in Mombassa, and pick some more fuel...."*

The hijackers told the Pilot-in-command to switch off the radio and that they were unwilling to negotiate on any terms. After which the leader removed the Pilot-in-command's headset and sun-glasses from him and instructed him again not to make any communication.

In such a difficult and dangerous situation they kept on flying. After passing Mombassa, they headed towards Zanzibar and further along the south east coast of Africa. The Pilot-in-command still tried to dissuade the hijackers from following their foolish plan of not making a refuelling stop.

Flying past abeam Dare-es-salaam the leader asked the Pilot -in-command to call again to Australia. This time the Pilot had another opportunity of calling Holloway radio (i.e. company radio) and informed them of the remaining fuel endurance. At the same time he informed DAR Center, of his position and heading. Now for the second and last time the hijacker snatched the captain's headset and ordered him to fly away from the coast, head to Australia and indicating to the altimeter not to descend below FL 390.

The Pilot-in-command turned left towards the Comoros Island. The leader was sitting in the First Officer's seat and was fiddling with the aircraft's controls, kicking the rudder, whilst also drinking whisky. The Pilot-in-command kept on telling them that he was running short of fuel pointing to the fuel quantity indicators, but the hijackers could not apprehend the dangerous situation that they were in. The leader continued fiddling with the controls, trying to turn the aileron and pulling the reverse thrust lever at random.

As the flight came over the Comoros Islands the Pilot-in-command saw the Moroni International Airport runway and circled 15-20 nm south of the field. Then the LOW FUEL CAUTION came on.

The Pilot-in-command pleaded to land because of low fuel. The hijackers were unconcerned and only insisted that the pilot not descend below FL 390. At about 11:41UTC the right engine ran down to wind milling speed. The Pilot-in-command showed the red warning message for the right engine on the EICAS to the hijacker (the leader).

At this moment, the hijacker left the right seat and went to the cabin door to discuss with the other two hijackers. This gave the Captain the opportunity to pick up his microphone and address the passengers. The script from the CVR reads as follows: **"....LADIES AND GENTLEMEN THIS IS YOUR PILOT, WE HAVE RUN OUT OF FUEL AND WE ARE LOSING ONE ENGINE THIS TIME, AND WE ARE EXPECTING CRASH LANDING AND THAT IS ALL I HAVE TO SAY. WE HAVE LOST ALREADY ONE ENGINE, AND I ASK ALL PASSENGERS TO REACT TO THE HIJACKERS...."**

The hijacker then came back to the cockpit and hit the microphone out of the PIC's hand.

After the right engine failed, the PIC started to descend the aircraft in order to increase speed, but the hijacker again interfered and violently played with the controls which resulted in improper control inputs. As a result the autopilot was disconnected and the flight became erratic with the airspeed varying between 216 kts and 336 kts.

The aircraft's flight path became wildly erratic because of improper control inputs made by the hijackers. As the PIC regained control of the aircraft, the left engine went dead. Some two minutes after this, the CVR and DFDR ceased to record. The hijacker kept on instructing the PIC not to descend and again went to the cabin. Upon returning to the cockpit he saw that the altitude was decreasing, and angrily shouted at the PIC not to go any lower.

The PIC said that the fuel was already finished and that the engines were without power. This time the hijacker instructed the captain not to touch the controls, and threatened to kill him. The Captain said, "I am already dead because I am flying an airplane without engines power".

The first Officer, who had earlier been forced out to the First Class Cabin, got up and, via the right aisle, went to the rear of the aircraft where he saw that a lot of economy class passengers had their life jackets on and that some had already inflated them. The First Officer, along with the cabin crew members, helped the passengers to deflate the life jackets and showed them how the jackets should be re-inflated and how to assume the brace position during impact. While returning to the front of the aircraft, they repeated the same instructions as many times as they could. The instructions were only given in the English language, and so it is likely that some of the passengers might not have understood them.

About less than 2 minutes before the ditching, the co-pilot forced his way to the cockpit shouting "let me help the PIC ...". After adjusting his seat and seat belts the PIC asked him for help since the controls were heavy. The hijackers still kept on struggling with the controls. By now, the aircraft was descending into the Indian Ocean over the Comoros Islands.

The aircraft now had only standby instruments and RAT (Ram Air Turbine). The altimeter was indicating 150 feet and the airspeed was 200 kts. By this time the flight crew had been left alone to assume control. They turned the aircraft to the left in order to parallel the waves. However, the aircraft brushed the water in a left-wing-low attitude. It was then held straight and level after which it broke into four sections. The aircraft was destroyed by impact. The final approach until the crash was recorded with a video camera by a tourist on the beach.

The accident occurred at 1220 UTC during daylight hours at coordinates of 11°22 S latitude and 43°18 E longitude. Of the 175 occupants of the airplane, 125 were fatally injured as a result of the impact and drowning in the water.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	6	119	-
Serious	6	38	-
Minor	-	2	-
None	-	4	

1.3 Damage to aircraft

The Boeing 767-260ER was destroyed as a result of impact on a reef in shallow water. The airplane was valued by the operator at 40 million US dollars.

1.4 Other Damage

There was no other damage reported or claimed.

1.5 Personnel Information

The crew consisted of a Pilot-in-command, a First Officer, one Flight Mechanic and nine Cabin Crew members. The flight crew were properly licensed by the Ethiopian CAA and were qualified to conduct the flight.

1.5.1 Pilot-in-command

Captain Leul Abate, of Ethiopian nationality, aged 42, held an Ethiopian CAA Airline Transport Pilot Licence (No. AA-196).

This licence carried the following ratings with instrument ratings entered.

Single engine land

Multi-engine land

Co-pilot on DC-3/C-47

" " DHC-5

" " B707/720

Flight Engineer on B707/720

Captain on DHC-6

" " B737

" " B757/767

He also held a current medical certificate issued by CAA designated medical examiner. He was last medically checked on May 31, 1996 and was pronounced fit for duty with no limitation. The Medical Certificate was valid until November 30, 1996.

His instrument and proficiency checks had been conducted by a CAA designated flight examiner on September 20, 1996 and were valid until March 19, 1997.

His flying experience was as follows:-

Total flight time 11,525:22 hours.

Flight experience on B757/767 4067:04, hr's, of which 686:40 hours is command time.

Most recent flight time record (all command time on B767/757).

- Last 90 days	257:35 hours
- Last 30 days	79:36 "
- Last 7 days	18:43 "
- Last 24 hr's	00:00 "
- On the date of the accident	04:04 "

1.5.2 Second-in-command

First Officer Yonas Mekuria, of Ethiopian nationality, aged 34, held an Ethiopian CAA Commercial Pilot Licence (No. AC-369). His licence carried the following ratings with instrument ratings entered.

- Single-engine-land
- Multi-engine-land

- Flight Engineer on B707/720
- Co-pilot on DC-3/C-47
- " " B727
- " " B767/757

He also held a current medical certificate issued by a CAA designated medical examiner. He was last medically checked on July 25, 1996 and was pronounced fit for duty with no limitations. The Medical Certificate was valid until January 24, 1997. His instrument and proficiency checks had been conducted by a CAA designated flight examiner on November 5, 1996 and were valid until November 4, 1997.

His flying experience was as follows:-

Total flight time 6570:04 hours.

Flight experience on B757/767 3042:45 hours. all flight time was as second-in-command.

Most recent flight time record on B767/757

- Last 90 days 181:54 hours
- Last 30 days 76:08 "
- Last 7 days 18:43 "
- Last 24 hr's. 00:94 "
- on the date of the accident 04:04 "

1.5.3 Flight Mechanic

The Flight Mechanic possessed an Ethiopian CAA Aircraft Maintenance Mechanic Licence No. MM-1071 in Airframe and Powerplant categories which was valid until October 02, 1997. His licence carried the following ratings with their respective engines:- B707/720, B727, B757, B767, ATR-42 and DHC-6.

1.5.4 Cabin Crew

There were nine cabin crew members. Six sustained fatal injuries in the impact. Three cabin crew members survived the crash. Training records for the cabin crew members were requested from the airline, but there were no individual training records available. The cabin attendants had attended a one day emergency training seminar back in October 1990.

1.6 Aircraft information

The Boeing 767-260ER, with S/N 23916 was manufactured by Boeing Commercial Airplane Company in 1987. It went into service with Ethiopian Airlines Corporation as public transport category in the same year.

A Certificate of Registration No. R-295 had been issued on October 22, 1987 assigning the registration markings as ET-AIZ. A Certificate of Airworthiness (CofA) No. A-295 had been also issued by Ethiopian CAA. The C of A was valid until November 25, 1997.

A review of the maintenance records revealed that the airplane had been inspected and maintained in accordance with Ethiopian Airlines maintenance programme that had been approved by the Ethiopian CAA.

The aircraft had been operated for a total of 32353 hours and 12623 cycles. Subsequent checks were scheduled for when the aircraft would have had accumulated a total of 33140 hours.

The maximum Landing Limited take-off weight for ET-AIZ was 133,398 kilograms (ADD - NBO flight). The actual take-off weight during the day of the accident flight was 124,419 kg. The calculated CG limits for this weight was within the prescribed limits. The last weight and balance check was performed on March 12, 1996. The accident aircraft was powered by Pratt & Whitney model JT9D-74RE engines.

Engines Data

Data	Number 1	Number 2
Serial number	716618	716602
Time since new	22460	20497
Cycles since new	8659	8281
Controlling cycles (upper limit)	16926	17355
Remaining cycles	8267	9074

Examination of flight and maintenance records indicated no abnormal engine operation prior to the accident.

1.7 Meteorological Information

Very little information on the actual weather conditions at the accident site was available. According to one eye witness, an airbus Captain from Air Inter, who was on at the beach during the accident, on the Beaufort Scale, the wind was reading 3 units, i.e. the equivalent of about 8 to 10 knots blowing in the NE direction in CAVOK conditions.

(The Beaufort Scale is located at the beach in the divers' club)

The actual weather condition observed at Moroni International Airport which is located 20 Kilometers south of the accident site was as follows:

at 1100 UTC

wind - 240°/02 kts
 visibility - over 10 km
 clouds - scattered 690 feet, Towering Cumulus
 temperature - 30°C
 dew point - 23°C
 QNH - 1010 Mb

at 1200 UTC

wind - 220°/06 kt
 visibility - over 10 km
 cloud - broken 690 feet, Towering Cumulus
 temperature - 30°C
 dew point - 24°C
 QNH - 1009 Mb

at 1300 UTC

wind - 110°/10 kt
 visibility - over 10 km
 cloud - broken 690 feet, Towering cumulus
 temperature - 31°C
 dew point - 25°C
 QNH - 1009 Mb

The accident occurred in full daylight. It was determined that weather was not a factor in this accident.

1.8 Navigational Aids

There were no known difficulties with navigational aids.

1.9 Communications

There were no known difficulties with communication equipment. Communication and co-operation from ATC units on the route of flight 961 were not a problem. However, certain communication difficulties resulted from the actions of the hijackers whilst they were in the cockpit.

1.10 Aerodrome information

Not a factor in this accident.

1.11 Flight Recorders

The B767-200ER was equipped with a Sundstrand Cockpit Voice Recorder (CVR), Serial No. 10222 and a Sundstrand Digital Flight Data Recorder (DFDR), Serial No. 9167. The recorders were taken to the Air Accidents Investigation Branch (AAIB) of the Department of Transport in the United Kingdom for reading and analysis. The recorders were transported in sealed water filled containers.

1.11.1 Cockpit Voice Recorder

The recorder was removed from the container and placed in a bath of fresh water to prevent it from drying out. External examination indicated that the recorder was undamaged and

in apparently good condition. The recorder was then disassembled so as to expose the tape deck. Sundstrand CVRs employ a co-axial reel system for the tape, with the reels mounted one above the other. Inspection revealed that the tape was undamaged, and after ensuring that it was not stuck to the recording heads and guides, and freeing the tape path, it was spooled onto the top reel. Throughout this process the tape was from time to time, re-wetted in order to ensure that it was kept moist. After removing the reel from the recorder, it was mounted on a hand wound reel system and manually spooled onto a five inch plastic reel. As the tape passed between the two reels it was cleaned with tape cleaner and dried using lint free pads. Subsequent examination revealed that where the tape had been stationary and against the tape heads, there were very localized areas of damage to the oxide layer due to the corrosion products produced from the dissimilar metals within the tape heads. This is always seen on recorder tapes which have been immersed in sea water, unless they are removed and cleaned very quickly. The tape was in good condition and in order to even out the tension, was spooled backwards and forwards using the replay open reel tape decks, in preparation for replay.

For replay the CVR tape was mounted on RACAL store 4 open reel deck, which was fitted with Sundstrand replay heads. The replay was satisfactory, and of the 4 tracks on the recorder, the Pilot and Co-pilot channels (i.e. channel 3 and 2 respectively) contained some ATC communications. The area microphone

channel (i.e. Channel 4) contained a satisfactory recording of the flight deck conversations. Although the PA and 3rd crew member channel (i.e Channel 1) was heavily distorted, it contained recordings of ATC communications including possibly HF and PA announcements. All ATC communications recorded on the CVR were those of other aircraft. The recording stopped before the aircraft came in to impact with the sea because the second engine had earlier failed thus cutting power to the recorder (see appendix B).

1.11.2 Flight Data Recorder

On removal from the container, it was apparent that the DFDR had suffered some impact damage, in that the case was dented and distorted in a few areas, and the mounting of the bolts and the protected enclosure to the frame had broken. In order to remove the external cover, it had to be cut away using powered hand tools. After this the protected enclosure was removed and the tape deck exposed. The Sundstrand DFDR uses a twin reel system with a co-belt drive. The tape was almost entirely on one reel, and after removing the co-belt it was hand spooled onto one reel. That reel was then removed and cleaned and dried in a similar manner to the CVR tape. Care was taken to ensure that before cleaning it was kept moist at all times. After this process the tape was seen to be in good condition.

The Flight Data Recorder tape was mounted on a RACAL store 4 tape deck and the binary information was replayed

onto computer hard disk. The replay was satisfactory and all information appeared to be present. The recorder stopped before impact and at 15000 ft altitude, due to a total engine failure. A full replay was hampered because of severe problems with the acquisition unit fitted to the aircraft, and of difficulties in determining the appropriate configuration information for the system.

According to the description from the DFDR data, the aircraft took off from Addis Ababa at a recorded time of 08:09:47, (the times referred to are not necessarily aligned with ATC time), on a heading of 074° and turned right onto a heading of 243° and shortly after turned back left onto 195°. It reached its cruising altitude of 39000 ft at 08:29:39, and continued with a speed of between 245 kt and 255 kt. There were two heading changes, firstly to 170° and then to 160°.

At 11:07:43 a race track-like pattern to the left was begun. The APU was started at 11:15:19. The right aft fuel pump indicated low pressure at 11:39:15, followed by a similar indication of the right forward fuel pump at 11:41:39. Some 4 seconds later at 11:41:43 the right engine ran down to windmilling speed. The aircraft gradually increased pitch to maintain altitude as the speed decayed to 216 kt, at which point the aircraft started to descend and increase speed. The autopilot was inadvertently disconnected by the hijacker at this time. Some 11.5 minutes after the right engine failed, the left aft fuel pump indicated low pressure followed 8 seconds later

by a similar indication of the left forward fuel pump and at 11:53:51, when the aircraft was at 20900 ft and 310 kt, the left engine also ran down. Some 2 minutes after this, at 11:55:43, the DFDR ceased to record, with the aircraft in a 26 degree banked turn to the left at a speed of 326 kt and at a height of 15000 ft. Some 40 seconds before the end of recording the Ram Air Turbine indicated "unlocked".

During the descent, after the first engine failed, the flight was erratic with air speed varying between 216 kt and 336 kt. The altimeter reading did not show a steady descent, but indicated a temporary increase in altitude.

The pitch angle varied between +3.3 and -8.3 degrees, and there were excursions in roll up to 47° to the right and 35° to the left. During the rolling manoeuvres, the aileron was not moving appreciably. Movement of only the outboard ailerons was recorded, and it is likely that the control laws disabled the ailerons during the higher speed flight regimes (see appendix C).

1.12 Wreckage and impact information

Most of the aircraft main wreckage was found at a location of 11:22 S latitude and 43:18 E longitude approximately 500 meters North of Galawa Beach, half immersed in water. The cockpit section up to station No. STA 360 was located at 11:22 S and 43:18 E in 28 meters of deep water. The center section and the tail section, including the right and left wings, with the left engine still attached to

the wing, were found in an area of 400 meters in radius, at the edge of the reef. The right engine was later recovered from the sea. The part of the aircraft from station No. STA 360 up to 615 was not recovered. At the time of the impact, the landing gears were in a retracted position with the doors closed. The RAM Air Turbine was deployed. The wing flaps were up.

The aircraft disintegrated on impact. There were four pieces of main wreckage, the aircraft having broken approximately at stations No. STA 368, 544 and 1270. Through these openings most of the occupants escaped, although, some eventually drowned.

After the second engine quit, the DFDR shortly stopped recording. Due therefore, to the lack of DFDR data at impact we were unable to determine the impact force (see appendix D).

1.13 Medical and Pathological information

The surviving passengers sustained injuries ranging from very minor to very serious. These injuries seem to have occurred mainly due to impact. However, there were also some fatalities caused by drowning. Several occupants sustained major disabilities such as paralysis, amputation, fractures, internal organ damage and abrasions. Four passengers had no reported injuries.

External examination of the fatally injured passengers showed that all had sustained multiple injuries. No post-mortem examination of the fatally injured persons was conducted. However, it is known from the pattern of injuries of the surviving passengers that the fatally injured passengers received or experienced severe multiple injuries caused by

the aircraft disintegrating upon impact. All the victims were recovered and identified (see appendix E).

1.14 Fire

There was no fire.

1.15 Survival Aspects

The force of impact destroyed the aircraft. The aircraft disintegrated into four main sections after it struck the reef in shallow water.

Surviving passengers reported that water started to flow into the cabin, while they were still in their seats. Passengers who had been in the center section of the fuselage were turned upside down whilst still fastened by their seat belts. Some passengers were either flung from their seats or managed to release themselves from their seats and exited the aircraft from the different openings caused by the breaking up of the fuselage.

1.15.1. Emergency Response

On Saturday, 23rd November 1996 at 11:10 UTC, the control tower of the Moroni International Airport informed the Rescue and Fire Fighting Service that an Ethiopian Airlines Boeing 767 with terrorists on board had lost contact with all frequencies and that it reportedly had a fuel endurance of one hour. At 12:20 UTC the aircraft accident occurred.

At 12:25 UTC the Director General of the Moroni Airport was contacted by telephone to obtain authorization to intervene.

Then, the Rescue and Fire Fighting team with one VMA 68II vehicle departed the airport at 12:30 UTC.

Around 13:00 UTC, the national radio station announced the crash of the aircraft and notified all hospitals about the disaster. As soon as the accident was announced, the Comorian Red Crescent (CRCO), the gendarmerie, the army and the people from the surrounding villages rushed to the accident site.

Prior to the arrival of the Rescue and Fire Fighting team of the airport, the rescue operation had already been immediately started by the Galawen Hotel staff, the boat house staff, the gendarmerie, and by people from the surrounding villages.

At 13:10 UTC the Rescue and Fire Fighting team began to take part in the rescue operations, by picking up the injured and the corpses.

Some delay was caused to the rescue operations as a result of the rescue teams having been informed by the first survivors of the accident, that there was a bomb on board the aircraft.

The rescue operation was interrupted at 14:40 UTC. At 15:20 UTC the Director General of the airport gave an order to the Rescue and Fire Fighting team to return to their duties at the airport.

Around 12:50 UTC, the first survivors started to arrive at the Mitsamiouli Hospital which was located less than 2 km from the accident site.

There, doctors and nurses, who had immediately been sent as reinforcements, administered first aid treatment. At about 15:00 UTC, all the survivors were transferred to the El-Maarouf Regional Hospital Centre in Moroni.

1.16 Tests and research

No special test and research was undertaken.

1.17 Organizational and management information

1.17.1 Security and facilitation

Security inspections carried out at the Addis Ababa Bole International Airport were adequate and strict. The hijackers were therefore not able to smuggle a bomb or weapons on board the aircraft. Instead they had used as weapons items that they had acquired on board such as a fire axe, a fire extinguisher and a whisky bottle.

1.17.2 Training

The flight operation training department of Ethiopian Airlines efficiently and effectively execute the training and retraining of its flight crew members.

The flight crew training course is an integrated ground and flight training program. This enables flight crew to operate the airplane safely and efficiently under all normal and abnormal conditions.

The Flight Operation and Flight Crew Training manual provides instructions on ditching. When the flight condition requires ditching and the decision has been made to ditch, the flight crew are expected to complete the ditching preparation checklist in the Quick Reference Handbook. However the situation that the flight crew of Flt. 961 were in, did not allow them to perform in accordance with the procedure. In addition, the procedures do not provide for ditching with both engines out. The assumption here is that, such accidents are very unusual. However as evidenced by this accident, one cannot entirely rule out the probability of it occurring.

In addition, since only the Ram Air Turbine (RAT) was available the only cues available to fly the airplane were provided by the stand-by instruments. There was no vertical speed information required to maintain a 200-300 fpm rate of descent, in accordance with the ditching procedure.

In the C.A.A. Technical Directive chapter 6.1 section 6.1.7., it is stated that crew member training must include anti-hijacking training and in section 6.1.10., it is stated that a commercial air transport operator shall establish and maintain a training program designed to assist crew members to minimize the consequences of acts of unlawful interference.

In the Flight Operations Policy Manual and Flight Operation Training curriculum of Ethiopian Airlines, it is stated that crew emergency training to include hijacking and other unusual situation.

The in-flight security training (i.e. hijacking and other unusual situation) is given in forms of Computer Based Training(CBT) and Audio Visual Training (AVT) for personal perusal. These training materials do not appear to be utilized in a formal or structured presentation.

1.17.3 Skymarshals

Once total engine failure occurs due to fuel exhaustion, either a ditching or a crash landing is inevitable. The ditching or the crash landing might not be as successful as expected due to distractions caused by task-irrelevant activity creating interference in critical situations. It is, in general, recognized that the use of skymarshals can pose a potential hazard to the safety of aircraft on which they are employed. However, in this extreme case, skymarshals might have played a role in saving more lives.

1.18 Additional information

None.

2. ANALYSIS

2.1 General

The aircraft was certificated, equipped, maintained and operated according to applicable Civil Aviation Authority directives, company regulations and procedures. The weight and balance check was performed on March 12, 1996 and was within the prescribed limit. The maximum certificated take-off weight of ET-AIZ was 133,398 kilograms. The actual take-off weight for the accident flight was 124,419 kg. The calculated CG limit for this weight was within the prescribed limits.

The Pilot-in-command and the First Officer of ET-961 were trained and qualified in accordance with applicable CAA directives and company standards, procedures and requirements to operate the airplane.

The airplane's maintenance records disclosed that it had been maintained and operated in accordance with existing applicable CAA regulations and company maintenance specifications and procedures. There was no evidence of any pre-existing malfunctions or failures of any of the airplane structures or systems which would have been a casual factor in this particular accident.

2.2 Flight crew

Twenty minutes after take-off the First Officer was forced out of the cockpit. The pilot-in-command was left alone to fly the aircraft throughout the flight until 2 minutes before the crash.

Although the pilot-in-command was subject to tension and a hostile environment, he seemed to have performed his assigned duties without reducing his capability and performance. His performance during the entire flight were timely and correct.

The pilot-in-command demanded for a refueling stop but the response offered by the hijackers was negative. This accident would not have occurred if the hijackers had agreed to a refueling stop at Mombassa as offered by NACC and the pilot-in-command, in order to reach the altered destination of Australia.

After losing the right engine, the pilot-in-command announced the situation, and requested for "... all passengers to react ... to the hijackers...." By making this announcement, the intention of the Pilot -in-Command was to inform the passengers of the gravity of the situation, and having realized that the hijackers were not in fact armed, to ask the passengers to overpower them. However, because the announcement was made only in English, and due to the ambiguous nature of the word 'react', neither the passengers nor the cabin crew members responded to this announcement on the seriousness of the situation. What ever the case, most of the passengers failed to understand the plea made by the Pilot-in-command.

However, it must be stated that had some initiative been taken by some of the passengers or cabin crew members upon understanding the plea of the pilot-in-command this accident might have been prevented.

2.3 Cabin Crew

The Ethiopian CAA technical directive chapter 6.1 section 6.1.7.7 requires that training for emergency duties be completed at least annually by each cabin attendant who is assigned an emergency function, so that they can fulfill the assigned duties effectively. However, the recurrent training for emergency duties was not conducted in accordance with this directive.

Pre-take-off briefings were given to the passengers by audiovisual demonstration and by means of safety briefing cards located in the seat backs pockets.

Due to very tight circumstances, and the confusion that is generally associated with the emergencies, additional pre-emergency briefing of passengers was not carried out. According to the CVR script at about 10 minutes before the crash the lead flight attendant had the chance of using the PA system to give instruction to calm panicky passengers, saying "*--- ladies and gentlemen please sit down and fasten your seat belts. don't panic, please fasten your seat belts ---*". The nature of the crash did not allow the flight attendants to perform their duties in accordance with their responsibilities.

The flight attendants were not able to give adequate information concerning the emergency due to their being prevented from using the public address

system by the hijackers. Given these particularly unusual circumstances, and the disintegration of the aircraft, it was very difficult to evaluate with certainty the performance of the cabin crew members, and whether the preparations for ditching had been fully and correctly carried out.

2.4 Flight Data Recorder

The Digital Flight Data Recorder tape binary information was replayed onto a computer hard disk. The replay was satisfactory and all the information appeared to be present. A full replay into engineering units was hampered because of severe problems with the Flight Data Acquisition Unit (FDAU) fitted to the aircraft, and in determining the appropriate configuration information for the system. In common with most data recording systems this aircraft recorded 64 twelve bit binary words every second. Each of these words present a particular parameter, with some words containing 2 or more discrete (switch position) parameters. In order to convert the binary information into engineering units, details of the position in which each parameter is recorded in the 64 word data frame is required together with the equations needed for making the conversions.

There were some problems with obtaining the configuration details initially, and Boeing was asked to provide what they thought was the appropriate data. However this did not appear to fit and only a few parameters could be recognized and some appeared to be in the incorrect word positions. Later information was provided by Teledyne (the acquisition unit manufacturers) which also did not appear to be appropriate. Information was also received from the operator Ethiopian Airlines, via the investigator in charge. This was

also not correct. The data from all three sources was broadly similar but obviously incorrect.

The information from Ethiopian Airlines also contained information for their Boeing 757s and it was noticed that the 757 data frame seemed to fit much better.

The part number of the Teledyne unit fitted was 755110-22-004 or-003, and after some discussion with Boeing they discovered that the unit fitted was not a correct part number for this aircraft. This part number acquisition unit could be fitted to either a 767 or 757 and the programming within it looks at the engine identifier code fed into the unit in order to set the correct frame layout depending on the type of engines fitted. If the unit does not recognize an engine identifier it reverts to programming for a 757. The engines fitted to the Ethiopian Airlines 767s were invalid as far as this part number acquisition unit was concerned, and it reverted to a 757 frame layout. This is not as simple as it sounds as the unit identifies parameters by the part it is fed in on and the data bus label. If the label for the 767 parameters does not appear on the 757 programming then this parameter will not be recorded. It was not possible to derive all the parameters that were supposed to be recorded, but a good deal of the primary parameters and some discrete were able to be decoded. Of the parameters believed to have been recorded, some were obviously not functioning or were not recorded as thought.

In regard to our question on the DFDAU, Ethiopian B767 airplanes were delivered with P/N S283TOO10-6 DFDAU. Ethiopian Airlines subsequently installed a P/N S28370010-21 DFDAU per Boeing Service Bulletin 767-

31-0069 to comply with FAR 121.343 amendment 197. Boeing erred in releasing this bulletin to Ethiopian Airlines for their B767 airplane, since the -21 DFDAU unit is intended to be installed on GE powered B767 airplanes. The -21 unit on the Ethiopian B767 airplanes will map the data per the B757 data frame.

As per the request of the investigation committee, Boeing started to work with the DFDAU supplier to develop corrective action for Ethiopian B767 airplanes on an urgent priority.

3. CONCLUSIONS

3.1 Findings

1. The aircraft had a valid Certificate of Airworthiness in public transport category and had been maintained in accordance with approved procedures.
2. The flight crew were properly licensed and qualified for the flight.
3. Loading and center of gravity were in accordance with the company procedures and within the prescribed limits.
4. Adequate numbers of survival equipment were installed.
5. Cabin crew had checked that all passengers had their life vests on and stowed all loose items in their appropriate place.
6. Cabin crew yearly recurrent training was not conducted in accordance with CAA directives.

7. The rescue operation was initially effective, but the time taken to winch all victims to safety was longer due to fear of suspected explosives.
8. CVR and DFDR did not guarantee a complete recording due to engine power loss before impact.
9. No indication of vertical speed information for proper ditching is available in the operation's manual.
10. there is no procedure in the operation's manual for two engines-out ditching.
11. Two engines-out ditching was outside the scope of training of the flight crew.
12. Training on Anti-Hijacking and other unusual situations was not conducted in a formal or structured presentation.

3.2 Cause

The Investigation Committee determines that the cause of this accident was unlawful interference by the hijackers which resulted in loss of engines thrust due to fuel exhaustion.

4. SAFETY RECOMMENDATIONS

1. All Ethiopian B767s should be checked to ensure that they are fitted with the correct data acquisition unit, and Boeing should check all Pratt & Whitney engined B767's which had been subject to same modification.
2. Both the CVR and DFDR should have a back-up system of power supply in the event of loss of the aircraft's electrical power supply, with some criteria on the run on time.

3. Flight crew and Cabin crew members should be properly trained for emergency duties in accordance with CAA Technical Directive chapter 6.1, section 6.1.7 and 6.1.10.
4. The fire axe should be stowed in such manner as to make it inaccessible to non-flight crew members.

**TAPE TRANSCRIPT FOR ETH 961 HIJACKED EN ROUTE TO HKJK FROM
HAAB ON 23rd NOVEMBER, 1997.**

At 0830, Addis Ababa Area Control Centre called Nairobi Area Control Centre to advise that ETH 961 a B767 from Addis Ababa to Jomo Kenyatta Airport was diverting to Mombassa and they suspected the aircraft was under unlawful interference, and that persons on board was 175.

The ETH 961 blip first appeared on radar at 085130 UTC squawking A2000 maintaining flight level 390 at position 35 nm on a bearing of 060° from position Rudol and was heading 170°m (about 342 nm on a bearing of 010° from JKIA). The flight maintained this heading and checked Nairobi FIR at 0855. The following is a tape transcript of the recording.

UTC	FROM	TO	RADAR POSITION	INTELLIGENCE
085730	ETH 961	NACC		Nairobi Ethiopian 961
085748	NACC	ETH 961		Ethiopian 961 Nairobi Centre go ahead.
	ETH 961	NACC		Nairobi, Ethiopian 961 we have a message for Australia please.
085750	NACC	ETH 961		Go ahead
085755	NACC	ETH 961		Ethiopian 961 go ahead
085817	NACC	ETH 961		Ethiopian 961 go ahead with your message
090245	ETH 961	ALL STATIONS		All stations, all stations, I have a telephone relay to Australia. This is Ethiopian 961, Australia telephone number is 032647346, Australia telephone number 022647346 and Ethiopian 961 proceeding to Australia presently on course to Mike Oscar Victor. Thank you.
0325	NACC	ETH 961		Ethiopian 961 confirm Australia telephone number 032647346?

UTC	FROM	TO	RADAR POSITION	INTELLIGENCE
090335	ETH 961	NACC		Negative 022647346, 022647346 this is Australia telephone number and we are flight level 390, fuel onboard is two hours right now, fuel on board two hours heading to Mike Oscar Victor.
090500	NACC	ETH 961		Confirm souls on board, confirm souls on board.
	ETH 961	NACC	 We are maintaining flight level 390.
	NACC	ETH 961		Roger copied flight level 390 and proceeding to Mike Oscar Victor, Australian telephone number 022647346 confirm
	ETH 961	NACC		Correct
090710	NACC	ETH 961		ETH 961 Nairobi Control
090956	NACC	ETH 961		ETH 961 Nairobi Centre confirm you are going to land Australia?
091000	ETH 961	NACC		Gentleman we can't make Australia we have only two hours of fuel we can't make it to Australia we will make a water landing.
	NACC	ETH 961		ETH 961 confirm you can't divert to Mombassa confirm you can't divert to Mombassa?
091023	ETH 961	NACC		They refused to land anywhere other than Australia so we have no choice except when we finished our fuel we will land on water.
	NACC	ETH 961		But with 2 hours fuel you can't make Australia, why don't you land Mombassa.
091045	ETH 961	NACC		Okay just a minute
091100	ETH 961	ALL STATIONS		All stations do you read
	NACC	ETH 961		Go ahead

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UTC	FROM	TO	RADAR POSITION	INTELLIGENCE
091111	ETH 961	NACC	204nm Bearing 027° from NV or 100nm bearing 274° from Wajir FL 390	Okay I just wanted our hijackers to hear what you are communicating and if you have anything to say go ahead and tell them.
091220	NACC	ETH 961		Okay I am advising you that with two (2) hours fuel you will be unable to reach your destination and probably you will have to land on the water. The best solution is for you to land in Mombassa. Go ahead.
091150	NACC	ETH 961		The hijackers of ETH 961 if you have copied go ahead
	ETH 961	NACC	 Waiting to talk standby
091206	ETH 961	NACC		Okay they say they don't want to talk they are not willing to negotiate on any terms.
091210	NACC	ETH 961		Roger Roger Ethiopian 961 check Australia is more than six (6) hours flight and you have only two hours fuel. You will most probably ditch in the ocean. Why don't you land Mombassa and pick some more fuel.
091230	ETH 961	NACC		They say negative, this is the captain speaking ah
091318	NACC	ETH 961		Ethiopian 961 Nairobi Centre
091325	ETH 961	NACC		Go ahead
091328	NACC	ETH 961		Ethiopian 961 we suggest you land Mombassa then pick up fuel to allow you to reach Australia. Please land in Mombassa, land in Mombassa.
091336	ETH 961	NACC		Negative they say negative, they say negative, impossible.
091340	NACC	ETH 961		Roger, Roger do you have another alternate apart from Australia.
091345	ETH 961	NACC		There is no alternate other than Australia. No alternate.
	NACC	ETH 961		Advise us when you expect to reach Australia. ETA Australia.

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UTC	FROM	TO	RADAR POSITION	INTELLIGENCE
091400	ETH 961	NACC		We have two (2) hours of fuel. Two (2) hours of fuel
091830	NACC	ETH 961		Ethiopian 961 Nairobi do you read
	ETH 961	NACC		Go ahead
091900	NACC	ETH 961		Ethiopian 961 is it possible for you to land Mombasa, pick some fuel and proceed to Australia?
091950	ETH 961	NACC	161 nm Bearing 040° from NV or 103 nm Bearing 242° from Wajir FL. 390	They said they don't agree
092530	NACC	ETH 961	138 nm Bearing 054° from NV or 103 nm Bearing 242° from Wajir FL. 390	Ethiopian 961 Nairobi
	ETH 961	NACC		Go ahead Nairobi
	NACC	ETH 961		Ethiopian 961, check with your remaining fuel, you will be unable to reach Australia and most probably you will to ditch in the ocean
	ETH 961	NACC		Yeah, that is what they are saying
	NACC	ETH 961		Confirm they are ready to lad in the ocean and drown?
092630	NACC	ETH 961		Ethiopian 961 do you have another alternate aerodrome where you can proceed other than Australia, any other alternate aerodrome. Please advise.

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UTC	FROM	TO	RADAR POSITION	INTELLIGENCE
092700	ETH 961	NACC	129 nm Bearing 061° from NV or 57 nm Bearing 288° from Garissa, FL. 390	I have no alternate aerodrome, Sir I am in a very tight corner
093500			58 nm Bearing 225° from Garissa or 85 nm Bearing 125° from NV FL. 390	
093900			133 nm Bearing 101° from NV or 79 nm Bearing 207 from Garissa FL. 390	ETH 961 squaks Emergency Code 7700
094000	NACC	ETH 961		Ethiopian 961 Nairobi Control Ethiopian 961 Ethiopian 961 Nairobi Control do you read?
094025	NACC	ETH 961		Ethiopian 961 Ethiopian 961 Nairobi Control on 120.5 do you read?
094110	NACC	ETH 961		Ethiopian 961 Nairobi Control on 120.5 and 121.3 do you read?
094235	NACC	ETH 961		Ethiopian 961 do you read?
094700				Ethiopian 961 Nairobi Control
094930			61 nm Bearing 354° from Mombasa FL 390	(ETH 961 disappears on radar at position 354° m and 61 nm from Mombasa VOR)
100705			75 nm Bearing 169° from Mombasa FL 390	(ETH 961 reappears on radar at position 169° m and 75 nm from MOV)
			130 nm Bearing 165° from MOV	
102420			199 nm from MOV Bearing 163° from MOV FL 390	ETH 961 disappears from radar coverage at position 163° m 199 nm from MOV on heading 163°

All through the Kenyan airspace, Ethiopian 961 maintained flight level 390 and a South Easterly heading of between 160° and 175°. The flight was given all the necessary assistance by the duty Air Traffic Control Officer because it was evident that the flight could not reach Australia.

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TIME (Minutes)	SPEECH FROM	CVR TRANSCRIPT (SELECTED)	TRANSLATION
00:00	Hijacker	አያስፈልገም ብዮለሁ	I said there is no need to?
00:06	Captain	ለመንገደኞቹ ልንገራቸው	May I broadcast to the passengers?
	Hijacker	አያስፈልገም	No.
00:16	Captain	ምን መለህ የምላቸው (ጠላፊ ይኸውልህ) አሁን ከኔ ኃላፊነት ውጭ በመሆኑ አይርጥላኑ ክራሽ ሊያደርግ ነው።	What I would tell them is (hijacker, look here) "at this very moment since it has been beyond my responsibility, the aircraft is bound to crash".
	-----	----- የማይነበብ	— Unintelligible
	Hijacker	መጥት ትፈልጋለህ?	Do you want to die?
00:21	Captain	አልቀረም እኮ መጥታችን አሁን	We are going to die any way
	Hijacker	በላዚህ እኛ እንግደለህ? ጀምር አሁን! ተስማምተናል አይደለ? ወሬ አያስፈልገም ከዚያ በኋላ ምን ብዘናል? እኛ ቃላችንን አናጥፍም አይደለ? አላጠፍንም! ይሂደ ከማደርስበት ሲደርስ የማይነበብ! አይደለ?	Therefore, do you want us to kill you. Commence now we are in agreement aren't we? No more talk. What have we said upon departure we don't break promises never have we let it go as far as it can reach then — unintelligible — isn't it?
	-----	----- የማይነበብ	— Unintelligible
	Hijacker	አዎ	Yes
	Hijackers	የማይሰማ ንግግር	Unintelligible Conversation
04:02	Hijacker	ምን ያደርግልሃል? ፋሉ ከኔ ጋር ነው።	Don't worry. The axle is with me
04:24	Captain	እባካችሁ at least controlled የሆነ landing ይደረግ እባካችሁ	Please, atleast, let us make a controlled landing
	Hijackers	የማይሰማ ንግግር	Unintelligible Conversation
	Hijacker	- እኔን እዚህ ትታችሁ?	— Leaving me behind here?
	Hijacker	- ኸ?	— What?
	Hijacker	- እኔን እዚህ ትታችሁ?	— Leaving me behind, here?
	Hijacker	- ኸ?	What?
	Hijacker	- እኔን እዚህ ትታችሁ?	Leaving me behind, here?
	Hijacker	- ለምን? አልወርድም! አብሬ ነው የምጥተው! ወንድንቴን አሳየዋለሁ! ተነጥፎ አልወርድም FINISHED አብረን ነው የምንጥተው	Why? I don't disembark. I will die along with him. I will show him my courage. I don't disembark alone finished. We die along side each other
	Hijackers	የማይሰማ ንግግር	Unintelligible Conversation
05:34	-----	አሁን ወደ መሬት	Now to the land
06:50	Captain	- እኔ ወደ መንገደኞቹ ጋ ልሂድና እዚያ ልመታ ከነሱ ጋር	So let me go to the passengers and face death along with them
	Hijacker	እዚህ አትሞትም??	Why not die here?
	Captain	አይኔ እያየ ከምጥት	Rather than dying with my eyes open
07:01	Hijacker	ካሁን በኋላ እንዲህ ዓይነት ንግግር! አቋም ብፁሃለሁ FINISHED በትሞትም መናገር የለም ዝም ብለህ መት በቃ! ጤና የለውም እንዴ? የጨረሰከው እዚያ መሬት እያለን ነው። በቃ!	From now on I said, stop such talk, finished, no talking even while You die. You die silently finished. Is he crazy? It was decided down there on the ground. Finished?

TIME (Minutes)	SPEECH FROM	CVR TRANSCRIPT (SELECTED)	TRANSLATION
	-----	የማይነበብ	— Unintelligible
	Hijacker	ገብ ነው	This is a bribe
	Captain	ከ ምንድነው ይኼ	What is this?
	Hijacker	በል ደምር አፒታይት ይከፍታል	Come on start. It will be an appetizer
08:38	Hijacker	ፍርሃት እንዳይሰማህ እየጠጣህ መት ታዲያ ከዚህ በጣይ ምን ላድርግልህ እሺ? ፍርሃት እንዳይሰማህ ብዬ ነው::	To avoid panic. Die drinking. What else can I don for you. I mean you should not feel paracy.
	Captain	ከ	What?
	Hijacker	እና?	And?
10:46	Captain	አሁን ጊዜ የለንም ተወን አባክህ	We don't have time leave me alone please
10:52	Hijacker	ገና ትጠጣህ	You will drink more
	Hijacker	ዳራሳም ----- የማይነበብ	Daressaalam — Unintelligible
	Hijacker	እና?	And?
11:52	Hijacker	ተስፋ ቀርጫለሁ ይህ ነገር አይሠራም - እና እንገረዋለን የማይሰማ	I have given up hope. This does not work and we will tell him Unintelligible
	Captain	የማይነበብ	— Unintelligible
	Hijacker	ይሻልህል? ከ	Does it suit you? eh.
12:03	Captain	ይሻለኛል አዎ: ዝም ብዬ ከምቀመጥ ከ ይሻለኛል::	It suits me. I prefer it to sitting here arms crossed
	Captain	ከ	What?
12:09	Captain	ከኔ ጋር ምን እንትን አላችሁ	What do you have with me
	Hijacker	ከ	What?
	Captain	ከኔ ጋር ምን ቂም አላችሁ	What grudge do you hold against me?
	Hijacker	አብረን: አብረን	Together, together
12:20	Hijacker	ጥላችሁኝ ልትወርዱ ነው ወይ? ብላሃል: እኛ ጥለን እንወርድም: ታል ዝንልህ አብረንህ ነው የምንሞተው ብለን: አንተን አደጋ ላይ ጥለን: እኛ ሕይወታችንን ለማትረፍ አንችልም ብለን - አይደል	You asked whether we will disembark leaving you behind. We don't do that. We gave you our word we will die with you. We don't intend to spare our lives exposing you to danger, isn't it?
12:37	Captain	አሁን እዚህ እያየሁ ከምሞት እዚያ መንገደኞቼ መካከል ቁጭ ብዬ - እዚያ ይሻለኛል::	Now, rather than dying with my eyes open. I prefer to be among the passengers and die there.
	Hijacker	ብትሞትም?	Even if you are going to die?
	Captain	ይሻለኛል መቼም	I prefer that any way
12:54	Hijacker	በጣም ጠማማ ነህ - - - እኔ ብቻ ሳልሆን ብዙ ሰዎችም አይሰማሙም::	You are very stubborn. Leave alone me, no one else will consent to this.
	Hijacker	እኔ የሚታየኝ እንደምንደርስ ነው	I envisage that we would reach.....
13:22	Captain	የት? አባክህ አትቀልድ	Where? Stop jocking.
	Hijacker	ፋስ ልወርውራ	Let me throw the axe then.
	Captain	ከ	What?
13:50	Hijacker	ደምር	Start

TIME (Minutes)	SPEECH FROM	CVR TRANSCRIPT	TRANSLATION
	Captain	ወርውር	Throw
	Hijacker	ጀምር	Start
	Captain	ወርውር	Throw
	Hijacker	ኸ	What?
	Captain	ወርውር	Throw
	Hijacker	ለምን? በምንድነው የሚበረው? አንተ ከሞትክ ሁላችን ልናልት? እንዴ አትቀልድ	Why? how cant it fly? When you die, all of us to be devastated? Don't jock.
14:12	Warning System	ፒፕ ፒፕ ፒፕ ፒፕ	Peep ... Peep ... Peep ... Peep
14:23	Hijacker	አንድ ሺ ይጉድሳል	It is less by one thousand
	Captain	ኸ	What?
	Hijacker	አንድ ሺ ይጉድሳል	Less by one thousand
14:29	Captain	ምን?	What is less?
	Hijacker	አልተቲቶድ	The altitude
	Captain	እሱ መውረዱ የማይቀር ነው እኔ አይደለሁም የማወርደው	It will descend by it self. (I am not making it descend)
	Hijacker	ነገርኩህ	I told you
14:40	Captain	እኔ አይደለሁም የማወርደው	I am not the one who is descending it
	Hijacker	በታ ነገርኩህ አልኩህ FINISHED	I said I am telling you, finished.
14:46	Captain	ኢንጅነር ሲጠፋ ይወርዳል ወደደም ጠላም ይወርዳል	As the engine stops it descends. Whether you like it or not it is descending
	Hijacker	በታ እስኪሰማን ድረስ	Well we will see that.
14:57	Captain	LADIES AND GENTLEMEN THIS IS YOUR PILOT, WE HAVE RUN OUT OF FUEL AND WE ARE LOSING ONE ENGINE THIS TIME AND WE ARE EXPECTING CRASH LANDING AND THAT IS ALL I HAVE TO SAY. WE HAVE LOST ALREADY ONE ENGINE, AND I ASK ALL PASSENGERS TO REACT TO THE HIJACKERS. THANK YOU.	
15:42	Hijacker	ተሰምቷል እዚያ ሁን! እዚያ ሁን! እዚያ ሁን	It has been heard. Remain there. Be there. Be there
16:04	Hijacker	እሱ እየቀለደ ነው	He is jocking
	Captain	ማ?	Who?
	Hijacker	እየወረደ ነው	It is descending
	Warning System	ፒፕ ፒፕ ፒፕ ፒፕ	Peep ... Peep ... Peep ... Peep ...
16:10	Captain	መሞታችን አልቀረም በታ THIS IS ያለኝ ምርጫ ይኼ ነው	We stare are going to die. This is the only choice I have
	-----	----- የማይሰማ	--- Unintelligible

TIME	SPEECH FROM (Munties)	CVR TRANSCRIPT (SELECTED)	TRANSLATION
	Captain	ፕ?	What?
	Hijacker	ዝጋው	Close it
	Captain	ኣ - - -	What?
16:28	Captain	ወገድ ቶውቃህ መጥቶኝ ኣኣ ነው AT ANY COST ሞተና ኣኒም ኣገተም ሁለታም	You will see what a man I am? We are dying? At any cost we are dead my self, you, and all of us are dead
16:34	Hijacker	ኣስኪፉህ	I will break it
16:40	Captain	ጠፈው GO AHEAD ጠፈው ኣይከህ ኣኔ ኣይህሁም ኣገደኪያ ሞገደርገው	Break it, go ahead and break it. Don't worry I am not the one who is doing that
16:57	Hijacker	ኣገተ ሞገም ገኣናቱ ኣታደርግ - ስማ ገኣናቱ ኣታደርግ	Don't move, listen, don't move.
	Captain	ስማ ሞገኩ ሰው ሃኛ - ስቃኝ ኣኔ ኣኣ ኣሁን	Listen, I am a dead man, I have had enough now.
	Hijacker	ገኣናቱ ኣታደርግ	Don't move.
17:03	Captain	ሞገኩ ሰው ሃኛ	I am a dead man
	Hijacker	ስማ	Listen
	Captain	ኣኔ ኣይህሁም ሞገተንተው ኣይርገላን ራሱ ነው	I am not applying any motion. The aircraft is doing it by it self
	Hijacker	ሂደ GO	Hey, Go
	Captain	ኣፈ ኣስከህ ኣሁን ሞገይህን ኣገተን ወስጥ ኣገገህ ነው	Oh please, you are doing the impossible?
	Hijacker	ኣኛ ሞገ ኣኛደርግ ኣሁን - ሞገደርገው ወጊያ ነው	So what shall we do? What we do is fight
	Captain	ኣኔ ኣይህሁም ኣገደህ ሞገደርገው	I am not the one who is doing that
17:42	Hijacker	ወጊድ ወጊድ ኣኔ ኣቃህ ኣይህሁ - ወጊድ ወጊድ 34 ደርሳል FINISHED	Descend, descend, I know, I will show you, descend, descend. It has reached 34 finished
	Captain	ወህ ኣደ ነው ሞገውርደው	We will descend to the water
	Captain	ነገርኩ	I told you
	Hijacker	GO ኣጠያው ሁን - ሂደ መጥቶ ትፈልጋህ? ወጊድ ኣኔ	Go, remain there, do you want to die, it is descending
	Hijacker	ወጊድ	It is descending
	Captain	ማነው ኣሉ?	Who is it?
	Hijacker	ሞገኩኒቶው ኣገተ ነህ	You are killing them all
	Captain	ስቃ ኣልተናል - ሞገም ኣገተን የለውም ኣሉ ስቃ ኣለተ ኣኣ ሲኣር ኣደ	We are dead. There is nothing to it. It is all over, we will drop in the ocean
18:27	Hijacker	31	31
18:38	Captain	ይህ ጢር ሆንቃል ይህም ጢር ኣገመገነ ነው	This is zero. This is also coming to zero
	Hijacker	ኣኣ ይሞገ	So let it be
	Hijacker	ወጊድ ስማም ደፋር ነህ ደፋር	Descend you are too bold, bold
19:11	Captain	ደኽ መደፋር ኣይደለም	This is not a matter of boldness

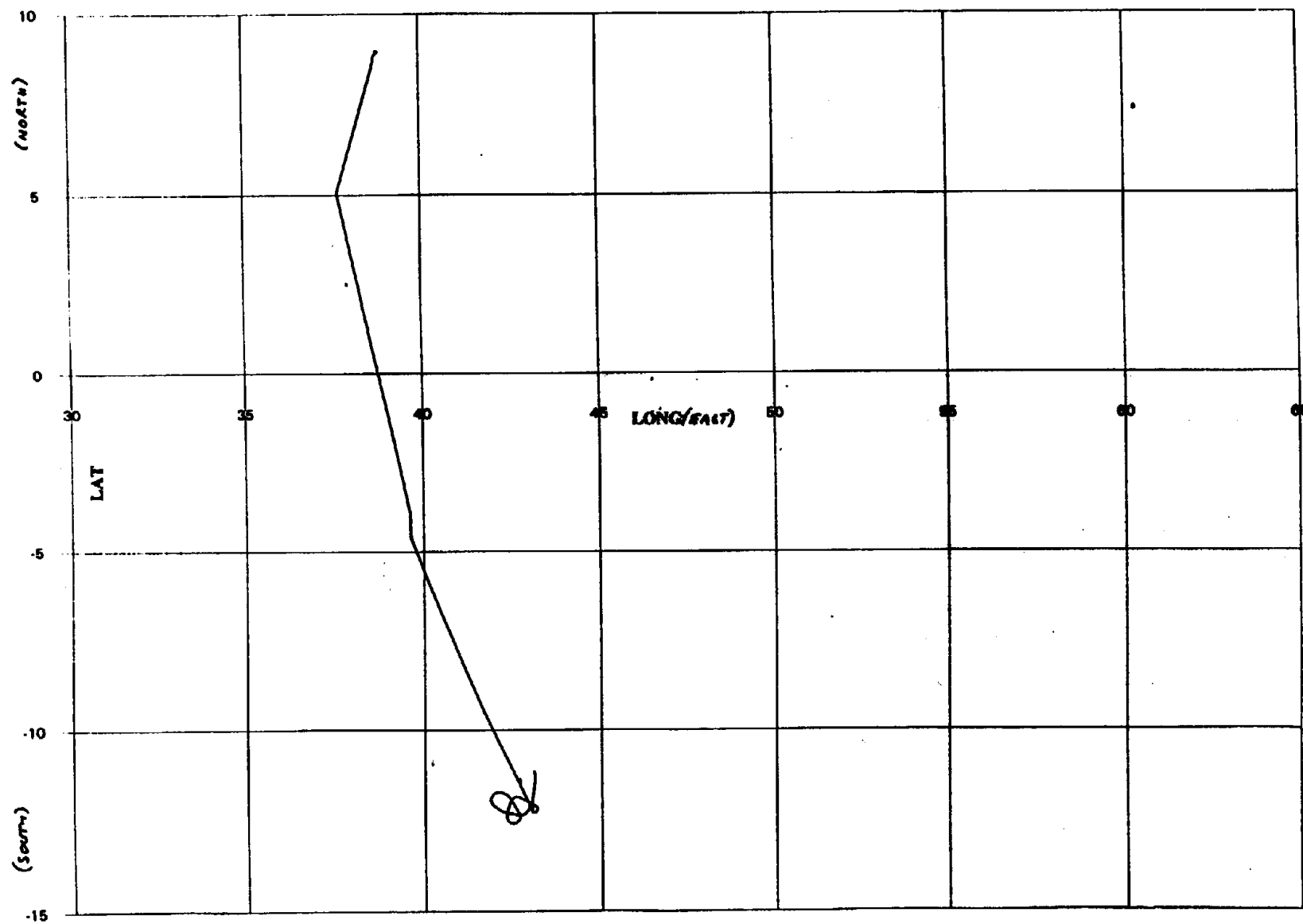
TIME (Minutes)	SPEECH FROM	CVR TRANSCRIPT (SELECTED)	TRANSLATION
19:17	Hijacker	ውረድ እኮ አሳይህሁ ቆይ እኔ እቃሁ እርምጃ የምወስድበትን እኮ ሊሟትድ አድርጊአለሁ::	Descend, I will show you. Wait I know I have decided where i will take action
20:01	Hostess	LADIES & GENTLEMEN PLEASE SIT DOWN AND FASTEN YOUR SEAT BELTS. DON'T PANIC PLEASE FASTEN YOUR SEAT BELTS	
	Hijackers	አይ ATTENTION - ATTENTION ወደዚያ ሂድ ትረባቸው ትረብ ዝጋው	Hey, attention, attention, go there, approach them approach, close it
	Hijacker	THIS ONE IS THE HIGHEST አረፍ አረፍ ከአንግሊህ በኋላ ያኛውን ሬዲዮ አንሳሁ ብትል	Stop it. Stop it. Hereafter, if you intend to pick up that radio.
20:29	Captain	ምንም ነገር አለንሳም	I pick up nothing
20:35		ፒብ - ፒብ - ፒብ - ፒብ - (ATUOPILOT DISENGAGE)	Peep ... Peep ... Peep ... Peep ... (Auto pilot disengage)
20:52	Hijacker	ውረድ አንበሳ ኸ 29 ሺ feet ንብቷል 29 feet	Descend. You are such a lion It has come up to 29 thousand, 29 feet.
20:58	Captain	እኔ ምንም የማድረግው ነገር የለም	I am not doing anything to it.
	Hijacker	ኸ	What?
21:09	Captain	መሬት ላይ atleast የሆነ ውሀ ውስጥ እንደሆነ ነገር ሆነን እንረፍ	Let us land on the water, at least in a manner we land on the ground
	Hijacker	ታርፋለህ ሂድ እዚያ ሂድ ልክ ሲመጣ ልቀው	You will land. Go. As soon as it returns release it.
22:09	Hijacker	እሺ እንግሊህ እዚያት አገር አርፋሁ ብህ	Ok then. Never think of landing at that country
22:15	Captain	በውሀ ላይ ነው የማርፈው አገር ላይ አይደለም-አልገባህም	You didn't understand. I land on water not on land
	Hijacker	OK ወደዚህ ውጣ (አለፍ) ልቀው	Ok. Come over here. Move release it.
22:21	Captain	እንደሱ አይደለም	Not that way
	Hijacker	ልቀው ልቀው	Release it. Release it.
	Captain	እኔ አልለትም	I won't
23:00	Hijacker	ልቀት ልቀት ብያለሁ	I said release it. Release
	Captain	አልገባህም እንደሱ አይደለም	You didn't understand, it is not proper
	Hijacker	ልቀት ልቀት ይኸ እኮ ግማሽ የሚያደርግበት ነው	Release. Release. This is half the motion
23:06	Captain	አሁን እኮ ከራሽ እያደረግን ነው	We are crashing now
	Hijacker	ከራሽ እናድርግ በቃ እዚሁ እናልቃለን	Let us crash finished. We all shall die here
	Captain	እኔ እናደርጋለን - ከራሽ	OK. We will crash
	Hijacker	ልቀው በቃ የግያስፈልገውን ነገር አታስብ	Release it finished. Never think of the impossible
	Hijacker	ውረድ ሆኖ ላይ ትወድቃለህ	Descend. You will drop down at 20.
	Captain	እኔ እኮ አይደለሁም ያማ.....	I am not the one doing ——
	Hijacker	FINISHED	Finished
24:28	Captain	እኔ እኮ አይደለሁም እንትን የማድረግው	I am not the one doing it.
24:34	Hijacker	ሆኖ ላይ ትወድቃለህ	You will drop at 20.
25:07	Captain	ይኸውልህ እኔ አይደለሁም የማወርደው ያለሁት	Look. I am not the one who is descending it.

TIME (Minutes)	SPEECH FROM	CVR TRANSCRIPT (SELECTED)	TRANSLATION
	Hijacker	ALLEZ ቀጥል	Go ahead
25:13	Captain	- - - - ስፒዳ እየወረደ ሲሄድ	— As the speed drops —
		- - - - አሉ	— He
25:19	Hijacker	ቀጥል ቀጥል ቀጥል ታየዋለህ FINISHED	Go ahead, go ahead. You will get it, finished.
	Captain	አሺ	OK.
25:25	Hijacker	ቀጥል እኔ እርምጃ የማልወስድበት ምክንያት FINISHED ትእዛዝ ስትሰጡ የተወሰነ ደረጃ እስኪደርስ ነው። እዚህም ወደቅህ እዚያ መሞትህ አይቀርም አይደለም? ስለዚህ ወጥተህ ሂድ	I am not taking action, until my patience reaches a certain limit, finished Whether you drop here or there you will die any way. Therefore, get out of here.
26:09	Captain	At least ቤተሰቦቼን ውህ ላይ	At least let me land my family on the water
	Hijacker	ወጥተህ ሂድ ለምን?	Why? Get out of here
	Captain	ኸ	What?
26:31	Hijacker	23 ደርሷል - እንግዲህ በጉልበትህ ሕዝቡን ልትወርስ ነው	It has come up to 23. So you are killing every one at your own desecration
26:53	Captain	ኖ ማለታችን የማይቀር እኮ ነው - አልተሳልም እኔ አሁን AS FAR AS I AM CONCERNED - አልተሳልም ቤንዚን አልቀደም አይርጥላኑ መውረድ ስለሌለበት ራሱ ይወርዳል። እኔ ምንም የማይደርገው ነገር የለም።	No we will die for sure. We are dead. Now that as far as I am concerned, we are all dead. My fuel is out. The aircraft will descend by itself. There is nothing I can do about it.
	Hijacker	ራሱ ይውረዳል አንተ አትንካ - ማንህ	Let it descend by itself don't touch it. Who is that.
27:10	Hijacker	እዚያ አታርፍም	In no way can you land there
27:16	Captain	አላርፍም	I won't land there
	Hijacker	I KNOW	—
27:24	Captain	አላርፍም ብዬሃለሁ አላርፍም እዚያ እኔ ውህው ላይ AT LEAST የሚሆን ነገር ልሥራ ብዬ ነው። ሞተሩ ጠፍቶ ከማለቱ በፊት	I told you, I won't land there, I won't, I mean to perform atleast, something meaningful on the water before the engine is completely out.
27:30	Hijacker	ያችን አገር ንገረኝ አሺ	All right tell me what that Country is?
	Captain	የቷን የቷን አገር	Which one, Which Country?
	Hijacker	ያችውልህ	There it is
27:41	Captain	የሆነ መሬት አለ እዚያ ጋ	I see land over there
	Hijacker	እኮ ምንድን ነው?	So, what is it called
	Captain	አላውቀውም መት አላውቀውም	I don't know it. Really I don't
	Hijacker	ስማ	Listen
27:52	Captain	ይኸውልህ ካርታው ላይ የለም ከየት እምጥቼ ላላይህ አላውቀውም	Look. It is not on the chart. How can I show you? I don't know it
	Hijacker	አታውቀውም?	You don't know it?
	Hijacker	— UNINTELLIGIBLE	
	Captain	ኖ ማወቅ አለበት እሱም	No, He has to know it too
	Hijacker	ሂድ	Go.
28:09	Captain	ውህ ላይ ለማረፍ ነው ሃሳቤ አንተም እወቅ	My intention is to land on water. Be aware of it too

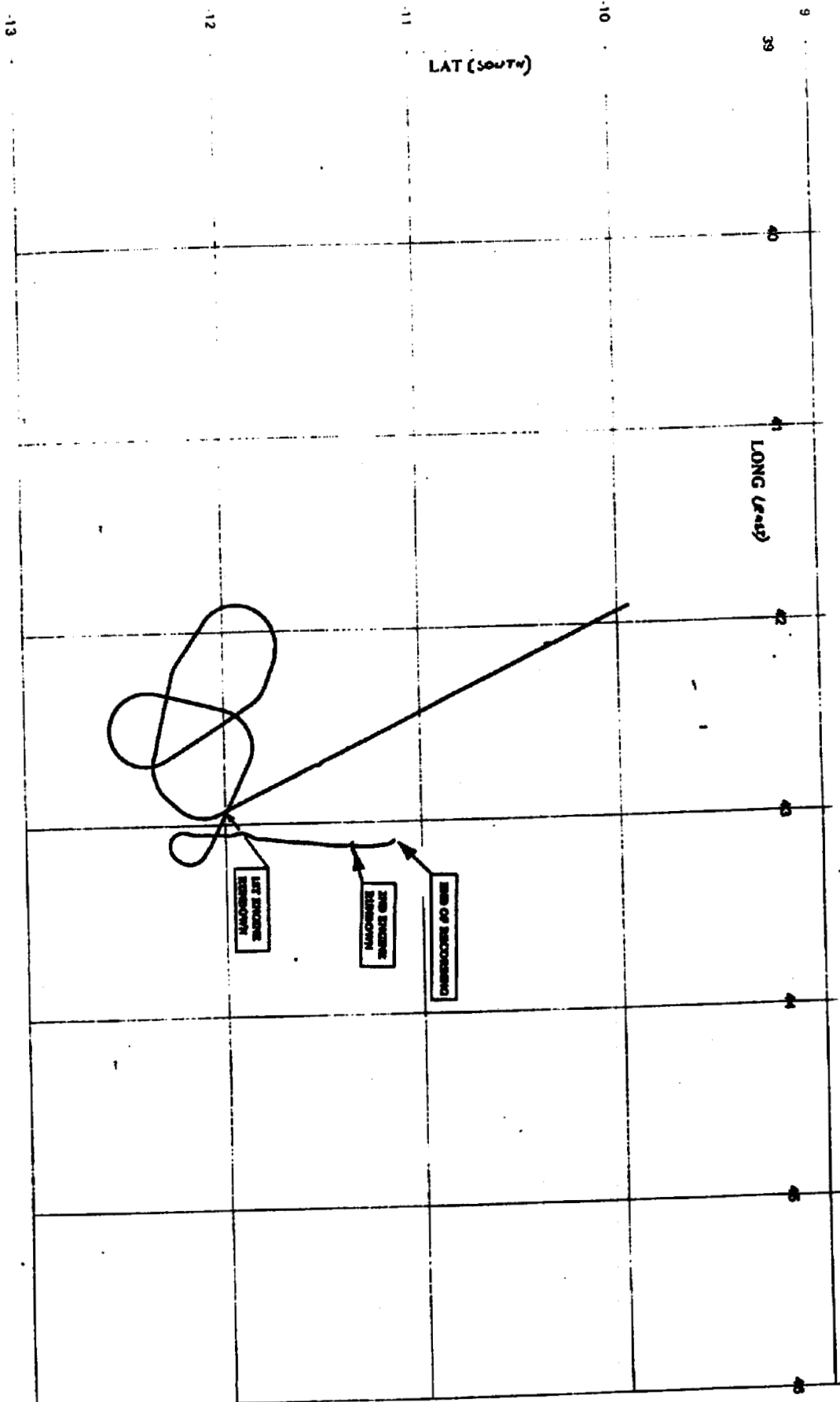
TIME (Minutes)	SPEECH FROM	CVR TRANSCRIPT (SELECTED)	TRANSLATION
	Hijacker	OK	OK
	Captain	ኸ	What?
28:26	Hijacker	ሃያ አንድ ሺ	Twenty one thousand
28:32	Captain	መሬት ላይ እንረፍ?	What may we land on dry ground?
	Hijacker	አይሆንም	No way
	Captain	ተመካከሩ	Discuss between your selves
	Hijacker	አይሆንም	I said, impossible
		— UNINTELLIGIBLE ዝም በል	— Unintelligible — Shut up
	Captain	እላውቀውም	I don't know it
	Hijacker	በቃ	Is that all?
28:43	Captain	የሆነ INDIAN OCEAN ውስጥ ያለ አገር ነው::	It is some country in the Indian Ocean
28:54	Captain	ነገርኩህ እኮ AS FAR AS I AM CONCERNED ሞቻለሁ ካሁን ወዲያ ምንም የምታደርግኝ ነገር የለም በቃ ቤንዚን አልቋል ቢሮ ቢሮ ነው የሚያንበረው::	I told you as far as I am concerned I am dead, there is nothing you can do to me hereafter. My fuel is exhausted. It is reading zero, zero
	Hijacker	ይሉታ ታዲያ ምን ይሁን	So what? Let it be exhausted.
29:11	Captain	በቃ ተቆይ በል ካሁን ወዲያ ምንም የምታደርግኝ ነገር የለም	That is all, sitdown. You can do nothing to me from now on
	Hijacker	አ	What?
	Captain	ካሁን በጋላ ምንም የምታደርግኝ ነገር የለም	Hereafter, you can do nothing to me
	Hijacker	እኔ	Me?
29:17	Captain	ሞቻለሁ አዎ	Yes, I am dead
	Hijacker	እኔ	Me?
	Captain	አዎ	Yes
	Warning System	ፒብ . . . ፒብ . . . ፒብ . . . ፒብ . . .	Peep — Peep — Peep — Peep
	Captain	ያውልህ ሁለተኛው ሞተር ጠፋ	There you are the second engine is also out
29:23	Hijacker	ምን ያህል እንደሚደርግህ ታያለህ	You will see what I can do to you
		ፒብ . . . ፒብ . . . ፒብ . . . ፒብ . . . የሞተር መጥፋት ማስጠንቀቂያ	Peep — Peep — Peep — Peep — engine out warning
29:45	Captain	THAT IS IT ሁለቱም ጠፋል አረፍከው THAT IS IT ይህንን ነው የምትፈልገው አይደለም	That is it. Both engines stopped. That is it. You wanted that, didn't you?
	Hijacker	አዎ	Yes
	Hijackers	የማይለማ ንግግር	Unintelligible Conversation
31:19	Captain	ሁለቱም ሊገደጉ አበቃ ምንም የምትይዘኝ ነገር የለም በቃ	Both engines are out. There is nothing you hold me for
	Hijacker	ይጥፋ አልኩት	I said let it be out
	Captain	እኮ ምንም የምትይዘኝ ነገር የለም	Therefore, there is nothing you hold me for
31:25	Hijacker	በቃ ዝም ብለህ ሂድ እውነት የት በታ እንደምገድልህ እሳይሁለሁ	Stop it and move on. I will show you really where I intend to kill you

TIME (Minutes)	SPEECH FROM	CVR TRANSCRIPT (SELECTED)	TRANSLATION
	Captain	የትም ቦታ ገደለኝ	Kill me where ever you want
	Hijacker	FINISHED	Finished
31:42	Captain	እኔ እኮ የሞትኩ ሰው ነኝ በቃ አሁን እዚህ ገደልኩህ እዚህ ገደልኩህ የምትለኝ ሰው አይደለሁም። ሞተር የለለው አይርጥላን የያዝኩ የሞትኩ ሰው ነኝ የማስጠንቀቂያ ፒፒ - - - ፒፒ - - - ፒፒ - - -	I am a dead man, that is all. I am not to be told where to be killed. I am a dead man handling an aircraft with out fuel Peep — Peep — Peep — Peep — (Warning)
32:10	Hijackers	የማይሰማ ገገግር	Unintelligible Conversation
	- - - -	- - - - -	- - - - -
32:49	Captain	AT LEAST እንዴት እንደሆነ ማወቅ አለባቸው መንገዶቻቸው ለኃላፊነቱ ስል	For the sake of my responsibility, atleast the passengers must know the condition
33:28	Hijacker	አውርደው አረ በጣም አፍጥነው	Descend it increase the speed further
33:39	Captain	እሱ ለውጥ የለውም PLEASE ያው እኮ ነው መሞታችን አልቀረም ለምን እት..... አያስፈልግም ብዬ ነው	It doesn't have any difference, please All the same. We are going to die. Why don't you — I thought there is no need to
33:56	Captain	ለመንገዶቻቸው	For the passengers

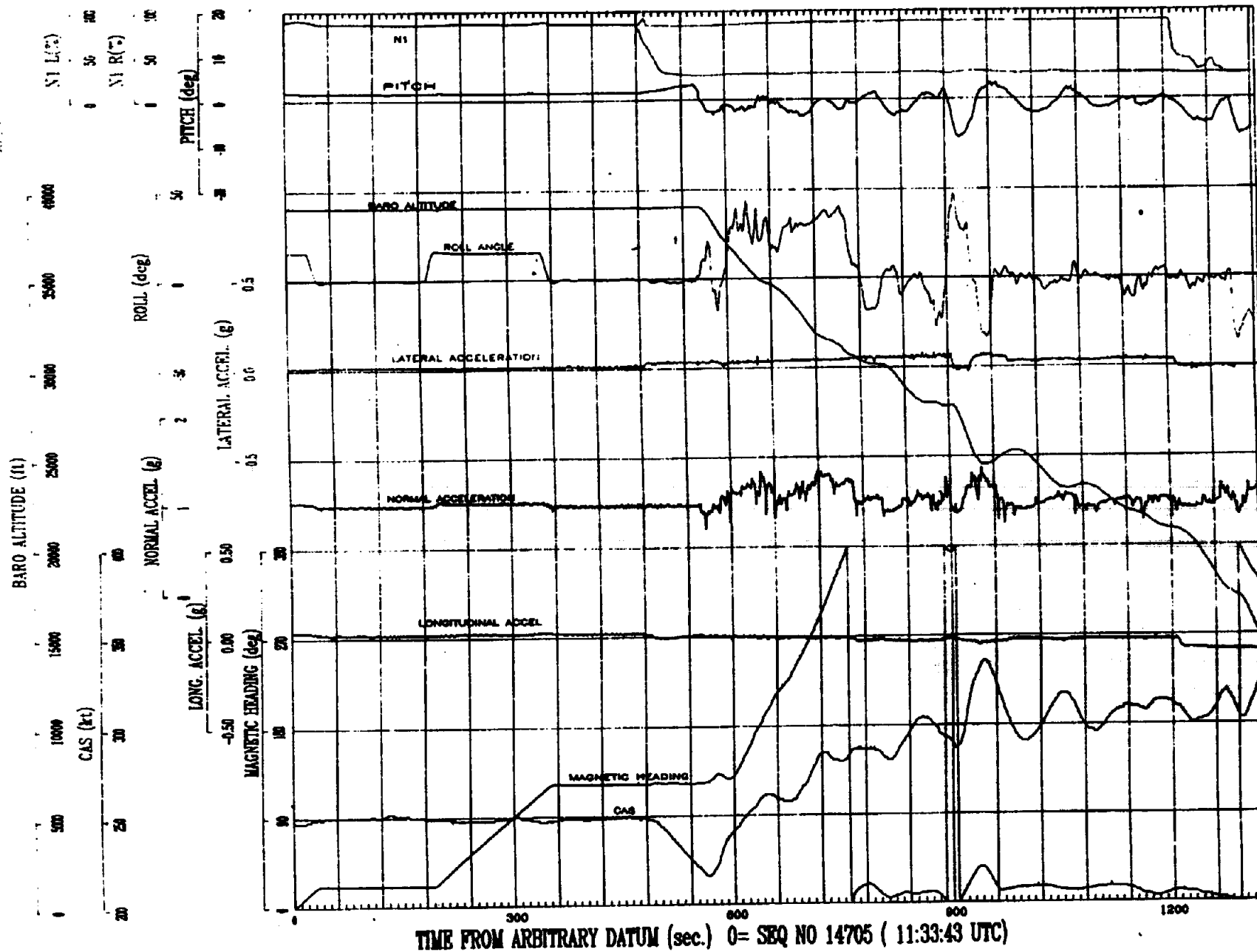
B767 ET-AIZ TRACK PLOT



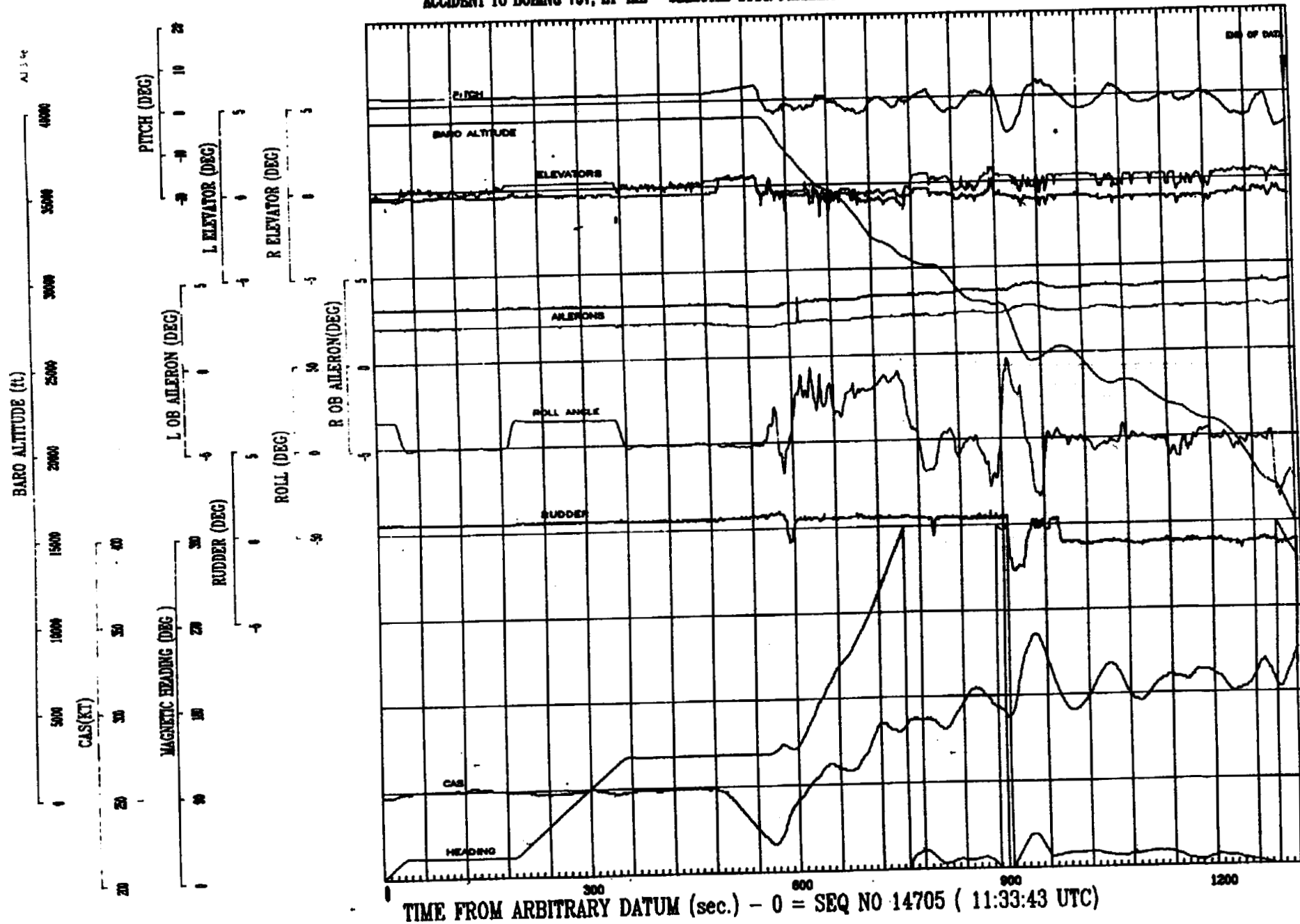
B767 ET-AIZ EXPANDED TRACK PLOT



ACCIDENT TO BOEING 767, ET-AIZ - SELECTED DFDR PARAMETERS

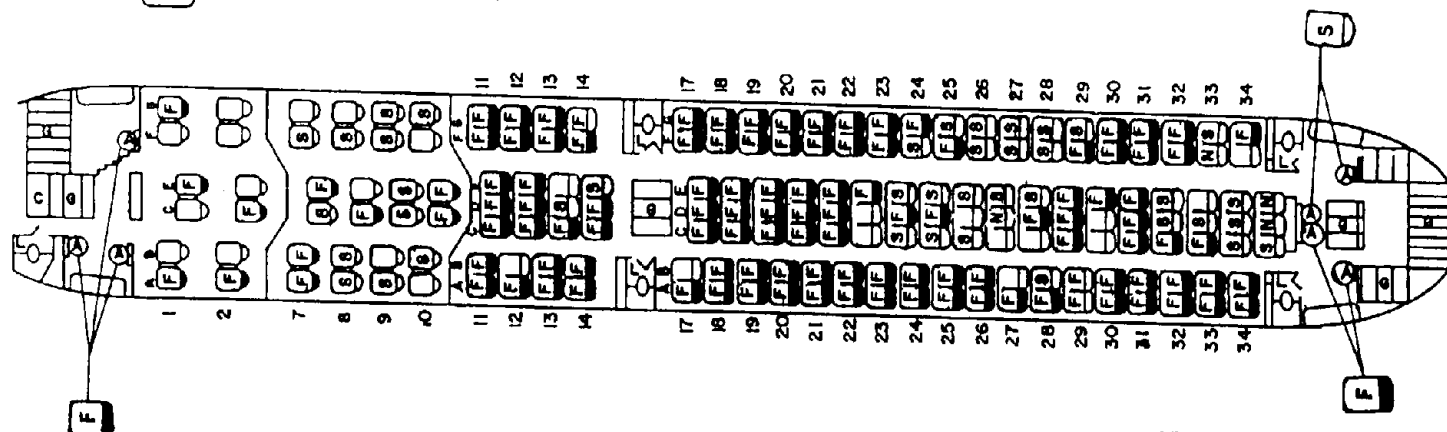


ACCIDENT TO BOEING 767, KT-AIZ - SELECTED DFDR PARAMETERS



KEY

- F FATAL INJURY
- S SURVIVORS WITH SERIOUS/MINOR INJURY
- N SURVIVORS WITH NO INJURY
- UNOCCUPIED SEAT



- A- ATTENDANTS SEAT
- G- GALLEY
- L- LAVATORY
- C- CLOSET

FIGURE -1

		DASH		DESCRIPTION		ETH STOCK No		MFR P/N		STOCK SIZE		MAT'L SPEC.											
QTY PER ASSY		No		P A R T S L I S T										FINISH		HEAT		ZONE					
UNLESS OTHERWISE SPECIFIED Dimensions are in _____ TOLERANCE ON FRA DEC DEG BREAK SHARP EDGES						NAME		DATE		TITLE SEAT ARRANGMENTS OF PASSENGERS FOR ET-AIZ (767-200 ER)										ETH DWG No: 5307-001			
				D W N		nikodimos F. [Signature]		31/01/97												DWG SIZE:			
				PROJ ENGR																REF. :			
				EXPERT						SCALE: ~													
				MGR ENGR						SHEET 1 OF 2													
										ETHIOPIAN AIRLINES P.O BOX 1755, ADDIS ABABA, ETHIOPIA													

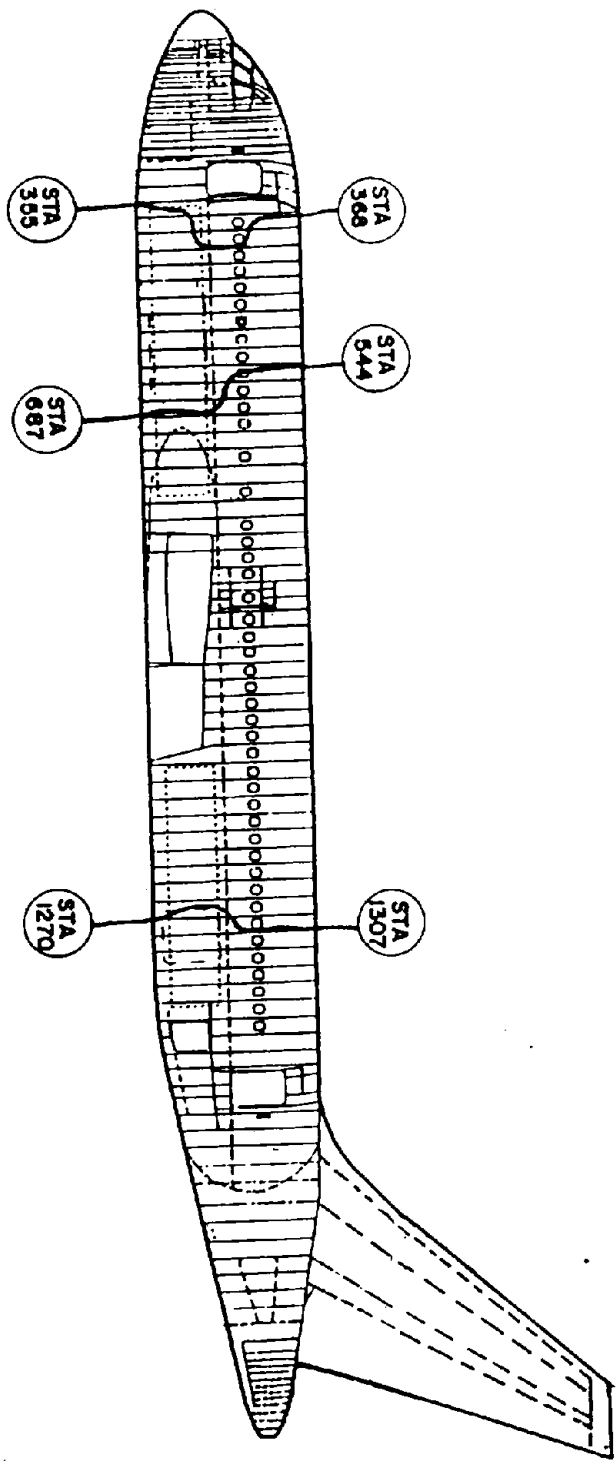
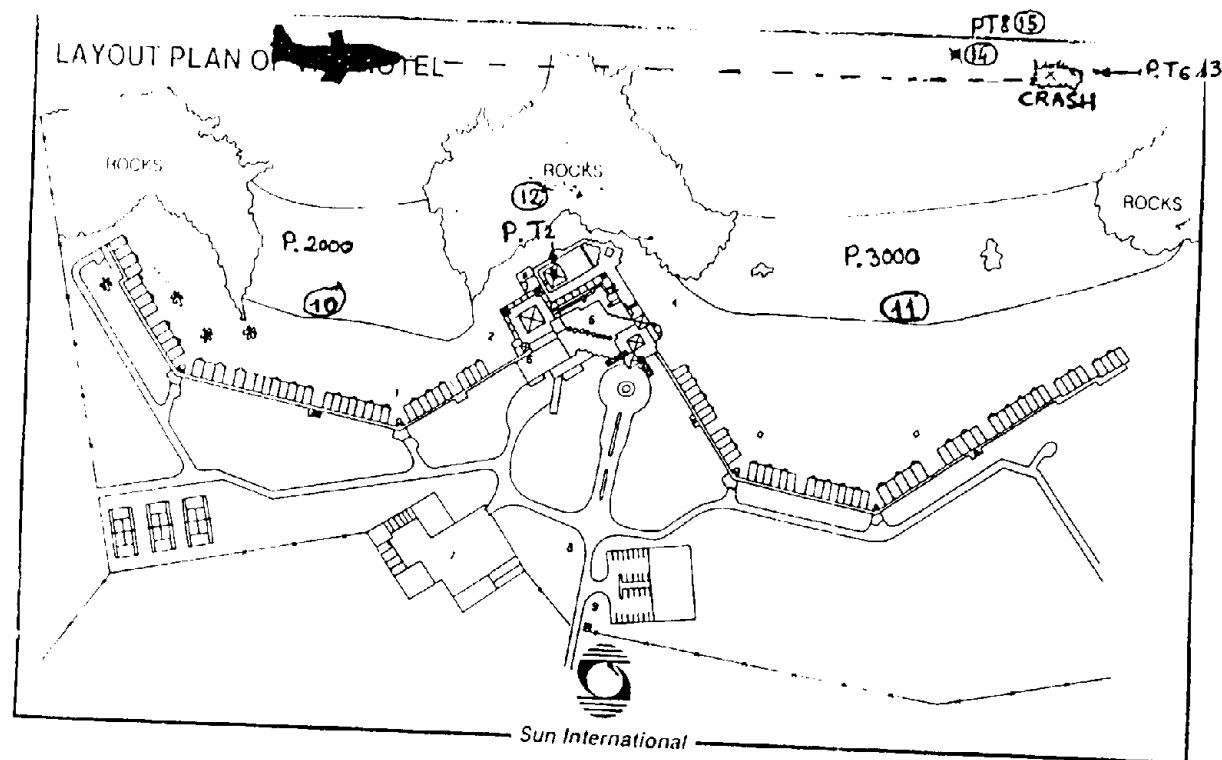


FIGURE - 2

QTY PER ASSY		DASH No	DESCRIPTION		ETL STOCK No	MR PN	STOCK SIZE	MATL SPEC	FINISH	DEVI	ZONE
UNLESS OTHERWISE SPECIFIED			NAME		DATE	TITLE					ETL DWG NO: 5307-001
Dimensions are in			NICKEL		3/01/97	LOCATION OF BREAKAGE FOR ET-AIZ (767-200 ER)					DWG SIZE:
TOLERANCE ON			PROL ENG			ETHIOPIAN AIRLINES PO BOX 1755 ADDIS ABABA ETHIOPIA					REF:
FRA DEC DEG			EXPERT								SCALE: ~
BREAK SHARP EDGES			MGR ENG								SHEET 2 OF 2



1. FIRST AIDS
2. SAILING
WINDSURFING
FISHING
DIVING
TENNIS
3. SWIMMING POOL
4. BEACH
5. PUBLIC AREA
6. KITCHEN AND STORES
7. TECHNICAL CENTRE
8. DELIVERIES
9. CAR PARK
10. Plage 2000
11. Plage 3000
12. Position Terrain N°2

13. Position Témoin N°6
14. PLACE TASECOM
15. POSITIONTEMPOIN N°8

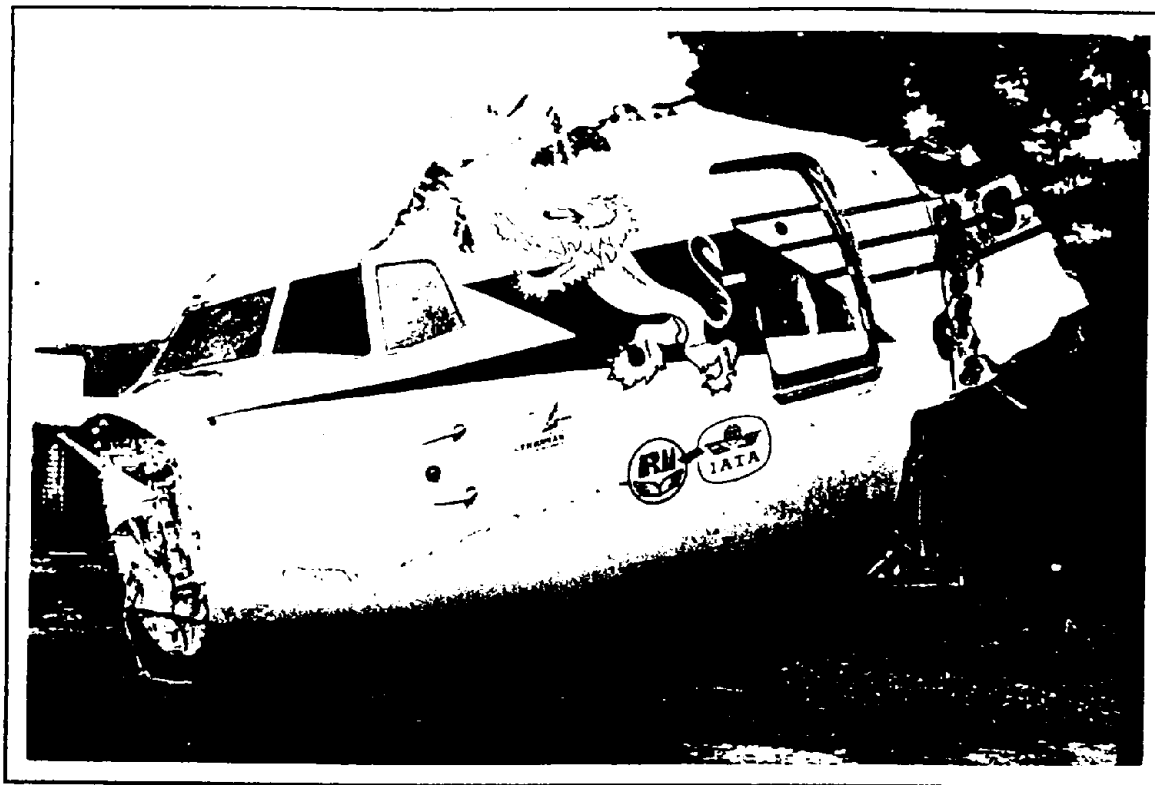


Figure 1. Left side of cockpit.

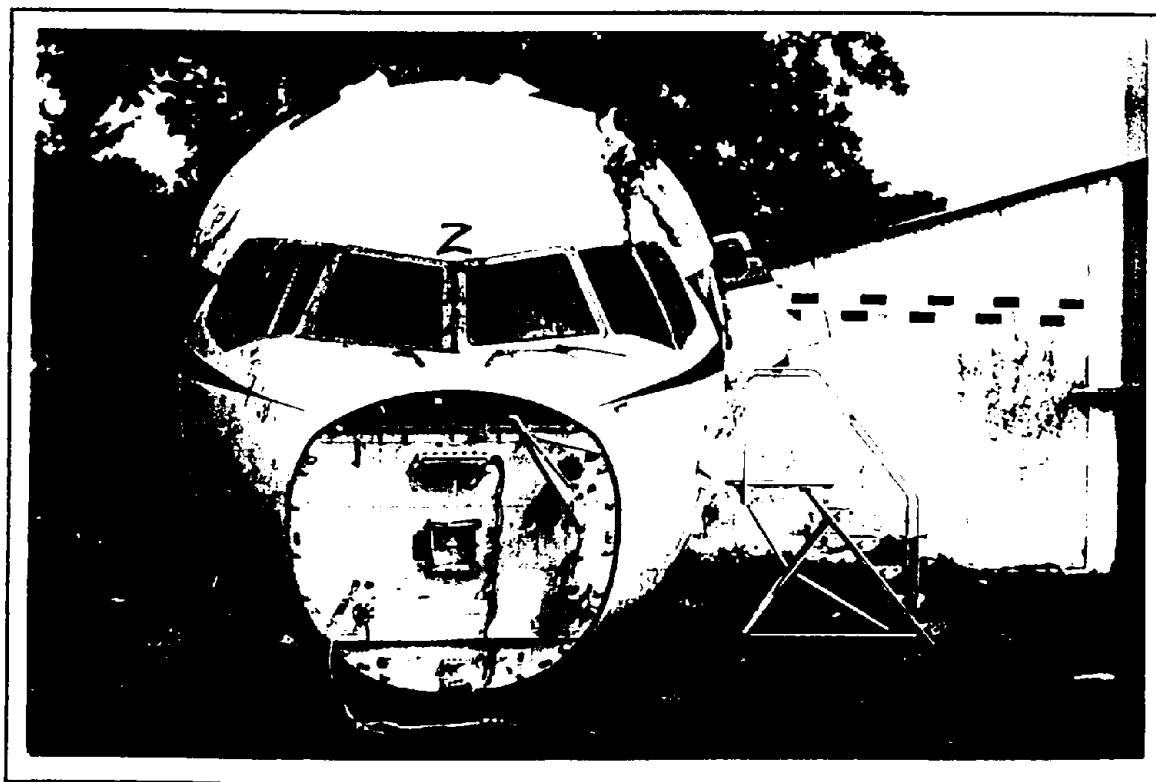


Figure 2. Front side of cockpit.



Figure 3. Center section of fuselage.

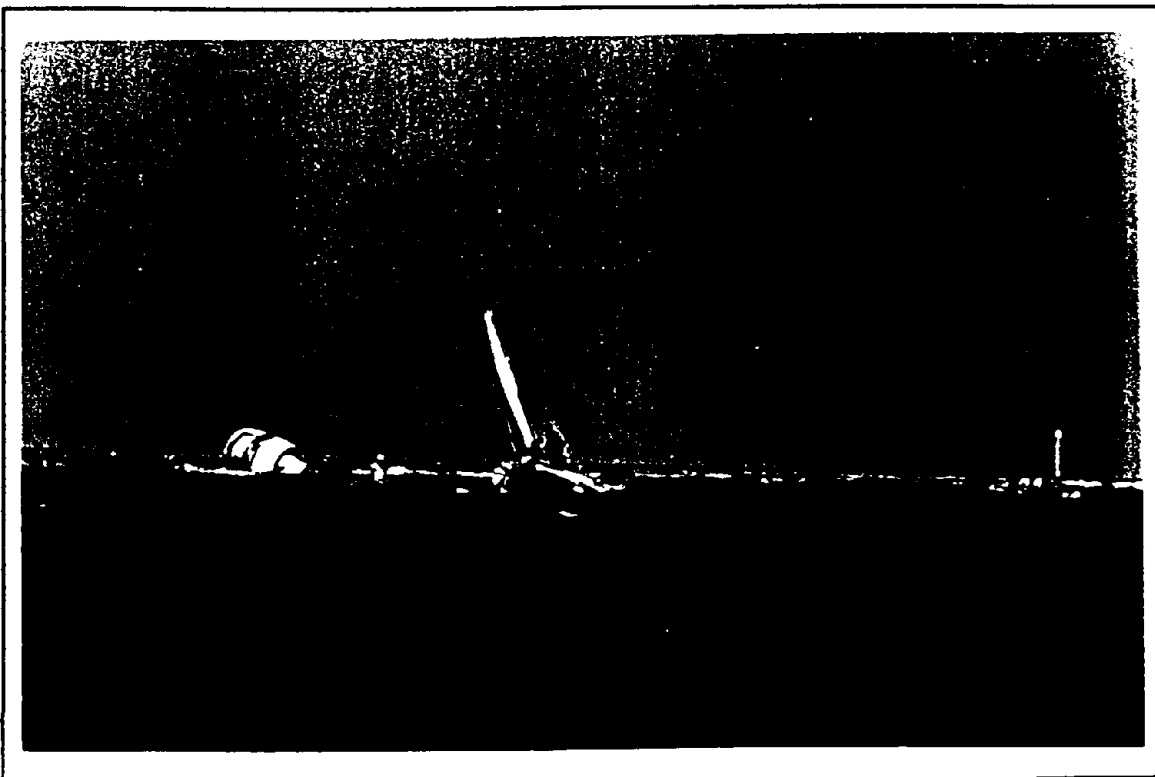


Figure 4. Right engine and vertical stabilizer.

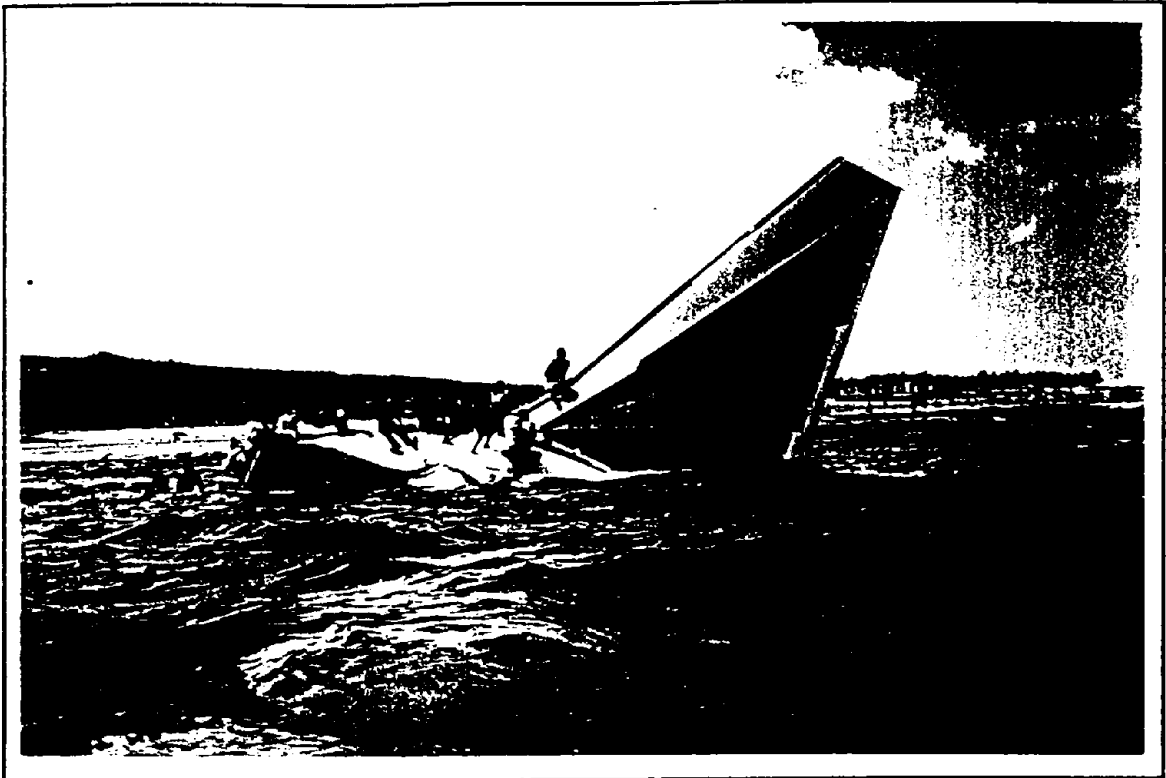


Figure 5. Tail section.

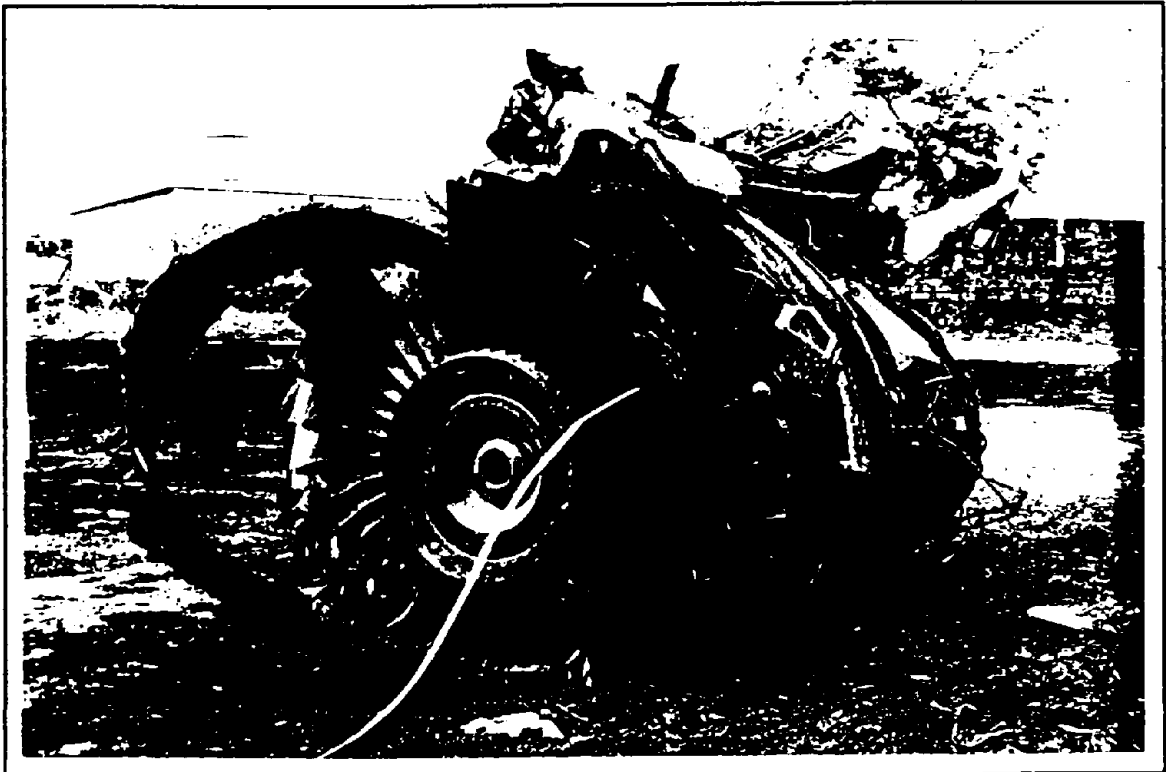


Figure 6. Left engine.

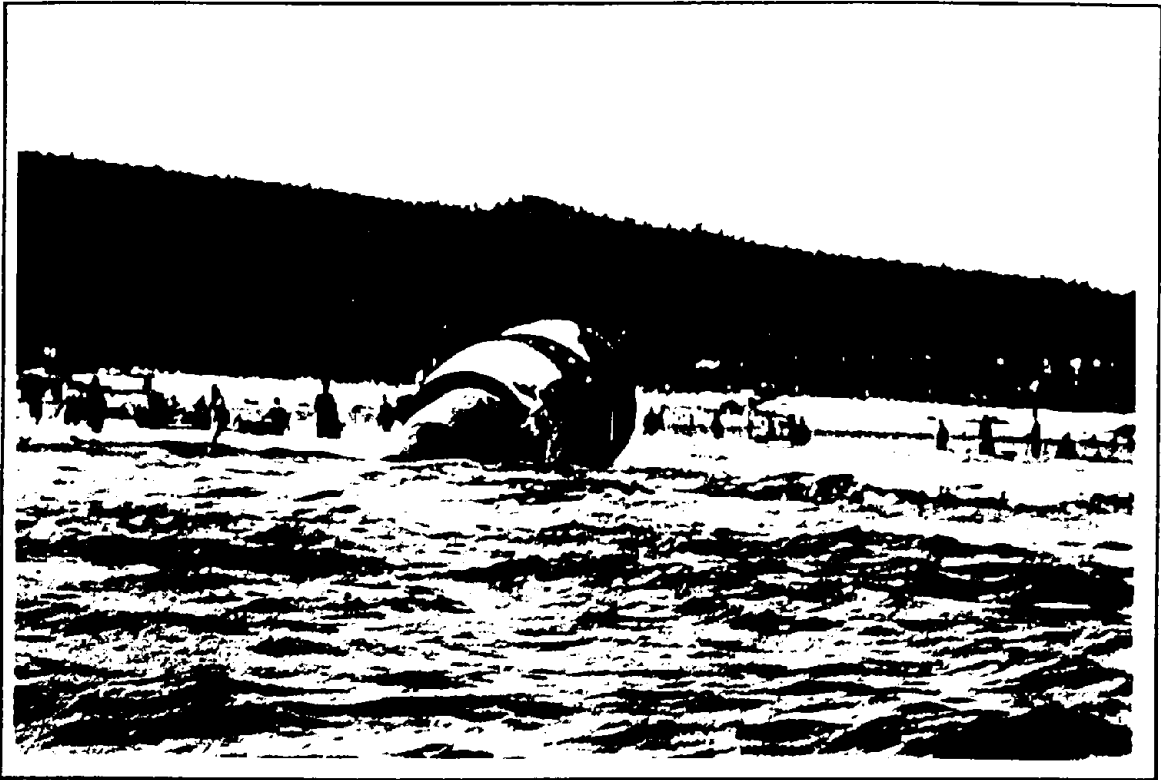


Figure 7. Right engine.

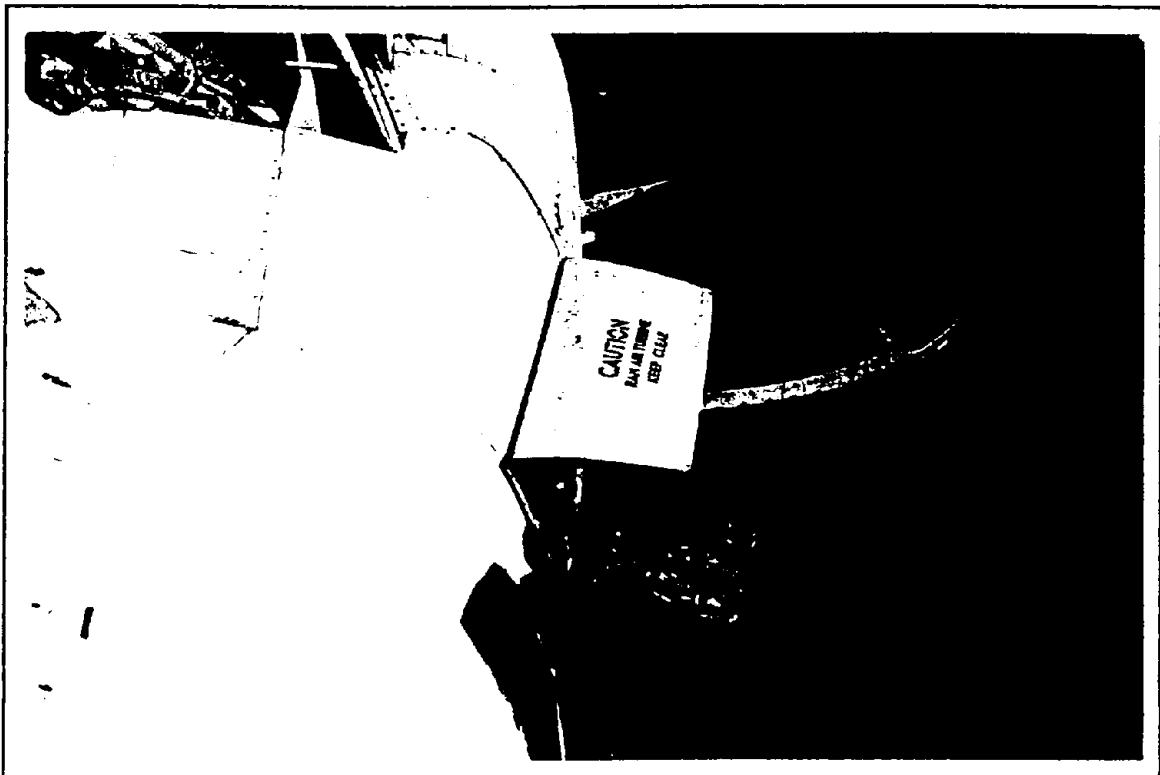


Figure 8. Ram Air Turbine deployed.

LIST OF SURVIVING CREW MEMBERS

NO.	NAME	STATUS	NATIONALITY
1	LEUL ABATE	CAPTAIN	ETHIOPIAN
2	YONAS MEKURIA	FIRST OFFICER	ETHIOPIAN
3	YESHIMEBET G/MESKEL	CABIN CREW	ETHIOPIAN
4	HIWOT TADESSE	CABIN CREW	ETHIOPIAN
5	GIRMAY LEMLEM	CABIN CREW	ETHIOPIAN
6	SHIBESHI MELKA	FLIGHT MECHANIC	ETHIOPIAN

Table 1

LIST OF FATALLY INJURED CREW MEMBERS

NO.	NAME	STATUS	NATIONALITY
1	TSEGEREDA ESTIFANOS	CABIN CREW	ETHIOPIAN
2	YODIT SEBSIBE	CABIN CREW	ETHIOPIAN
3	TEHUT ZEMEDAGEGNEHU	CABIN CREW	ETHIOPIAN
4	NAZERAWIT AMANUEL	CABIN CREW	ETHIOPIAN
5	TSEHAY ZEWDI	CABIN CREW	ETHIOPIAN
6	SIME GULIMA	CABIN CREW	ETHIOPIAN

Table 2

LIST OF SURVIVING PASSENGERS

NO.	PASSENGER NAME	NATIONALITY	SEAT NO.
1	HUDDLE C	AMERICAN	22D
2	HUDDLE F	AMERICAN	22C
3	McFARLAND R	AMERICAN	8B
4	ANDERS/ELIZABETH	BRITISH	33E
5	HAYES/KATHERINE	BRITISH	33D
6	ABOUBAKAR/DRAME	CONGOLESE	28F
7	AWAD/MOHAMMED	CONGOLESE	24C
8	MOUSSA/AINAN	DJIBOUTIAN	26G
9	SOULEIMAN/AHMED	DJIBOUTIAN	27G
10	BISRAT/ALEMU MENGESHA	ETHIOPIAN	25C
11	LUCIA/NEGASI	ETHIOPIAN	14E
12	YISHAK/TESSEMA	ETHIOPIAN	33C
13	BERNARD/MAURICE	FRENCH	34E
14	BRET/JACQUES	FRENCH	34D
15	MIRCHANDANI/BHARTI	INDIAN	8F
16	MIRCHANDANI/REKHA	INDIAN	9A
17	NANKANI/SR	INDIAN	8A
18	RAVAL/NR	INDIAN	28B
19	SURTI/N	INDIAN	25E
20	MOHAN/SHIBANAND	INDIAN	25G
21	FUCHS/LIOR	ISRAELI	13D
22	DIFOLCO/L	ITALIAN	29G
23	FAVIO/BENDINI	ITALIAN	34F
24	LABARBERA/MASSIMO	ITALIAN	27F
25	URZI/CATHRINE	ITALIAN	24F
26	SUGIYAMA/TAKAHITO	JAPANESE	10G
27	ABWAO/KANAIDZA	KENYAN	34C
28	ASMELASH/SEBHATU	KENYAN	33G
29	MERALI/MOHAMMED	KENYAN	33F
30	SHAH/RASIKAL	KENYAN	26D
31	UDDENIO/M	KENYAN	24E
32	WANDERIE	KENYAN	32D
33	MAKONE/JOALANE	LESOTHO	25D
34	BOUYE/DJAWARA	MALIAN	23C
35	DIWARA/SAMO	MALIAN	31D
36	ISSAKA/A	MALIAN	23E
37	ADUMONYEMA/P	NIGERIAN	9F
38	ALPHONSO/DALA	NIGERIAN	26F
39	MTAKWU/AMBROSE	NIGERIAN	27E
40	OGBANNA/F	NIGERIAN	7C
41	TIBWITTA/MONICA	UGANDAN	9G
42	IOUKHATCHOV/VITA	UKRANIAN	28G
43	LISIVICTOR/DEMITROVITZM	UKRANIAN	26E
44	STRELNKOV/VICTOR	UKRANIAN	31E

Table 3
APPENDIX E (Page 2 of 6)

LIST OF FATALLY INJURED PASSENGERS

NO.	PASSENGER NAME	NATIONALITY	SEAT NO.
1	FARRIS/RONNIE	AMERICAN	12C
2	SHEDD/LESLIE	AMERICAN	24G
3	MEISGEIER/J	AUSTRIAN	21B
4	TSHITE/NGOYA	BELGIAN	14D
5	BELLO/RA M	BENINESE	21G
6	ISSA/ A R	BENINESE	20G
7	WILDING/KE	BRITISH	11G
8	CHARTERS/JOHN	BRITISH	17F
9	MEAKENS/ANDREW	BRITISH	20E
10	AMIN/MOHAMED	BRITISH	2A
11	RUSSELL/ALISTER	BRITISH	17C
12	TCHOULENOU/F	CAMEROONIAN	30B
13	NDONGKO/TERESA	CAMEROONIAN	14F
14	TIM/STONE	CANADIAN	14A
15	YAYA/B	CONGOLESE	31C
16	SAMUEL/N	CONGOLESE	19D
17	MUNTALOU/V	CONGOLESE	19C
18	IBRAHIM/AHMED	EGYPTIAN	21E
19	ABRAHA/ZERAY	ETHIOPIAN	8C
20	AHMED/IBRAHIM	ETHIOPIAN	18A
21	ALEMAYEHU/BEKELE	ETHIOPIAN	32C(hijacker)
22	ALEMEZEWD/SHIFERAW	ETHIOPIAN	22A
23	DR. ASNAKE/KITAW	ETHIOPIAN	19A
24	BEYENE/GUTEMA	ETHIOPIAN	12F
25	EJIGAYEHU/AKLILU	ETHIOPIAN	13B
26	GENET/LEDETU	ETHIOPIAN	13G
27	KALKIDAN/W.MICHAEL	ETHIOPIAN	20A
28	SITENA/BINEAM (chd.)	ETHIOPIAN	20B
29	MATIAS/SOLOMON	ETHIOPIAN	31B(hijacker)
30	MATIWOS/WAKBULCHO	ETHIOPIAN	14B

Table 4

Table 4 (Continued)

NO.	PASSENGER NAME	NATIONALITY	SEAT NO.
31	SILESHI/JEMBERE	ETHIOPIAN	14C
32	SULTAN/NURE	ETHIOPIAN	25B(hijacker)
33	G.SEMAYAT/WOLDU	ETHIOPIAN	32F
34	ZELALEM/AYENEW	ETHIOPIAN	12G
35	MATARASSO/CLAUDE	FRENCH	29A
36	RAKATOBÉ/SYLVIANA	FRENCH	13A
37	EHMIKE/ULRICH	GERMAN	34G
38	ANNUS/ANTAL	HUNGARIAN	1A
39	RHINE /G	INDIAN	17A
40	DCUNHA/C	INDIAN	11C
41	FULFAGAR/BS	INDIAN	17G
42	GOMES/E	INDIAN	28E
43	KISHNI/TULSIANI	INDIAN	7A
44	KRIPALANI	INDIAN	11F
45	KRISHNANA/A	INDIAN	11D
46	LALWANI/K	INDIAN	1G
47	OUSEPH/L	INDIAN	27A
48	PALATHINGAL/VJ	INDIAN	12E
49	RAVINDRA/Y	INDIAN	11E
50	SHANKERDAS/T	INDIAN	7B
51	SINGH/M	INDIAN	18B
52	SUNILHIRA/M	INDIAN	28D
53	SOROKA/YEHUDA	ISRAELI	21C
54	LEVIKOVICH/ELIZALD	ISRAELI	11A
55	LEVI/GADM	ISRAELI	18D
56	RAZ/H	ISRAELI	31F
57	BARNISAN/SHRA	ISRAELI	18C
58	BENDAVIDOHAY/AMRA	ISRAELI	12A
59	BROWN/YAAKOV BRAHIA	ISRAELI	13C
60	DOUMBIA/ADAM	IVORIAN	28C

Table 4 (Continued)

NO.	PASSENGER NAME	NATIONALITY	SEAT NO.
61	NAKAUCHI/H	JAPANESE	1E
62	JOHN/MUIA	KENYAN	32A
63	MUIA/E	KENYAN	33A
64	MUIA/KEVIN	KENYAN	33B
65	MUIA/STEPHONY	KENYAN	32B
66	OLOO/ROMA	KENYAN	11B
67	SHAH/KANTI	KENYAN	20D
68	SOLOMON/ABRAHA	KENYAN	34A
69	TETLEY/BRIAN	KENYAN	10E
70	LEE/HJ	KOREAN	21F
71	CHUPLEH/CUMM	LIBERIAN	18G
72	PRINCE/RICH	LIBERIAN	18F
73	LAH/OUSM	MALIAN	30D
74	DEMBELLE/A	MALIAN	23D
75	DOUCOURE/DRAM	MALIAN	30E
76	DRAME/GAOUT	MALIAN	28A
77	SACKO/F	MALIAN	25F
78	SYLLA/MAHA	MALIAN	22B
79	SYLIA/MOUN	MALIAN	14G
80	TOUNKARA/M	MALIAN	23B
81	TRAORE/LASS	MALIAN	30C
82	ADELOLA/M	NIGERIAN	10C
83	ADETOYE/A	NIGERIAN	19B
84	ANOZIE/CHUK	NIGERIAN	22G
85	BOLADE/ODES	NIGERIAN	26B
86	DOZIE/UCHE	NIGERIAN	21D
87	GRACE/CE M	NIGERIAN	21E
88	KINGSLEY/OGIE	NIGERIAN	27D
89	MAKANJWOLA/R	NIGERIAN	23G
90	MASSIROU/S	NIGERIAN	29B

Table 4 (Continued)

NO.	PASSENGER NAME	NATIONALITY	SEAT NO.
91	MOHAMMED/SAMB	NIGERIAN	12D
92	NNECOMA/NKUL	NIGERIAN	22F
93	ODIKWA/O	NIGERIAN	30A
94	OJIAKO/BC	NIGERIAN	19E
95	OKIFUFE/I	NIGERIAN	19F
96	SAKARIAWA/KO	NIGERIAN	23F
97	SAVAGE/T	NIGERIAN	13F
98	SHERIFAT/AL	NIGERIAN	20C
99	TITILAYO/WL	NIGERIAN	20F
100	YUSUFU/ANIK	NIGERIAN	23A
101	MOHAMMED/JAWE	PAKISTANI	29F
102	PAULINE/JULIANA	SIERRA LEONNE	32G
103	OMAR/MOHAMMED	SOMALI	21A
104	KANAGARATNAM/T	SRI LANKAN	31G
105	KANDIAH/TCHUR	SRI LANKAN	25A
106	SELLATAMBY/C	SRI LANKAN	22E
107	SENIVASAR/A	SRI LANKAN	24A
108	SENIVASAR/P	SRI LANKAN	19G
109	THANGAVELU/A	SRI LANKAN	31A
110	PARAMALINGAM/S	SRI LANKAN	30G
111	BALAKRISHNAN/S	SRI LANKAN	30F
112	NALLANATHAN/I	SRI LANKAN	17E
113	FRITZ/EVA	SWEDISH	26A
114	OLSSON/AANA	SWEDISH	34B
115	MORGENEGG/CLAUDE	SWISS	2C
116	IBRAHIM/SAEED	CHADIAN	17D
117	TERIAEV/UDARBUR	UKRANIAN	24B
118	DR. NASSER/A ALZAREK	YEMENI	24D
119	MALU/KULO	ZAIREAN	18E

APPENDIX F

Investigation Committee Members

1. Mr. Mesfin Fikru	Investigator-In-Charge (Ethiopian CAA)	
2. Mr. Gobena Guangul	Member	(Ethiopian CAA)
3. Major Tefera Haile	Member	(Ethiopian CAA)
4. Mr. Alemayehu Asfaw	Member	(Ethiopian Airlines)
5. Dr. Aynalem G/ Mariam	Member	(Ethiopian Airlines)
6. Capt. Berhanu Abera	Member	(Ethiopian Airlines)
7. Mr. Ali Aboudou Mohamed	Member	(Comoros DGAC)
8. Mr. Youssouf Oumara	Member	(Comoros DGAC)
9. Mr. Fakriddinf Mahamoud	Member	(Comoros DGAC)
10. Mr. Said Naffion Zarcache	Member	(Comoros DGAC)
11. Mr. Mohamed Sandi Anzi	Member	(Comoros DGAC)

FEDERAL AND ISLAMIC REPUBLIC OF THE COMOROS
Ministry of Transport, Tourism, Handicraft,
Posts and Telecommunications
DEPARTMENT OF TRANSPORT

SUPPLEMENTARY DOCUMENT
TO THE FINAL REPORT
OF THE TECHNICAL ENQUIRY
INTO THE ACCIDENT TO THE
ETHIOPIAN AIRLINES
BOEING 767-200 (ET-AIZ)
IN THE COMOROS
23 NOVEMBER 1996

By the Comorian
team of
investigators,
members of the
mixed Technical
Enquiry
Commission

JANUARY 1998

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II Repatriation of the injured and the bodies of the victims	7
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IV Recommendations	11
V Annexes	13

FOREWORD

The Comorian investigators considered it useful to prepare the present report, supplementary, not parallel, to the final technical report.

It describes step-by-step the manner in which the rescue operations were carried out and how the efforts of the Comorian authorities were deployed to assume their responsibility, as the country involved (the country where the accident took place).

In publishing this document, the Comorian Government should like to offer its most sincere condolences to the 34 friendly countries whose citizens were the victims of this accident, in particular to Ethiopia.

The Comorian Government should also like to address its heartfelt thanks to all the volunteers (anonymous medical personnel, divers, officials, specialists from every walk of life) and all those who lent assistance. All of them, volunteers and professionals alike, in a pure spirit of supportive solidarity, helped as far as they could to minimize the material human and moral loss in this air disaster.

As our country has neither the infrastructures nor the appropriate material resources to cope with such a tragic and unexpected event, it has no doubt manifested some shortcomings here and there.

We are certain that the 34 countries concerned as well as the international aviation organizations will be understanding with our country in this regard.

*For the Government
Minister of Transport*

Dr MTARA MAECHA .

I. SEARCH AND RESCUE OPERATIONS

1. The first rescue response

The accident took everyone by surprise in the town of Mitsamiouli, but above all those at the shore, on the beach and at the hotel. Once the initial surprise was over and especially after the call for help from the first survivors from the aircraft, the people that had boats in the water, and those on the beach and in the hotel, all rushed to the aircraft to help. This was fortunate for the survivors because there was a water sport centre, a boathouse, a team of eight French doctors, a medical centre at the hotel, and such things as sheets, blankets and towels available. Everyone spontaneously volunteered and so the 51 survivors were able to receive first aid at the field hospital set up for that purpose at the entrance to the hotel bar/restaurant.

Otherwise, the rescue operations could not have been undertaken so quickly, even at the International Airport, as the resources would not have been at hand.

At 1100 hours GMT (1400 hours local time) the International Airport had been informed by Seychelles through the Antananarivo regional centre that since 1036 hours GMT or 1336 hours local time, Nairobi had lost contact with ETH 961 registration no. ET-AIZ and that this aircraft was likely in the area.

It was not until 1225 hours GMT (1525 hours local time) that a telephone call from Galawa alerted the Airport that the aircraft in question had made a forced landing close to Galawa. The Fire Service was alerted and received an order from the Director General of the Airport to leave immediately for the scene of the accident.

At 1300 hours GMT (1600 hours local time) Radio Comoros broadcast a message of the Director of the Cabinet of the Presidency of the Republic announcing the news of the crash and appealing to the Police Force, the Comorian Defence Force, the Comorian Red Crescent and officials in the region of Mitsamiouli and volunteers to go to help the accident victims.

Well before this message, the people of the Mitsamiouli area who heard about the disaster hurried to Galawa and began the rescue operations. The Comorian Red Crescent, the Federal Gendarmerie, the Comorian Defence Force, the National Police Force, some officials who happened to be close by and the Mitsamiouli Hospital staff all joined in the operation without any administrative procedures.

The first gendarmes, and the police and military officers arriving on the scene cordoned off a security zone at the site. The staff of the various hospitals began to arrive as well as the general public. The traffic built up as the bodies and the injured were transferred to the Mitsamiouli Hospital. Every vehicle present was converted into an ambulance .

Some vehicles went on to Moroni. At 1330 hours GMT (1630 hours local time) the whole island was in a state of shock. Everyone was trying to speed up the rescue operations and people realized that a team of eight doctors were on hand which made first aid easier.

At 1500 hours GMT (1800 hours local time) all the survivors were transferred from the Mitsamiouli Hospital to the El Maarouf Hospital in Moroni. At the accident site, the search continued.

2. The organization of operations

The Comoros had never experienced such a disaster, had no experience in this field nor any emergency response plan: the organization was simply that of meeting the needs of the moment.

At 1400 hours GMT (1700 hours local time):

- Volunteers from the Comorian Red Crescent arrived in a Peugeot 404 pickup and immediately began to bring bodies and the injured from the aircraft to the beach and from the beach to the Mitsamiouli Hospital.

- The Gendarmerie undertook the following missions:

A. Participation in the rescue

A team of six gendarmes with two rubber dinghies at the accident site helped to recover bodies and the injured, to transport the injured and to evacuate bodies to the mortuary in Moroni.

B. Organization and maintenance of order

(a) **In the front line:** a cordoned-off security area was set up at the accident site and its immediate surroundings until the end of the operations. Seventy gendarmes were needed for this operation over five days and four nights.

(b) **At the mortuary in Moroni:** Six gendarmes were needed over seven days.

(c) **At the El Maarouf Hospital:** Twenty gendarmes were needed throughout the night 23/24 November 1996.

(d) **For the identification of victims:** Six gendarmes took part in photographing the victims.

(e) **For the judicial enquiry:** Fifteen gendarmes (officer and NCOs) were given responsibility for the legal procedure; they placed provisional seals on the baggage and various other objects recovered, including the black boxes from the aircraft, which were later handed over to the competent authorities.

- The Comorian Defence Force (FCD) intervened mainly to assist the Gendarmerie in transporting the bodies.

3. Establishment of the various commissions

At 1535 hours GMT (18.30 hours local time) an operational emergency unit was set up in the Department of Civil Aviation (DGAC) and proceeded to coordinate, with the Airport authorities, the operations of various aircraft movements and the arrival of foreign dignitaries. The plan for the reception of the families of victims was reviewed.

At 1535 hours GMT (1835 hours local time) overseas telephone calls started coming in to the Department of Civil Aviation and to the Mahaya Airport. Some time before that, several survivors had already called their families.

The world's attention was on Moroni; journalists were calling from Nairobi, London, South Africa, the United States, Israel, Ethiopia and many other countries. The 175 passengers represented 34 different nationalities.

The DGAC unit was transferred to the International Airport. Aircraft began to transmit their flight plans to Moroni. Many flights were programmed for the evening and the emergency unit began to worry whether the airport parking would be congested. The attention of the authorities was drawn to the fact that an Ethiopian delegation was due to arrive in the evening. Provisions were made for the reception of this delegation.

At 1630 hours GMT (1930 hours local time) an emergency unit at ministerial level was set up in the Ministry of Foreign Affairs.

At 1800 hours GMT (2100 hours local time) the Minister of Home Affairs and the Minister of Information joined the unit at the Airport. They were informed of the procedures being followed. The Comoros Ambassador to the United States was present in Mahaya. Other officials of the Ministry of Foreign Affairs were at Mahaya to receive people. On arrival at close to midnight, the Ethiopian delegation were received in the VIP Lounge, and, after the address and an exchange of views, as planned, the delegation went first to El Maarouf Hospital and then to the scene of the accident.

The members of this delegation were:

- A representative of the Ethiopian Government,
- Mr. Ahmed Kellow, the Director General of Ethiopian Airlines,
- Mr. Sultan, the Deputy Director General of Ethiopian Airlines,
- A delegation from the Ethiopian Civil Aviation Authority.

All through the evening, other aircraft movements were taking place at the airport, notably the arrival of an American aircraft and a French Transall. Foreign rescue teams thronged the country. Journalists and other persons arriving at Mahaya all went to Galawa. The lack of proper resources and organization began to make itself felt. Volunteers and local helpers made their appearance, the planning at all levels was maintained, and everyone reached where they had to go.

At 2000 hours GMT (2300 hours local time) A Top-level Emergency Committee

Several Ministers and other personalities such as the Head of the Gendarmerie and the Head of the Comorian Defence Force formed an Emergency Committee, with the following objectives:

1. To reflect the will of the country to respond to this disaster;
2. To supervise all operations;
3. To facilitate all initiatives lest in one way or another the proper course of operations might be hindered.

This Emergency Committee was chaired by the Attorney General.

It was this Committee that made many requests for aid to cope with the disaster, particularly to the United States. It was through this Committee that the representatives of the Ethiopian Government, the heads of Ethiopian Airlines and Lloyds Insurance Company exhorted the Comorian Government to do all in its power to facilitate the smooth running of all operations.

II. REPATRIATION OF THE INJURED AND THE BODIES OF VICTIMS

1. Repatriation of the injured

Nineteen of the injured were evacuated to the island of Réunion, together with all the French survivors, on the Transall military aircraft, and the rest were evacuated to Nairobi and South Africa on special aircraft.

2. The recovery of bodies remaining in the aircraft wreckage

On 24 November a team of firemen/divers from the island of Réunion, headed by Lieutenant Thirel Dominique, arrived at the scene of the accident. They measured the depth at the scene and waited for low tide.

At 0600 hours GMT (0900 hours local time) the Réunion team recovered eight bodies from the aircraft wreckage. In the late afternoon, the Comorian rescue teams sought to tow in the wreckage to recover the rest of the bodies. Fifty bodies were trapped in the central cabin. A bulldozer towed the section of cabin on to the beach at about 1600 hours GMT (1900 hours local time).

On the morning of 25 November, some bodies were recovered by the group of Comorian gendarmes, and police and army officers.

On 26 November while the Réunion team were preparing to dive, a Comorian fisherman came with a dead body in his boat; the divers tried to revive the victim but he was already dead; he was found to be one of the volunteers who took part in the rescue operations.

On 27 November at about 1200 hours GMT (1500 hours local time), some human body parts were handed over to members of the Comorian Red Crescent.

On 28 November other body parts were handed over to the Comorian Red Crescent team at about 1200 hours GMT (1500 hours local time), the same day that the divers (including the representative of Lloyds Aviation of

London) picked up the cabin voice recorder (CVR) and the flight recorder (DFDR). A half hour later, the Comorian army officers and gendarmes asked that these two boxes be sent to the Director General of Civil Aviation, which was then done.

On 29 November set out to search for body parts and a person reported missing. They found a black computer which they handed over to the gendarmes.

On 30 November a memorial service was held in Galawa.

On 1 December the divers found identity documents, which they handed over to Ethiopian Airlines. The Ethiopian senior official on site confirmed that all the bodies had been recovered.

3. Repatriation of the bodies

One of the injured died in Réunion, which brought the total number of dead to 125. One hundred and twenty-four of these were in Moroni.

If there was any area in which the Comoros had less experience it was perhaps in this regard. To have to deal with 124 bodies to be repatriated when Moroni did not even have a mortuary, or any expert to identify bodies in a state of decomposition, or any products or specialists to halt the decomposition of bodies...

It was therefore necessary to:

1. Requisition the existing cold rooms, although one businessman was using part of the cold rooms to store meat;
2. Repair some cold rooms that had not been in service for three years;
3. Find an electricity generating set, since there were electricity breakdowns in Moroni at that particular time.

We can say with certain pride that it was thanks to the intelligence, courage and loyalty of the Director General of Securicom that all this work was carried out properly from the technical point of view. It is true that the identification of the bodies and their preservation against decomposition were carried out with the help of Israeli experts, but without the determination of the Director General of Securicom this could not have been done; although he was paid for this work, in our humble opinion the Government should accord him official recognition for it.

III. TECHNICAL ENQUIRY ORGANIZATION

As indicated above, from the moment the disaster happened, the Civil Aviation Department took action to coordinate all operations.

1. Relationship with ICAO

On the evening of the accident, the Director General of Civil Aviation sent a message, at the request of the Comorian Government, to the ICAO Regional Representative in Nairobi, to inform him and request ICAO for material and

technical support in the conduct of operations and the enquiry.

Later, the Director General of Civil Aviation kept in close contact with the ICAO Regional Representative in Nairobi.

- ICAO sent a technical OPS expert to support the Director General in carrying out his responsibilities for the period 30 November to 7 December 1996.
- ICAO also sent a security expert to Addis Ababa to conduct the security enquiry, at the request of the Comorian Government.
- ICAO intervened to ask UNDP in Moroni to lend technical assistance in the conduct of the enquiry.
- The two "black boxes" from the aircraft were taken to Nairobi for forwarding to London, at the request of the two parties of the Commission of Enquiry (Comorian and Ethiopian), by the technical OPS expert from ICAO.

To sum up, the Commission considers that ICAO (the Regional Office) amply fulfilled its advisory role in these difficult moments. The UNDP Moroni Office also lent assistance to the Comorian Government.

2. The Technical Commission of Enquiry

Under annexes 13 and 17 of the International Civil Aviation Convention (Enquiry into Aviation Accidents and Incidents - Security, Safeguarding International Civil Aviation against Acts of Unlawful Interference), an Order signed by the Prime Minister and the Minister of Transport constituted a Technical Commission of Enquiry, whose mission was as follows: the handling, collection and recording of data, analysis of the information received and the preparation of the final report on the crash. The Commission worked with experts from ICAO, Ethiopian Civil Aviation, Ethiopian Airlines, Lloyds Aviation of London (the Insurer) and Beaumont and Son (lawyers for the Insurer) to find the best formula to adopt, knowing that the Enquiry should begin its work with the least possible delay, and required logistic resources and experts that the Comoros lack, all the more so given that by international civil aviation regulations, the Comoros had the primary responsibility for the Commission of Enquiry.

3. Memorandum of Understanding

When contacted by ICAO, the UNDP Regional Office in Moroni replied that it did not have available funds in its IPF Programme or from any other source to pay for the services of an experienced investigator.

It became quite urgent not to allow tidal damage to the wreck wipe out traces of evidence required for the purposes of the enquiry. Needless to say, the Comoros would not be able to meet the expenses involved, because of its situation of financial constraint. On the other hand, the Ethiopian team included experienced investigators. For all these reasons, after four days of discussions and talks a Memorandum of Understanding was signed, through the mediation of ICAO, under the provisions of paragraph 5-1 of annex 13 of ICAO regulations, which stated, inter alia, that:

- The Ethiopian Civil Aviation Authority (the State of registration) recognized the setting up of a Commission of Enquiry in the Comoros (the State of the accident);
- The Commission of Enquiry of the State of the accident delegated the entire enquiry to the State of registration, under the provisions of annex 13 of ICAO regulations;
- The Ethiopian Civil Aviation Authority would associate with the enquiry the experts supplied by the Department of Civil Aviation and the Department of Meteorology of the Comoros, and ensure their active participation.

4. The work of the Technical Commission of Enquiry

The chief investigator was appointed by the Director General of the Ethiopian Civil Aviation Authority; before leaving for Ethiopia, the appointee submitted a list of tasks to be completed. The objective of these tasks was the collection of all available information on the way in which the accident happened and the way the aircraft and the survivors reacted.

The Commission requested photographs, the collection of messages, reports, eye-witness accounts and interviews on video and audio cassettes. These investigations took place in respect of:

- The accident site
- The Hahaya Airport
- At Mitsamiouli and the area around Galawa
- The Mitsamiouli and El Maarouf hospitals
- The aircraft crew
- The meteorological service at the Moroni Prince Saïd Ibrahim International Airport.

These time-consuming tasks took until 23 January 1997, on which date the five Commission members nominated according to the Memorandum of Understanding left for Addis Ababa to join the Commission's Ethiopian team.

5. The first working meeting of the mixed Comoros-Ethiopian Commission

The Comorian section of the Technical Commission was in Addis Ababa from 25 December 1996 to 2 February 1997. The Commission met from 27 January to 31 January 1997. The work consisted of:

- Finalizing and signing the preliminary report of the enquiry;
- Briefing of the Comorian members on the high-level technical details by the Ethiopian Civil Aviation Authority, enabling the whole Commission (Comorian and Ethiopian) to deal with the enquiry at an appropriately high technical level;
- Exchanging documents and discussing certain aspects of those documents to obtain a deeper analysis.

At the end of this meeting, the Commission fixed a date for a meeting for two to three weeks in Addis Ababa to finalize and sign the final report.

IV. RECOMMENDATIONS

1. Regarding airports

- That the Comoros should develop an emergency response plan to cope with such incidents as they occur.
- That the Prince Saïd Ibrahim International Airport should develop a site and acquire the equipment needed for rescue at sea and that our airports should be equipped with adequate search and rescue services.
- Two civil aviation accident investigators should be trained as soon as possible (over six weeks in the first instance and two weeks at a later stage).
- The strengthening of aviation security measures in our airports by the implementation of a national civil aviation security programme.

2. Regarding hospitals

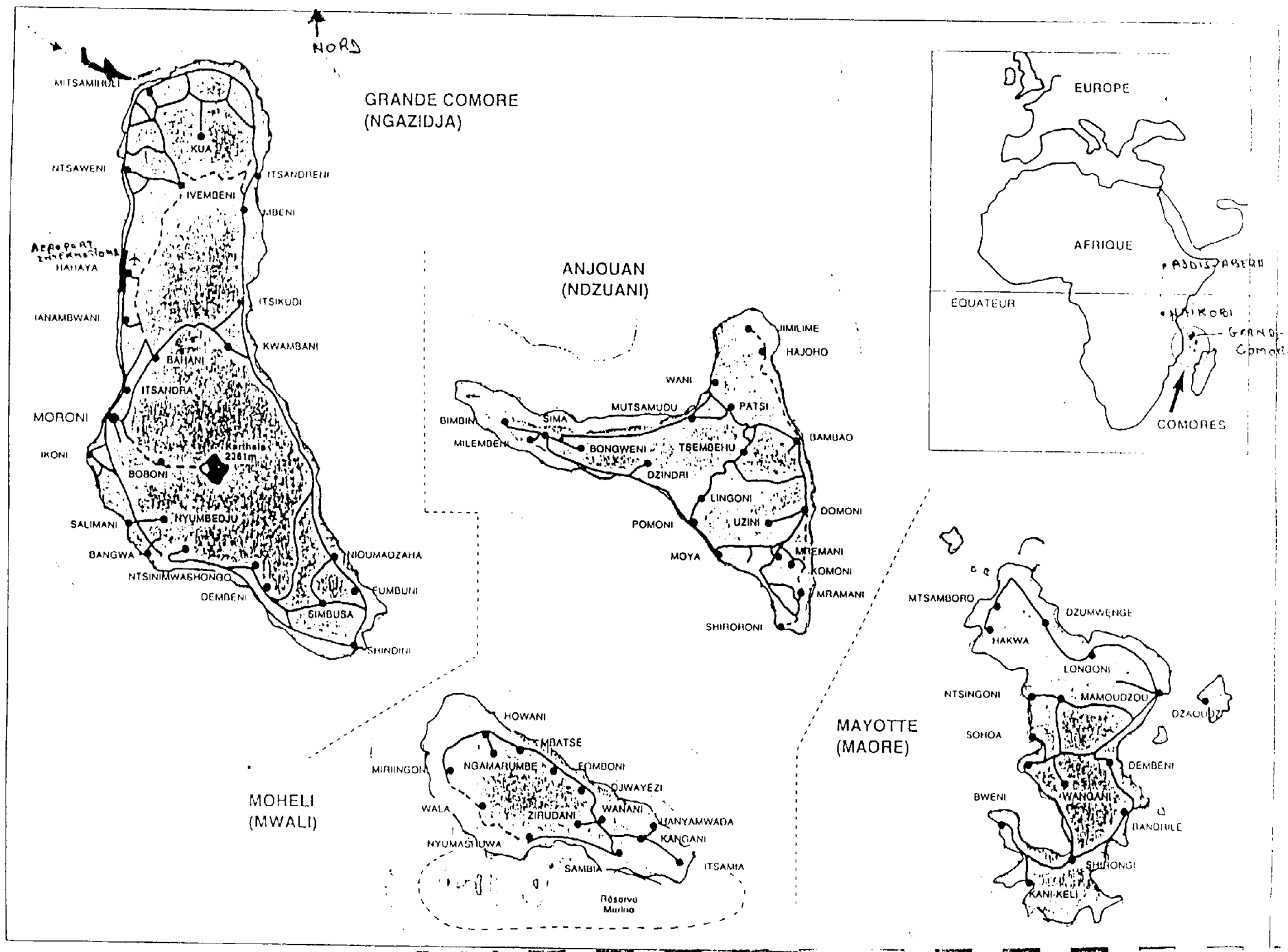
- The Commission recommends the setting up of the nucleus of a SAMU team in hospitals with the basic necessary equipment.
- For the Mitsamiouli Hospital, the Commission recommends an improvement in the hospital reception conditions and the renovation of the intensive care unit, the operating theatre, the orthopaedic service and the training of qualified staff.
- All hospitals in the country to be provided with emergency response equipment and training for medical and paramedical staff.

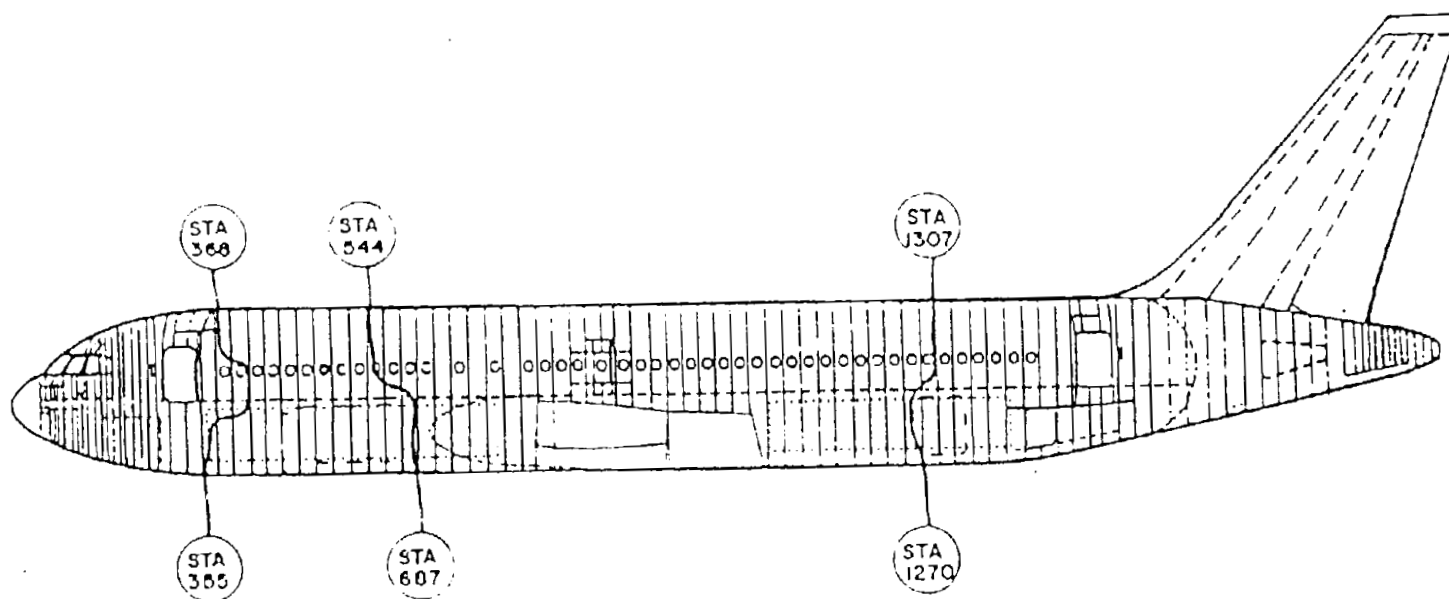
LIST OF PARTICIPANTS IN THE VARIOUS MEETINGS

Names	Positions and addresses
H.J. THOMSON	Representative of Lloyd Réunion
ABASSY BINY ANASSY	Head of Air Traffic Control Service
ABHAR BOURHANE	Director General, Civil Aviation
ALI ABOUDOU MOHAMED	Deputy D. G., Civil Aviation
SAID NAFFION ZARCHACHE	Air Transport Director
TEFERA ALEME	Ethiopian Civil Aviation Authority
WOLDETNSAY WIMELAK	Ethiopian Airlines
ALEMAYEHU ASFAW	Ethiopian Airlines
YOUSSEUFA OUMARA	Head of PAF
Lt. ALY M'BAY	Gendarmerie
Capt. FAKRIDINE MAHAMOUD	Gendarmerie
ROGER LAMBO	ICAO
MESFIN FIKRU	Ethiopian Civil Aviation Authority
AHMED KELLOW	Director G. of Ethiopian Airlines
BOB DUKE	Lloyds Aviation, London
BOURHANE AHMED	Aircraft engineer
MAHAMOUD ALI BAY	Meteorologist

V. ANNEXES

1. Letter of Comoros and location of crash of B 767 ETH 961
2. Message of appreciation of the President of the Board of ICAO
3. Order No 96-517/PM-Cab of the Prime Minister on the establishment of the Technical Commission of Enquiry
4. Minutes of meetings for the preparation of the conduct of the enquiry, including the debate on the Memorandum of Understanding of 3 December 1996
5. List of meeting participants, including the meeting of 3 December 1996
6. Memorandum of Understanding and organization chart of Commission of Enquiry
7. Minutes of the first meeting of the Commission of Enquiry in Addis Ababa





EMPLACEMENTS DES
CASSURES DE L'AVION
ET - AIZ - B 767-200 ER

Legende



Decès



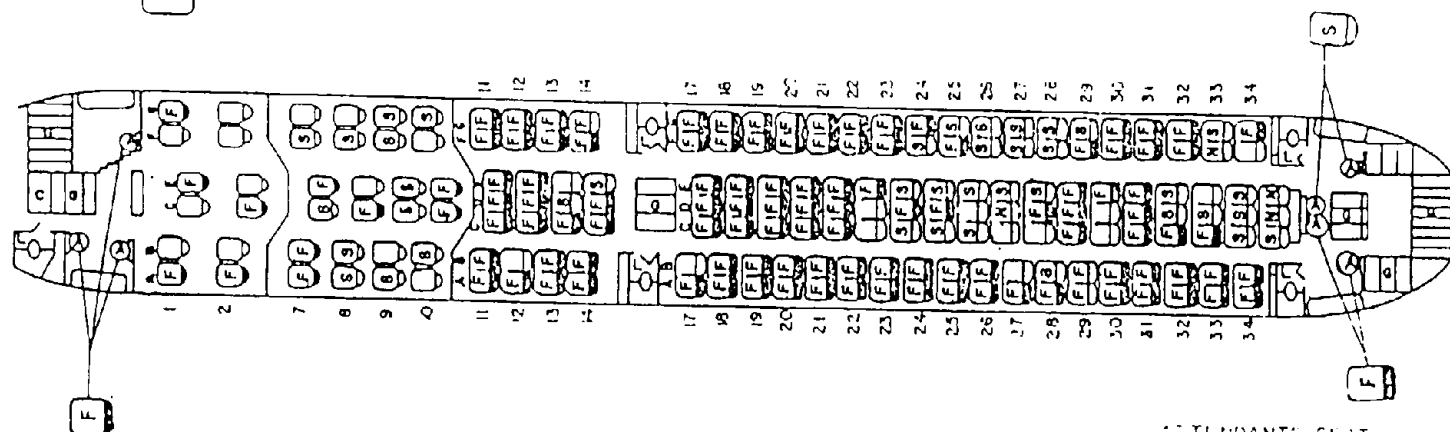
Survivants avec blessure grave ou legere



Survivants sans blessure



siège un occupé



ATTENDANTS SEAT

GALLEY

LAVATORY

CLOSET

Occupation des sièges par
des passagers



ORGANISATION DE L'AVIATION CIVILE INTERNATIONALE
999, RUE UNIVERSITY
MONTREAL, QUEBEC
CANADA
H3C 5H7

N° DE TÉLÉCOPIEUR: (514) 954-6077

EXPÉDITEUR: Président du Conseil
et le Secrétaire général
TÉLÉPHONE: (514) 954-8011/8041
RÉFÉRENCE:

DATE: le 25 novembre 1996

N° DE PAGES: 1
PRIORITÉ: Urgent

F.PRE.

N° DE TÉLÉCOPIEUR: 011 269 731 030
ou 269 744 111

A: DIRECTION GÉNÉRALE DE L'AVIATION CIVILE
ET DE LA MÉTÉOROLOGIE
MORONI
RÉPUBLIQUE FÉDÉRALE ISLAMIQUE DES COMORES

POUR LE MINISTRE DES AFFAIRES ÉTRANGÈRES, LE MINISTRE DES TRANSPORTS, DU TOURISME ET DE L'ENVIRONNEMENT ET LE DIRECTEUR GÉNÉRAL DE L'AVIATION CIVILE ET DE LA MÉTÉOROLOGIE. CONCERNANT L'ACTE D'INTERVENTION ILLICITE PERPÉTRÉ CONTRE UN AVION ÉTHIOPIEN LE 23 NOVEMBRE 1996 EN RÉPUBLIQUE FÉDÉRALE ISLAMIQUE DES COMORES, QUI S'EST SOLDÉ PAR UNE FIN TRAGIQUE, NOUS CONDAMNONS LES AUTEURS DE CETTE INTERVENTION ILLICITE CONTRE L'AVIATION CIVILE INTERNATIONALE ET EXPRIMONS NOTRE APPRÉCIATION POUR LES EFFORTS DÉPLOYÉS PAR VOTRE GOUVERNEMENT, QUI ONT PERMIS D'APPORTER LES SOINS NÉCESSAIRES AU BIEN-ÊTRE DES INNOCENTES VICTIMES. NOUS SOMMES CONFIANTS QUE VOTRE GOUVERNEMENT PRENDRA LES MESURES VOULUES POUR QUE LES AUTEURS DE CET ACTE SOIENT POURSUIVIS EN JUSTICE, CONFORMÉMENT À LA RÉSOLUTION A31-4 DE L'ASSEMBLÉE DE L'OACI ET À LA CONVENTION DE LA HAYE POUR LA RÉPRESSION DE LA CAPTURE ILLICITE D'AÉRONEFS. À MOINS QUE TOUS LES GOUVERNEMENTS NE PRENNENT DES MESURES VIGOUREUSES POUR LA PROTECTION ET LA SÛRETÉ DU TRANSPORT AÉRIEN INTERNATIONAL, UNE SITUATION CHAOTIQUE PARALYSERA L'AVIATION CIVILE INTERNATIONALE, QUI EST DEVENUE VITALE POUR CHAQUE PAYS ET CONSTITUE UN ÉLÉMENT ESSENTIEL DANS L'ÉCONOMIE MONDIALE. NOUS VOUS SERIONS RECONNAISSANTS DE NOUS ADRESSER AUSSITÔT QUE POSSIBLE UN RAPPORT SUR LES CIRCONSTANCES DE CET ACTE CRIMINEL ET LES RÉSULTATS DES POURSUITES JUDICIAIRES. HAUTE CONSIDÉRATION.


ASSAD KOTAITE PRÉSIDENT DU CONSEIL DE L'OACI

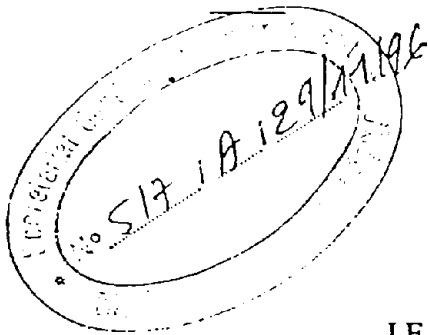

PHILIPPE ROCHAT SECRÉTAIRE GÉNÉRAL DE L'OACI

REPUBLIQUE FEDERALE ISLAMIQUE DES COMORES

Unité - Justice - Progrès

PRIMATURE

CABINET DU PREMIER MINISTRE



[Signature] N° 808 du 29-11-96
Le Contrôleur Financier

Arrêté n° 96- 517/PM-Cab, portant
création d'une Commission d'Enquête/
Accident.

LE PREMIER MINISTRE

- Vu la Constitution du 7 juin 1992 ;
Vu le décret n° 96-137/PR du 21 août 1996, portant nomination du Premier Ministre;
Vu le décret n° 96-138/PR du 21 août 1996, portant nomination des membres du Gouvernement;

Suite à l'accident aéronautique survenu le samedi 23 novembre 1996 à Mitsamiouli (Comores), conformément aux annexes 17 et 13 relatives à la Convention de l'Aviation Civile Internationale :

- Protection de l'Aviation Civile Internationale contre les accidents et incidents d'aviation.

A R R E T E

Article 1er : Il est créé une Commission technique d'enquête sur le crash à Mitsamiouli du B 767 du vol ETH 961.

Article 2 : La Commission d'enquête est composée de :

* **Président :**

- ABHAR BOURHANE, Directeur Général de l'Aviation Civile (enquêteur principal)

* **Membres :**

MM: - ALI ABDU MOHAMED, Inspecteur contrôleur de l'Aviation Civile.
- KARANI BAKARI, Mécanicien Avion, Inspecteur contrôleur.
- MOHAMED SANDI ANZI, Pilote Inspecteur contrôleur.

- MOUSSA ABDALLAH MOUMINE, Représentant du ministère des Transports.
- SAID NAFFION ZARCACHE, Directeur des Transports aériens.
- ABASSY BINTY ANASSY, Chef du service de la Navigation aérienne à la Direction Générale de l'Aviation Civile.
- MAHAMOUD ALI BAY, chargé de la supervision et de l'archivage des éléments techniques de l'enquête.
- Un représentant de l'Aéroport HAHAYA.
- Un représentant de la Gendarmerie Fédérale.
- Le Chef de la Police Air et Frontière.
- Les représentants de l'OACI dépêchés pour les circonstances.
- Le représentant de l'Aviation Civile Ethiopienne.
- Un représentant de la Compagnie Ethiopian AirLines.

Article 3 : Cette Commission a pour mission la conduite, la collecte, l'enregistrement des données, l'analyse des renseignements recueillis et l'établissement du rapport final sur le crash.

Article 4 : La Commission d'enquête ainsi désignée a accès libre à l'épave et exerce un contrôle total sur celle-ci.

Article 5 : La Commission peut solliciter à tout moment la collaboration du constructeur de l'aéronef.

Article 6 : Avant de commencer leurs travaux tous les membres de la Commission doivent prêter serment d'exercer les présentes fonctions dans l'honnêteté et la franchise en s'engageant à ne pas divulguer aucun élément d'information à d'autres fins que l'enquête sur l'accident.

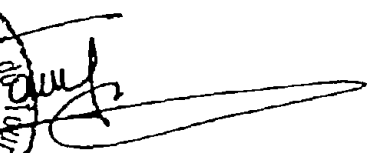
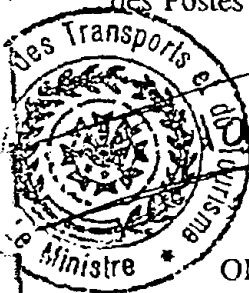
Article 7 : Pendant toute la période de fonctionnement de cette Commission, une indemnité de 25.000 FC par jour sera allouée à chaque ressortissant comorien, membre de la Commission.

Article 8 : Le présent arrêté qui prend effet à compter du 25 novembre 1996, sera enregistré, publié au Journal Officiel et communiqué partout où besoin sera.

Fait à Moroni, le 29 novembre 1996.

Le Ministre des Transports, du Tourisme,
des Postes et Télécommunications

Le Premier Ministre



 OMAR TAMOU



 TADJIDDINE BEN SAID MASSOUNDE

Le Mardi 03 Décembre 1996 s'est tenue sous la présidence de Mr. Abhar BOUHANE, président de la Commission technique d'enquête/accident une séance de travail. La liste des participants figure en annex.

Mr; Abhar a chaleureusement remercié l'assistance de leur présence et présenta l'ordre du jour qui portait sur la conduite de l'enquête.

Après une échange de vue entre les deux parties, et dans le soucis d'une meilleure conduite de l'enquête, l'expert de l'OACI entendu et conformément au point 5.1 de l'annexe 13 de l'OACI, il a été convenu de laisser la conduite de l'enquête à l'Etat d'immatriculation de l'aéronef (ETHIOPIE) avec une participation active de l'Etat d'occurence (COMORES).

Dans ces conditions la partie Comorienne sollicite la participation d'un observateur de l'OACI durant la conduite de l'enquête.

La partie Ethiopienne a exprimé sa volonté de voir la participation active de chaque partie concerné et d'une franche collaboration étant nécessaire pour le déroulement de l'enquête.

L'enquête pourra se dérouler soit aux Comores, soit en Ethiopie. Toutefois afin d'officialiser cette délégation à la partie Ethiopienne il a été convenu d'établir un memorandum entente entre les deux parties conformément à l'annexe 13 de l'OACI.

La partie Comorienne remercie la partie Ethiopienne de leur bonne compréhension et leur étroite collaboration.

Le représentant de l'OACI a dresse ses sucères remerciements à toutes les parties concernées et espère voir l'enquête demarer le plus tôt possible. Il rappelle encore une fois l'importance du facteur temps sur cette enquête pour éviter la disposition des indices nécessaires à l'enquête.

Au sujet de la boîte noire, Mr. LAMBO propose que l'OACI prenne la responsabilité de l'analyse. Il la transportera au Bureau régional à Nairobi et l'OACI pourra la confier à une entreprise spécialisé pour le décryptage. Il a été convenu entre les deux partie que le decryptage sera confié à Boeng industri.

La partie Ethiopienne proposa la composition de trois sous-commissions et demandant à la partie Comorienne de désigner un représentant Comoriens à chaque sous-commissions. Ce qui a provoqué une vie protestation de la part de la partie Comorienne, cette dernière faisant référence au document 6920 de l'OACI, Le représentant de l'OACI proposa une pause d'une heure de temps afin que chaque partie puisse se concerter.

Après que Monsieur LAMBO ait téléphoné au Bureau Régional de l'OACI à Nairobi, la séance a repris à 13h00mn.

La Commission a pris connaissance avec satisfaction des entretiens que MR. LAMBO a eu avec MR. Baliddawa, et a été informé que l'OACI désignera un observateur durant le déroulement de l'enquête.

.../...

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Le représentant de l'assurance informa l'assistance que l'AABI offrira le contenair pour le transport des boites noirs à condition que le décryptage se fasse à LONDRES.

Ce qui fut accepté par toutes les parties concernées.

Aussi il souhaite que l'épave soit déplacé le plus vite possibles.

La Commission a examiné le projet de memorandum présenté par la partie Ethiopienne sur les pouvoirs que la partie Comorienne peut déléguer à la partie Ethiopienne conformément au paragraphe 5.1 de l'annexe 13 de l'OACI. Il a été décidé d'inclure une clause sur l'observateur de l'OACI.

La partie Comorienne a rappelé que durant le déroulement de l'enquête aux Comores, la participation des Comoriens ne sera pas limitatifs.

Il a été décidé de continuer l'enquête ouvert par la partie Comorienne et proceder au rassemblement des documents ci-après :

- 1) Photographes et film de l'accident
- 2) Cartes aéronautiques (AIP)
- 3) Renseignements météorologiques avant, pendant et après le crash.
- 4) Enregistrement des Communications avec la tour
- 5) Documents nécessaires à la préparation du Vol.
- 6) Temoignages
- 7) Rapports médicaux des blessés et des morts
- 8) Coordonnées géographique

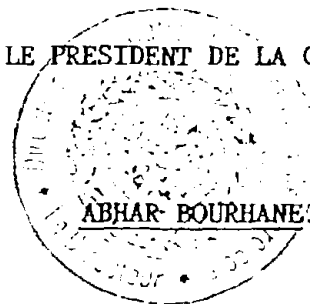
ect.....

Au nom de l'OACI, Mr; LAMBO s'est déclaré satisfait du déroulement réussi des travaux pour arriver à une telle conclusion et a exprimé sa gratitude à tous les participants de leur collaboration.

MR.ABHAR BOURHANE, a remercié Mr; LAMBO, la partie Ethiopienne, l'assureur et tous ceux qui ont contribué à l'adoption de cette memorandum.

La Séance et levée à 16h30mn.

LE PRESIDENT DE LA COMMISSION



Liste des participants aux différentes réunions

Noms et Prénoms	Fonctions et adresses
H. J. THOMSON	Représentant Lloyd Réunion
ABASSY BINY ANASSY	Chef Service Navigation Aérienne(DGACM)
ABHAR BOURHANE	Directeur GI Aviation Civile
ALI ABOUDOU MOHAMED	Directeur GI Adjoint Aviation Civile
SAID NAFFION ZARCACHE	Directeur Transport Aérien
TEFERA ALEME	Autorité Aviation Civile Ethiopie
WOLDETNSAY WIMELAK	Ethiopian Airlines
ALEMAYEHU ASFAW	Ethiopian Airlines
YOUSSEUFA OUMARA	Chef de la PAF
Lt ALY M'BAY	Gendarmerie
Cpt FAKRIDINE MAHAMOUD	Gendarmerie
ROGER LAMBO	OACI / ICAO
MESFIN FIKRU	Autorité Aviation civile Ethiopie
AHMED KELLOW	Directeur GI Ethiopian Airlines
BOB DUKE	Lloyd's Aviation Londres
BOURHANE AHMED	Mécanicien avion
MAHAMOUD ALI BAY	Météorologiste

MEMORANDUM D'ENTENTE
ENTRE
LA DIRECTION GENERALE
DE L'AVIATION CIVILE DES COMORES
ET
L'AUTORITE DE L'AVIATION
CIVILE ETHIOPIENNE

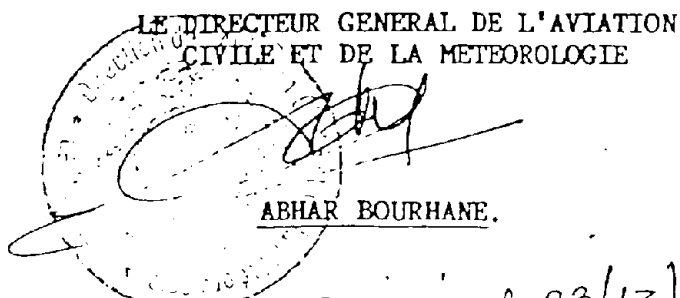
Considérant l'accident survenu le 23 Novembre 1996 aux Iles Comores, sur le Boeing 767,200 avion immatriculé ET-AIZ, d'Ethiopian Airlines, la République Fédérale Islamique des Comores, en sa qualité d'Etat d'occurrence (où l'événement a eu lieu) a procédé par la mise en oeuvre d'une commission d'Enquête et a ouvert une enquête accident conformément à l'annexe 13 relative à la convention de Chicago.

La Direction Générale de l'Aviation Civile aux Comores Etat d'occurrence (où l'accident s'est produit) et l'Autorité de l'Aviation Civile Ethiopienne (Etat d'immatriculation de l'Aéronef) souhaitent faciliter l'enquête de l'accident par ce présent Mémoire d'Entente.

Il est convenu de ce qui suit :

- 1 - L'autorité de l'Aviation Civile Ethiopienne (Etat d'immatriculation) reconnaît l'institution de la Commission d'Enquête accident aux Comores (Etat où l'accident a eu lieu).
- 2 - La Commission d'Enquête de l' Etat d'occurrence (où l'accident a eu lieu) délègue en totalité, la conduite de l'enquête à l'Etat d'immatriculation conformément à l'annexe 13.
- 3 - L'autorité de l'Aviation Civile Ethiopienne inclura et assurera que la participation des spécialistes fournis par la Direction Générale de l'Aviation Civile des Comores sera active dans la conduite de l'enquête.
- 4 - L'Enregistreur de voix en cabine de Commande (cockpit) (CVR) et l'enregistreur digital de données en vol (DFDR) seront mis à la disposition de l'OACI en attendant la désignation d'un Enquêteur Principal.
- 5 - Selon la nécessité accordée par l'Enquêteur Principal, l'enquête sera menée à Addis-Abeba et aux COMORES.
- 6 - Un observateur indépendant de l'OACI doit être désigné comme convenu.
- 7 - L'organigramme de l'enquête est ci-annexé.

Fait à Moroni, le 3 Décembre 1996



02/12/1996/519

MEMORANDUM OF UNDERSTANDING BETWEEN DIRECTION GENERALE DE
L'AVIATION CIVILE
OF THE COMOROS AND THE ETHIOPIAN CIVIL AVIATION AUTHORITY

WHEREAS

Following the accident of 23 November 1996 in the Comoros Islands to the Boeing 767--260 aircraft registration ET-AIZ, of Ethiopian Airlines the Republique Federale Islamique des Comores, (as the State of Occurrence), through the establishment of a Commission of Enquiry) has instituted an accident investigation, in accordance with Annex 13 to the Chicago Convention.

The Direction General de l'Aviation Civile of Comoros (the State of Occurrence) and the Civil Aviation Authority of Ethiopia (the State of Registry) wish to facilitate the investigation into the accident by entering into this Memorandum of Understanding.

IT IS NOW AGREED AS FOLLOWS

1. The Civil Aviation Authority of Ethiopia (the State of Registry) recognises the institution of the Commission of Enquiry in Comoros (the State of Occurrence).
2. The Commission of Enquiry of the State of Occurrence delegates the whole of the investigation to the State of Registry in accordance with Annex 13.
3. The Ethiopian Civil Aviation Authority will include and ensure the active participation of the specialists provided by the Direction Generale de l'Aviation Civile of Comoros in the investigation.
4. The CVR and DFDR will be placed at the disposal of ICAO pending the appointment of the investigator-in-charge.
5. As deemed necessary by the investigator-in-charge the investigation shall be conducted in Addis Abeba and the Comoros.
6. That an independent ICAO observer be appointed as applicable.
7. Preliminary heads of areas of investigation are annexed hereto.

Made in Moroni, 3rd December, 1996

Directeur General de l'Aviation
Civile et Meteorologie des Comores

ABHAR BOURHANE

Director Ethiopian Civil Aviation
Authority



B. MESHERA
MESHERA BEAUNEH
GENERAL MANAGER

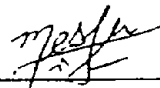
2. *AFTN messages concerning the subject accident.*
3. *Audio communication on certified logging cassette which will be copied to ordinary cassette, this will be done by Comoros investigation team.*
4. *Report on rescue operation.*
5. *Witness report (in French) and sketch of the beach.*
6. *Medical reports from two hospitals (Mitsamiouli & El Maarouf) (in French).*
7. *Dead body pictures.*
8. *Metreological reports.*
9. *Three video cassette recordings for the subject accident (to be copied and returned).*

According to ICAO Annex13, the sole objective of the investigation of an accident shall be the prevention of accidents. It is not the purpose of this activity to apportion blame or liability.

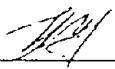
After thorough discussion about the investigation the committee members agreed to the following recommendations.

- Each committee members should do his assigned duty and present the result to the investigator in charge.
- The investigator in charge shall prepare the draft report to be submitted to the committee for comment and suggestion.
- The flight crew and cabin crew members to be released after extensive medical and psychotherapy treatment and the appropriate proficiency check.

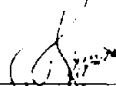
- The committee gave full mandate to the investigator - in - charge to arrange the translation from the French version to the English version in co-operation with the Comoros investigation team.
- The Comoros investigation team will come back to Addis to finalize the analysis and approve the final report, when informed by the investigator-in-charge.



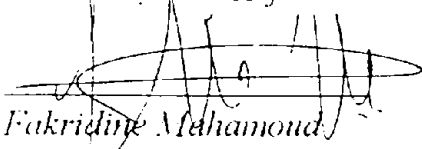
Mesfin Fikru



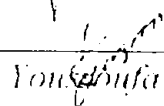
Tefera Haile



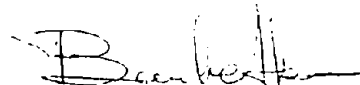
Alemayehu Asfaw



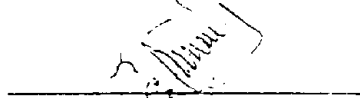
Fakridine Mahamoud



Youssoufa Oumara



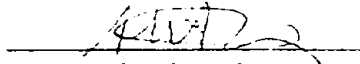
Berhanu Aberra



Anzi Mohamed Saadi



Said Naffion



Ali Aboudou