



FEDERATION OF RHODESIA AND  
NYASALAND

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REPORT  
of the  
COMMISSION  
on the  
ACCIDENT INVOLVING  
AIRCRAFT SE-BDY

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*Presented to the Federal Assembly*  
1962

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SALISBURY

REPORT  
of the  
COMMISSION  
on the  
ACCIDENT INVOLVING  
AIRCRAFT SE-BDY

**REPORT OF THE COMMISSION TO INQUIRE INTO  
THE ACCIDENT INVOLVING AIRCRAFT SE-BDY**

To HIS EXCELLENCY SIMON, EARL OF DALHOUSIE, Knight Grand Cross of the Most Excellent Order of the British Empire, upon whom has been conferred the Decoration of the Military Cross, Governor-General and Commander-in-Chief in and over the Federation of Rhodesia and Nyasaland.

May it please Your Excellency,

We, the Commissioners appointed by Your Excellency in terms of the Federal Commissions of Inquiry Act, 1955, have the honour to submit our report. Our report is unanimous.

We were directed to inquire into:

“The cause or causes of and circumstances surrounding the accident involving aircraft SE-BDY near Ndola during the night of the 17th September, 1961, including any matter or circumstances relating to the preparation for and flight of the aircraft, the accident, the deaths of the occupants, and the conduct of any person or authority concerned before, during and after the accident.”

**PROCEDURE**

Before entering on our inquiry we caused to be given in newspapers of the Federation and to be broadcast by the Federal Broadcasting Corporation notification that the inquiry would be held, coupled with a request that persons who might have any information to give to the Commission would do so. The Board of Inquiry appointed under the Federal Aviation Act had before given very extensive advertisement of its presence and its desire that anyone who had any information to give should come forward. We also sent a request to the Chairman of a Commission of Inquiry appointed by the United Nations Organization asking him to notify us of any facts which he thought might assist us. We, for our part, and the Federal Government before and during our inquiry have made available to that Commission all known information. At the end of our public sessions a reply was received to our request which indicated that that Commission had no further information.

Evidence was led on behalf of the Commission by Mr. F. G. Cooke of the Government Solicitor's Department. Counsel who appeared were:

Mr. Roland Adams, Q.C., on behalf of the Swedish Government to have a general care for the interests of the Swedish persons, whether individuals or companies, who might be concerned in the matter and who were not separately represented.

Mr. Geoffrey Lawrence, Q.C., with him Mr. P. J. Stuart Bevan on behalf of Her Majesty's Government in the United Kingdom.

Mr. C. S. Margo, Q.C., with him Mr. R. H. Streeten on behalf of the Federal Government and the Federal Department of Civil Aviation.

Dr. R. H. Mankiewicz appeared before the Commission to represent the United Nations.

Evidence was given before the Commission in public at hearings at Ndola from 16th - 20th January and Salisbury from 22nd - 29th January. The evidence was given on oath or under affirmation, but there were two witnesses who could not be brought before us and earlier statements by those witnesses were admitted. One technical report was also received without evidence.

The procedure adopted in regard to the hearing of the evidence was that the evidence was led on behalf of the Commission by Mr. Cooke. Then all Counsel, in an order determined in each case by themselves, asked whatever questions they wished. Then the Commissioners asked questions. Counsel were not limited in any way in their questioning, and were allowed to question the witness again if further matters occurred to them as a result of other questioning. Witnesses were recalled when that was suggested. At the start of the Commission, Counsel were informed that if they thought that any person who had not been called should be called they had only to tell the Commission and the person would be called if possible. No such request was made.

At the conclusion of the evidence we had the advantage of addresses by Counsel on the issues and evidence.

We must express our very great appreciation of the assistance we got from the earlier inquiry which had been held by the Board of Inquiry. That Board had

obtained statements from more than 130 persons, and the statements were available to us. We called as witnesses all those whose evidence we thought was relevant. In addition some persons came forward on their own initiative to give evidence to assist us. We heard evidence from 120 witnesses. The record of the evidence contains over 750 typed pages. In addition several lengthy technical reports were before us.

We inspected the scene of the crash from the air and on the ground. We inspected the Control Tower at Ndola Airport. And we inspected the wreckage of the aircraft SE-BDY which had all been collected into a hangar at Ndola.

## FORM OF THE REPORT

The report is divided into the following parts:

- Part 1. Introduction.  
Crew and Passengers.
- Part 2. Geography and Navigating Aids.
- Part 3. The Weather.
- Part 4. Planning and Preparation for the Flight.
- Part 5. Conduct of the Flight.
- Part 6. The Accident.
- Part 7. Examination of the Scene and Wreckage.
- Part 8. Causes of Death of the Occupants of the Aircraft.
- Part 9. Alerting, Search and Rescue Action.
- Part 10. Causes of the Accident.
- Part 11. Conduct of Persons and Authorities after Accident.

- Appendices 1. Examination of Eye-witnesses' Statements.
- 2. List of Witnesses.
- 3. Map of Countries and Routes.
- 4. Map of Ndola and Country to Crash Area.
- 5. Photographs of Crash Site.
- 6. Wreckage Plan.
- 7. Enlarged Portion of Wreckage Plan.

### Times

Throughout the report times are given as Greenwich Mean Time. The local time at Leopoldville is one hour in advance of G.M.T. The local time in the Federation is two hours ahead of G.M.T. Where there is need to refer to the date in September it is set out.

### Abbreviations

The following abbreviations are used:

- A.T.C. Air Traffic Controller.
- C.A.S.O. Civil Air Search Officer.
- E.T.A. Estimated Time of Arrival.
- F.I.C. Flight Information Centre.
- F.I.R. Flight Information Region.
- F.L. Flight Level.
- M. Magnetic.
- N.D.B. Non-directional Radio Beacon.
- N.R.P. Northern Rhodesia Police.
- Q.D.M. "Q" Code symbol for the bearing to be steered in zero wind to reach the radio station concerned.
- Q.F.E. "Q" Code symbol for the pressure setting to be set on an altimeter for it to read zero on landing.
- Q.N.H. "Q" Code symbol for the pressure setting to be set on an altimeter for it to read the aerodrome height on landing, above mean sea level.
- R.C.C. Rescue Co-ordination Centre.
- R.R.A.F. Royal Rhodesian Air Force.
- T. True.
- V.H.F. Very High Frequency.

## PART 1

### Introduction. Crew and Passengers

A Swedish aircraft company, Transair Sweden A.B., in September 1961 was operating in the Congo Republic from Leopoldville under charter to the United Nations. It owned a Douglas D.C.6B, an aircraft powered by four Pratt & Whitney engines. This aircraft had been bought second-hand by Transair, and delivery of it was taken in the United States of America. It was flown from there to Leopoldville. Its registration letters were SE-BDY.

On the 17th September, 1961, this aircraft flew from Leopoldville to Ndola in the Federation of Rhodesia and Nyasaland. It carried the Secretary-General of the United Nations Organization, Mr. Dag Hammarskjold. After reaching Ndola it crashed in the bush to the west of Ndola Airport.

The crew of the aircraft consisted of three pilots, a radio operator and a flight engineer. The pilot in command was Captain P. B. Hallonquist. He had flown for a little under 8,000 hours, including some 1,350 hours on the D.C.6 and D.C.6B types. He was a skilled navigator. His age was 35. The co-pilot was First Officer L. O. Litton. His flying hours were about 2,700, including 720 hours in these types. His age was 29. The reserve captain was Captain N. Ahreus with total flying hours of over 7,100, including 860 hours on these types. His age was 32. The flight engineer was Mr. N. Wilhelmsson, aged 27, with some 1,370 hours in the air on these types. Mr. C. E. B. Rosen was flying as the radio operator as it was anticipated that Mr. Hammarskjold might need long-range communication.

In addition to Mr. Hammarskjold there were ten other passengers: Mr. S. Barrau, Mr. F. Eivers, Mr. V. Fabry, Sergeant S. O. Hjelte, Sergeant H. Julian, Miss A. Lalande, Mr. H. Noork, Private P. E. Persson, Mr. W. Ranallo and Mr. H. Weischhoff.

All the crew and passengers died as a result of the accident.

## PART 2

### Geography and Navigating Aids

#### A. Geography

The town with which this report is mainly concerned is Ndola. Its general situation is shown in the map, Appendix 3. The direct distances by air from Ndola are to Leopoldville 970 nautical miles, to Elisabethville 115 nautical miles, to Kolwezi 230 nautical miles, to Lusaka 147 nautical miles and to Salisbury 333 nautical miles.

Ndola is a town of some size with substantial buildings and street lighting. Mufulira is a town connected with a copper mine which lies to the north-west of Ndola, 38 miles away by tarred road. Most of the country around Ndola, and between Ndola and Mufulira, is thick forest country, known locally as bush, and many parts of this forest are forest reserves. It was in one of these forest reserves that the aircraft crashed. The trees are hardwood trees, growing up to some 35 feet in height, mostly of a diameter of eight to ten inches but some of them of a diameter of up to two feet. They grow from five to ten feet away from each other. In this bush grass grows under the trees; in the month of September it is some eight inches high. In the bush there are areas in which very few trees grow. These are the areas which in the rainy season are swampy. The nature of the bush appears in the photographs, Appendix 5, and the amount of bush is indicated on the map, Appendix 4. September is in the dry season of the year and the trees and the grass under them easily catch fire. In that month it is usual to have many bush fires.

Ndola Airport has been a recognized airport for many years. It has a runway which can be used by all aircraft except large modern jet aircraft. Its runway is 4,160 feet above sea level. The surrounding country on the whole is flat, but there are some small hills in the vicinity. Between the runway and the place of the crash,  $9\frac{1}{2}$  miles away on a true bearing of  $280^\circ$ , there is no significant change in the country. The land at the place of the crash is 4,300 feet above sea level. It

then falls to 4,200 feet, rises again to a height which, from a very low altitude, would obscure the airport lights, and then falls gently to the runway.

Ndola, which is also mentioned, is an airfield some six miles from the Ndjili Airport at Leopoldville. It was closed for use by large aircraft in 1959. Its height above sea level is 951 feet. The runway at Leopoldville is at 1,027 feet, and that at Elisabethville at 4,187 feet above sea level.

The situation of Kolwezi, Abercorn and Kasama is shown on the map, Appendix 3.

#### **B. Navigating Aids**

Non-directional radio beacons existed at Ndola, Abercorn and Kasama. That at Ndola was in operation at all relevant times. Those at Abercorn and Kasama were switched off at 1600 (6 p.m.) as there had been no request to keep them open and it was then dark. It was not known in Salisbury that the aircraft would be on a route anywhere near Abercorn and Kasama until 2040.

All ordinary means of communication existed for communication between the aircraft and Salisbury and Ndola and these were effective until the aircraft reached Ndola and ceased to communicate. There was telex connexion between Ndola and Salisbury which was working throughout the night. Normal communication with Leopoldville was from Ndola through Salisbury and from Salisbury through Johannesburg. Ndola succeeded in making direct radio contact with Leopoldville on the 18th in a search for news.

### PART 3

## The Weather

The last routine weather observation taken prior to the accident was made by the Meteorological Officer on duty at Ndola at 1900 on 17th September, which indicated that the weather was fine with slight haze and no cloud. Visibility was five miles and surface wind 110°M., speed 10 knots.

At 2137, thirty-six minutes before the accident, the Ndola Air Traffic Control transmitted to aircraft SE-BDY the following weather information obtained from instruments in the Tower. Surface wind 12°M., speed 7 knots Q.N.H. 1021 mbs., Q.F.E. 877 mbs. From visual reference the Air Traffic Control also transmitted the visibility as 5 - 10 miles with slight smoke haze.

The Q.N.H. was again checked by the aircraft with Air Traffic Control at 2210 and a confirmation of 1021 mbs. given.

The Q.N.H. and Q.F.E. were later confirmed by the autographic record for 2200 on 17th September. Moonset on 17th September was 2224, first light on 18th September 0340 hours, and sunrise at 0400 hours.

### PART 4

## Planning and Preparation for the Flight

The United Nations Organization at Leopoldville, Congo, had from time to time chartered aircraft belonging to Transair and on Sunday, 17th September, 1961, were requested to provide a D.C.6B aircraft to fly the Secretary-General, the late Mr. Dag Hammarskjold, and party to Ndola on that day. The purpose of the journey to Ndola was a meeting between Mr. Dag Hammarskjold and President Moise Tshombe. As part of the arrangements of the meeting, a D.C.4 aircraft, the property of a Belgian company and registered OO-RIC, was to take off ahead of SE-BDY, carrying Lord Lansdowne and party to Ndola. Lord Lansdowne was to take off from Ndola for Salisbury before the arrival of Mr. Hammarskjold.

Security measures were taken at Leopoldville before departure to make it appear that OO-RIC was actually carrying the Secretary-General and, apart from

the crew, few knew of the plans to use SE-BDY, and no one except the crew of SE-BDY appeared to have any knowledge of the proposed route or flight levels that were to be used.

Witnesses testified that, in discussions with Captain Hallonquist, he made known his decision not to file a flight plan and to maintain radio silence throughout the flight for security reasons. On a suggestion by the Air Traffic Control Officer, Leopoldville, Captain Hallonquist filed a departure plan for destination Luluabourg.

No evidence could be found that any briefing was carried out at Leopoldville by the crew of this flight before departure.

There is no evidence that special security arrangements for SE-BDY were arranged and it was therefore left unguarded for two or three hours before departure. The main doors had been locked and the ladders removed.

Lord Lansdowne in OO-RIC did not take off until 1504 and the departure of the Secretary-General was thereby delayed until 1551. After taking off and clearing Leopoldville Tower frequency, radio silence was apparently maintained until SE-BDY called Salisbury F.I.C. at 2002, while still outside that F.I.R., requesting information on E.T.A. of aircraft OO-RIC.

Meanwhile OO-RIC had flown to Ndola via Villa Henrique de Carvalho (*see* Appendix 3) in full radio contact and with navigation lights on throughout the flight. A normal flight plan was filed and departure signal made. It arrived at Ndola at 2035 without incident.

The aircraft SE-BDY had been damaged by bullets fired at it from the ground at Elisabethville on the morning of 17th September. After a most careful search the only damage found was to an exhaust stub on one of the engines. This damage was repaired and routine pre-flight checks were carried out and the fuel and oil tanks filled. The fuel on board was sufficient to give the aircraft an endurance of approximately 13 hours. From the evidence submitted the Commission is satisfied that all the required inspections had been carried out and all the modifications prescribed by the manufacturers and the Swedish Aviation Authorities had been put into effect, and that the aircraft was serviceable when it left Leopoldville.

## PART 5

### Conduct of the Flight

The information available to permit a reasonable reconstruction of the flight of SE-BDY is vague and incomplete. From the time of departure from Leopoldville at 1551 no further communication was recorded with the aircraft until it called Salisbury F.I.C. at 2002. On request from Salisbury F.I.C., aircraft SE-BDY gave its destination as Ndola, aircraft Type D.C.6, E.T.A. Ndola at 2235 and place of departure Leopoldville. At 2040 the aircraft reported to Salisbury F.I.C. that it was over Lake Tanganyika at 2035 and was flying on advisory route 432 at 17,500 feet to avoid Congolese territory. At 2049 the arrival time of OO-RIC at Ndola was passed to the aircraft and at 2108 the aircraft reported abeam Kasama at 2106, estimate abeam Ndola at 2147 and requested permission to descend to 16,000 feet. Permission was given. At 2115 SE-BDY was asked its intentions on arrival Ndola but apart from saying it was intended to take off almost immediately no other information was given. At 2132 Salisbury F.I.C. instructed the aircraft to contact Ndola on V.H.F. 119-1. Radio contact was made with Ndola Tower at 2135 when the aircraft gave its E.T.A. Ndola as 2220 hours. Its actual arrival over Ndola Airport was 2210.

There must be some conjecture in any attempt to reconstruct the flight or what should be considered as the most likely route followed by the aircraft. (*See* Appendix 3.) This will be particularly true for the portion of the flight between Leopoldville and the point where the position report was made at 2035. The flight plan to Luluabourg indicated that the initial cruising altitude should have been 13,500 feet (FL 135), but at 2035 the aircraft reported cruising at 17,500 feet (FL 175). Since there is no indication of the timing of the climb from FL 135 to FL 175, this part of the flight has been computed as if the climb to FL 175 was made immediately after take-off from Leopoldville. It has also been assumed the climb was made in still air at a true air speed of 184 knots. This climb should then have taken about 35 minutes and should have covered about 108 nautical miles over the ground. The only upper wind information available for FL 175 covers



that portion of the probable route from reporting position 432B to Ndola Airport. During this period of the flight this wind is believed to have been 070° - 100° (T) at 10 to 15 knots. For computing purposes a wind of 085° (T) at 15 knots has been used for the portion of the flight from 432B to Ndola Airport. For the portion of the flight Leopoldville to reporting point 432B the wind was weaker and from the east; a wind speed of 5 to 6 knots has been used as the average for this purpose.

The most likely route followed by SE-BDY between Leopoldville and reporting point 432B was direct to an approximate position 04°35' south, 29°25' east, then down Lake Tanganyika to reporting position 432B.

The computation for the portion of the route that is most likely to have been followed after 432B has been made in reverse, i.e. starting from the time over Ndola Airport at 2210. At 2147 the aircraft reported abeam Ndola. This was 23 minutes before arriving over Ndola. A bearing (Q.D.M. 279) taken at the time of this report indicates that the aircraft was then due east of Ndola Airport. Assuming the aircraft travelled at an average ground speed of 255 knots (240 true air speed plus 15 knot tail wind component) from where it was at 2147 until it reached Ndola, it would be logical to conclude that the aircraft was then 98 nautical miles from Ndola over position 13°00' south, 30°19' east. The distance from abeam Kasama to the assumed position when the aircraft reported at 2147 is 170 nautical miles. The elapsed time for this portion of the flight was 41 minutes. This indicates a ground speed of 248 knots which would appear reasonably consistent with known and assumed circumstances. The distance from abeam Kasama to reporting point 432B (on a direct line from 432B to position assumed at 2147) is 150 nautical miles. This portion of the flight took 31 minutes and indicates that the ground speed would have been 290 knots. This ground speed is not consistent with the other section of the flight and in view of reported wind conditions appears to be unlikely. Since the ground speed south of the point abeam Kasama appears reasonable and consistent, the computed ground speed of 290 knots would appear to suggest that the aircraft covered a shorter distance than 150 nautical miles between 2035 and 2106, and was probably 22 nautical miles to the south or south-east of 432B when it reported as being over this reporting point.

The total distance covered was approximately 1504 nautical miles. OO-RIC, on the route it took, covered 973 nautical miles.

It is clear that the captain was prepared to accept lower safety standards in certain respects for the sake of security. He flew over a large distance in Africa without any person, other than the crew, knowing what his route or intentions were; he did not take the precaution of filing a proper flight plan or even a proper passenger manifest; he undertook the flight in conditions of radio silence and with no apparent information on the weather conditions en route; he did not avail himself of navigation aids en route which would have been available on request; he did not report his presence on the Nairobi F.I.R.

We express no opinion on whether security measures justified these actions.

## PART 6

# The Accident

Following the radio contact by SE-BDY with the Ndola Tower at 2135, Ndola gave the aircraft at 2137 the weather, Q.N.H. and Q.F.E. settings and asked what time it wished to commence its descent. At 2138 SE-BDY requested descent clearance at 2157 and was given permission by the Tower to descend to 6,000 feet on Q.N.H., and to report top of descent. At 2147 the aircraft reported abeam Ndola and at 2210 reported "lights in sight, overhead Ndola descending, confirm Q.N.H." This was done and the aircraft was also asked to report reaching 6,000 feet.

It would seem that the aircraft started its descent at 2157 and was 6,000 feet when overhead Ndola and the aircraft's reference to "descending" at that time may well have related to the descent below 6,000 feet. Although requested to inform the Control Tower on reaching 6,000 feet no such report was received and no further radio communication was received from the aircraft.

At approximately 2210 an aircraft was heard and observed over the airport by a number of witnesses, none of whom noticed anything unusual in its flight. Estimates of height varied among witnesses, one indicating he thought it was flying

higher than usual, while two thought it lower than usual for an aircraft approaching to the airport. Several considered it was flying at the average height.

The Commission considers that the evidence shows the aircraft to have approached at approximately the correct height above the airport in order to commence its landing approach (6,000 feet above mean sea level—1,840 feet above aerodrome level). It flew towards the Ndola non-directional radio beacon situated 2.5 miles west of the airport. It was reported by witnesses to appear to be lower than normal over the beacon area and beyond. Runway lights and high intensity approach lighting (set at maximum) were on at all times.

The evidence led enables us to time the crash at 2213. It is, we think, established by the watches recovered from the wreckage which we feel justified in assuming stopped at the time of impact. The evidence which established the appearance of a flash or glow in the sky at a point in the general direction the aircraft appeared to the witnesses to be flying when last seen is also consistent with this time.

The wreckage of the aircraft was located early in the afternoon of the 18th September, 9½ miles from Ndola Airport on a bearing of 280° T. The aircraft hit trees at an altitude of 4,357 feet above sea level at a shallow angle when slightly turning to the left at normal approach speed. The swath cut in the trees gave a clear indication of the heading of the aircraft.

## PART 7

### Examination of the Scene and Wreckage

From the time that the Northern Rhodesia Police arrived at the scene of the crash no unauthorized person was allowed to enter the area. It was cordoned off as soon as could be, and when night came lights were installed to exercise control. On the first afternoon and evening bodies, and papers which were lying about, in case there were secret documents, were removed. Sergeant Julian was taken to hospital.

The Investigating Board of Inquiry was made up of the Director of Civil Aviation, Lieutenant-Colonel M. C. H. Barber, D.F.C., Group-Captain J. Blanchard-Sims, A.F.R.Ae.S., who is Senior Operations Officer, Department of Civil Aviation, Mr M. Madders, A.F.R.Ae.S., who is Chief Inspector of Aircraft, and Wing-Commander E. Evans, who is Air Adviser to the British High Commissioner in the Federation. Representatives from Sweden—the State of Registry, the International Civil Aviation Organization on behalf of United Nations, the International Federation of Airline Pilots Associations, and Transair—the operators of the aircraft, were invited to participate in the investigation. These persons were:—

#### *Accredited Representatives:*

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| Mr. E. A. Landin . . . . .     | Inspector of Civil Aviation, Royal Swedish Board of Civil Aviation. |
| Mr. J. P. Fournier . . . . .   | International Civil Aviation Organization/United Nations.           |
| Captain A. G. McAfee . . . . . | International Federation of Airline Pilots Associations.            |

#### *Technical Advisers:*

To Mr. Landin:

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| Dr. E. Bratt . . . . .         | Minister for Sweden to the Republic of South Africa.  |
| Mr. T. Nylen, LL.M. . . . .    | Legal Adviser, Royal Swedish Board of Civil Aviation.   |
| Mr. N. E. L. Lindman . . . . . | Temporarily attached to the Royal Swedish Board of Civil Aviation, as Senior Inspector of Aircraft. |
| Mr. O. Danielsson . . . . .    | Superintendent, Swedish Criminal State Police.  |

Mr. N. Landin, M.Sc. . . . . Assistant Director of the Swedish National Institute of Technical Police.

Mr. A. W. Jansson . . . . . Temporarily attached to the Royal Swedish Board of Civil Aviation, as Inspector of Aircraft.

To Mr. Fournier:

Mr. T. R. Nelson, A.F.R.Ae.S., International Civil Aviation Organization/  
M.C.A.I. . . . . United Nations.

On behalf of Transair Sweden, A.B.,  
the owners and operators of the aircraft:

Captain S. Persson . . . . . Director of Flight Operations, Transair Sweden, A.B.

Mr. B. Virving . . . . . Chief Engineer, Transair Sweden, A.B.

Mr. C. G. Hellberg . . . . . Chief Flight Engineer, Transair Sweden, A.B.

The examination of the scene and of the wreckage on the scene, the removal of the wreckage to a hangar at Ndola, the examination of the wreckage in the hangar, and specialist examination of parts of the wreckage were all carried out. There were detailed reports of every stage of the examination by those concerned. A wreckage plan, Appendix 6, and an enlarged wreckage plan of the area of the main part of the wreckage, Appendix 7, both showing the position of bodies, were prepared. These we have found of the greatest assistance in our inquiry.

An accurate survey of the scene of the wreckage, with measurement of the heights of the trees where they were damaged, shows clearly that the aircraft hit the trees at a normal angle of descent. There were no holes in the ground or scars in the ground to indicate steep descent. The measurement from the first tree damage to an anthill which the aircraft struck, and from which it cartwheeled to rest, shows an overall angle of 5° of descent. It is clear that with damage to the aircraft and loss of speed this angle must have been slighter initially. So that it can confidently be said that the trees were hit when the aircraft was descending at an angle of descent of less than 5°.

The total length of the wreckage trail from where the trees were first hit was 800 feet. There was no sign of fire at all except in the last 400 feet. The main area of incineration was in the last 80 feet. The fire backwards on the trail from that area was probably caused by flash-back of fuel on explosion and by burning grass.

We do not propose to discuss in detail the position of the wreckage or bodies. There was nothing significant in the position of bodies or wreckage, except that the nose wheel doors were found in the expected position if torn off on impact, and that four bodies were found with safety belts fastened. The presence of landing manuals at the scene is discussed later.

From the examination of wreckage in the hangar the following important matters emerge. The engines were under power at the time of the crash. The landing gear was all fully lowered and in the locked position. There was strong indication from the way in which the flap control quadrant was bent around its lever that there was 30° of flap at the time of impact.

Nothing was found to indicate that any of the controls were not operating before the accident. From the nature of the fire it was obvious that there was plenty of fuel.

Examination of the wireless equipment showed no apparent pre-accident failure.

The altimeters, three of which were on panels and two of which were spares, were sent to the United States of America for examination by the Civil Aeronautics Board and the manufacturers. Nothing was found to indicate that they were not operating properly before the crash. The barometric settings on the three instruments which were in use corresponded approximately to the setting given to the aircraft by the Controller at Ndola.

At the scene of the crash, in the wreckage, and from the bodies, a total of 201 live rounds, 342 bullets, and 362 cartridge cases were recovered. All were of calibre corresponding to weapons which were in the aircraft. No bullet showed any sign of

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having passed through a rifled barrel. Very careful examination of the wreckage was made to try to discover any sign of having been hit by a bullet or other projectile. Eventually only one suspect hole was put before us. It was of a size too small to have permitted passage of a 7.62 mm. bullet. Microscopic examination showed no presence of any metal foreign to the adjoining metal. The Board of Inquiry decided not to have a spectrographic examination made as the article still had to come before this Commission and the United Nations Commission. We consider that that decision was proper. We thought that it was important that spectrographic examination should be made. It disclosed no sign whatever that a bullet had come into contact with the metal. There were traces of cadmium, chromium and zinc and lead. Cadmium and chromium are metals associated with the plating of bolts, which gives some indication that the hole might have been caused by the tearing out of a small bolt. Bullets are not zinc or lead covered.

II The plastic radar nose cone when first found did not show signs of penetration by any projectile.

III The one possible examination which was not made was to remelt all the fused metal recovered from the place of fire, some 5 tons in weight, in order to see whether any projectile could be found. It had all been broken by hammer and steam hammer into pieces about 8 inches square and a few inches thick. In it there were many objects such as bolts. It tended to break where these objects lay. We were informed that at an early stage of the Board's inquiry a suggestion was made by Swedish representatives that further examination should be made. The Board decided not to do that, but broke up all the fused metal in the manner described. In the course of the hearing it was suggested to us that this examination should now be made, but the request was not persisted in in the final address. We considered carefully whether the melting of all this wreckage was justified, and decided that it was not.

IV Apart from examination of the actual scene of the crash a search was made of a large area back from the scene of the crash in the bush over which the aircraft must have come before the crash. The extent of this search is shown in Appendix 4, and it covered an area of some 2 miles by 1½ miles. Some 180 men were engaged in the search. Nothing which might have come from the aircraft was discovered. There was no sign of fire in the area.

## PART 8

### Causes of Death of the Occupants of the Aircraft

Very careful post-mortem examinations were carried out on all the bodies. When the aircraft was found all the crew and all the passengers except Sergeant Julian were dead. Of the other fifteen occupants of the aircraft, nine sustained such injuries, apart from burning, as to indicate that they were killed in the crash. Included in these was Mr. Hammarskjöld. He had been thrown clear of the aircraft and out of the area of the fire. The medical evidence is that he must have died instantaneously. Three of the bodies were too badly burnt to assess their injuries. In three bodies no lethal injuries apart from burns were discovered. The position of these other bodies in the wreckage, and the fact that they were not able, as was Sergeant Julian, to escape from the wreckage gives strong indication that if they were not killed by impact they were at least rendered unconscious, and so unable to escape.

Sergeant Julian had a compound fracture of one ankle. He said that he ran from the wreckage. That is improbable; he probably had to crawl. He died as a result of burns, caused by the fire, and aggravated by exposure to the sun in some ten hours of daylight during which he lay exposed. The total area involved in the burns was over 55 per cent. of the body surface. There was a possibility that but for this exposure, and exposure for six hours in the night, in a shocked condition, his life might have been saved. All was done for him that could be done after he reached the hospital. He developed renal failure and died in uremia.

Carboxyhaemoglobin estimations were made for twelve of the bodies including all three pilots. In three bodies the estimation was 7 per cent., in one 5 per cent., in one 2 per cent., and in seven bodies nil. Both in the flight deck, and in the cabin, there were persons with and without carboxyhaemoglobin percentages.

There were no signs of alcohol in the organs of the pilots which were examined.

Evidence of fastened seat belts was to be seen on six bodies. This was confirmed in regard to four bodies by what was seen at the place of the crash.

Bullets were found in the bodies of the two soldiers who were in the fire. They had been seen at the time of departure to be carrying ammunition pouches. All bullets were recovered and examined microscopically. None of these bullets had passed through a rifled barrel. In the bodies they were relatively superficially situated and they were not associated with any discernible evidence of bleeding. All the bullets were of 9 mm. calibre, a type carried by these soldiers. In the same bodies there was also found 9 mm. cartridge cases, and brass fragments which appeared to have come from cartridge cases, and a percussion cap. Percussion caps and fragments of cartridge cases were found in one other body. All cartridge cases, fragments of cartridge cases and percussion caps were superficially situated either in the skin or in tissues exposed by incineration. Other metallic fragments, such as a small cog wheel and fused alloy, were found lying superficially in or on tissues exposed by incineration.

## PART 9

### Alerting, Search and Rescue Action

The procedures to be followed for search and rescue action by personnel of the Air Traffic Services is laid down in Procedures for Search and Rescue Action issued by the Federal Department of Civil Aviation and covers the Salisbury search and rescue area, i.e. the whole of Northern and Southern Rhodesia and Nyasaland together with a portion of Bechuanaland, the limits of which are not here relevant. The scheme therein set out involves co-operation between civil units and the Royal Rhodesian Air Force, but it is made clear that action in respect of overdue R.R.A.F. aircraft is the responsibility of that service, whilst action in respect of overdue civil aircraft rests with the Air Traffic Services and is specifically made the responsibility of a Rescue Co-ordination Centre (R.C.C.) established at Salisbury and covers initiating, co-ordinating and terminating the search and rescue action.

Any emergency calling for alerting procedure is notionally divided into three parts: (a) The Uncertainty Phase; (b) The Alert Phase; and (c) The Distress Phase, which phases bear the respective code names Incerfa, Alerfa and Detresfa. Circumstances which can create such phases are identified by the scheme as follows:—

*Uncertainty Phase.* An uncertainty phase is considered to exist when—

- (a) no communication has been received from an aircraft within a period of thirty (30) minutes after the time a scheduled position report or "All's Well" report should have been received; or when
- (b) an aircraft fails to arrive within thirty (30) minutes of the estimated time of arrival last notified or estimated by air traffic control service units, whichever is the later;

**except** when no doubt exists as to the safety of the aircraft and its occupants.

*Alert Phase.* An alert phase is considered to exist when—

- (a) following the uncertainty phase, subsequent communication checks have failed to reveal any news of the aircraft; or when
- (b) an aircraft has been cleared to land and fails to land within five minutes of the estimated time of landing and communication has not been re-established with the aircraft; or when
- (c) information is received which indicates that the operating efficiency of the aircraft has been impaired but not to the extent that a forced landing is likely; or when
- (d) information is received or it is reasonably certain that the aircraft is about to make or has made a forced landing;

**except** when there is reasonable certainty that the aircraft and its occupants are not threatened by grave and imminent danger and do not require immediate assistance.

*Distress Phase.* A distress phase is considered to exist when—

- (a) following the alert phase the absence of news from widespread communication checks in the circumstances points to the probability that the aircraft is in distress; or when

- (b) the fuel on board is considered to be exhausted, or to be insufficient to enable the aircraft to reach safety; or when
- (c) information is received which indicates that the operating efficiency of the aircraft has been impaired to the extent that a forced landing is likely; or when
- (d) information is received or it is reasonably certain that the aircraft is about to make or has made a forced landing;

**except** when there is reasonable certainty that the aircraft and its occupants are not threatened by grave and imminent danger and do not require immediate assistance.

Both air and ground searches are contemplated. Should air search be necessary the scheme provides for the appointment by the Director of Civil Aviation of a civil air search officer (C.A.S.O.) with duties which are therein precisely indicated, which duties include an obligation to keep the Rescue Co-ordination Centre fully informed. For ground search, the R.C.C. may request assistance from the Police and local authorities.

The whole scheme, so far as it has relation to civil aircraft, presupposes knowledge on the part of the Air Traffic Services of the intended movement of such aircraft into or through the area. This is secured through the medium of a Flight Plan prepared by the captain of the aircraft and submitted to Air Traffic Control at the point of departure. Air Traffic Control carry the responsibility of transmitting this information to all Air Traffic Services en route up to the destination. The Flight Plan shows, *inter alia*, the registration letters of the aircraft, its type, the name of the captain, the number of crew and passengers, the destination, alternate airfields which are intended for use if prevented from landing at destination, endurance in hours, the aircraft's radio frequencies, details of life saving equipment on board, etc. The plan also shows the route, check points, the estimated time to the different check points and the altitudes the captain proposed to use. In practice, it is sometimes found necessary to amend such Flight Plan during the period of the flight and this is done by radio communication between the aircraft and the Air Traffic Services.

The information made available to the Air Traffic Controller (A.T.C.) at Ndola in respect to this aircraft came from four sources. He was told by responsible persons on the ground that the Secretary-General of the United Nations was expected to arrive at Ndola in a second aircraft leaving from Leopoldville and he was aware that the first aircraft, bringing Lord Lansdowne, had previously arrived. He was told by F.I.C. Salisbury that aircraft SE-BDY was en route for Ndola with an E.T.A. of 2235. From 2135 onwards he was in touch with the aircraft from which he learned that the E.T.A. was amended to 2220, and that the aircraft was descending to 6,000 feet and desired a Q.N.H. Fourthly, he was told that the aircraft had passed over the aerodrome heading west-north-west.

It would appear clear in consequence that a landing of the aircraft at or about 2220 should have been contemplated. Thirty minutes thereafter, para. (b) of the Uncertainty Phase provisions would apply, unless the exception justified no action. A.T.C. Ndola communicated to F.I.C. Salisbury at about 2242 the absence of any contact with the aircraft after 2210. Later, at 2342 A.T.C. Ndola originated the first Incerfa signal.

We have considered the evidence which bears upon the applicability of the exception. So far as concerns A.T.C. Ndola, Mr. Martin, he was at all material times in contact with and under the instructions of the Airport Manager, Mr. J. H. Williams. Mr. Martin's personal impression at the time that the aircraft had refrained from reporting termination of its authorized descent because it was purposely holding off to enable the Secretary-General to complete radio communication with a base outside Rhodesia was genuinely held, and sufficiently explains why he found no reason to question the prevailing belief expressed to him by Mr. Williams that the aircraft was holding off or had proceeded to some other destination. It is, we think, further corroborated by the fact that when a period of approximately an hour and a half had elapsed, a time to which the explanation of possible radio communications is not patently appropriate, Mr. Martin, after consultation with Mr. Williams, originated the Incerfa signal.

We turn to consider the attitude of mind disclosed by the evidence of Mr. Williams. He had returned to Ndola on the 16th September from leave with a view to commencing his duties as Airport Manager on Monday, 18th September, at 0700 (9 a.m. local time) but on Sunday 17th he was called to the airport to attend a meeting at which security and accommodation arrangements were discussed

for a projected meeting that day between President Tshombe of Katanga and Mr. Hammarskjold. From 1230 (2.30 p.m. local time) onwards strict security provisions were in operation at the airport and the house of the Senior Provincial Commissioner, with a strong detachment of police at both places. R.R.A.F. operations from the aerodrome had required the crew briefing room to be given up to service personnel and the Airport Manager's own office had been reserved for the projected meeting. From 1400 (4 p.m. local time) onwards President Tshombe and the British High Commissioner, His Excellency Lord Alport, had made use of this office. From their conversation, Mr. Williams had gained the impression that some doubt existed both as to the certainty of the arrival of the Secretary-General and also of the time at which he was to be expected. Later, these two were joined by Lord Lansdowne on his arrival by OO-RIC from Leopoldville. The further information brought by Lord Lansdowne confirmed the expected arrival of the Secretary-General and indicated a possible time of arrival after Lord Lansdowne's departure from Ndola. It was against such a background that the passage of SE-BDY over Ndola aerodrome on a heading in the direction of Leopoldville was notified to Mr. Williams. He then went out and saw Lord Lansdowne's aircraft leave and when he returned he learned that SE-BDY was not responding to signals. He instructed the Duty Controller to report to Salisbury and Lusaka and continue to call SE-BDY. Later he caused Salisbury to be asked to check with Johannesburg to secure contact with Leopoldville. No news had been received by 0115 (3.15 a.m. local time) when he decided to leave the airport for his hotel, leaving instructions for an immediate message to be passed to him there should any information become available. He assured us that at this stage he entertained no thought that the safety of the aircraft was imperilled, taking the view that the departures from normal conventional working of civil aircraft in his area which had characterized this particular flight were explanatory of its continued silence, despite repeated requests by signal. A similar state of mind, although held by someone not experienced in airport practice nor charged with any responsibility for airport operation, was held by Lord Alport, who told us that, knowing that a cease-fire in Katanga was an essential requirement for any meeting between the Secretary-General and President Tshombe, he feared that whilst in flight the Secretary-General had been made aware of some breach of this armistice, and had in consequence abandoned his original intention of landing. This and other speculations Lord Alport told us he communicated to Mr. Williams, and we can well understand that the possibility of accident did not up to his departure from the aerodrome present itself to the mind of Mr. Williams, and that the overdue action already initiated was adequate in all the circumstances.

Reference has already been made to the presence of a strong contingent of police at the house of the Provincial Commissioner, Ndola. One of these officers detected what he referred to as a flash or a glow in the sky some minutes after SE-BDY had passed beyond hearing distance somewhat distant from what he had supposed was the track of that aircraft. In this area, bush fires and lightning flashes are of common occurrence, and no one seems at first to have associated the flash or glow with the aircraft, but when report was made to Ndola police station Assistant Inspector Begg thought the occurrence justified report to the aerodrome. When the communicator on duty was informed at about 0130 (3.30 a.m. local time) he directed the police to Mr. Williams and Assistant Inspectors Begg and Pennock called on Mr. Williams at his hotel and informed him of this reported flash. Mr. Williams expressed the opinion that nothing could be done until first light (which would be 0340 and 5.40 a.m. local time) and sent them away. These police officers on their own authority then sought and obtained leave by telephone for a police ground patrol to be sent out, but the search proved negative.

It was not until 0700 (9 a.m. local time, i.e. over three hours after first light) that Mr. Williams resumed duty as Airport Manager at Ndola, to find that F.I.C. Salisbury had originated the Distress Phase signal at 0445 and requested the assistance of two R.R.A.F. aircraft for local searches north and south of Ndola airfield at 0700, that search beginning at about 0800.

It is we think, a matter for comment that Mr. Williams' implied intention to initiate action at first light was not carried into practice. Though Mr. Williams did not suggest that it affected his action we have taken into account the fact that his official return from leave did not require his attendance at the airport until his normal duty time on that morning, but his part in the arrangements on the previous day and his acceptance of the police report as properly made to him, imposed upon him, as we see the matter now, an obligation to accept as from the time of his actual return the responsibility normally borne by the Airport Manager during his duty times.

By paragraph 33 of the "Procedures for Search and Rescue within the Salisbury Search and Rescue Area" these duties are defined as those laid down in "Air Traffic Control Instructions" issued by the Department of Civil Aviation dated September, 1960, read together with "Station Standing Instructions" dated June, 1961.

The former provides that whenever the urgency of the situation so requires, the A.T.C. Unit responsible shall first alert and take other necessary steps to set in motion all appropriate local rescue and emergency organizations which can give the immediate assistance required. It is to be noted in this connexion that unlike the exception applicable to the Uncertainty Phase the exception to alerting action is expressed differently for it reads "except where evidence exists that would allay apprehension as to the safety of the aircraft and its occupants". The absence of any satisfactory response to the signals put out by his F.I.C. could have served only to excite rather than allay apprehension. It is true that responsibility for liaison with the R.R.A.F. is in these instructions laid upon the Salisbury Rescue Co-ordination Centre, but as this for its initiation would require a report from Ndola, it is reasonable to assume that a report by Mr. Williams to R.C.C. Salisbury at first light that he was apprehensive of the safety of the aircraft by reason, *inter alia*, of a report of a flash or glow in the sky in the Mufulira direction and timed only a few minutes after its departure from earshot would have produced the authority required to enlist the aid of the R.R.A.F. for an immediate air search of the vicinity.

The other document "Station Standing Instructions" is primarily concerned with crash landings, and although it places initial responsibility for action upon the Air Traffic Control Officer on duty, the recital of his duties, including informing the Airport Manager, is a clear indication that when available it is the Airport Manager from whom supervision of procedures is to be expected.

An independent search resulted from an observation by Assistant Inspector Vaughan of the Northern Rhodesia Police. He on the night of September 17th was engaged on road patrol duties by Land-Rover from Mufulira to Mokambo, a distance of some ten miles. When driving towards Mufulira he saw at about 2340 a sudden light in the sky in the direction of Ndola and an impression of a falling object. As this was an hour after the crash a possible explanation may reside in the bursting of a gas container during the fire. When on return to Mufulira he heard that an aircraft was overdue at Ndola he recalled his experience and reported it. At about 0140 he and another officer made a slow patrol and another officer made a fast patrol about half-way along the Mufulira-Ndola road to see if any sign was observable from the ground. Both searches proved fruitless. There was a further extensive search along this portion of the road next morning.

To assist the air search operations bearings were taken by R.R.A.F. personnel at the ground positions from which flashes and the like were reported as having been seen and map plots prepared in the hope of securing a fix.

The air search subsequently undertaken by Flying Officer Craxford on instructions given at 1245 (2.45 p.m.) succeeded in locating the crash site at 1310 (3.10 p.m.), and although the information upon which these instructions were given included statements not available until after midday, the information given by Assistant Inspector van Wyk to Assistant Inspector Begg and passed on by him to Mr. Williams should as it seems to us have been adequate guidance for a creeping search to have achieved success.

We realize that a recommendation for an air search involves acceptance of a heavy responsibility, in that it may secure dispersal of available aircraft on fruitless errands and deny the assistance they can provide if and when credible reports assist in identifying areas of high probability. The report of Assistant Inspector van Wyk came from a responsible police officer and had been thought by his superiors sufficiently cogent to justify a search by road which because of the extensive bush areas could not reliably exclude the possibility that the phenomenon he witnessed was associated with the apparent disappearance of SE-BDY. That it could not unreasonably in ordinary circumstances be attributed to a bush fire or an electric discharge we would accept, but its coincidence in time with the loss of all contact with SE-BDY seems to us enough to make it a clear warning that an urgent situation had arisen despite non-receipt of signals from Leopoldville until 0550 (7.50 a.m.), and certainly after that time. When to this is added the feature that a defined segmental area with a radius of only a few minutes of flight was required to be searched for investigation of the report we think that initiative on the part of so responsible an officer as an Airport Manager would have caused



him to invite R.C.C. Salisbury to authorize one of the available R.R.A.F. aircraft to undertake the task. Discovery of the crash site might then have been made some hours before it was and the living survivor been given succour before further exposure to the tropical sun had aggravated the burns sustained in the crash.

## PART 10

# Causes of the Accident

## A. GENERAL

### 1. General Considerations

Before we come to consider particular suggested causes of the accident we shall set out some general considerations which govern throughout. What we have to try to discover on the evidence is why SE-BDY hit the ground some  $9\frac{1}{2}$  miles short of the runway at Ndola Airport. It is certain that the examinations after the crash show clearly that the aircraft was intending to land at Ndola, and in conversation with the Control Tower that intention had been indicated. The engines were under power at the time of impact. All landing gear was fully lowered and locked. There is strong indication that there was  $30^\circ$  of flap, a normal amount at that stage in a landing. Those safety belts which could give indication of their condition, four in number, were found fastened, and six bodies, those on which examination in this regard was possible, showed signs of fastened belts. The fastening of safety belts takes place on take-off and before landing. The landing lights were not extended, but the aircraft was still too far from the runway for that normally to have been done.

When everything in an aircraft indicates that it was on its way to land and it hits ground before the runway is reached there can only be one of two general causes. One is that something caused the aircraft, against the will of the pilots, to come too close to the ground and to hit it. The other is that the pilots, misled by something or by mistake, brought the aircraft too close to the ground so that it hit the ground. There may, of course, be a combination of the two causes: the pilots may have brought the aircraft lower than they should have, so that it was in a position in which some other causes could operate more easily to interfere with flight. When some cause against the will of the pilot is being considered, the proper initial approach is, we think, to assume that such cause began to operate when the aircraft was at a height at which it should have been at that stage in the approach. For an assumption that the aircraft was below that height carries the implication of mistake on the part of the pilots.

At night an aircraft will land either by the pilot relying on what he can see, a visual descending procedure, or by the pilot adopting an instrument approach procedure. The latter procedure, when based on the existence of a non-directional radio beacon, consists of flight on a designated track in a direction opposite to that in which the aircraft will land, at a prescribed height until the non-directional radio beacon is passed. Shortly thereafter the procedure turn is made. This is a turn away from the track then being traversed, followed by a turn in the opposite direction, both turns being executed so as to bring the aircraft along the reciprocal of the track on which it was travelling before the procedure turn, so that the aircraft is then flying in the proper direction to land. The procedure is laid down for each airport. In some cases the aircraft is required to maintain its height until the procedure turn is completed; in other cases the aircraft is required to lose height during the procedure turn.

The instrument approach procedure for Ndola consists of initial approach at 6,000 feet altitude on a track of  $280^\circ$  until 30 seconds after the N.D.B. has been passed. The procedure turn is then made to the right at the same height. On completion of that turn and when on the inbound track of  $100^\circ$  to the N.D.B. the aircraft descends to 5,000 feet over the N.D.B., thereafter descending to the critical height of the aerodrome.

In the high intensity lighting system at Ndola there are two short parallel lines of lights at right-angles to the runway at the approach end of the runway. If these tend to merge into a single line the pilot knows that he is too low, and if they appear to be far apart he knows that he is too high.

The evidence of eye-witnesses establishes that SE-BDY crossed Ndola Airport at about 6,000 feet altitude on a bearing close to  $280^\circ$ . It also establishes that the

aircraft then turned to the right. As no sufficient time elapsed according to the evidence between this turn and the crash for the aircraft to have gone away for any substantial distance and then come back, we are satisfied that the pilot continued his approach by a subsequent turn to the left to reach the place of crash.

It has already been set out that when the aircraft hit the trees it was descending at an angle of descent of less than 5°, a normal angle of descent. The fact that the nose wheel doors were not detached in the air by speed, and they would be so detached if there was great speed, indicates clearly that there had not been any considerable dive towards the ground, followed by a flattening out to the angle of descent which was shown.

## **2. The Effect of Statements by Sergeant Julian in the Consideration of the Cause of the Crash**

Statements by the sole survivor, Sergeant Julian, which have any relevance to the cause of the crash are as follows.

Senior Inspector Allen of the Northern Rhodesia Police, on the evening of the 18th September, had the following conversation:

Allen: "The last we heard from you you were over Ndola runway. What happened?"

Julian: "It blew up."

Allen: "Was this over the runway?"

Julian: "Yes."

Allen: "What happened then?"

Julian: "There was great speed. Great speed."

Allen: "What happened then?"

Julian: "Then there was the crash."

Allen: "What happened then?"

Julian: "There were lots of little explosions all around."

Allen: "How did you get out?"

Julian: "I pulled the emergency tab and I ran out."

Allen: "What about the others?"

Julian: "They were just trapped."

Senior Inspector Allen said that he seemed to be understanding. The conversation was not simply as set out, as Sergeant Julian was very incoherent, and questions such as "What happened then?" were often repeated. Mr. McNab, the surgeon in charge, said that in his opinion the remarks could only be taken as a guide and were not necessarily true, having regard to the condition of Sergeant Julian. There was also the possibility of retrograde amnesia.

On the same evening, Sister McGrath heard him say: "We were on the runway and there was an explosion", and "We were on the runway when Mr. Hammarskjold said 'Go back', then there was an explosion", and "I was the only one that got out all the others were trapped."

On the same evening Dr. Lowenthal said that he asked why they had not landed when they were expected to, and Sergeant Julian replied first in words which indicated that Mr. Hammarskjold had changed his mind or said "Turn back", and then by saying that he did not know. He said that Sergeant Julian said that there was an explosion and then a crash, and a little later said that there was a crash and then an explosion; and also said that he had jumped from the aircraft. Dr. Lowenthal said that Sergeant Julian was highly sedated at the time but appeared to be speaking coherently.

No attention need be paid to remarks, later in the week, about sparks in the sky. They either relate to the fire after the crash, or to a symptom of his then condition.

In so far as weight can be given to these remarks at all they relate to the following:

### *On the runway*

Sergeant Julian seems to have thought that what happened happened as they were just about to land.

### *Great speed*

Until the aircraft had passed over Ndola there is a body of evidence to indicate that it was flying at a normal speed. So the great speed, if it referred to the aircraft in the air, could only relate to some time during the approach procedure. The evidence indicates that the nose wheel doors would be blown off by unusual speed. They were not, but were found in the wreckage trail. If then this was an accurately remembered impression it could, we think, have been gained only when, by passage through the tree tops, an impression of speed could have been given.

bullshit

### *An explosion in the aircraft before it hit the trees*

There undoubtedly was an explosion after the aircraft hit the ground. In one remark Sergeant Julian put the events in that order. In so far as the remarks can be said to support a theory there was an explosion causing the aircraft to come to the ground the matter is dealt with later.

### *Instruction to go back*

The only indication that there was a change of plan is in the evidence of Dr. Lowenthal that Sergeant Julian said that Mr. Hammarskjold "changed his mind or said 'Turn back'". It seems likely that the phrase "changed his mind" was the witness's interpretation from the words "Turn back" or "Go back". These words could not have been said after the crash, for the evidence shows that Mr. Hammarskjold died instantaneously. So the words must have been said in the aircraft. On both versions given the words were said before the explosion. There is nothing to indicate that Mr. Hammarskjold, apart from anything connected with the crash, would be likely to have changed his plan to land. What seems likely is that the first impact with the tree tops gave the impression to Mr. Hammarskjold that there was some designed obstruction to his landing, and that he then shouted words such as "Go back".

### **3. Accounts of eye-witnesses**

To avoid undue complication in this part of the report we deal in detail with all the eye-witnesses in Appendix 1. We have divided them into four classes. In Classes A and B the general picture given by those witnesses who saw or heard SE-BDY is of it passing across the airport more or less in the direction in which it should have been heading, of it being at about 6,000 feet above sea level, perhaps a little lower, and of it going faster than aircraft usually went, which is probably explained by its being a larger type than was usual in this area. There were two witnesses, living to the west, who heard the aircraft passing over in what must have been a turn to the right, Mr. Bermant and Mrs. Wright. Both, from the sound, had an impression of low height. In so far as witnesses in Class B speak of some phenomenon in the sky they do not help in the discovery of the cause of the crash. Their evidence merely shows that there was a crash. But none of these witnesses, and they are many, saw or heard any other aircraft at about the time that SE-BDY passed over Ndola.

Class C, persons who speak of two aircraft at the same time, is dealt with later. Class D comprises witnesses who saw or heard something long after the crash. Their evidence does not bear on causation. The same is of course true of any evidence which relates only to the later discovery of the crashed aircraft.

## **B. POSSIBLE CAUSES**

### **1. Damage Suffered at Elisabethville**

When the aircraft left Elisabethville to go to Leopoldville on the morning of the 17th September it was fired on. On arrival at Leopoldville a bullet hole was found in an engine cowling and there was damage to an exhaust pipe. The pipe was replaced. There was careful examination but no other damage was found. It does not seem to have been hit by explosive bullets, so that even if a bullet had not been found it could not have caused later damage.

What happened at Elisabethville did not, we consider, contribute in any way to the crash.

### **2. Sabotage**

Before the aircraft left the ground at Leopoldville it was in the charge of employees of Transair except for a period when they went for lunch. During that period the aircraft was locked and ladders were removed. This would leave avail-

able for the deposit of an explosive machine the undercarriage wells. There was nothing in the wreckage to indicate explosive damage to the undercarriage. The interior of the aircraft was examined prior to take-off. It is inconceivable that any occupant wilfully carried some bomb into the aircraft. If any bomb had been placed in the personal luggage of any occupant the explosion would not be in the least likely to be in the flight deck so as to incapacitate the pilots. And if any explosion took place such as to disable the aircraft some part would almost certainly have been blown off and found short of the place of the crash. Examination of the wreckage and bodies showed nothing to indicate that any bomb had exploded.

Further to this we cannot imagine that there was any likelihood of any such thing being done at Leopoldville. If it had been done it must be assumed that it was directed at Mr. Hammarskjold and meant to be effective. No one could have timed an explosion for arrival at Ndola when that destination was known to very few people, and no one except the pilots could possibly have known that the flight would last as long as it did, having regard to the route selected.

We find no grounds for attributing the crash to sabotage.

### **3. Circumstances of the Flight to Ndola**

There is nothing to suggest that the security precautions which were taken in regard to the flight, which led to a lack of information about it, were in any way the cause of the crash. There was no separate navigator on the aircraft, and the flight was for the greater part made by dead reckoning. Captain Hallonquist was, however, an experienced navigator, and the route taken, due east with a feature as enormous as Lake Tanganyika to govern change of course to the south, was not difficult to fly. There was radar in the aircraft which could have been used to determine when that lake was reached had visual conditions been difficult.

Two of the three pilots had flown the aircraft to Elisabethville on the previous day, and had flown it to Leopoldville in the morning of the 17th September. Captain Litton when he boarded the aircraft in the afternoon indicated that he was tired. Captain Hallonquist seemed to be fit and relaxed before the aircraft took off. The flight to Ndola was a long flight but it should not unduly have tired a pilot. Some strain may well have been associated with the flight in that a most important person was aboard and precautions had to be taken to conceal the route. We do not think that undue fatigue contributed to the crash.

### **4. Erroneous Communication from the Ground at Ndola**

There was no tape recorder to record the conversation between Mr. Martin, the traffic controller on duty at Ndola, and SE-BDY. The account of the conversation is dependent on his memory; the flight strip confirms his evidence in part, and is in no way inconsistent with it. Information which could have misled the pilot was an incorrect Q.N.H., but examination of the altimeters showed that they were set approximately to the figure which he said he gave, and this was the correct figure. After the aircraft had disappeared, and long before it was known that it had crashed, the information he gave to Salisbury of his conversation accords with his account of the conversation. The height above sea level of Ndola Airport was not given, but that information is not given unless it is asked for. It is not usual for a pilot to ask for this information, and SE-BDY did not do so.

There is nothing to suggest that any but proper information was given to the aircraft, either from Salisbury or Ndola.

### **5. Failure to use Ndola approach chart, or use of Ndolo approach chart**

2 | Pilots in Transair were supposed to use the approach charts in the Jeppesen Manual. This is a large loose-leaf manual published in the United States of America. It contains a chart for Ndola which shows the instrument approach procedure. An individual issue of the Manual is made to each pilot. There is no record of the issue of the Manual to any of the pilots in SE-BDY. An inventory of Jeppesen Manuals, taken at our instigation, shows that three are missing. When they disappeared is not known. Each pilot is supposed to carry this Manual on a flight.

In the wreckage only one Jeppesen Manual was discovered. Others may have been entirely burnt. That is not known. In the one Manual which was found the Ndola chart was missing. It is usual practice to remove the chart needed in landing. This may have been done. The spring clip in which it is usually put on

the captain's side of SE-BDY had one part missing, so it could not be seen if anything had been in it. The state of the clip may have been caused in the fire.

In Leopoldville there seems to have been freely available to pilots a small bound manual of approach charts, The United States Air Force Approach Chart Manual, which is reprinted regularly. Although Ndola has been an airport for many years the issues in 1961 contained no approach chart for it. They did contain a chart for Ndolo, an airfield some six miles from the present Ndjili Airport at Leopoldville. Ndolo was abandoned as an airfield for large aircraft in 1959. In the wreckage three of these Manuals were found; two at the scene of the crash on the ground, and one later amongst the wreckage in the hangar. One of the Manuals on the ground lay open, folded back, and showing the Ndolo chart.

A pilot's papers and books are normally kept in a bag. The fact that three copies of this Manual, when there were three pilots, were found loose in the wreckage seems to us to give strong indication that reference had been made to it. And reference might well have been made to it if the Ndola chart was found not to be in the Jeppesen Manual, perhaps because it had been taken out by a previous user of the Manual and not replaced. It seems too much of a coincidence that there were three Manuals, not in bags, with the added coincidence that one was open at a page where a chart for Ndola would have been sought.

In one of the United States Manuals found there was written in green ink on the Ndolo page the height of the Ndola Airport. And there were two barometric pressures, one the standard and one more or less the figure for Ndola at that time of year. The latter figure did not exactly correspond to the conversion into inches of the figure in millibars given to the aircraft on the night in question. There were also odd dots along the chart of the turn and an underlining of an altitude of 2,500 feet. On the outside of the Manual the words "Approach Charts" were written. We arranged for this book to be sent to Sweden for quick comparison with the writing of the three pilots, and the report is that the writing does not correspond to that of any one of the pilots. So far as we were able, we confirmed this by comparing writings of the three pilots which were sent to us with a photostatic copy of the writing in the Manual. We accept that this writing was not that of any pilot in SE-BDY. If it had been it would, from the presence of the correct altitude of Ndola, have shown that there was realization that the height in the chart for Ndolo, 951 feet, had no relation to the Ndola Airport.

Nor do we consider that Captain Hallonquist would have thought that the Ndolo chart applied to Ndola. A week before in Elisabethville, and shortly before he took off in Leopoldville, Captain Hallonquist had discussed the altitude of Ndola, and showed that he knew that it was about the same altitude as Elisabethville, 4,187 feet. Quite apart from that, the Ndolo approach is shown as being from the opposite direction, with the beacon to the east and not to the west of the runway. And the clearance to 6,000 feet by the Controller, and the sight of lights some 2,000 feet and not over 5,000 feet below him as he passed over the airport would have indicated to a pilot of his experience that he was not about to land at an altitude of 951 feet. In addition the instrument approach procedure for Ndolo is a descending procedure with passage over the beacon at 4,000 feet, losing height to 2,500 feet on completion of the turn. Such an approach would be obviously impossible to an airport known to the pilot to have an altitude of over 4,000 feet.

If there was uncertainty in regard to the altitude of Ndola runway it might have been expected that inquiry would have been made from the Control Tower. But it appears that Captain Hallonquist had his own ideas in regard to information from a controller. About a week before in a conversation with Major Ljungkvist at Elisabethville he had stated that he thought it quite unnecessary that the tower should remind a pilot of the airport elevation, or give certain other information. It was a clear night, and the airport lights were plainly to be seen.

We do not consider that the pilots were misled by an Ndolo chart, but it may well be that there was no Ndola chart in the aircraft. We discuss the manner of approach later.

## 6. Mechanical Failure

The evidence shows that SE-BDY was in very good condition and fully serviceable at the time of the flight. Examination of the engines shows that they were under power at the time of the crash. Some five minutes before the crash the aircraft was seen to be flying normally. The aircraft was a four-engined aircraft and able to maintain altitude with some degree of engine failure. There was plenty

*1/10/62  
village bank -  
big trees  
forming!*

of fuel. Examination of the controls mechanism disclosed no defect. Mechanical failure would undoubtedly have brought about some reaction in the pilots. There would either have been a message to the Control Tower or some sort of preparation for a crash landing, as by retracting the landing gear. There was no such action.

There is nothing to indicate that mechanical failure caused, or contributed to, the accident.

#### 7. Defective Altimeters

All three altimeters which were in use were set approximately to the barometric setting given by the Controller. They were all damaged in the crash. Very extensive examination disclosed no abnormal condition not attributed to impact damage and fire.

There is nothing to indicate that defect in the altimeters caused or contributed to the accident.

#### 8. Internal Fire During the Flight

O. Danielsson

There were two hand fire extinguishers discovered in the wreckage in a discharged state. Though they could have been discharged in the fire on the ground it cannot be said with certainty that that was how they came to be discharged. Two possibilities in regard to internal fire have to be considered: mere fire, or fire suddenly causing explosion. If fire occurred it must have occurred in the last few miles of the flight. The post-mortem examinations indicate that both among those who were in the flight deck and among those who were in the cabin there were persons with no carboxyhaemoglobin percentage. The percentage found in the bodies of the pilots was such that they could not have been so affected by it as to be incapable of action. In these circumstances it is really inconceivable that, if there were a fire, experienced pilots should have refrained from taking obvious steps. No message was sent: the aircraft did not make suddenly for the airport for an emergency landing; and none of the action was taken which would have been taken if the fire necessitated a crash landing in the bush, such as retraction of the undercarriage or extension of the landing lights to choose as favourable a spot as possible.

If there had been a fire causing sudden explosion, so that either or both pilots were incapacitated or the aircraft was put out of control, it must we think have been of such a nature that some evidence of it would have been found on the ground, either at the wreckage site or in the other searched area.

There is no reason whatsoever to suspect internal fire as the cause of the crash.

#### 9. Incapacitation of the Pilots

This is suggested as a possibility in the report of the Board of Inquiry. We can find nothing to support it. Post-mortem examination indicated no disease in any one of the pilots. They had all passed medical examinations as pilots. The possibility of incapacitation by natural causes of any of these pilots is most unlikely. The chances of simultaneous incapacitation are in our view so remote that that possibility can be dismissed.

#### 10. Action by Other Aircraft

3 st  
D.H. 2000

(a) At the outset we would say that no reason was suggested, and we cannot think of one, why anyone who might have been able to attack this aircraft from the air should ever have wanted to attack it as it carried Mr. Hammarskjold on the mission he was then undertaking. We have investigated the position of aircraft capable of offensive action not because of suggestions that there was such action but to eliminate any known aircraft within range. There was evidence that no aircraft of the Royal Rhodesian Air Force was flying on the night of 17th/18th September. That evidence was not queried at all. In the Congo, other than in Katanga, there was no aircraft capable of offensive action which was not under United Nations control. One aircraft capable of offensive action was in Katanga at the time and was not under United Nations control. It was a Fouga jet fighter trainer, armed with two 7.62 mm. machine-guns. On the night of the 17th/18th September it was at Kolwezi, where it was normally based, but there was another landing strip which it used which was further away from Ndola than Kolwezi. Its effective range, to allow five minutes for attack, is 135 nautical miles. Kolwezi is 230 nautical miles from Ndola. Quite apart from the impossibility of the Fouga having reached Ndola and returned, there is evidence from several witnesses that Kolwezi runway was not then equipped for night take-off or landing, and in fact obstacles had been placed on the runway on the night of the 17th/18th September. In addition, Major Delin gave sworn evidence before us that it was only he who then

flew this aircraft and that he did not fly it on that night. Major Delin came voluntarily to give this evidence; we had no way to compel him to do so. In addition, when information was given to the Commission which might have indicated that his evidence was not true, he returned to give further evidence. We found no reason to doubt his evidence.

Volreda

One De Haviland Dove belonging to the Katanga Government was after the 18th September armed by removing a door and placing a machine gun on the floor to fire through the opening. On 17th September this and possibly another were in the hands of the United Nations at Elisabethville. Three Doves were then in the Republic of South Africa undergoing examination.

Delin's statement

There was one military aircraft of the United States of America on the ground at Ndola.

(b) Very careful examination was made of all the wreckage recovered. There was only about one-fifth of the total aircraft which could be examined. This examination disclosed only one hole which could possibly have been caused by a bullet or other projectile. The parts of the aircraft which had been fused by the fire were, as has been said, broken up into small pieces. The fused metal tended to break where there was any object, such as a bolt, in the fused alloy. Nothing suspicious was found. The one suspect hole, in a pilot's window frame, was too small for a 7.62 mm. bullet to pass through it. Both microscopic and spectrographic examination of the metal around the hole disclosed no traces of metal of which a bullet might have been made. No bullet was found anywhere which had passed through any rifled barrel, and the many bullets which were found were of a type to be used in the weapons carried in the aircraft. There were bullets and parts of bullets disclosed on X-ray in some of the bodies, not the bodies of the pilots. None of these disclosed any sign of having passed through a rifled barrel. They came from ammunition carried by persons on the aircraft which exploded in the fire. In the bodies they lay either on the burnt surface or slightly under the skin or in the muscle. There was no injury to bony structure in any of the bodies which indicated damage by any projectile.

If any projectile of a rocket type had hit the aircraft, so as to disable both pilots, or so to damage the aircraft as to render it uncontrollable, there must have been an explosion. No witness speaks of the sound of an explosion before the aircraft hit the trees. If the aircraft was hit by an explosive missile it is almost certain that some part of the aircraft, blown off, or some part of the missile, or some sign of fire, would have been discovered on the ground in the searched area over which the aircraft passed before the crash. Nothing was found at all. Except in the area where the aircraft came to rest and caught fire, and an area back from that in which fire could be expected, there was no sign at all of burning of any part of the aircraft which became detached, or of the vegetation. The area in which there was no fire is shown on the wreckage plan, Appendix 6, and covers the first half of the wreckage trail. Nor was there any sign of burning in the large area back from the scene of the crash which was examined.

(c) There were seven witnesses who spoke of a second aircraft. One is not worthy of consideration. Three were very definite in regard to the times of which they spoke, which times could have no reference at all to the time of arrival and crash of SE-BDY. In addition to speaking of a different time one spoke of hearing two aircraft at a place some 30 miles away from any place over which SE-BDY can have passed, and another was obviously referring to the arrival of the aircraft OO-RIC.

We turn now to the three charcoal burners. We give in Appendix 1 our appreciation of these Africans as witnesses. All three were unsatisfactory. Apart from that finding, their evidence discloses so improbable an attack that it could carry no weight. Both Mr. Simango and Mr. Mazibisa speak of the second aircraft being with the large aircraft immediately before the crash and then apparently disappearing in the crash. No sound of an aircraft was heard by them thereafter. Both Mr. Mazibisa and Mr. Buleni speak of a second aircraft which had a light on it, which seems highly improbable for an attacking aircraft. None of these witnesses heard any sound of firing in the air, a most distinctive sound, or any sound of explosion before the crash. If there had been any attack it could have been expected that it would have been when SE-BDY was at a normal height in an approach to land, but they speak of that aircraft just before the crash when it must have been very low indeed, and speak of the second aircraft as still being very close to it, and, in the case of Mr. Buleni, in a position from which no attack could have been made. Only the one witness, Mr. Buleni, speaks

of the second aircraft after the crash, and in a statement he gave one version of what it did as it flew off, with its lights still showing, and in evidence, given a few days later, he gave a quite different version.

(d) There was no communication from SE-BDY after it was over the airport. If the aircraft was at its proper approach height and was then attacked, unless both pilots were instantaneously killed, or the wireless was put out of action, it is hard to imagine that there should have been no message. If the aircraft came low in evasive action it could still have communicated.

(e) Another factor against aircraft attack is the extreme difficulty of interception at night. The first indication of a time of arrival was given to Salisbury at 2006. The time given was 2235. At 2135, to Ndola, an estimated time of arrival of 2220 was given. In fact it arrived over the airport at 2210 and had crashed by 2215. It has to be assumed that any attacking aircraft arrived either 25 minutes, or at least 10 minutes, before it thought SE-BDY would arrive. It has to be assumed, too, that it managed to arrive at a place where it could attack without being heard in the air by anyone as it was on its way. There were many people on duty in Ndola on that night who heard SE-BDY. But no one heard another aircraft at that time. And, having so arrived, it had only some two or three minutes in which to attack. If SE-BDY was at proper approach height interception would have been difficult enough. If SE-BDY was coming in low it would have been in an unexpected position, and interception would have been all the more difficult. When it did attack the attack has to be assumed to have been such that either both pilots were disabled, or the aircraft was so put out of control that no communication could be made or emergency action taken. And this had to be done in such a way that no part of the aircraft was blown off, and the aircraft came down apparently in normal descent and under power.

(f) Having regard to all these factors we consider that it is clear that the aircraft was not shot down in any way from the air.

#### 11. Action From the Ground

This again is a cause which has to be considered although there is nothing to indicate that the crash was caused in this way. Normally the aircraft could have been expected to be some 2,000 feet above ground and not in the area in which it was before it crashed. If attack from the ground had been designed it is almost certain that weapons would not have been sited to make it effective against the aircraft on the course which it did take. The absence of any sign of bullet damage to the aircraft or its occupants and the factors relating to the improbability of the putting out of action of both pilots or of the aircraft again operate. So, too, does the absence of indication of attack in the discovery of anything short of the scene of the crash. Not one of the charcoal burners who say that they saw the aircraft speaks of any sound of firing. It is impossible to imagine that a stray shot from a rifle should have brought down this large four-engined aircraft with two pilots without there being any opportunity to communicate with the ground or prepare for a crash landing.

We do not consider that action from the ground was the cause of the crash.

#### 12. Pilot Error

We have already set out how it may have come about that a decision to carry out a visual descending procedure was made. To support the view that the Ndola instrument approach procedure was not carried out are the facts that the aircraft did not pass over the airport exactly on the course it should have been on as it went to the non-directional radio beacon and for 30 seconds beyond that beacon. It flew over the house of Mr. Bermant which is some three-quarters of a mile to the north, and slightly to the west of the beacon. At that stage, to make the noise which Mr. Bermant heard, it must have been below the proper altitude in an instrument approach, 6,000 feet. Then it came near the house of Mrs. Wright, seven miles to the north-west of the airport. The procedure turn would not have taken it so far out, nor would the aircraft have seemed to be so low.

We consider that the evidence establishes that, whether or not the decision was influenced by chart manuals, it was decided to bring the aircraft in by a visual descending procedure approach. It was a clear night, all the lights of the airport were at maximum intensity, the aircraft had reported that it had seen them, and the aircraft had been told that there was no other traffic. There was no reason why a visual approach should not have been made. The absence of signals, usual in the instrument approach procedure, is another indication that there was visual



approach, for there was nothing, except silence, to suggest that the wireless equipment was not working before the crash.

The altitude of the aircraft as it crossed over the airport has been taken by us, on the evidence of eye-witnesses, to be about 6,000 feet above sea level. The absence of a report on reaching 6,000 feet, which was asked for, may well have been because the aircraft had reached that altitude when the request was made. It is as certain as can be that the aircraft started to descend soon after it had passed over the airport.

In the country to the west of Ndola there is bush, and after the lights of Ndola were passed and as the descending turn was made to the right there would be blackness ahead. This is what is known in the language of the air as a "black hole". And if in the course of the turn the aircraft came far too low the slight rise in the ground between the place of the crash and the airport would obscure the lights of the runway, and of Ndola, as the aircraft came back to a course on which those lights might otherwise have been seen to port.

Failure to recognize the dangerous altitude of the aircraft in relation to the airport elevation, and the slightly higher elevation of some of the country to the west, is unexplained in view of the apparent correct settings of the three altimeters and the fact that, as far as can be determined, they would have been functioning properly.

### C. CONCLUSION

It has been strongly urged on us that we should not reach the conclusion that the accident was due to pilot error by considering first other possible causes, dismissing them, and so being left with a cause which can seldom be dismissed in an aircraft accident. Obviously suggested causes have to be dealt with in some order. We have given our reasons for saying that other suggested causes were not really possible. And we have given our reasons for concluding that the approach to the airport was made by a visual descending procedure in which the aircraft was brought too low. We cannot say whether that came about as a result of inattention to altimeters or misreading of altimeters. But the conclusion to which we are forced is that the aircraft was allowed by the pilots to descend too low so that it struck the trees and was brought to the ground.

## PART 11

# Conduct of Persons and Authorities after Accident

### Civil Air Authorities

We have considered the action taken by each of the four sections falling within this category, viz. Air Traffic Control, Ndola (A.T.C.), Flight Information Centre, Salisbury (F.I.C.), Rescue Co-ordination Centre, Salisbury (R.C.C.) and the Department of Civil Aviation.

So far as concerns A.T.C. the action taken by the Air Traffic Controller on duty at the material times was proved in evidence. In our view, all that was done by the Control Tower was in proper accordance with recommended practice, and the initiative shown by Mr. Martin in originating an Incerfa signal at 2342 when the passage of time made his original supposition for the non-arrival of SE-BDY improbable was, we think, proper. The reference of the police report on a flash or glow to the Airport Manager by the Communicator on duty properly laid responsibility for further action upon Mr. Williams and, as we have already indicated, there was an absence of a proper sense of urgency in Mr. Williams' failure to initiate further action so soon after first light as was possible.

The only specific matter which attracted comment at the hearing was the decision taken at 0105 to close the airport and tower (erroneously said to be "closing down" since a 24 hour communicator service was kept in operation). It was explained to us that difficulties in procuring efficient staff for the onerous duties of Air Traffic Control and the absence of air traffic scheduled for arrival during the early morning justified a shut down of airport and tower so as to provide adequate rest periods for the staff. We can find no room for legitimate criticism of the decision so taken, which was communicated to F.I.C. Salisbury.

The action taken by F.I.C. was also proved in evidence and here again the proper observance of recommended practice was established.

There was some confusion in the evidence with regard to the decision to close the airport and tower at Ndola. The message from Ndola to Salisbury was in the form of a request for permission, and on the evidence this request did not reach the Controller at Salisbury whose duty would include dealing with the approval sought. The Communicator at Salisbury agrees that he responded with the letters O.K. but is unable to recall the circumstances in which this was done. In the result, nothing turns upon this point and we have made no attempt to resolve the doubt.

We should here take note that Mr. Thorogood, Air Traffic Control Officer, Salisbury, anticipated the issue of the Incerfa signal from Ndola by arranging for contact with Nairobi, Johannesburg and Leopoldville in an endeavour to secure information regarding SE-BDY, but the failure of Leopoldville and Elisabethville to reply rendered his effort nugatory.

In addition, Mr. Knight, the Senior Air Traffic Control Officer, who took over from Mr. Thorogood, initiated the Detresfa signal at 0445 for transmission to Ndola, Elisabethville and Leopoldville in order to secure news from the two Congo stations.

Unhappily, these efforts were of no avail until H.F. Air Ground frequency signals, commencing at 0450 and continued until contact was secured, procured a reply from Leopoldville at 0542 that no news of the aircraft had been received.

It appears that messages to Leopoldville were initially received by a Congolese national and transmitted by hand thereafter to the Flight Information Centre. This gentleman, at the material time, did not understand the English language and required the services of a colleague or a United Nations co-ordinating officer before he could deal with such messages. This involved serious delays.

Despite the repeated request for information sent from Salisbury during the night of 17th/18th September to Elisabethville, the first communication received from that station was at 0816 when an H.F./R.T. message requesting news of SE-BDY was received by Salisbury F.I.C.

Additionally to the execution of normal duties, Mr. Murphy, the Airport Manager at Salisbury, maintained close contact by telephone with Colonel Barber, the Director of Civil Aviation, who, because of the importance of the visit of the Secretary-General, had instructed that both he and the R.R.A.F. should be kept fully advised.

The R.C.C. forms part of the F.I.C. at Salisbury, and put into operation the requisite procedures for alerting the various centres from which information and possible assistance could be expected and in the Distress Phase procured the appointment of the Civil Air Search Officer and secured effective liaison with the officer commanding the R.R.A.F. station at Ndola. Here, again, the maintenance of close contact with the Director of Civil Aviation ensured the effective co-ordination of the various interests involved.

The fourth section, the Department of Civil Aviation, calls for a review of the activities of the Director, for he it was who personally represented his Department in connexion with this important flight. He, like the responsible people at Ndola, and no doubt because of the expression of their belief communicated to him by telephone to Salisbury, accepted initially that the aircraft had diverted. He gave instructions that confirmation should be sought from Leopoldville and Elisabethville, and when informed that neither station would respond to signals, he proceeded to Salisbury Airport to study all available information at first hand and be in immediate touch with affairs and later flew to Ndola to take personal charge. It will be appreciated that the potential area which might have required air search extended fanwise from Ndola into Congolese territory, and that close liaison with aircraft based on Leopoldville—for R.R.A.F. aircraft could not be directed beyond the frontier—was requisite before any effective general air search could be put into operation. The preparations for this general search, which involved the procurement of long range aircraft from as far afield as Nigeria in one direction and Tripoli in another, were in our view wise precautionary measures and justified Colonel Barber in leaving the conduct of a local search to Mr. Williams (whom he had nominated as Civil Air Search Officer, C.A.S.O.) in association with the R.R.A.F. unit at Ndola. It is, as we think, from the wider aspect of overall responsibility that the Director's actions are to be judged and, so far from finding

blame, we find that at all stages he maintained proper control of the situation and initiated and supervised appropriate action.

### **Police**

As we have already recorded, there were officers among the police on duty who noted a flash or glow in the sky shortly after SE-BDY had flown over and reported it. In addition, the police despatched road patrols during the hours of darkness to investigate these phenomena. The distance of the crash site from the roadway and the thickness of the intervening bush effectively prevented such patrols from sighting the remains of the aircraft and we cannot question the efficiency with which these patrols were conducted. There was a further daylight patrol sent from Mufulira which, despite careful search, found nothing.

As soon as information was received by the police from the Africans who discovered the wreckage, they took prompt action to reach the site and render assistance to any survivors. The arrangements for the presence of ambulances, first aid assistance, etc., were promptly made and efficiently carried out. The site of the crash was well guarded.

### **R.R.A.F.**

The complete log of R.R.A.F. activity at Ndola at the material time was put before us and this was supplemented by the evidence of Squadron Leader Mussell, the Commanding Officer at this station. The unit was flying regular reconnaissance sorties as part of its normal duties and so soon as reports were received by the Duty Operations Officer of flashes seen during the night, instructions were sent to reconnaissance pilots to look for any signs of a crashed aircraft. In addition, Canberra, Vampire and Provost aircraft were detailed for search duties in areas recommended by the civil authorities, and at 1310 Flying Officer Craxford, flying a Provost, located wreckage and reported its map reference by radio. Altogether some 16 hours 40 minutes of flying time was applied to the specific search operations.

We can find no ground for criticism of the contribution made by the R.R.A.F. to search and rescue activities.

### **The Board of Inquiry**

In accordance with Annexure 13 to the Convention of Civil Aviation, Chapter 5, a Board of Inquiry was set up on the 18th September, commenced its investigation on the 19th September and concluded its investigation by the 2nd November, 1961. Its Final Report, we are given to understand, was signed on the 11th January, 1962. It was assisted by accredited representatives and technical advisers, the names of each of which have already been set out. The team was divided into two groups, one the operations and one the technical, although all inspected the site and wreckage both from the air and on the ground. As a result of appeals issued over the normal broadcasting service, in newspaper advertisements, by posters and handbills, contact was made with all persons thought to have relevant evidence to convey and statements were taken from 133 witnesses. Technical reports on instruments, radio equipment, electrical equipment, flight system and auto-pilot and altimeters were procured, and medical and ballistic examinations undertaken by experts. Flight tests simulating the actual passage of SE-BDY as spoken to by ground observers were carried out in the vicinity of the airfield. We have derived great assistance from a consideration of the documents collated by the Board which were made available to us, particularly as a preparation for the understanding of the oral evidence led at the hearing before us. In the course of that hearing, certain findings by the Board in relation to causation of the accident were brought to our attention and these we have thought it proper to consider. In so far as our conclusions are more precise than those of the Board, we would make it plain that no implied criticism of the Board is intended. Indeed, we wish to place on record our conviction that the investigation made by the Board is noteworthy for its thoroughness and the Report detailing it remarkable for its clarity. We cannot conclude this section of our report without acknowledging our indebtedness to and admiration for the patient, tedious, informed and precise study which the Board conducted, the results of which materially lightened the burden of our own inquiry.

## APPRECIATIONS

In the first place we wish to express our great appreciation of the work done on our behalf by Mr. F. G. Cooke. He arranged for the attendance of a great number of witnesses in such manner that our work could go on without any hitch, and led all relevant evidence for the witnesses who were called.

Your Commissioners have already acknowledged their great indebtedness to the Board of Inquiry. We would express our special appreciation to Mr. I. J. Berry of the Department of Civil Aviation, who was the Secretary of that Board, for the work which he did for us in the care and production of exhibits before us.

We would also thank the staff of the British High Commissioner for making arrangements in regard to the production of witnesses from outside the Federation. The Northern Rhodesia Police gave us every assistance in securing the attendance of witnesses from Ndola. It was a great advantage to have been allowed the use of the High Court at Ndola.

Your Commissioners also wish to express their appreciation of the excellent work done in preparing daily the verbatim record of evidence, and the work done in the typing of this report.

Finally, we wish to thank especially our Secretary, Mr. H. S. Perry, and our Assistant Secretary, Mr. R. B. Ulyett. They have given us every assistance at all stages of our inquiry.

This we submit for Your Excellency's consideration.

(Sgd.) J. CLAYDEN,  
Chairman.

(Sgd.) G. H. LLOYD-JACOB,  
Member.

(Sgd.) J. NEWTON,  
Member.

(Sgd.) H. S. PERRY,  
Secretary,  
Salisbury.  
February, 1962.

APPENDIX I

EXAMINATION OF EYE-WITNESSES' STATEMENTS

To enable us to make easier reference to the evidence of eye-witnesses in the body of the report we have divided the eye-witnesses into the following classes:

- Class A. Those in or close to Ndola who heard or saw an aircraft pass over the airport.
- Class B. Similar witnesses, who in addition saw anything which might be associated with the crash.
- Class C. Those who heard or saw two aircraft at about the same time.
- Class D. Those who, without seeing an aircraft, saw anything which might be associated with the crash.

In each case the evidence is summarized, and our comments in regard to the evidence follow the summary.

CLASS A

MR. D. L. BERMANT:

He lived in a house some five miles west of Ndola, about three-quarters of a mile to the north of the N.D.B. and a little further to the west. After he had gone to bed, and at a time which he estimated as 2130 he was awakened by the thundering roar of an aircraft flying very low over his house, so that it shook the house. It seemed much lower than was usual with aircraft. It seemed to be going towards the north.

*Comment.* The time might have been later, and the aircraft probably was SE-BDY passing near the beacon shortly after 2210. The evidence of very low altitude is not consistent with other evidence, and is probably explained by a type of aircraft which was unusual to the area, but his evidence does indicate that the aircraft was lower than is usual. The direction of travel was admittedly uncertain.

MR. A. C. MARTIN:

He was the controller at the airport, and after SE-BDY reported at 2210 that it was overhead he heard it.

*Comment.* Nil.

MRS. A. D. WRIGHT:

She lived on a farm some seven miles to the north-west of Ndola. At about 2215 - 2230 she was woken by the very loud noise of an aircraft. It came from the east. She heard only one aircraft.

*Comment.* This evidence fits in with what must have been the course of SE-BDY. The time is a little late but as the witness was woken up the time she gave was only an approximation.

MR. LEMON MWANSA:

As he was on his way to assume duty as a plantation firewatcher, which duty began at 2300, he heard an aircraft, and saw one red and one white light of an aircraft. It went out of sight.

*Comment.* The time is most uncertain. It was probably SE-BDY.

MR. F. J. ANDREWS:

He was on duty as a Reserve Inspector of the N.R.P. at the airport. Shortly after 2200 he heard an aircraft, glanced up and saw two flashing red lights. The aircraft was going to the west and there was nothing abnormal about its height. He heard no other aircraft in the air.

*Comment.* This fits in with the passage of SE-BDY over the airport.

CHIEF INSPECTOR J. A. EADE, N.R.P.:

Shortly after 2200 he heard and saw two red lights of an aircraft going to the west over the airport. It seemed to be a little low and to be going fast. He heard no other aircraft.

*Comment.* This fits in with the passage of SE-BDY over the airport.

SENIOR SUPERINTENDENT R. J. READ, N.R.P.:

He was on duty at the airport. At about 2200 he heard and saw the lights of an aircraft going across the airport to the west. It seemed to be at normal height. He heard no other aircraft.

*Comment.* This fits in with the passage of SE-BDY.

ASSISTANT INSPECTOR A. E. BEGG, N.R.P.:

He was on duty at the airport. At about 2200 he heard an aircraft and saw a light of one going across the airport to the north-west. There was nothing unusual about the height.

*Comment.* This fits in with the passage of SE-BDY.

PRIVATE M. G. VOSLOO:

He was on guard duty on the side of Mufulira away from Ndola (some 45 miles away), from 2000 - 2200. At some time towards the middle of his duty he heard a twin-engined aircraft pass overhead.

*Comment.* This witness does not strictly fall within this class. This aircraft was almost surely the D.C.4 OO-RIC which came from that direction to Ndola and landed at 2035.

LIEUTENANT-COLONEL F. D. SLATER:

He was in barracks about ten miles to the south-east of Ndola. He was awakened in the night by a large aircraft flying very low over his house. He could not fix the time.

*Comment.* This aircraft was almost surely the D.C.4 OO-RIC which took off from Ndola at 2235 to go to Salisbury, and kept low to be out of the way of SE-BDY which it was thought might come into land. Its route to Salisbury would take it in that direction.

SENIOR TECHNICIAN K. H. HAMMOND, R.R.A.F.:

He was on duty at the airport. At about 2200, he heard and saw the red lights of an aircraft, which crossed the airport from east to west. He estimated its height as from 8,000 to 12,000 feet above the airport.

*Comment.* The height given is much higher than that given by any other witness. Otherwise the evidence fits in with the passage of SE-BDY.

SENIOR TECHNICIAN J. A. TOWNSEND, R.R.A.F.:

He was on duty at the airport. At about 2230 he heard and saw the lights of an aircraft which crossed the airport from east to west. Its height was about 2,000 feet above the airport.

*Comment.* Except that the time, an estimate, is a little late this fits in with the passage of SE-BDY.

CORPORAL T. N. LLOYD, R.A.F.:

He was on duty at the airport. At about 2200 he heard and saw the lights of an aircraft going overhead from east to west. He thought that the height was 2,000 feet above the airport.

*Comment.* This fits in with the passage of SE-BDY.

#### CLASS B

MRS. O. ANDERSON:

She lived in Ndola. At a time which she fixed by having looked at a clock as 2225 she heard an aircraft. She glanced out of a window and saw the red lights of an aircraft coming from the north-west towards Ndola and about eight to ten miles away. It seemed a bit low. At a time which she said was about seven minutes later, but which by her actions was the time taken in getting water from a refrigerator and walking to a bedroom some eight yards away, she heard an explosion, followed by two other explosions in rapid succession. She heard no other aircraft.

*Comment.* Except that the time is some ten minutes later than was probable this seems to accord with other evidence.

MR. D. A. C. CLARKE:

He was on security duty at a place some five miles east of Ndola. Shortly after 2200 he heard an aircraft and saw the steady red light of an aircraft go from east to west towards Ndola. The noise ceased and the light could not be seen. Shortly thereafter he saw a glow in the far distance to the west. He reported what he had seen after hearing the news at 1100 on the 18th September.

*Comment.* This evidence seems to fit in with other evidence and to be accurate.

MR. D. E. PEOVER:

He is an architect. He lives about one and a half miles from the airport. At about 2030 he saw an aircraft over Twapia Township area. It switched on its landing lights, twin beams, and approached in a steep descent. At that time he saw or heard no other aircraft. Just after 2200 he heard a large aircraft and from the balcony of his flat saw the red flashing light of an aircraft going from the airport to the north-west. It seemed to be slightly higher and to be going somewhat faster than the normal aircraft. It went out of sight behind some trees. About half a minute later he saw a red glow in the sky which went up and down twice. After the news at 1100 on the 18th September he reported what he had heard and seen to the airport. He heard no other aircraft.

*Comment.* This witness was by far the most impressive of the eye-witnesses. His account was, we consider, an accurate account of the landing of OO-RIC, which landed at 2035, and the passage of SE-BDY.

MR. D. MOYO, Mr. L. DAKA, Mr. P. BANDA:

These three witnesses can conveniently be dealt with together. They are three charcoal burners who were sleeping in the bush near where they worked, about two and a half miles from the scene of the crash. At dawn on the 18th they all went to the scene. They were all three convicted of the theft of a typewriter from the wreckage. Moyo said that at about 2400 he heard a sound as of a gun and later saw something burning. He said that Daka woke him up. Daka said that at about 0100 he was woken by a noise as of something exploding. He then saw a lot of fire. He said that he also saw something coming down and breaking the trees. He awakened Moyo. Banda was also awakened by Daka who said: "Wake up, listen, and hear what has exploded." He then heard sounds as of a gun going off many times. He saw a fire through the trees. None of them speaks of hearing any aircraft in the sky.

*Comment.* The times given are quite unreliable as is to be expected with these witnesses, awakened in the night. Moyo was awakened after the crash and the noise of a gun which he speaks of is obviously an explosion after the crash or the noise of exploding ammunition, as spoken of by Banda. Daka's evidence as to seeing something breaking the trees is obviously a reconstruction from what he saw at dawn, for he could not have seen that at night and that distance away. The failure to report the discovery of the crash was most regrettable but is no doubt explained by the theft of a supposed typewriter from the wreckage.

There is one matter which must be mentioned in regard to Banda, though it is not relevant to the Inquiry. In a statement made to members of the Board of Inquiry he said that when he went to the scene of the crash he saw dead bodies. Before us he said that he saw none. Asked to explain the difference in statements he said that he was beaten. Although it was inconceivable that the members of the Board who interviewed him should have been in any way concerned to make him say that he saw bodies, we thought it proper, in regard to the conduct of the Board, to inquire shortly into this allegation of the witness. We are satisfied that there was no truth in the allegation whatsoever.

ASSISTANT INSPECTOR M. U. VAN WYK, N.R.P.:

He was on duty at the house of the Provincial Commissioner in Ndola. At approximately 2220 he heard a large aircraft and then saw the steady red lights go across to the west, and disappear behind the trees. There was nothing unusual in height or speed. Three

or four minutes later he saw a red flash in the sky coming upwards from the ground. The glow lasted for about two seconds. He heard no other aircraft. When he came off duty at 2400 he told Assistant Inspector Begg what he had seen. Begg said that he would report it to the airport, and did so. Next morning the witness at the house gave the bearing of the glow to Squadron Leader J. Mussell.

*Comment.* This was accurate evidence.

MR. L. H. COCK:

He was on duty at the airport. At 2205, checked by a watch, he heard an aircraft pass overhead going in a north-westerly direction. He glanced up but did not see it. It seemed to be at normal height. When the noise could no longer be heard he saw a flash to the north-west which lit up the horizon. He thought that it was lighting. He heard no explosion. He heard no other aircraft.

*Comment.* This was accurate evidence.

DETECTIVE INSPECTOR D. J. F. BUCHANAN, N.R.P.:

He was on duty at the house of the Provincial Commissioner. At about 2205 he saw the lights of an aircraft which went to the north-west. It seemed to be climbing slightly. At about 2210 he saw a flash of light to the north-west which lasted for about one second and lit up the sky. He thought that it was lightning. He heard no explosion.

*Comment.* This seems to be accurate, except that the impression that the aircraft was climbing must be wrong having regard to other evidence.

MR. D. D. LOWE:

He was on duty at the house of the Provincial Commissioner as a Reserve Police Officer. He is district sales manager of the British Overseas Airways Corporation in Northern Rhodesia and has worked at airports. He knew the D.C.6 type of aircraft. At 2207 he heard what he thought was a D.C.6 pass overhead. He saw lights intermittently through the trees. It was heading west. He thought that it was rather low, and it seemed to be going fast. About ten minutes later he saw a pinkish glow in the sky to the west which lasted a few seconds. He thought that it was the reflection of a bush fire. He heard no explosion. He heard no other aircraft. He admitted that in an earlier statement he had put the times earlier, and thought that earlier times were correct.

*Comment.* This seems to be accurate except possibly as to times.

#### GENERAL COMMENT ON CLASSES A AND B

Apart from witnesses who must have been referring to the aircraft OO-RIC, there is general agreement in the evidence of all these witnesses as to what happened to an aircraft which must have been SE-BDY. It flew across the airport to the west, apparently at a height of somewhere about 6,000 feet above sea level, or maybe a little lower. Hammond seems to be inaccurate as to height. Many witnesses saw a flash some minutes later. None of these witnesses heard any explosion. None of the witnesses in Class A and B heard or saw any other aircraft.

#### CLASS C

MR. W. J. CHAPPELL:

*Comment.* This witness was completely unreliable. He contradicted himself again and again, and gave evidence in a most unconvincing manner. We do not propose to examine his evidence.

MRS. Y. JOUBERT:

She lived at Mufulira, some 40 miles to the north-west of the airport. In regard to times she was definite. She said that at 2300 she heard a jet aircraft far away, and ten minutes later she heard another aircraft fly low over the house. At 2330 she heard an explosion and saw a fire in the sky. At 0100 the fire was still burning.

*Comment.* The evidence as to the fire may be accurate, though whether it was a fire caused by the crash is uncertain. There may have been a later explosion from the crashed aircraft one and a quarter hours after the crash, but it seems unlikely that it would have been heard some 30 miles away. If it had been so loud as to be heard at that distance it is strange that no one else heard it. If she did hear an aircraft at about 2300 in Mufulira it certainly was not SE-BDY, which never went anywhere near Mufulira and had crashed by 2215. There is no question of mistake as to times on her evidence. It seems probable that there has been imaginative reconstruction.

MR. T. J. KANKASA:

He is the secretary of the Twapia Town Management Board. Twapia is some four miles to the west of the airport. He was walking to his house at about 2035. He fixed this time by knowing that when he got home he listened to the Springbok Radio news service at 2100. He was certain the time he spoke of was before 2100. He did not think that it was possible that it was the Brazzaville news service at 2300 to which he listened. At 2035 he heard the peculiar noise of an aircraft and saw a big aircraft flying to the north-west. He actually saw the aircraft. It had lights. He saw a smaller aircraft, without lights, flying above the big aircraft in the same direction, at a slightly faster speed. Then he said, "I saw as if the small plane was beaming lights on this bigger plane and from that instant that bigger plane had then two headlights bright lights bearing straight." They disappeared in the horizon. He described the beaming of lights as being like the light of a torch put on and off two or three times.

*Comment.* One thing is clear, that the big aircraft seen at 2035 was not SE-BDY. It was almost certainly OO-RIC which landed at 2035. The witness Peover saw it over Twapia at 2030 and saw it switch on its landing lights, two beams. The small aircraft was probably the tail plane of the large aircraft; the light as of a torch may have been a flashing light on the big aircraft seen momentarily as the aircraft banked to come in to land.

MR. J. M. LAURIE:

He is a reporter. He was at the airport from 2200 on the 17th September to 0330 on the 18th September. Shortly after 2200 he heard an aircraft pass overhead. At 2340 he heard an aircraft, sounding like a D.C.3, over the airport. It continued to drone very faintly around the vicinity of the airport for 20 minutes. The noise was very faint.

*Comment.* The aircraft which he heard after 2200 was obviously SE-BDY. If there was another aircraft overhead at 2340 it is strange that no one else heard it. There were many police officers on duty.

MR. D. SIMANGO:

He is a charcoal burner who was sleeping near his kiln some two and a half miles from the scene of the crash. He saw the shape and lights of an aircraft going away from Ndola. Shortly afterwards it came back towards Ndola. He did not then see the lights. Then he saw a flash of light and the aircraft crashed down. Then he heard some explosives banging. After the flash and crash all sound of engines ceased. His cross-examination was deferred until after Mazibisa had given evidence. Under cross-examination he said that he saw two aircraft. A small one was showing between the wing and fuselage of the large one. In his earlier statement he had said that he saw what he believed to be two aircraft.

*Comment.* His description of the sequence of flash and crash was very vague. It is hard to discover how he could have seen a second aircraft on the return of the large aircraft when he did not even see the lights of the large aircraft. From the fact that all engine noise ceased with the crash it seems clear that there was not in fact a second aircraft, and that his original statement is more likely to be correct, that he saw what seemed to be two aircraft. This would fit in with his having mistaken the tail plane of the large aircraft for a second aircraft.

MR. F. MAZIBISA:

He is a charcoal burner and the president of the Charcoal Burners' Association. He was sleeping near his kiln about two and a half miles from the scene of the crash. It was he who through the Forestry Station reported the finding of the crashed aircraft at some time after 1230 on the 18th September.

He made two statements. In the first statement he made no mention at all of having seen an aircraft in the night, and said that he became "excited" when he discovered the crashed aircraft on his way from work. He made a second statement about a week later, after he had discussed the matter with a Mr. Mattson, a trade union organizer who had interested himself in the affairs of the Charcoal Burners' Association. In that he said that he was attending to his work when he heard aircraft and saw lights in the sky which he thought were two aircraft, about 100 yards apart, one behind the other coming from the north. A few minutes later at about 2215 he heard a horrible noise and saw a very bright light on the ground. Then he heard a lot of smaller noises.

In his evidence before us he said that at 2230, a time which he fixed by looking at his watch, he heard the noise of two aircraft and looked up and saw the lights of two aircraft. Then he went to sleep. After a few minutes he heard a very big bang and saw a very big light. Then there was a number of smaller explosions. He went away.

In later questioning he said that he saw the shapes of two aircraft. And then he said that it was the spacing of the lights which led him to think that there were two aircraft.

*Comment.* This witness was not impressive. He had no real explanation as to why in his first statement he made no mention at all of seeing aircraft in the night, or of hearing the crash. The smaller noises, or explosions he speaks of, if heard, would be cartridges exploding in the fire. His story does not confirm that a second aircraft was still in the air after the crash. There is no satisfactory explanation as to why this witness, if he heard the crash in the night, and did not, as he first said, find it on his way from work next day, should not have reported sooner.

MR. D. BULENI:

He first made a statement on 20th January, 1962. He had a discussion with Mr. Mattson and Mazibisa and decided to give evidence to this Commission. He is a charcoal burner who said that he was sitting outside his house in the compound on Sunday night. There was a beer drink in progress. Between 2000 - 2100 he saw an aircraft with lights flying from west to east. After a long while he saw another aircraft with very big red lights. Above this was a smaller aircraft with a red light on it. They flew from the north to the south. The small aircraft was above the large aircraft, about 150 yards above it. One aircraft burst and fell to the ground. He then saw a big flame. Then the small aircraft flew off towards Kitwe. In an earlier statement he said that it flew in a different direction towards Mufulira.

*Comment.* He was not a reliable witness. There are statements in his evidence such as: "It is easy for one to see aeroplanes flying at night because of the buzz of the engines." It is most unlikely that he would have confused the direction of Mufulira with the direction of Kitwe, and the difference in this regard shows that he had forgotten what he said a few days before.

#### CLASS D

ASSISTANT INSPECTOR N. J. VAUGHAN, N.R.P.:

He was on patrol in a vehicle on a road from Mufulira. At 2340 he saw in the direction of Ndola what appeared to be an exploding light in the sky and something falling. He likened it to a lamp bulb bursting. It lasted for some two seconds. He reported this on his return to his station in Mufulira at 0130. As a result of this report patrols were sent out.

*Comment.* Probably what was seen was a red-hot oxygen cylinder, or some other part of the wreckage, blown into the sky. Whatever was seen, was seen over an hour after the crash.

MR. J. NKHATA:

At a time determined by cock-crow as between 2400 and 0100 he heard an explosion. He was lying awake in his house in a road camp on the Mufulira-Ndola road.

*Comment.* Nil.

MR. M. A. BRACHE:

At about 0130 he was motoring from Mufulira to Ndola. At a point on that road which is about opposite the scene of the crash he saw a fire which appeared to be a localized bush fire, and smelt an unpleasant smell such as would not come from a bush fire.

*Comment.* This may have been the burning aircraft, though the scene of the crash was some four miles from the road.

2 vittnen talas  
-om hur det miedes  
planat efter det stras 30  
cirklar kunnat.  
Om hur de 5 rapportar?



APPENDIX 2

LIST OF WITNESSES

ALLEN, Alfred Vincent, Senior Inspector, N.R.P.  
ALPORT, His Excellency the Right Honourable Lord, T.D.  
ANDERSON, Mrs. Olive.  
ANDREWS, Frederick James, Reserve Assistant Inspector, N.R.P. Reserve.  
APPLETON, David John, Senior Inspector, N.R.P.  
APTHORP, Henry William.  
BANDA, Posyana.  
BARBER, Lieutenant-Colonel Maurice Clinton Hilton, D.F.C.  
BARBER, Acting Group Captain Roger Hilton, D.F.C., R.R.A.F.  
BEGG, Adrian Eden, Assistant Inspector, N.R.P.  
BERMANT, David Lyon.  
BERRY, Ian Jeffery.  
BLANCHARD-SIMS, Group Captain Jack.  
BONKULI, Felix.  
BOWELL, Henry Charles.  
BRACHE, Malcolm Alan.  
BRADSHAW, Squadron Leader Denis Arthur, R.R.A.F.  
BRICHANT, Peter Leon.  
BRIDGES, Henry Cameron.  
BRINKMAN, Gerhardus.  
BUCHANAN, David John Frederick, Detective Inspector, N.R.P.  
BUDREWICZ, Richard.  
BULENI, Dickson.  
CARY, Michael Tom, Assistant Superintendent, N.R.P.  
CHAPPELL, William John.  
CHILVERS, Cyril Percy.  
CHIPASULA, Judson Arnold.  
CHOISNE, Captain George Bernard.  
CLARK, Henry Clifford.  
CLARKE, Douglas Alexander Campbell.  
COCK, Leslie Henry, Reserve Assistant Inspector, N.R.P. Reserve.  
COLES, John.  
CRAXFORD, Flying Officer Gerald, R.R.A.F.  
CROUCH, Frederick James.  
DAKA, Ledison.  
DANIELSSON, Otto Daniel.  
DELIN, Major Jose, Katanga Military Forces.  
DELTOUR, Guillaume.  
DICKINSON, John, Acting Inspector, N.R.P.  
EADE, John Alfred, Chief Inspector, N.R.P.  
ECCLES, Brian Rupert Dorset.  
ELS, Robert Henmann, Superintendent, N.R.P.  
EVANS, Wing Commander Edgar, R.A.F.  
FOURIE, Gideon David Joubert.  
FREETH, Victor.  
GANGE, Raymond John, Detective Senior Inspector, N.R.P.  
GARFITT, Thomas Noel.  
GOODBRAND, John Alexander.  
GRAY, Alan Frank.  
GREGORY, Alan.  
HABGOOD, Sister Patricia Holt.  
HAMMOND, Kenneth Hugh, Senior Technician, R.R.A.F.  
HAWKINS, Air Commodore Harold, C.B.E., A.F.C., A.D.C., R.R.A.F.  
HOOD, John Gordon, Detective Inspector, N.R.P.  
HUFF, Brock Vernon.  
JOHNSTON, Douglas James Herbert, Inspector, N.R.P.  
JONES, Sister Joan Margery.  
JOUBERT, Mrs. Yvonne.  
KAMBENDJA, Damas.  
KANKASA, Timothy Jiranda.  
KAVANAGH, Mrs. Doreen May.  
KNIGHT, Albert Wesley.  
KROON, Hendrik.  
LANDIN, Ernst Ake.  
LAURIE, James MacKenzie.

LINNER, Dr. Carl Sture.  
 LJUNGKVIST, Major Knut Olov.  
 LLOYD, Corporal Thomas Neil, R.A.F.  
 LOWE, David Dudley, Reserve Assistant Inspector, N.R.P. Reserve.  
 LOWENTHAL, Dr. Mark Leytham.  
 LOWRIE, Vincent Aloysius.  
 MADDERS, Martin.  
 MARTIN, Arundel Campbell.  
 MATEMI, Captain Raphael, Katanga Military Forces.  
 MATLICK, Colonel Ben, U.S.A.F.  
 MAYNE, Edgar, Reserve Assistant Inspector, N.R.P. Reserve.  
 MAZIBISA, Farie.  
 McGRATH, Sister Angela.  
 McNAB, Donald Matthew, M.B., Ch.B.  
 MOSS, Wing Commander John Peter, R.R.A.F.  
 MOYO, Damson.  
 MUBANGA, Jeki.  
 MURPHY, Leslie John.  
 MUSSELL, Squadron Leader John, R.R.A.F.  
 MWANSA, Lemon.  
 NELSON, Thomas Robert.  
 NKHATA, Johnny.  
 NKONFELA, Eliman Alick London.  
 NUNNS, James Augustus Peter.  
 O'DONOVAN, Captain Michael.  
 OWEN, Godfrey Ralph.  
 PARKES, Thomas Keith.  
 PARMENTIER, Roland.  
 PENNOCK, John Keith, Assistant Inspector, N.R.P.  
 PEOVER, Donald Edwin.  
 PERSSON, Captain Sture.  
 READ, Robert Jeffery, Senior Superintendent, N.R.P.  
 ROSS, Hugh Douglas, M.B., Ch.B., Forensic Pathologist and Consultant Histologist.  
 ROUNCE, Norman James Essington.  
 SIMANGO, Davidson.  
 SLATER, Lieutenant-Colonel Frank Desmond, Rhodesia and Nyasaland Army.  
 STARCK, Captain Lars Eric George.  
 THOROGOOD, Leslie Ernest.  
 TJERNELL, Oskar Evert.  
 TORP, Sivert Edvald  
 TOWLSON, George Eric, Assistant Inspector, N.R.P.  
 TOWNSEND, James Arthur.  
 TRYGGVASON, Tryggvi Jon.  
 TURNBULL, John.  
 VAN WYK, Marius Uranus, Assistant Inspector, N.R.P.  
 VAUGHAN, Nigel John, Assistant Inspector, N.R.P.  
 VIRVING, Bo Sten.  
 VOSLOO, Private Malan Gerhardus, Rhodesia and Nyasaland Army.  
 WALDRON, Drew Donald.  
 WEITSZ, Stephanus Cornelius, Assistant Inspector, N.R.P.  
 WENHAM, Andrew John, Assistant Inspector, N.R.P.  
 WILKINSON, John Stafford, Inspector, N.R.P.  
 WILLIAMS, John Howel.  
 WRIGHT, Mrs. Adelaid Roderick.  
 WRIGHT, Trevor Ernest Arthur, Senior Inspector, N.R.P.



BRAZZAVILLE FIR

LEOPOLDVILLE FIR

NAIROBI FIR

GULF OF GUINEA

LUANDA FIR

SALISBURY FIR

LOURENCO MARQUES FIR

PROBABLE ROUTE FLOWN BY SE-BDY

ROUTE FLOWN BY OO-RIC

REPORTING POSITION 432 B

POSITION AT 2035 GMT

CALLED "ABEAM KASAMA" 2106 GMT

13°00'S 30°19'E 2147 GMT

SE-BDY REPORTED "OVERHEAD NDOLA" 2210 GMT

04°35'S 29°25'E

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PHOTOGRAPH No. 1

*Approach path illustrating narrowing swath cut by aircraft as left wing down attitude increased*



PHOTOGRAPH No. 2

*Main wreckage area showing ant-hill struck by aircraft nose in centre left of photograph and last 300 feet of wreckage trail*



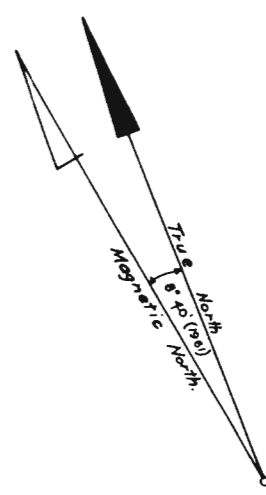
PHOTOGRAPH No. 3

*View looking back along approach path showing swath cut by aircraft and the initial shallow approach angle*

# WRECKAGE PLAN

## ACCIDENT TO DOUGLAS DC-6B SE-BDY

SCALE: 1 INCH TO 40 FEET.



The Magnetic Bearing of the line 00/084 is 120°.

- NOTE**
- ① Datum ground level of peg 10 adopted as 4300 feet from Federal Trig. Survey 1 in 50,000 Series Sheet 1228 D<sub>3</sub>.
  - ② Ground level contours are indicated thus:— 4298
  - ③ The heights of the highest damaged points of a few selected trees (W1-W36) are shown thus:— eg 4346.4 W3
  - ④ Letter "B" indicates position of a Body.
  - ⑤ Letter "E" represents position of an Engine.
  - ⑥ Scorched areas // // // //
  - ⑦ Incinerated areas [hatched pattern]

A  
B  
C  
D  
E  
F  
G  
H  
I  
J

A  
B  
C  
D  
E  
F  
G  
H  
I  
J

