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REPORT OF THE COMMISSION OF INVESTIGATION INTO THE CONDITIONS AND CIRCUMSTANCES RESULTING IN THE TRAGIC DEATH OF MR. DAG HAMMARSKJOLD AND OF MEMBERS OF THE PARTY ACCOMPANYING HIM *

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LETTER OF TRANSMITTAL

24 April 1962

Sir,

I have the honour to refer to General Assembly resolution 1628 (XVI) of 26 October 1961 establishing a Commission of investigation into the conditions and circumstances resulting in the tragic death of Mr. Dag Hammarskjöld and of members of the party accompanying him and, at the request of the Commission, to submit to you the attached report in accordance with paragraph 4 of the said resolution.

.....

The Commission approved its report at its last meeting on 8 March 1962 in Geneva. However, in transmitting it to the Secretary-General for submission, the Commission noted that it had requested certain scientific tests to be performed on the wreckage of the airplane, involving the remelting of blocks of aluminium and light alloys which had been melted and fused in the fire following the crash. For this purpose the Secretary-General had arranged for the appointment by the United Nations of an expert to participate with the Rhodesian authorities in the remelting of the metal blocks and to perform laboratory tests on the residue (see paragraph 47 of the report).

As these tests were still in progress, the Commission asked that its report should not be submitted until these experiments were completed and the Commission members had had an opportunity to consider the results. The report of the expert appointed by the United Nations, containing the results of the tests, was received by the Secretary-General on 6 April 1962 and was communicated to the members of the Commission. Having examined these results, the members of the Commission have concluded that no reconsideration of their report is necessary and have authorized the release of the report as previously approved. The report of the expert containing the results of these scientific tests is annexed to the report of the Commission (see annex XII).

Accept, Sir, the assurances of my highest consideration.

(Signed) U THANT
Acting Secretary-General

His Excellency
Mr. Mongi Slim
President of the sixteenth session
of the General Assembly

LIST OF ABBREVIATIONS

ALERFA	Alert phase
ASL	Above sea level
B	Ndola local time
CASO	Civil Air Search Officer
DETRESFA	Distress phase
FIC	Flight Information Centre
FL	Flight level
ICAO	International Civil Aviation Organization
INCERFA	Uncertainty phase
NDB	Non-directional beacon
ONUC	United Nations Organization in the Congo
OO-RIC	Registration number of Lord Lansdowne's aircraft
QFE	Altimeter setting to obtain altitude reading above airport
QNH	Altimeter setting to obtain altitude reading above sea level
RCC	Rescue Co-ordination Centre
RRAF	Royal Rhodesian Air Force
SE-BDY	Registration number of Secretary-General's aircraft
Z	Greenwich Mean Time (GMT)

REPORT OF THE COMMISSION OF INVESTIGATION

INTRODUCTION

1. On 18 September 1961, the whole world learnt with profound grief of the tragic death of Dag Hammarskjöld, Secretary-General of the United Nations, in the service of the Organization and in the performance of the mission which he had undertaken for peace and the independence of peoples. In this tragedy the following fifteen persons accompanying him also met their deaths:
Mr. Heinrich A. Wieschhoff, Mr. Vladimir Fabry, Mr. William Ranallo, Miss Alice Lalande, Mr. Harold M. Julien, Mr. Serge L. Barrau, Mr. Francis Eivers, Mr. Stig Olof Hjelte, Mr. Per Edvald Persson, Mr. Per Hallonquist, Mr. Nils-Eric Åahréus, Mr. Lars Litton, Mr. Nils Göran Wilhelmsson, Mr. Harold Noork, Mr. Karl Erik Rosén.
2. In carrying out the task entrusted to us of investigating the circumstances of the tragic death of Dag Hammarskjöld and his associates, we, the members of the Commission appointed for that purpose, were aware that we were inquiring into the causes of the deaths of men who have laid down their lives in the performance of a mission the purpose of which was to secure a better life for millions. For this reason, we feel it incumbent upon us at the beginning of this report to express our profound respect and high regard for Dag Hammarskjöld and for the other victims engaged in this mission.
3. The late Secretary-General left New York by air on 12 September and arrived at Leopoldville on 13 September 1961. The purpose of his journey was to discuss with the Central Government the adoption of a programme of aid to the Republic of the Congo. Immediately after his arrival, however, he was confronted with a grave crisis in the relations between the United Nations and the provincial authorities of Katanga.
4. The crisis arose out of the implementation by ONUC - the United Nations Organization in the Congo - of part A, paragraph 2, of the resolution adopted by the Security Council on 21 February 1961 (S/4741). In this paragraph the Council urged that "measures be taken for the immediate withdrawal and evacuation from the Congo of all Belgian and other foreign military and para-military personnel and political advisers not under the United Nations Command, and mercenaries".

5. By far the largest concentration of such personnel, about 500 men, was to be found in the Katangese armed forces. In the months which followed the adoption of this resolution, ONUC attempted to implement the provisions of part A, paragraph 2, by agreement with the provincial authorities of Katanga and, in particular, their chief, Mr. Tshombé. This attempt achieved only partial success, and the United Nations military command was compelled to set a time limit for the surrender, for purposes of evacuation, of all mercenaries in the service of the provincial authorities of Katanga. On the expiration of the time limit, however, over 100 mercenaries known to be in Katanga had failed to report to ONUC, and on 13 September the Military Command took precautionary measures to facilitate the task of apprehending and evacuating these men. These measures were met by force, and fighting broke out at Elisabethville and in other Katangese cities (S/4940).
6. Hostilities were not limited to ground forces. Whereas the United Nations had no armed aircraft, the Katangese authorities put into action a jet "Fouga Magister" carrying two machine guns and a small bomb load. This aircraft considerably hampered the movement of United Nations transport planes and in some instances prevented the supply and relief of United Nations units.
7. In the meantime, several contacts with Katangese officials were arranged for the purpose of bringing about an immediate cease-fire, but no results had been achieved by the evening of 15 September. During 16 September the Secretary-General considered the possibility of a meeting in Rhodesia between himself and Mr. Tshombé. In the course of the night, the United Nations representative at Elisabethville received, through the British Consul, a message informing the United Nations that Mr. Tshombé wished to meet him at Bancroft, Northern Rhodesia, on 17 September at 0930 GMT. The Secretary-General sent a reply in which he recalled the guiding principles of the United Nations action in the Congo and suggested that he should meet Mr. Tshombé personally. He specified, however, that "the proposed meeting obviously requires that orders should be given beforehand for an immediate and effective cease-fire" (S/4940/Add.4, para. 7). He proposed therefore that "such a cease-fire should be formally imposed by both sides so as to make a meeting possible". He pointed out, furthermore, that as there were no adequate landing facilities for a large aircraft at Bancroft he would be unable to arrive there by the time suggested by Mr. Tshombé. He accordingly

suggested that the projected meeting should take place at a later hour at Ndola, Northern Rhodesia. The Secretary-General concluded his reply to Mr. Tshombé with the following words:

"I shall inform you as early as possible tomorrow morning /17 September/ of my time of arrival /at Ndola/, allowing for the fact that before I leave I must have your reply to this message, including your decision regarding the cease-fire. The cease-fire will occur automatically on the United Nations side, in view of the fact that, according to the instructions given and the rules followed by the Organization, it only opens fire in self-defence. I am awaiting your urgent reply to this proposal for a meeting and for an immediate cease-fire" (S/4940/Add.4, para. 7).

8. In the morning of 17 September, the British Consul at Elisabethville transmitted a message to the United Nations from Mr. Tshombé stating that he agreed to "the principle of an immediate cease-fire" and was prepared to meet the Secretary-General at Ndola. Mr. Tshombé specifically requested, however, "that United Nations troops be confined to their camps" and "that the United Nations stop troop movements and the sending of reinforcements by land and air" (ibid., para. 10).

9. In answer to this message, the Secretary-General instructed the United Nations representative at Elisabethville to inform Mr. Tshombé that he found it "impossible to accept the conditions for a cease-fire and a meeting which have been conveyed to him". He emphasized that "there can be no question of anything but an unconditional cease-fire on both sides and an agreement to meet together, all other modalities obviously to be discussed in the course of the meeting" (ibid., para. 12).

10. When, however, the United Nations representative at Elisabethville asked the British Consul to transmit the Secretary-General's answer to Mr. Tshombé, he was informed that Mr. Tshombé had chartered an aircraft and was expected to leave for Ndola shortly.

11. In the circumstances, the Secretary-General decided to proceed to Ndola and took off from Leopoldville at 1551 GMT in the plane of the Force Commander, a DC.6.B bearing the registration letters SE-BDY. At 2210 GMT, SE-BDY radioed "overhead Ndola" and was seen flying over the airport. A few minutes later it disappeared from sight in a westerly direction, and all efforts to re-establish

radio contact failed. On the next day, 18 September, at 1310 GMT, the wreckage of the aircraft was sighted from the air 9.5 miles west of Ndola. When the police arrived at the site of the crash, they found only one survivor - Sergeant Julien - who was in so serious a condition that he died a few days later.

12. On 29 September Dag Hammarskjöld was buried at Uppsala. Two days before his funeral, several Member States had requested the General Assembly to place on its agenda an item entitled "An international investigation into the conditions and circumstances resulting in the tragic death of Mr. Dag Hammarskjöld and of members of the party accompanying him" (A/4896 and Add.1-6). By unanimous decision the item was placed on the agenda on 13 October; it was discussed on 26 October, at the 1042nd plenary meeting.

13. At that meeting the Assembly had before it a draft resolution (A/L.356/Rev.1 and Add.1-5) providing for the establishment of a United Nations Commission to conduct an investigation into all the conditions and circumstances surrounding this tragedy. In the course of the discussion the following arguments were advanced in support of the draft resolution: the investigation should be carried out under the auspices of an international body, in order to satisfy public opinion and allay the world-wide concern aroused by the magnitude of the tragedy and by its political and historical importance; the United Nations should conduct this investigation as a tribute to the Secretary-General and the other victims of the disaster; an international investigation should be conducted under the auspices of the United Nations in order that the independence and impartiality of the inquiry should be assured; the investigation should provide answers to the rumours, fears and speculations to which the tragedy gave rise; the investigation should determine any responsibility involved; finally, the investigation should assist in preventing the occurrence of such disasters in the future and in ensuring maximum protection for those performing functions in the service of the United Nations.

14. At the end of the discussion, the draft resolution was adopted by the General Assembly by 97 votes to none and became resolution 1628 (XVI) (see Annex I). On 8 December, the General Assembly appointed the following persons as members of the Commission:

Mr. Justice Samuel Bankolé JONES (Sierra Leone)

Mr. Raúl QUIJANO (Argentina)

Mr. Justice Emil SANDSTRÖM (Sweden)

Mr. Rishikesh SHAHA (Nepal)

Mr. Nikola SRZENTIC (Yugoslavia)

The Secretary-General assigned Mr. Blaine Sloan as Principal Secretary and Mr. Nicholas Teslenko as Deputy Principal Secretary of the Commission. Through the courtesy of the International Civil Aviation Organization (ICAO), Mr. Neil Richardson, Director of the Middle East Regional Office of ICAO, and Mr. R.H. Mankiewicz, a member of the Legal Bureau of ICAO, who had acted as counsel for the United Nations at the Federal Commission of Inquiry, were seconded to the United Nations to serve as the Commission's Aeronautical and Air Law Advisers, respectively.

15. The terms of reference of the Commission are set out in operative paragraph 3 of resolution 1628 (XVI) as follows:

"The General Assembly,

.....

3. Decides that an investigation of an international character, under the auspices of the United Nations, should be held immediately into all the conditions and circumstances surrounding this tragedy, and more particularly as to:

(a) Why the flight had to be undertaken at night without escort;

(b) Why its arrival at Ndola was unduly delayed, as reported;

(c) Whether the aircraft, after having established contact with the tower at Ndola lost that contact, and the fact of its having crashed did not become known until several hours afterwards, and if so, why;

(d) Whether the aircraft, after the damage it was reported to have suffered earlier from firing by aircraft hostile to the United Nations, was in a proper condition for use."

16. While the sub-paragraphs set forth four specific questions to be inquired into by the Commission, the opening sentence gives it the general mandate to investigate "all the conditions and circumstances surrounding this tragedy". It is clear from the resolution itself and from the discussion in the General

Assembly that the specific questions were not intended in any way to restrict the general mandate of the Commission.

17. In the present report, part I describes the programme of work of the Commission and the relationship of its investigation to those conducted under the auspices of the Federation of Rhodesia and Nyasaland. The three following parts deal with the conditions and circumstances surrounding the disaster, namely: the departure, the flight and crash, and the search and rescue operations. Each of these parts attempts to provide an answer to the specific questions asked by the General Assembly which are relevant to the subject matter dealt with therein. Finally part V summarizes the views expressed in the preceding parts.

I. THE INVESTIGATION CONDUCTED BY THE UNITED NATIONS COMMISSION

18. The United Nations Commission of Investigation held meetings in New York from 15 to 22 December 1961 and at Leopoldville, Ndola and Geneva from 24 January to 8 March 1962.

A. OTHER INVESTIGATIONS

19. Before this report proceeds to give a more detailed description of the work of the Commission, it will be useful to note other investigations which have been conducted.

20. In adopting resolution 1628 (XVI), the General Assembly noted that other inquiries had been or were being conducted by Governments or parties concerned. Representatives who spoke on this matter in the General Assembly considered that there should be no conflict between the different investigations and that the results of previous investigations could facilitate the task of the United Nations Commission. The Commission has taken into account these suggestions and examined very carefully the results of the previous investigations.

1. Rhodesian Board of Investigation

21. Immediately after the crash, a Board of Investigation was set up by the Federal Government of Rhodesia and Nyasaland, the State in which the accident occurred, in accordance with article 26^{1/} of the Convention on International Civil Aviation and annex 13 (Standards and Recommended Practices - Aircraft Accident Inquiry) to that Convention as implemented by section 144 of the Federal Air Navigation Regulations, 1954.

1/ Article 26 provides: "In the event of an accident to an aircraft of a contracting State occurring in the territory of another contracting State, and involving death or serious injury, or indicating serious technical defect in the aircraft or air navigation facilities, the State in which the accident occurs will institute an inquiry into the circumstances of the accident, in accordance, so far as its laws permit, with the procedure which may be recommended by the International Civil Aviation Organization. The State in which the aircraft is registered shall be given the opportunity to appoint observers to be present at the inquiry and the State holding the inquiry shall communicate the report and findings in the matter to that State."

22. This Board, whose Chairman was Lt. Colonel M.C.H. Barber, the Federal Director of Civil Aviation, conducted its investigation from 19 September to 2 November 1961. The Board, in addition to the Chairman, was composed of two Rhodesian members and one United Kingdom member. Its report, to which were attached a number of annexes, including a detailed technical examination of the wreckage, was concluded on 11 January 1962 (see annex II). In addition a report on the medical investigation was also prepared for the Board of Investigation.

23. In accordance with annex 13 to the Convention on International Civil Aviation referred to above, observers for Sweden, the State of registry of the aircraft, were invited to attend. Similar invitations were extended to the observers designated by the United Nations. The United Nations observers were Mr. J.P. Fournier and Mr. R.T. Nelson of ICAO. Each had had wide experience of aircraft accident investigations in their national services before joining the staff of ICAO, and Mr. Nelson had been in charge of ICAO's Accident Investigation Unit. Both the Swedish and the United Nations observers, as well as representatives of Transair, Sweden, the operators of the aircraft, and of the International Federation of Airline Pilots Associations participated fully in the investigation. The names of the members constituting this Board of Investigation, together with those of all observers, will be found in annex II, paragraph 22.

2. Rhodesian Commission of Inquiry

24. In addition to the Board of Investigation, a Federal Commission of Inquiry was established under the Federal Commissions of Inquiry Act, 1955, also in conformity with the provisions of annex 13 to the Convention on International Civil Aviation. The Commission of Inquiry had the following terms of reference: to inquire into "The cause or causes of and circumstances surrounding the accident involving aircraft SE-BDY near Ndola during the night of 17 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".

25. By letter of 8 December 1961 to the President of the General Assembly, the Permanent Representative of the United Kingdom, on behalf of the Government of the Federation of Rhodesia and Nyasaland, invited the United Nations to designate

a member of the Federal Commission of Inquiry. By the same letter, the representative of the United Kingdom informed the President of the General Assembly that the Federal Government had also requested the Governments of Sweden and the United Kingdom and ICAO to designate members of the Federal Commission. He added that the fifth member of the Federal Commission would be the Chief Justice of the Federation of Rhodesia and Nyasaland, who would act as Chairman.

26. The President of the General Assembly, in accordance with a suggestion made by the Permanent Representative of the United Kingdom, referred the question to the United Nations Commission of Investigation, which was then holding its organizational meetings in New York. After careful consideration, the Commission concluded that the harmonization desired by the General Assembly between the two different investigations could best be achieved by co-operation and exchange of information between the investigating bodies, the investigations themselves being kept separate.

27. Accordingly it advised the President of the General Assembly as follows:

"The Commission has given careful consideration to this letter and the Chairman has also discussed the subject with the Permanent Representative of the United Kingdom.

"The Commission considers that it would be best that the United Nations investigation should be kept separate from the Rhodesian investigation, and therefore does not recommend that the United Nations appoint a member to the Public Commission of the Federation.

"The question was also discussed whether it would be advisable for the United Nations to name an observer to the Commission. There was, however, no consensus on this point. The Commission does not make a positive recommendation for the appointment of an observer by the United Nations, but would make no objection should the President of the General Assembly or the Secretary-General deem it advisable that an observer be appointed.

"The Commission would also desire to inform the President that it has received proposals from the Rhodesian authorities for co-operation between the two Commissions and will discuss with the appropriate authorities the best methods of effecting co-operation."

28. In the light of this opinion, the President of the General Assembly answered the Permanent Representative of the United Kingdom in the following terms:

"After full and sympathetic consideration of the invitation the Commission concluded that it would be best that the United Nations investigation should be kept separate from the Rhodesian Investigation and hence was not able to recommend that the United Nations appoint a member to the Public Commission of Enquiry of the Federation.

"The Commission has, however, informed me that it has received proposals from the Rhodesian authorities for co-operation between the two Commissions and that further steps will be taken urgently to effect this co-operation which should prove to be of advantage to both inquiries.

"I have discussed this matter with the Secretary-General who joins me in agreement regarding the views expressed by the United Nations Commission."

29. The Government of Sweden likewise decided not to designate a member. The Government of the United Kingdom and ICAO accepted the invitation of the Federation of Rhodesia and Nyasaland and designated members to the Rhodesian Commission.

30. The Secretary-General appointed counsel to represent the interests of the United Nations in the hearings of the Rhodesian Commission and in matters related to the subject of the inquiry. Following the conclusion of the Rhodesian hearings, which were held from 16 to 29 January 1962 at Ndola and Salisbury, counsel for the United Nations, Mr. R.H. Mankiewicz, reported to the United Nations Commission on the proceedings of the Federal Commission. The report of the Federal Commission was made public on 9 February 1962 (see annex III).

B. WORK OF THE COMMISSION

1. New York session (15-22 December 1961)

31. When it first met in New York on 15 December 1961 the Commission elected its officers: Mr. Rishikesh Shaha (Nepal) was unanimously elected Chairman of the Commission and Mr. Raúl Quijano (Argentina) was unanimously elected Rapporteur. Sir Alexander MacFarquhar attended the meetings in New York as the representative of the Secretary-General. The Commission considered the programme and organization of its work, and decided on the relationship of its investigation to those then proceeding in Rhodesia. It also received a report from Mr. T.R. Nelson (ICAO), one of the United Nations observers to the Rhodesian Board of Investigation. The Commission heard three additional witnesses, including Mr. A.W. Cordier, Under-Secretary for General Assembly and Related Affairs, with respect to general security procedures which had been observed for the protection of the Secretary-General.

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2. Leopoldville session (24-30 January 1962)

32. The Commission met at Leopoldville from 24 to 30 January 1962. At its first meeting it received a report from Mr. J.P. Fournier (ICAO), the other United Nations observer at the Rhodesian Board of Investigation. During this session it also heard all witnesses then present in the Congo (Leopoldville) who could give any information concerning the planning, organization, security arrangements and communications with respect to the Secretary-General's flight or with respect to the crew of the aircraft. These witnesses included Mr. S. Linnér, Officer-in-Charge of the United Nations Organization in the Congo (ONUC), Lt. Gen. Sean McEoin, Commander of the United Nations Forces in the Congo, and Mr. D.M.H. Riches, the British Ambassador. The Commission also heard other witnesses who were present in the city or who had come to Leopoldville in order to make statements to the Commission. Among these were officials of Transair, the Swedish company which was the operator of the aircraft. During its meetings at Leopoldville, the Commission heard twenty-three witnesses in plenary session; eight witnesses were interviewed by the Chairman and Principal Secretary, who reported to the Commission on these interviews.

3. First Salisbury session (31 January - 7 February 1962)

33. At the urgent request of the Federal Government of Rhodesia and Nyasaland, the Commission decided to go to Salisbury before visiting Ndola, in order to discuss with the authorities of the Federal Government the legal and practical arrangements necessary for the conduct of its hearings. The Commission en route from Leopoldville to Salisbury flew over the crash site in order to view it from the air.

34. The Commission held public hearings in the Federal Supreme Court building from 2 to 7 February, during which time it heard fifteen witnesses, including two members of the Swedish investigation team who had participated in the work of the Board of Investigation, the United Kingdom member of the Board of Investigation, the Chief Medical Examiner, and personnel of the Salisbury Air Traffic Control and Flight Information Centre. The Commission also visited at Salisbury Airport the Flight Information Centre and the Airport Control Tower.

4. Ndola session (8 - 14 February 1962)

35. The Commission held public hearings at Ndola from 8 to 14 February and heard twenty-eight witnesses, including many persons who had seen the aeroplane shortly before the crash, the police officers who had first reached the scene of the crash, the airport and air traffic control personnel from Ndola airport, and doctors and hospital personnel who had taken care of Sgt. Julien. The Commission also viewed the site of the crash, examined the wreckage - which had been sealed in an airport hangar, visited the control tower, and finally visited the charcoal burners' compound and the actual positions in the bush from which some of the African witnesses had observed the crash. One of its hearings was conducted in the Ndola West Forest Reserve on spots from which witnesses had observed the crash.

5. Second Salisbury session (15 - 16 February 1962)

36. The Commission returned to Salisbury and held hearings on 15 and 16 February, at which time it heard the Rhodesian members of the Board of Investigation and a nurse who had taken care of Sgt. Julien shortly after he had been brought to the hospital.

6. Geneva session (21 February - 8 March 1962)

37. The Commission continued its meetings at Geneva on 21 February. It heard statements from Lord Landsdowne, the United Kingdom Joint Parliamentary Under-Secretary of State for Foreign Affairs, and Mr. A.E. Landin, the Swedish representative at the Rhodesian Board of Investigation. It also heard Mr. Spinelli, Director of the European Office of the United Nations, and Mr. Knut Hammarskjöld, nephew of the late Secretary-General, who had gone to Ndola immediately after the crash. The Commission also heard final statements from counsel representing the Governments of Sweden, the United Kingdom and the Federation of Rhodesia and Nyasaland.

38. The Commission devoted twelve meetings to the preparation of its report, which was completed on 8 March 1962.

C. GENERAL CONSIDERATIONS

1. Procedures and methods of work of the Commission

39. The United Nations Commission had before it the reports and proceedings of the Rhodesian Board of Investigation and the Rhodesian Commission of Inquiry as well as all exhibits submitted to the latter. This material included a detailed technical report on the wreckage, a detailed medical report on the examination of the victims of the tragedy, and statements or verbatim records of all testimony of witnesses taken by either the Board of Investigation or the Commission of Inquiry (see paras. 21-30 above).

40. As already mentioned, the Commission received full reports from Mr. Nelson and Mr. Fournier, the United Nations observers at the Rhodesian Board of Investigation and from Mr. Mankiewicz, United Nations counsel before the Rhodesian Commission of Inquiry. It also heard the views of the Swedish Government representative, the representatives of Transair, and the Rhodesian and United Kingdom members of the Board of Investigation. It received from the Government of Sweden an analysis of the Rhodesian medical report made for the Royal Medical Board of Sweden.

41. The United Nations Commission, having taken note of all the evidence submitted to the Rhodesian Board of Investigation and to the Rhodesian Commission of Inquiry, did not consider it necessary to duplicate all the work already done. It did, however, hear all the witnesses whose evidence it was thought might yield new information or whose appearance was regarded as essential for the purpose of forming a judgement about earlier testimony. Altogether, the United Nations Commission heard ninety witnesses, of whom twenty-five had not previously either made statements or given evidence (see annex IV).

42. As far as possible, the Commission permitted each witness to tell his story in his own way. Additional information was elicited by questions from the members of the Commission and by counsel for interested Governments.

43. In this connexion it was also agreed by the Commission (see para. 50 below) that interested Governments might be represented by counsel at its public hearings and might put questions to witnesses through the Chairman of the Commission. The

Commission reserved the right to hold private hearings if it considered them necessary, but did not in fact utilize this right in Rhodesia.

44. At its hearings, the Government of the Federation of Rhodesia and Hyasaland was represented by Mr. C.S. Margo, Queen's Counsel, and Mr. F.C. Cooke of the Government Solicitor's Department. The Government of Sweden was represented by Mr. T. Thompson, Mr. T. Tscherning and Mr. A. Edelstam, and the Government of the United Kingdom by Dr. D. Neill and Mr. P.S. Bevan.

2. Appeal for witnesses

45. Before the opening of its hearings in Rhodesia the United Nations Commission issued the following appeal for witnesses:

"The Commission appointed by the United Nations to investigate the death of the Secretary-General, Mr. Dag Hammarskjöld, will begin hearings in Salisbury [Ndola] on 1 February [8 February] 1962.

"The Commission, which is an international body established by the General Assembly of the United Nations, appeals to every person, who may have information concerning the subject of its inquiry, to contact its offices at the following address:

[address given] "

46. This appeal was published in the African and English Press and broadcast on the radio. In addition, posters in African languages and in English were displayed in and near Ndola and distributed to Africans living in the vicinity of the crash. In response to this appeal, five persons who had not been heard at previous investigations appeared to give testimony.

3. Additional investigation

47. The Commission decided to request certain additional tests on the wreckage. The most important of these was decided at the suggestion of the Government of Sweden and will involve the remelting of blocks of aluminium and light alloys that had been melted and fused in the fire which followed the crash (see para. 113 below) and subsequent scientific examination of the residue; the object of this test is to determine if any foreign materials, such as explosives, bullets, or shell or rocket fragments, are present in the wreckage. For this purpose the

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Secretary-General arranged for an expert appointed by the United Nations to participate with the Rhodesian authorities in the tests which were to be carried out.^{2/}

4. Co-operation between the United Nations Commission and the Rhodesian Commission

48. In order to achieve the maximum co-operation, the Chairman of the United Nations Commission exchanged views with the Chairman of the Rhodesian Commission of Inquiry. It was agreed that consultation on the co-ordination of working programmes would be useful and should be carried out between the two Chairmen.

49. It was also agreed that the United Nations Commission would not take evidence in the Federation before the Federal Commission had completed its hearings, but would begin hearings in the Federation immediately after the completion of the Federal hearings. It was further agreed that the Federal Commission would place the records of its proceedings at the disposal of the United Nations Commission and that the Rhodesian authorities would so far as possible make available all Rhodesian witnesses. The United Nations Commission would make available to the Federal Commission all relevant evidence taken in the Congo and would use its good offices for the purpose of securing the attendance of witnesses to testify in the proceedings of the Rhodesian Commission.

50. Although Rhodesian law requires that counsel before a public commission of inquiry must be a lawyer admitted to practice in the Federation, the Rhodesian Commission was authorized by the Federal Government to accredit the counsel for the United Nations as "the representative of the United Nations" and to grant him the rights and privileges of counsel in putting questions to witnesses, addressing the Commission and presenting evidence. The United Nations Commission, departing

^{2/} The report of the expert appointed by the United Nations, Dr. Frei-Sulzer, Chief of the Scientific Department of the Zurich Police and Professor of Science Criminology at the University of Zurich, was received by the Secretary-General on 6 April. No foreign materials were found. The expert's report was circulated to the members of the Commission who, after studying the results of the tests, have concluded that no reconsideration of the report of the Commission is necessary. The report of the expert containing the results of the tests is reproduced as annex XII.

from normal United Nations practice in commissions of inquiry, agreed that the Rhodesian Government and other interested governments might be represented by counsel in all its public hearings.

51. On the day of its arrival at Leopoldville (24 January) the Commission received a communication from the British Ambassador to the Republic of the Congo (Leopoldville) forwarding a request of the Rhodesian Commission of Inquiry that the United Nations Commission give urgent consideration to the material contained in the report of the Rhodesian Board of Investigation and inform the Federal Commission whether there was any material relevant to the inquiry of which it was aware and which did not appear to have come to the attention of the Rhodesian Board of Investigation.

52. In reply to this request the Principal Secretary informed the British Ambassador that the United Nations Commission had only just begun its meetings at Leopoldville and did not at that stage have any information which it considered would be of value. At the same time he conveyed the Commission's assurances of its desire to co-operate and of its intention to make available to the Federal Commission any material relevant to the latter's inquiry which should come to its attention.

53. The Chairman of the United Nations Commission, in a letter to the Chairman of the Rhodesian Commission, also gave assurances that he would not fail to bring to the attention of the Rhodesian Commission any new information which might be of interest to it. Accordingly, the records of the hearings of the United Nations Commission were given to the Rhodesian authorities for their use and for the use of the Federal Commission as soon as they were available.

5. Arrangements with the Rhodesian authorities concerning the hearing of witnesses

54. The Rhodesian authorities, in discussions with the Commission, indicated that the laws of the Federation relating to the attendance of witnesses could not be made applicable to the hearings of the United Nations Commission without special legislation, which could not be enacted in time for the United Nations hearings. Consequently, it would not be possible for the United Nations Commission to subpoena witnesses, administer oaths, or commit for contempt. The authorities further expressed the view that it would not be possible to treat the statements of witnesses to the United Nations Commission as "privileged".

55. With respect to the first three points no particular difficulties were envisaged. The Rhodesian authorities assured the Commission that all officials desired by the Commission would appear on request and that assistance would be given in obtaining the voluntary appearance of witnesses. In fact, while attendance could not be compelled, there was not a single instance in which a witness requested by the Commission did not appear, and in some cases witnesses were brought many miles to be available to the Commission.

56. The Commission was, however, concerned at the suggestion that the testimony of witnesses who appeared before it might not be privileged. In its view a witness appearing before a United Nations Commission must enjoy privilege against legal process as a result of such appearance. The view was expressed that such privilege was enjoyed under the general principles of law and in accordance with Article 105 of the Charter of the United Nations. Without prejudice to the legal position, the Rhodesian authorities gave assurances that there would be no governmental action against any person by reason of his appearance and/or testimony before the United Nations Commission.

6. Facilities and expression of appreciation

57. Facilities for the meetings of the Commission in Salisbury and Ndola were provided by arrangement with the Rhodesian Government, and included the use of the Federal Supreme Court building for the first session in Salisbury. For its meetings in New York, Leopoldville and Geneva the Commission had available the services and facilities of the United Nations.

58. The Commission wishes to record its gratitude to the Federal authorities of Rhodesia and Nyasaland for the co-operation and facilities which enabled it to perform its work in Rhodesia. The Commission likewise wishes to express its appreciation to the Republic of the Congo (Leopoldville). The Commission also expresses its gratitude to ICAO for placing an aeronautical adviser and an adviser on air law at its disposal. Lastly, the Commission wishes to thank the Governments of Sweden, the United Kingdom and the Federation of Rhodesia and Nyasaland for the assistance which their representatives rendered in its work.

II. THE DEPARTURE OF SE-BDY FROM LEOPOLDVILLE

59. The conditions and circumstances surrounding the departure of SE-BDY from Leopoldville are analysed in the present part of the report. In addition, a reply is given to the questions asked by the General Assembly in paragraphs 3 (a) and 3 (d) of resolution 1628 (XVI).

A. DIPLOMATIC ARRANGEMENTS FOR THE MISSION OF THE SECRETARY-GENERAL

60. As was mentioned in the Introduction (see para. 7 above), early on 16 September 1961 a message was sent to Mr. Tshombé stating that the Secretary-General was prepared to meet him at Ndola. Later in the day the Secretary-General asked Mr. Riches, the British Ambassador at Leopoldville, to ascertain from the United Kingdom and Rhodesian Governments whether suitable arrangements could be made at Ndola Airport for the projected meeting with Mr. Tshombé. On the same evening, Ambassador Riches sent a cable to the Foreign Office requesting that the necessary facilities for a meeting with Mr. Tshombé at Ndola should be given to the Secretary-General. The cable was sent with the concurrence of Lord Lansdowne, Joint Parliamentary Under-Secretary for Foreign Affairs, who was visiting Leopoldville at the time on behalf of the United Kingdom Government.

61. On Sunday, 17 September, Lord Lansdowne called on the Secretary-General at 9.30 a.m. Since no reply to Ambassador Riches' cable had yet been received, Lord Lansdowne suggested in the course of his visit that he should accompany the Secretary-General to Ndola in order to offer him certain facilities and help with arrangements in British territory. Lord Lansdowne explained to the Commission:

"[The Secretary-General] accepted my suggestion, considering that, since we had not as yet at that time received clearance from my Government, my presence in Ndola might be of some use. Thus, he accepted my suggestion, but, after having considered it, he thought it wiser - for political reasons which I do not think we need go into here - that I should not travel with him. He therefore suggested to me that I should go in another aircraft provided by the United Nations and that I should travel ahead of him. To this suggestion I, of course, readily agreed. I further suggested that I should not personally see Mr. Tshombé; I felt that it was important that I should limit my activities to the one purpose of helping to make arrangements for the meeting. I was in no way involved in the negotiations."

62. As regards the time agreed upon for his departure, Lord Lansdowne testified as follows:

"... it was suggested that I should leave from Leopoldville in the early afternoon - about 3 o'clock, I think - and that the Secretary-General would follow later. I was informed that I would go in a slow aircraft, a DC.4, and that the Secretary-General would go in a faster aircraft, that he would start after me and would, of course, achieve the journey in far less time."

Lord Lansdowne's testimony is confirmed by the testimony of Mr. Poujoulat, one of Mr. Linnér's assistants, who told the Commission that "Lord Lansdowne was supposed to take off at approximately 3 o'clock".

63. It is clear from the general tenor of their testimony that both Lord Lansdowne and Mr. Poujoulat were referring to Leopoldville local time which is one hour ahead of Greenwich Mean Time, or "Z" in aviation parlance. Therefore, the time which they mention is 1400 Z.

64. It should be noted that Air Operations - a branch of the United Nations Military Command - understood that Lord Lansdowne was to leave somewhat later and issued for his journey to Ndola Flight Order No. 685 giving estimated time of departure as 1510 Z, or ten minutes past 4 o'clock local time.

65. Around noon on 17 September the Secretary-General was informed by a telephone message from the British Embassy that an "all clear" message had been received from the Foreign Office on the projected meeting at Ndola with Mr. Tshombé.

66. At 1349 Z, Ambassador Riches sent the following cable to Lord Alport, United Kingdom High Commissioner in Salisbury:

"Lord Lansdowne and Wilford will arrive Ndola about 1900 hours to-day by UN aircraft and will continue to Salisbury, returning to Leopoldville tomorrow afternoon. Secretary-General is due Ndola this evening by separate flight after Lord Lansdowne. Flight details will be notified direct from the aircraft."

67. In the early afternoon Mr. Poujoulat called for Lord Lansdowne and his assistant, Mr. Wilford, and drove them to the airport, stopping on the way at Ambassador Riches' residence and at the British Embassy to collect their documents and luggage. During the drive to the airport, Mr. Poujoulat talked by radio with ONUC Security concerning the readiness of the DC.4 which was to take Lord Lansdowne to Ndola and Salisbury. At the airport Lord Lansdowne and Mr. Wilford boarded

the DC.4, bearing the registration letters OO-RIC, which had been assigned to them by Flight Order No. 685, and took off for Ndola at 1504 Z.

B. PREPARATIONS FOR THE SECRETARY-GENERAL'S FLIGHT ON SE-BDY

68. Originally it had been intended that the Secretary-General should leave for Ndola in OO-RIC at 1000 Z on 17 September. On 16 September, Air Operations had issued Flight Order No. 673 to that effect. However, it was later decided that the Secretary-General should fly in the aircraft of the Force Commander, SE-BDY, a Douglas DC.6B belonging to the Swedish company Transair, which was a faster and more comfortable aircraft. Flight Order No. 673 was amended accordingly and the estimated time of departure for the Secretary-General's flight was changed from 1000 Z to 1500 Z. As indicated above, OO-RIC was assigned to Lord Lansdowne.

69. SE-BDY had flown the Force Commander to Elisabethville on the night of 16 September and had returned to Leopoldville at approximately 0700 Z on 17 September. The crew on that journey had been composed of Captain Århéus First Officer Litton and Flight Engineer Wilhelmsson. On landing at Leopoldville, Wilhelmsson had reported that SE-BDY had been fired on at the take-off from Elisabethville. A thorough inspection of the aircraft was accordingly carried out under the supervision of Chief Mechanic Tryggvason of Transair. In the course of the inspection it was found that number 2 engine (inboard port) had been struck by a bullet, which had penetrated the engine cowling and hit the exhaust pipe. The exhaust pipe was replaced and the plane was refuelled to a total amount of ten tons. Both Tryggvason and Tjernell, a mechanic of Transair, testified that this work had been completed and that the plane was ready to take off by 1100 Z.

70. A thorough examination had also been made of the aircraft to make certain that there was no other damage, and a careful check had been carried out. There was testimony, which the Commission considers reliable, to the effect that this aircraft was in very good condition and, as the special plane of the Force Commander, very well maintained. Evidence of the airworthiness of the aircraft and particulars of the radio and other equipment carried on board will be found in Annex V.

71. From the time when work on the aircraft was completed (1100 Z) until approximately 1500 Z the plane remained unattended on the airfield although, except while they were at lunch, Transair mechanics were working in the vicinity on another aircraft. During this period all ladders were removed and the main doors of the aircraft were locked. However, the doors giving access to the hydraulic compartment and to the heating system were unsecured. No special guard was put round it and the regular United Nations guard detachment at the airfield was not asked to provide special security measures for the aircraft.

72. At about 1530 Z the crew of SE-BDY arrived at the airfield. It was composed of the three men who had flown the aircraft to and from Elisabethville and Captain Hallonquist, who was to act as pilot in command. Captain Hallonquist, had not been on the flight to Elisabethville and is reported to have appeared rested and in a cheerful state of mind (See annex II, para. 12.9). It is also noted that there was sleeping accommodation for the crew on the aircraft and that apparently Captain Århéus and First Officer Litton alternated as co-pilot. First Officer Litton, according to the testimony of Major Ljungkvist, had announced his intention of sleeping during the first part of the flight. In view of these facts, it is believed that there was no violation of international standards and recommended practices, nor of special regulations applicable in this regard.

73. The crew had been specially trained for the operation of SE-BDY. Full particulars of their qualifications and experience may be found in annex II, paras. 4.1-4.4. Captain Hallonquist, in addition to being a skilled pilot, was also his company's navigation officer and instructor. Each of the three pilots held a valid licence as a radio telephony operator. The crew was highly competent and experienced and Captain Hallonquist was considered to be a reliable and cautious pilot by all who testified. The Commission is convinced that the aircraft was properly manned with a competent crew licensed in accordance with international standards and recommended practices.

74. In the course of its investigation the Commission examined the question whether the crew of SE-BDY, having never previously landed at Ndola, could have difficulties in landing there at night. After hearing expert opinion

the Commission was satisfied that a night landing at Ndola could not present any difficulties. In this connexion the Commission has noted that Captain Hallonquist had flown a total of 7,841 hours, including 2,669 of instrument and night flight. Reserve Captain Århéus a total of 7,107 hours, including 1,500 hours of instrument and night flight; and Co-Pilot Litton 2,707 hours, including 835 hours of instrument and night flight.

75. Because of the danger of an attack by the "Fouga Magister" of the Katangese Armed Forces, it was decided to observe radio silence during the flight to Ndola. In order, however, to enable SE-BDY to receive and send emergency messages, a radio operator, Karl Erik Rosén, was instructed to fly with the crew and another radio operator was assigned to monitor SE-BDY from an ONUC radio station installed at Leopoldville airport. Both operators were instructed to communicate by Morse code in Swedish so as to render any message sent by or addressed to SE-BDY less intelligible to the Katangese Armed Forces. There is no evidence, however, that any messages were sent or received.

76. The Chief Communications Officer of ONUC, Leopoldville, was aware that SE-BDY could be contacted on 11318 kc/s, which was no longer an aeromobile network frequency in that area, and requested the Ndjili radio station to notify SE-BDY's radio operator that ONUC Headquarters radio station would be standing by for contact with the aircraft after take-off for Ndola. The Chief Communications Officer, however, was instructed that the ONUC station was not to communicate with SE-BDY during this flight. Nevertheless, ONUC maintained a listening watch on 11318 kc/s from the time of SE-BDY's take-off until the crash was confirmed. During this time no transmission was heard from SE-BDY and no station was heard to call SE-BDY.

77. Shortly after his arrival at the airport, Captain Hallonquist filed a flight plan for Luluabourg. The aircraft would not have been permitted to take off without a flight plan, and, for security reasons, it was not desired to declare the true destination. Actually, in a conversation with Major Ljungkvist of ONUC Air Operations, who arrived at the airport shortly before the take-off of SE-BDY, Captain Hallonquist mentioned that he would be flying not to Luluabourg but to Ndola.

78. As regards the route which Captain Hallonquist intended to follow, Major Ljungkvist testified before the Commission that:

"... when I was with Captain Hallonquist and First Officer Århéus, we discussed the route of this flight, and at that time the last beacon to be used on the way down was Luluabourg. After that, he told me, 'there is no radio navigation aid for me, so I have to go to Luluabourg, and after that I do not know if I am going to follow the Angolan border or whether I am going to take some other way'. That was all he told me anything about, that he had decided to go to Luluabourg and that after that he did not know. He told me: 'I am going to prepare the rest of the flight during the flight, dependent upon the special conditions'. Captain Hallonquist was to be the navigator himself. He was a navigation specialist with the company and was always the teacher at the company. They told me he was doing the navigation himself."

C. THE ARRIVAL OF THE SECRETARY-GENERAL AT LEOPOLDVILLE (NDJILI) AIRPORT AND TAKE-OFF OF SE-BDY

79. Shortly after 1530 Z, the Secretary-General and his party arrived at the airport and boarded SE-BDY. Mr. Ranallo, the personal aide of the Secretary-General, who together with Mr. Julien, the ONUC Acting Chief of Security, and a team of security officers, was providing close personal security for the Secretary-General, searched the cabin of the aircraft immediately after boarding. In accordance with standing orders issued by the military command after the outbreak of fighting at Elisabethville, two ONUC soldiers - Sgt. S.O. Hjelte and Pvt. P.E. Persson - were placed on board the aircraft. The engines were started and at 1551 Z SE-BDY took off for its last flight.

D. SECURITY MEASURES AT LEOPOLDVILLE (NDJILI) AIRPORT AND THE QUESTION OF A FLIGHT PLAN FOR SE-BDY

80. Before attempting to reply to the specific questions asked by the General Assembly in paragraphs 3 (a) and 3 (d) of resolution 1628 (XVI), the Commission wishes to comment on two matters dealt with in the preceding sections.

81. The Commission notes with regret and concern that in the afternoon of 17 September SE-BDY remained for several hours unguarded and unattended on the tarmac of the airport. The evidence before the Commission shows that a person wishing to sabotage the aircraft might have gained access to it without being detected. The Commission considers that its terms of reference do not require

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it to pass judgement on individual responsibilities for the lack of special security measures with respect to the Secretary-General's plane at the Leopoldville airport, but it must be observed that necessary co-ordination appears to have been lacking. In this connexion the evidence showed that while certain ONUC officials who should have been informed of the proposed flight were not so informed, other ONUC personnel not directly concerned had heard it discussed.

82. The Commission further notes that no flight plan for SE-BDY was transmitted to Salisbury. The Commission has taken into consideration the conditions existing in the Congo at the time and in particular the danger of an attack from the "Fouga Magister" which explain this departure from the rules governing commercial aviation. Indeed, the system of aeronautical communications cannot ensure the secrecy of messages.

83. The Commission believes, however, that a responsible official of ONUC should have been informed in advance of the route which Captain Hallonquist intended to follow, so that the Flight Information Centre of Leopoldville could have initiated the necessary search and rescue action if the aircraft had been obliged to make a forced landing before making contact with the Salisbury Flight Information Centre.

E. REPLIES TO THE QUESTIONS ASKED BY THE GENERAL ASSEMBLY IN PARAGRAPHS
3 (a) AND 3 (d) OF RESOLUTION 1628 (XVI)

84. Two of the specific questions asked by the General Assembly in paragraph 3 of resolution 1628 (XVI) relate to the subject matter of the present part of the report.

85. The first question is contained in sub-paragraph 3 (a) and reads:

"Why the flight had to be undertaken at night without escort".

86. As regards the first point - why the flight had to be undertaken at night - the Commission notes that, in his testimony, Mr. Linnér said:

"Two factors were uppermost in Mr. Hammarskjöld's mind with regard to the timing of the meeting. He was anxious, first of all, to arrive at Ndola as soon as possible in order to avoid the possibility of Mr. Tshombé having left before he arrived. In the second place, Mr. Hammarskjöld and

Lord Lansdowne had agreed that the latter would also go to Ndola on Sunday, but that he would continue as early as possible for Salisbury and that he would definitely leave before the Secretary-General arrived. Lord Lansdowne's departure from Leopoldville for reasons unknown to me was, however, delayed until 4 p.m. and as a result the departure of the Secretary-General was also delayed until 4.55 p.m."

87. In another part of his testimony Mr. Linnér said:

"Now, a plane had been put at Lord Lansdowne's disposal and it was ready about lunch time, as far as I know. I remember distinctly we sent a message to the British Embassy, where Lord Lansdowne was having lunch, asking him when he would be prepared to take off, but for reasons unknown to me, he could not make it before 4 o'clock, and, therefore, there was no other thought in the late Secretary-General's mind than that he was anxious to take off as soon as possible and, as things turned out, it happened to become a night flight."

88. The Commission believes that the evidence before it does not fully support this view. It observes that, even if Lord Lansdowne had driven to the airport immediately after receiving the message referred to by Mr. Linnér, he would not have left Leopoldville in time to allow the Secretary-General to arrive at Ndola before dark. The Commission believes furthermore that the testimony of Lord Lansdowne and Mr. Poujoulat (see para. 62 referred to above), as well as the estimated times of departure given in Flight Orders Nos. 673 and 685 (see paras. 64 and 68 above), show that the Secretary-General had decided to take off from Leopoldville not earlier than 1500 Z, or 4 p.m. local time. In these circumstances, as decided by the Secretary-General himself, the major part of his flight to Ndola had to be undertaken at night.

89. There appear to be several reasons why the Secretary-General's flight did not leave at an earlier hour. During the morning of 17 September, as has been noted, repairs were in progress on the aircraft. Moreover, as noted in the Introduction to this report, discussions concerning the meeting with Mr. Tshombé had continued throughout that morning, and the decision concerning the time of departure must have been influenced by the efforts to communicate with Mr. Tshombé through the British Consul at Elisabethville. It is also clear that the Secretary-General wished to arrive at Ndola after Lord Lansdowne had had time to land and depart, and this also conditioned the time of his departure. All these

circumstances taken together may have rendered a night flight unavoidable in any event. It is also relevant to observe that, because of the danger of an attack from the "Fouga Magister", most of the flights in the Congo at the time were undertaken at night.

90. As to the second point - why the flight had to be undertaken without escort - the Commission notes that ONUC had no fighter planes in the Congo at the time and that no request for an escort over Rhodesian territory was submitted to the Government of the Federation of Rhodesia and Nyasaland.

91. The second question appears in sub-paragraph 3 (d) of the resolution and reads:

"Whether the aircraft, after the damage it was reported to have suffered earlier from firing by aircraft hostile to the United Nations, was in a proper condition for use."

The Commission is satisfied from the evidence before it that the damage to SE-BDY by gunfire at Elisabethville was minor and had been properly repaired before the take-off of the aircraft from Leopoldville on 17 September.

III. THE CRASH OF SE-BDY

92. The present part of the report deals with the conditions and circumstances of the flight and crash of SE-BDY and contains an analysis of possible causes. In addition a reply is given to the questions asked by the General Assembly in paragraph 3 (b) of resolution 1628 (XVI).

A. FLIGHT FROM LEOPOLDVILLE TO NDOLA

93. As described in part II, the Secretary-General left Ndjili airport, Leopoldville, at 1551 Z^{3/} aboard SE-BDY. For reasons of security it would appear that complete radio silence was maintained while the aircraft was over Congolese territory. So far as is known, SE-BDY first broke radio silence at 2002 Z when it called Salisbury Flight Information Centre (FIC) and asked the estimated time of arrival at Ndola of aircraft OO-RIC carrying Lord Lansdowne. At the request of Salisbury FIC, SE-BDY then identified itself as a DC.6 bound from Leopoldville to Ndola and estimated its time of arrival at Ndola as 2235 Z. Subsequently at 2035 Z it reported its position at a point over the southern end of Lake Tanganyika.

94. While the exact flight route of the aircraft up to that point is unknown, it is assumed that it flew from Leopoldville in an easterly direction and on reaching Lake Tanganyika took a southerly course informing Salisbury Flight Information Centre that it was flying on Advisory Route (ADR) 432. It continued to skirt the Congolese border flying for that purpose slightly to the east of ADR 432 and approached Ndola from the east or south-east. The operational team, including a United Nations observer, which was established in connexion with the inquiry by the Rhodesian Board of Investigation, reconstructed the probable flight route as shown on the map in annex XIII. A description of the reconstruction of the probable route will be found in part 3, section 11 of the report of the Board of Investigation (annex II, paras. 11.1-11.3). See also report of the Rhodesian Commission of Inquiry (annex III, para. 5).

95. In communications between SE-BDY and Salisbury FIC, SE-BDY was given OO-RIC's estimated time of arrival at Ndola as 2017 Z, and later its actual time of arrival

^{3/} Z indicates Greenwich Mean Time (GMT).

as 2035 Z. SE-BDY was cleared to descend from 17,500 to 16,000 feet and reported reaching the latter flight level at 2115 Z. The aircraft also reported it was keeping outside Congolese territory and proceeding round the border to land at Ndola, that thereafter it was taking off almost immediately, was not returning to Leopoldville and was unable at that time to give its destination after departure from Ndola. The pilot also estimated that he would be abeam Ndola at 2147 Z.

At 2132 Z, Salisbury FIC transferred SE-BDY to Ndola Air traffic Control.

96. A summary of relevant communications exchanged between Salisbury FIC and Ndola tower and the aircraft OO-RIC and SE-BDY is attached as annex VI A. There will also be found in annex VI B and C transcriptions of tape recorded radio-telephone conversations between SE-BDY and Salisbury FIC and between Salisbury and Ndola; in annex VI D, the extracts from the air traffic control log of Ndola airport; and in annex VI E a more complete list of communications between SE-BDY and Ndola tower. This list was prepared late the following morning by Mr. Martin, the air traffic controller who was in the tower at the time that SE-BDY approached Ndola, partly from memory and partly from "flight progress strips" - notes recorded at the time of the communication.

97. SE-BDY, on instructions from Salisbury Flight Information Centre, called Ndola tower at 2135 Z and informed it of its estimate that it would be abeam Ndola at 2147 Z and would arrive at 2220 Z. The tower transmitted a weather report giving wind as seven knots from an east-south-easterly direction, visibility as 5 to 10 miles with slight smoke haze, and the barometric settings for the altimeter in order to obtain the altitude reading above sea level (QNH) and the altitude reading above the airport (QFE). The aircraft acknowledged the weather report and requested clearance to descend beginning at 2157 Z. Clearance to descend to 6,000 feet was given and the aircraft was requested to report "top of descent". To questions whether the aircraft would be proceeding to Salisbury or remaining overnight in Ndola, SE-BDY replied in the negative. It declared itself unable to give further information concerning its intentions after landing and stated that it would give them on the ground. It also stated that it might require a little refuelling at Ndola.

B. ARRIVAL OVER NDOLA AIRPORT

98. The following conversation is reported to have occurred at 2210 Z:

"SE-BDY: 'Your lights in sight, overhead Ndola, descending, confirm QNH.'
(AD 200-317⁰). 4/

"NDOLA: 'Roger QNH 1021 mb, report reaching 6,000 feet.'

"SE-BDY: 'Roger 1021'."

This was the last communication with the Secretary-General's aircraft.

99. From the information given by air traffic controller Martin, it appears that SE-BDY never reported reaching 6,000 feet. However, at 2210 Z it did state that it had Ndola lights in sight and was overhead Ndola, descending. At the same time it requested and received confirmation of the altimeter setting (QNH).

100. It may be of some interest to note the exchange of communications between the Ndola tower and OO-RIC, described as follows by air traffic controller Martin:

"..... cleared to descend to 6,000 feet on QNH from FL 75. The aircraft was required to report reaching 6,000 feet. All this was acknowledged, and in due course the aircraft reported 6,000 feet. It was instructed to maintain that height and to report ND or 'lights in sight'. It reported 'lights in sight' and was given the wind direction and strength, and cleared to enter the traffic circuit for runway 10-..."

101. It will be observed that OO-RIC, which was approaching from the west, after reporting reaching 6,000 feet was asked to report its arrival over the radio beacon or "lights in sight". It reported "lights in sight" and was then given clearance to enter the traffic circuit. The possibility was considered whether SE-BDY, in reporting "lights in sight", should have been understood as being at 6,000 feet over the airport. However plausible this interpretation may be, it does not seem to have been so understood by Mr. Martin, who states that his final words to the aircraft at 1210 were "report reaching 6,000 feet".

102. The aircraft was observed as it flew over Ndola by a number of persons at the airport or in or near Ndola. The navigation lights were on and, while the

4/ The entry "AD 200-317⁰" indicates that the magnetic heading of Ndola from the aircraft, as shown on the automatic direction finder (AD 200) in the Ndola tower, was 317⁰ (magnetic). It would appear that the aircraft was not actually over the airfield but was approaching the airfield from the south-east, as would be expected if it had flown round the Katanga pedicle.

observations of all witnesses do not agree, it appears that the flashing red anti-collision beacon on top of the tail fin was also operating. With the exception of one of the RRAF personnel stationed at the airport, who thought the plane was approximately 10,000 feet above the airport, all witnesses who actually saw the aircraft pass over the field stated that it flew at normal height or slightly lower. It will be noted that the normal height according to the approved charts is 6,000 feet above sea level, or less than 2,000 feet above the airfield the elevation of which is 4,160 feet. On the other hand, some witnesses living west of the airfield stated their belief that the height of the aircraft was much lower than usual. These witnesses did not actually see the plane but only heard it and their conviction that it was flying at a low altitude was derived from the fact that it sounded much louder than aircraft normally landing at Ndola. However, it would seem that these witnesses were not aware that a DC.6 B is a much noisier plane than those normally landing at Ndola.

C. LANDING PROCEDURES AT NDOLA

103. The Federal Government of Rhodesia and Nyasaland has approved an Instrument Approach Procedure for aircraft landing at Ndola based on the use of a radio beacon (Non-directional beacon - NDB) located approximately three miles west of the airport. This procedure is depicted on an ICAO standard Instrument Approach Chart published by the Rhodesian authorities. It is also shown on a chart (see annex XIV A) in the Jeppesen Manual published by the Jeppesen Company of Denver, Colorado, which is a loose leaf flight information manual approved for use by Transair.

104. As the name implies, instrument approach charts are primarily intended for use in conditions of reduced visibility when it becomes necessary for the pilot to rely on instruments instead of on visual reference. However, it has been stated that the standing instructions issued by Transair require pilots using an airfield for the first time to make a complete instrument approach even when visibility and cloud height are unlimited.

105. In executing an instrument approach for Ndola the aircraft flies west from Ndola on a heading of 280° to a point 1.25 nautical miles beyond the radio beacon (NDB). It then begins its "procedure turn", altering course first to the right on

a north-westerly heading of 325° and then turning gradually to the left until it is aligned with the runway on an easterly heading of 100° . In accordance with the Chart referred to above, the aircraft maintains an altitude of 6,000 feet above sea level (ASL) throughout this procedure turn. On completion of the turn it begins losing height in order to arrive inbound over the radio beacon (NDB) at 5,000 feet (ASL), after which a normal rate of descent ensures an accurate final approach and landing.

106. It came to the Commission's attention, however, during some of its flights in Rhodesia that there are in use instrument approach charts for Ndola which provide for a descent from 6,000 to 5,000 feet during the procedure turn. A pilot using this descending turn might well reach the level of 5,000 feet while flying over terrain higher than 4,000 feet and thus reduce the safety margin to less than the 1,000 feet recommended in the ICAO Procedures for Air Navigation Services - Aircraft Operations (Doc. 8168 - OPS/611) relating to NDB Instrument Approach. There is, however, no evidence before the Commission whether the crew of SE-BDY had available, or in fact knew of, charts authorizing a descending turn, while the chart in the Jeppesen Manual, as well as that published by the Rhodesian Civil Aviation Authorities, provided for maintaining 6,000 feet throughout the procedure turn.

D. DESCRIPTION OF THE CRASH

107. After passing over the airfield, SE-BDY appears to have executed a turn over the appropriate approach area and to have crashed near the end of the turn as it came back to an easterly heading. In fact, in all test flights conducted by the Rhodesian Board of Investigation in which a procedure turn was made, the test aircraft flew over the crash site on approximately the same heading (120°) as the swath cut through the trees by SE-BDY. The Rhodesian Board of Investigation was satisfied that SE-BDY was carrying out a procedure approach when it crashed (see annex II, paras. 14.1-14.6; see also annex XIV C).

108. The time of the crash to the exact minute is difficult to fix. If one accepts as correct the time given by Mr. Martin, that the aircraft was over the airfield at 2210 Z, then the time of the crash was probably about 2213 to 2215 Z. On the other hand four watches which stopped within less than two minutes of each other

gave a mean time of 2211 Z and there is some evidence that the aircraft may have passes over the airfield a few minutes earlier than reported in Martin's log. In any event the crash almost certainly occurred between 2210 Z and 2215 Z, or shortly after midnight Ndola time.

109. The spot where the aircraft struck is approximately nine and a half miles west of Ndola airport. The ground elevation at the point of impact was 4,285 feet and the height of the tops of the first trees standing on slightly higher ground, which were brushed by the aircraft, was 4,357 feet. This is nearly 200 feet higher than the elevation of the Ndola airport which is 4,160 feet. There was also a ridge of higher ground lying between the crash site and the airfield which might have obscured the view of the lights of Ndola immediately before the crash.

110. An examination of the crash site and of the aircraft wreckage appears to establish beyond all doubt that, except for its altitude, the aircraft was in a normal approach position at the time of the crash. The description in the following paragraphs (paras. 111-114) is based on the opinion of experts who participated in the work of the Rhodesian Board of Investigation and who testified before this Commission.

111. The landing wheels were lowered and locked, flaps were in an intermediate (30°) position proper for that stage of the approach. Engines appear to have been operating under normal approach power. There were no signs of excessive speed. Moreover, several experts stated that experience had shown that had the aircraft speed at this time been excessive, the nose-wheel housing would almost certainly have become detached from the fuselage before contact with the trees.^{5/} This, however, had not occurred. The seat belts of at least six of the persons aboard

5/ The Swedish Government, however, comments as follows:

"The (Rhodesian) Commission of Inquiry states that the nose wheel doors should have been detached in the air, should there have been great speed, as for instance after a diving movement of the aircraft prior to the impact. The fact that this did not happen indicates in the opinion of the Federal Commission that there had not been any considerable dive towards the grounds, followed by a flattening out. We would like to point out, however, that the landing gear was in a lowered position and that the dive, if any, could not mean a loss of height of more than a few hundred yards."

were fastened; the position of others could not be determined. The landing lights were not extended but testimony was given to the effect that they would not necessarily be turned on at that stage of an approach.

112. The aircraft was either in level flight or at a very shallow angle (to the order of perhaps one degree) when it first brushed the tree-tops and there were indications that, at this moment, the aircraft was banked slightly to the left. After the initial contact with the three-tops, the angle of descent and the amount of left bank increased. The angle from the point of first contact to the site of the crash averaged 5°. The first indication of contact was branches severed by the propellers and traces of rubber from the propeller de-icing boots. Almost immediately thereafter the left wing tip was ripped away and the left wing was progressively demolished nearly to the number 1 engine as it tore through the trees at an increasing angle of bank. At about 760 feet from the point where the aircraft first touched the trees, the stub of the left wing struck the ground in front of a 12 foot high ant-hill. The aircraft cart-wheeled to the left coming to rest facing the direction from which it had come. The nose cone was broken off and found intact on the ant-hill. The interval from first contact with the trees to final crash could not have been more than a few seconds.

113. At the time of the crash, SE-BDY must have had nearly 5 tons of fuel remaining in its tanks. Petrol from the demolished left wing had been spilled over the last 300 to 350 feet of the wreckage trail. The fuel from the right wing, which was broken as it descended through the trees at the completion of the cart-wheel, must have poured over the main wreckage. The fire which ensued engulfed the wreckage and flashed back along the petrol trail. The intense heat destroyed or melted 75 to 80 per cent of the fuselage and exploded the ammunition and pyrotechnics carried on board the aircraft.

114. There was no sign of scorching of the tree tops or other indication of fire in flight and a search, conducted for the Rhodesian Board of Investigation, of the area which the aircraft presumably traversed immediately prior to the crash revealed no parts of the aircraft prior to contact with the trees.

115. A plan of the wreckage prepared by the Rhodesian Board of Investigation is contained in annex XV. Pictures of the crash site and of the wreckage are produced in annex XVI. A summary of a report on the technical examination of the wreckage prepared by the Rhodesian Board of Investigation will be found in annex II, section 10, and particularly in paragraphs 10.3.1 to 10.3.12.^{6/}

^{6/} The full technical report is on file with the Secretariat and may be consulted by interested delegations on request. /...

E. MEDICAL INFORMATION

116. On the basis of the testimony of the Rhodesian police officers who first reached the crash site, it would appear that at the moment of impact the Secretary-General was thrown clear of the aircraft, falling outside the area subsequently covered by fire. The Rhodesian medical report of Drs. H.D. Ross, P.J. Stevens and J. Hillsdon Smith (see annex VII A) concluded that the Secretary-General had died instantly from injuries resulting from his fall. On the other hand, on the basis of a study of the Rhodesian medical report made at the request of the Medical Board of Sweden, Drs. A. Frykholm and N. Ringertz expressed the opinion that if Mr. Hammarskjöld had been rescued immediately after the accident and had immediately received medical treatment with the most modern equipment, the survival period might have been somewhat lengthened. In other respects the Swedish report concurred in the findings of the Rhodesian medical report (see annex VII B).

117. Sgt. Julien was found alive outside the charred area. He had been burned by fire and had suffered further from exposure and sunburn in the course of the 16 hours that he remained at the crash site. He received first-aid treatment from the police who arrived at the scene of the crash and was taken to Ndola hospital at about 16.45 local time. Despite constant medical attention he died at 08.00 on the morning of 21 September 1961. Dr. MacNab, who headed the team of doctors looking after Sgt. Julien, stated that if he had been rescued earlier in the morning and had not suffered the heat of the sun all day he would have had a better chance of surviving. Dr. Lowenthal, who also saw Sgt. Julien immediately after his admission to the hospital, testified that his chances of survival would have been infinitely better.

118. The others aboard the aircraft are believed to have died within seconds after the crash. Some had suffered injuries which would have precluded survival even had no fire ensued, others were considered to have died suddenly from shock.

119. Bullets were found in the bodies of the two Swedish soldiers. At the outset of the Rhodesian Investigation some doubt was expressed whether this could be explained by the explosion of cartridges set off by the fire. However, the bullets were relatively superficially sited below the skin and in the muscle, and fragments of exploded shell cases were found in the same wounds. Ballistic examination showed that they bore no rifling marks and had not passed through the

barrel of a gun. They were also of the same calibre as the ammunition carried by the soldiers themselves. It was consequently accepted by all experts consulted that the presence of the bullets was in fact the result of cartridges in close contact with the bodies exploding during the fire.

120. One body was not found until the second day when parts of the wreckage were moved. The absence at first of information concerning the total number of persons aboard undoubtedly contributed to the difficulty of ascertaining that all bodies had been found. The Commission is satisfied that a proper identification was made of the sixteen persons aboard the aircraft.

F. POSSIBLE CAUSES

121. In the case of the crash of an aircraft where there are no survivors and where the greater part of the wreckage is destroyed by fire, difficulties may be encountered in determining the cause of the crash. Various theories have been advanced with or without supporting evidence and different conclusions have been reached. Some have been based only on rumour. The Commission considered it among its duties to examine these theories and rumours and to provide the true facts wherever possible. Possible causes of the crash will be considered under four main headings: (1) Sabotage or internal interference; (2) Attack or external interference; (3) Material failure; and (4) Human failure.

122. Counsel for the governments represented before the Commission have argued the question whether the Commission should require in each case proof beyond reasonable doubt or should reach its conclusions on the preponderance of evidence or the balance of probabilities. The Commission, while accepting that it is not required in expressing an opinion to limit itself to the rules of evidence of any particular legal system in respect to a particular class of cases, believes that it should apply generally the standard of proof required in the search for truth. This standard will be applied equally to all of the possible causes considered by the Commission.

1. Sabotage or internal interference

123. As no special guard was provided for SE-BDY prior to its departure from Leopoldville, the possibility of an unauthorized approach to the aircraft for

purposes of sabotage cannot be excluded. Moreover, although the doors were said to have been locked, access was possible to the hydraulic compartment, the heating system, and the undercarriage of the aircraft.

124. One possible means of sabotage could be interference with one or more of the aircraft's vital parts, such as the cables operating the control surfaces or the flap or undercarriage mechanism, in order to render these parts inoperative at the time of approach or landing. There is however, no evidence before the Commission of such interference. The technical examination of the vital parts which had not been destroyed by impact or fire revealed no pre-crash damage. Furthermore, the aircraft had been properly trimmed for an approach and the crash path did not indicate any abnormality in manoeuvrability or control such as might have been expected if sabotage of this type had occurred.

125. A second possibility which seems most unlikely in the present case is the use of a time bomb. A potential saboteur would scarcely have anticipated that the aircraft would take a route requiring over six hours instead of the direct route requiring only four or five hours flight. Likewise it would have been difficult to guess the exact time of departure.

126. The possibility might also be considered of an infernal machine, the activation of which was linked to the mechanism operating the undercarriage or wing flaps so as to explode when these were set for landing, to a barometric instrument operating when the aircraft descended to a pre-set altitude, or to some other scientific device. The installation of bombs of this order would require special skill while considerable time would be needed for their manufacture.

127. While the detonation of a bomb at the time of landing is not impossible, the Commission must repeat that there is no evidence of a bomb having exploded aboard the aircraft, or in fact of any explosion having occurred while the aircraft was in flight. Specifically, technical examination established that there were no traces of an exploding bomb on the undercarriage or in the vicinity of its housing, or in any other parts of the aircraft which were examined. As described earlier in this report, further scientific experiments are being carried out on the wreckage at the request of the Commission in order to leave no possibility of proving or disproving sabotage unexplored.^{7/}

^{7/} The results of these experiments will be found in annex XII.

128. There is no convincing evidence that any witness heard or saw an explosion before the crash. Certain witnesses testified to explosions at the approximate time of the crash, but in all probability these were exploding fuel tanks and subsequent discharge of ammunition and pyrotechnics carried on board the aircraft. A member of the Northern Rhodesian Police reported that at 2340 Z he saw an exploding light in the sky and an object dropping immediately thereafter. This was approximately an hour and a half after the crash, and what was seen may have been the discharge of one or more of the pyrotechnic signalling cartridges carried by SE-BDY or, as variously suggested by the Rhodesian Commission of Inquiry, a bursting gas container, oxygen cylinder or some other part of the wreckage blown into the sky during the fire (see annex III).

129. Several witnesses testified that Sgt. Julien spoke of an explosion. According to Dr. Lowenthal, he first said there was a crash and then an explosion and later said there was an explosion and then a crash. According to Nurse McGrath, he said there was an explosion when the aircraft was on the runway. Senior Inspector Allen made the following statement to the Rhodesian Board of Investigation regarding his conversation with Sgt. Julien and confirmed it before the United Nations Commission:

"I told him that we had last heard of you over the runway at Ndola airport and we didn't hear anything more: 'What happened?' He said: 'It blew up'. I said: 'Was this over the runway?' and he said: 'Yes'. I said: 'What happened then?' and he replied: 'There was great speed - great speed'."

130. Sgt. Julien's reference to an explosion may relate either to the shock and sound of the left wing being torn off as it struck the first tree, or to the explosion of the fuel tanks at the time of impact. The idea that this occurred over the runway seems to have been inadvertently suggested to him by Senior Inspector Allen and in his state of shock and sedation, this probably has no significance. It is possible that the reference to great speed reflected the sensation of the aircraft passing through the trees, as suggested by the Rhodesian Commission of Inquiry (see annex III, part 10, section A.2).

131. It must also be noted that several witnesses who saw SE-BDY fly over the airfield and disappear in a west or north-westerly direction reported seeing a flash in the sky at times varying from 20 seconds to 4 or more minutes thereafter.

The Swedish observers at the Rhodesian Board of Investigation, noting this

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discrepancy in time, suggested that the possibility should be examined whether there had been two flashes, one of them while the aircraft was still in the air. However, when test flights were made with the witnesses observing the aircraft from positions which they had occupied on the night of the disaster, one of these witnesses, Mr. Peover, realized that from the fourth storey balcony of his apartment building he must have seen SE-BDY through most of its procedure turn. He concluded that it had disappeared from his vision only a few seconds before the actual crash. Some of the other witnesses who had made their observations from the ground would have lost sight of the aircraft several minutes earlier. Discrepancies in the times given by other observers may possibly be explained by their relative field of vision according to the nearness or remoteness of the tree line.

132. As another possibility of internal interference the Commission notes the sensational story carried in several newspapers in some countries during January 1962 to the effect that a seventeenth man boarded the aircraft at Leopoldville for the purpose of hijacking it. The story speculated that the crash occurred when this man tried to take over the aircraft from the pilot. While this story falls clearly in the category of rumour, the Commission carefully investigated whether or not it was true. Dr. Linnér and others who saw the plane take off from Leopoldville testified that they knew or were introduced to all persons who went aboard. Moreover, Dr. Ross considered the possibility of there having been a seventeenth body in the wreckage unlikely in the extreme, while the police, who did not know how many persons were aboard, examined the scene of the crash in order to discover if anyone had wandered into the bush but found no trace of this.

2. Attack or external interference

133. The Commission has carefully examined the possibility of SE-BDY having been shot down by another aircraft or by attack from the ground. It has also considered the possibility that the crash may have resulted from evasive action, or from momentary distraction of the pilot by an attack or feigned attack from the air or from the ground. The Commission has found no evidence to support such a hypothesis.

134. The Commission received testimony from experienced Air Force officers of the great difficulties attached to the successful shooting down of an aircraft at night, particularly where the aircraft route and time of arrival are uncertain. With respect to the latter points, however, it is noted that aircraft landing at Ndola frequently pass close to the crash site and that the approach of SE-BDY to Ndola was disclosed approximately two hours before its arrival, and estimated times of arrival were given in communications to Salisbury FIC and to Ndola tower which could be readily intercepted by any interested person. The possibility cannot, therefore, be ruled out completely.

135. The possibility of other aircraft being in the area of Ndola at the time of the crash was examined. Since the "Fouga Magister" of the Katangese Armed Forces had been operating against the United Nations in Katanga, the possibility of its reaching Ndola was examined by the Rhodesian Board of Investigation and the Rhodesian Commission of Inquiry. It was established that it could not have made the flight from its normal base at Kolwezi to Ndola and returned to Kolwezi since the distance is greater than its operational range. It was also stated by its captain and others that the "Fouga" was on the ground at Kolwezi the night of 17/18 September and could not have operated that night. This evidence is not entirely conclusive since the captain admitted before the Rhodesian Commission of Inquiry that on at least one occasion the "Fouga" had taken off from an unpaved track. While this particular track was said to be at an even greater distance from Ndola, nothing would appear to preclude the use of a track within range of Ndola. Nevertheless, there is no evidence that the "Fouga" was in the vicinity of Ndola on the night of the crash.

136. The Rhodesian authorities have stated that they have no knowledge of any aircraft other than SE-BDY being in the air in the Ndola region between 2035 Z, when CO-RIC landed, and the time that SE-BDY is presumed to have crashed. The Commission has, however, been informed that no radar watch was maintained in the Ndola area during the evening and night of 17 September 1961 and, therefore, the possibility of an "unknown aircraft" cannot be entirely excluded.

137. Certain witnesses testified that they saw or heard a second, or even third, plane. In particular, some of them testified that they saw a second smaller aircraft flying close to SE-BDY after it had passed over the airport or immediately

before the crash and that the smaller aircraft was beaming lights on the larger. The Commission visited with some of these witnesses the spots from which their observations had been made and endeavoured to obtain an understanding of their testimony. The Commission considers that several of these witnesses were sincere in their accounts of what they believed they saw. The Commission is also of the opinion, however, that these witnesses may have misinterpreted their observations and reported some incidents which may not in fact have occurred in the way or at the time that they believed when they testified before the Commission.

138. The Commission notes that SE-BDY, a DC.6 B, is a larger aircraft than normally seen in the Ndola area and was equipped with a red flashing anti-collision beacon located on an unusually high tail fin. It seems possible that the "smaller plane" may in fact have been the tail assembly of SE-BDY whose flashing beacon would have given different impressions depending on the angle of vision. This possibility is supported by witnesses' testimony that the smaller plane flew above and behind the larger plane at a fairly steady interval.

139. This theory does not explain all aspects of their testimony, particularly the statement of some of these witnesses that the small plane flew away after the crash. It is possible, considering the time lapse between the crash and their testimony, that some of the witnesses may have believed that they saw or heard phenomena which, in fact, they did not, or have compressed into a single day observations of events occurring over a longer period. Other witnesses showed strong anti-Federation feelings and it is probable that some of their testimony was given for political motives. A more detailed presentation of the statements of some of these witnesses is contained in annex VIII.

140. With the foregoing exceptions none of the witnesses who observed SE-BDY as it flew over the airfield and disappeared from sight saw another aircraft, and no one reported hearing the sound of gun-fire before the crash.

141. The Commission also considered the possibility of an attack from the ground. It was observed that there were clearings which could have afforded a field of fire. On the other hand, an attack with prospects of success would, in the opinion of experts, have required a concentration of fire and there was no evidence direct or indirect, to suggest that this had taken place. No strangers were reported to have been in the bush, nor, as noted above, was any sound of gun-fire heard before the crash.

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142. When the wreckage was first examined several holes were noted which it was thought might have been bullet holes. Closer examination established to the satisfaction of all experts that this was not the case, with the possible exception of a hole in the right hand window frame of the cockpit. At the suggestion of the Swedish representative, the Rhodesian Commission of Inquiry ordered a spectrographic examination. This examination, the United Nations Commission was informed, established to the satisfaction of the Swedish experts that the hole had not been made by a bullet.^{8/}

143. Mr. Virving, a Transair official, put before the Commission a theory that SE-BDY might have been attacked and shot down by a plane armed with rockets. This theory was based in part on an analysis of the statements of various witnesses concerning their observations of planes and of flashes in the sky. No substantial evidence was submitted in support of this theory and the Commission is of the opinion that most of the phenomena referred to by Mr. Virving are susceptible of other and more logical explanations. The Commission also consulted rocket experts with ONUC who expressed considerable doubt concerning the possibility of such an attack. Finally, as already noted, no signs of a pre-crash explosion or traces of a rocket were found in the wreckage.^{9/}

144. The Commission also noted the opinion of experts that, had the aircraft been shot down, its descent might have been expected to have been at a steeper angle than that indicated by the path of the crash. Had SE-BDY been attacked and evasive action attempted, the normal reaction of the pilot, if time permitted, would have been to retract the undercarriage and flaps and to apply full engine power. None of these measures was taken.

3. Material failure

(a) Technical or structural defect

145. There is no evidence whatever to suggest that the crash of SE-BDY may have been caused by technical or structural defect in the aircraft or its engines. In the opinion of technical experts the aircraft was trimmed, and the engines and

^{8/} See also annex XII, section 3.2.

^{9/} See also the results of the experiments in annex XIII.

propellers appropriately set, for a normal approach to the runway. Such is unlikely to have been the case had there been any defect, failure or malfunctioning of any important component. Since the state of the wreckage did not permit a full examination this possibility cannot be completely excluded, but it appears unlikely for the reasons stated.

(b) Altimeter failure

146. An examination of the altimeters by the United States Civil Aeronautics Board and the Kollsman Instrument Corporation, the manufacturers, did not reveal any defects existing before the crash (see annex IX). Each altimeter also had the correct barometric setting as given by the Ndola control tower.

147. One altimeter, when found after the crash, was disconnected from its static supply. The effect of such disconnection would be for the altimeter to show an altitude based on the pressure inside the aircraft instead of on the outside pressure. Normally the result would be an indication of an altitude lower than true, and the consequent reaction of the pilot would be to gain height. When at high altitude the cabin pressure of SE-BDY was said to be maintained at a pressure equivalent of 6,000 feet. However, on descent the pressure should automatically increase and at no time should it be less than the pressure outside the aircraft.

148. Disconnection could have occurred as a result of the impact. Had it occurred in flight the captain should have had an instant warning since his rate-of-climb indicator, connected to the same static supply, would also have been affected. The captain's and co-pilot's altimeters in SE-BDY were provided with separate static supplies and consequently any disconnection or leakage should also have been revealed by discrepancies in the readings of the altimeters.

(c) Fire in flight

149. There has been no evidence before the Commission of any fire aboard the aircraft before it struck the ground. The experts who examined the crash site reported no scorching of the tree-tops and no horizontal streaks on the parts of the aircraft examined which would indicate a fire in flight. Two hand fire extinguishers were found in a discharged condition and the Commission requested their examination in an attempt to determine whether they had been manually

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operated during flight or discharged by heat or other causes after the crash. The results of the dismantling and examination were inconclusive but it was noted that at least one of the fire extinguishers had still been attached to the bulkhead of the aircraft at the time of the crash. It was therefore unlikely that it had been used in flight. Moreover, it is believed that had there been a fire, traces of remedial action by the pilot such as emergency decompression of the cabin would have been found. From the evidence it appeared that no such action had taken place.

150. Finally, there was no evidence of carbon monoxide poisoning and the traces of carbonxyhaemoglobin found in a few bodies could readily be accounted for either by cigarettes or by a few seconds survival after the fire had started. While the possibility of fire in flight cannot be completely excluded, there is no evidence of any kind to support it.

4. Human failure

(a) Incapacitation of pilots

151. The theory was advanced that one or more of the pilots became suddenly incapacitated. The Commission did not receive any evidence to support this hypothesis. The Commission notes that there is no evidence in the medical reports that any of the pilots had been unable, for physical reasons, to perform his duties. However, since all forms of incapacity would not necessarily be revealed by a post-mortem examination, this possibility cannot be excluded.

152. The Commission is also satisfied that the accident was not due to pilot fatigue. In this connexion the following is noted:

- (a) The total flying time from Leopoldville to Ndola was only 6 hours and 30 minutes;
- (b) There were three experienced pilots on board, at least one of whom had had 24 hours rest;
- (c) There was sleeping accommodation on board for the pilots;
- (d) There was an automatic pilot;
- (e) Navigation by dead-reckoning in these parts of Africa did not present particular problems under the circumstances, and should not cause exceptional fatigue.

(b) Use of wrong instrument landing chart

153. Considerable attention was given in the proceedings before both the Rhodesian Board of Investigation and the Rhodesian Commission of Inquiry to the possibility of confusion between Ndola in Northern Rhodesia, with an elevation of 4,160 feet above sea level, and Ndolo, a small aerodrome with an elevation of 951 feet above sea level, close to Leopoldville (see annex II, para. 6.4.2 and annex III, part 10, section B.5; see also charts in annex XIV A and B). In the wreckage of SE-BDY, copies were found of a US Air Force flight information manual containing an instrument landing chart for Ndolo, but none for Ndola. In January 1962, a member of the Rhodesian Board of Investigation noted that in one of these manuals the altitude of Ndola (4,160 feet) was written in green ink on the Ndolo landing chart. It was eventually established that the handwriting was not that of any of the pilots aboard SE-BDY.

154. The possibility of confusion between the two airports appears to the Commission to be remote. The approach procedure for Ndolo is to the east of the airport and that for Ndola is to the west. The aircraft was apparently following, at least generally, approach procedure for Ndola at the time of the crash. There are prominent topographic features such as the Congo river on the Ndolo Chart which would be difficult to overlook. Moreover, Captain Hallonquist is reported to have discussed with others the similarity in the names of Ndola and Ndolo, and the fact that the altitude of Ndola was very close to that of Elisabethville in Katanga with which he was thoroughly familiar. Finally, there is no reason to believe that Captain Hallonquist was not using the Ndola chart from the Jeppesen Manual which was aboard the aircraft and was normally used by Transair pilots. The page containing the Ndola landing chart was missing from the copy of the Jeppesen Manual which was found in the wreckage. It is believed that the pilot, as is customary, removed the page, for use in landing, from this loose-leaf publication and clipped it next to him in the cockpit where it burned during the fire. Thus the absence of this page is a strong indication that it was in fact being used.

(c) Misreading of altimeters

155. The Commission examined the question of whether the crash could have resulted from a misreading of altimeters by the pilots. It noted several accident reports

in which experienced pilots had misread their altimeters. The most common mistake appears to be a misreading of 10,000 feet, due to the small size of the 10,000 foot pointer. The manufacturer of the altimeters used on SE-BDY have changed this pointer in their newer instruments to make it more easily readable. It seems unlikely in the present case, however, that a mistake of 10,000 feet could have been made immediately after flying over a well-lit airfield. The possibility was also suggested by a member of the Rhodesian Board of Investigation that the pilot might have misread 4,600 feet for 6,400. However, a mistake would have to be repeated several times and no explanation was offered of how he might have descended to that particular height without noting the altitude. Although on the one hand there is no evidence to support this particular hypothesis, on the other hand the possibility of some misreading of the altimeter cannot be completely excluded.

(d) Distraction of the pilot's attention

156. If the pilot had for some reason descended to 5,000 feet in the course of his procedure turn, as is permitted in some instrument landing charts for Ndola (see para. 106 above), or in a visual or semi-visual approach, his margin of safety over the ash site could have been reduced to less than 650 feet. It is possible that some momentary distraction, either from inside or from outside the aircraft, during the precise flying needed for his procedure turn, may have caused him to lose the remainder of this rather narrow margin. It would be extremely difficult either to prove or to disprove this hypothesis as a possible cause of the accident.

(e) Misleading or incomplete information provided to the pilot of SE-BDY

157. It may be noted that ICAO specifications for Instrument Approach Charts (Annex 4 to the Convention on International Civil Aviation) require depiction of topographical information pertinent to the safe execution of the instrument approach and provide that "relief shall be shown in the manner best suited to the particular elevation characteristics of the area". Consequently it is customary for States to include terrain contours and spot heights wherever pertinent. Instrument approach charts for Ndola indicate significant spot heights in the

vicinity of the aerodrome. In the area of the procedure turn and in the approach area there are neither spot heights of elevations nor terrain contours. Nor do the profiles on some charts adequately represent the elevation. If for some reason the pilot had descended to 5,000 feet he might not have been aware that his margin of safety over the terrain was so small. The possibility cannot, therefore, be completely excluded that the disaster may have resulted indirectly from incomplete information supplied to the pilot for use at this most critical phase of his flight to Ndola.

G. REPLY TO THE QUESTION ASKED BY THE GENERAL ASSEMBLY IN
PARAGRAPH 3 (b) OF RESOLUTION 1628 (XVI)

158. Paragraph 3 (b) of resolution 1628 (XVI) reads:

"Why its the Secretary-General's aircraft's arrival at Ndola was unduly delayed, as reported?"

159. Except for the fact that the departure from Leopoldville, as described in part II, was for several reasons delayed until late on the afternoon of 17 September, and that the aircraft took a less direct route requiring an additional hour and a half to two hours and a half of flight, there does not appear to have been any delay in its arrival over Ndola. In fact the aircraft arrived over the airfield some minutes before its latest estimated time of arrival. As will be noted in the following part of the report, when the aircraft disappeared, speculation arose that it might have delayed its landing or flown off elsewhere. Instead it had crashed during what must have been its approach to the airfield with the intention of landing.

IV. THE SEARCH AND RESCUE ACTION

160. This chapter briefly reviews the relevant regulations which were in force in the Salisbury flight information region at the time of the crash, gives a chronological account of the search and rescue action undertaken after the disappearance of SE-BDY, analyses that action, and sets forth the Commission's replies to the questions asked by the General Assembly in paragraph 3 (c) of resolution 1628 (XVI).

A. REGULATIONS GOVERNING SEARCH AND RESCUE ACTION IN THE SALISBURY FLIGHT INFORMATION REGION

161. The regulations governing search and rescue action which were in force in the Salisbury flight information region at the time of the crash were issued on 6 October 1959 by the Federal Department of Civil Aviation, under the title "Procedures for Search and Rescue Action within the Salisbury Search and Rescue Area". The regulations specify that they were adopted "in compliance with and amplification of" the relevant ICAO Standards and Recommended Practices. (Annex 12 to the Convention on International Civil Aviation). The full text of these regulations, minus the appendices, is attached to this report as annex X. It was submitted by the Rhodesian authorities to the Federal Commission of Inquiry as exhibit 16.^{10/}

162. The regulations provide for the establishment of a Rescue Co-ordination Centre (RCC) "for the express purpose of initiating, co-ordinating and terminating search and rescue action". When an emergency arises, the Centre becomes operational at the FIC of Salisbury. Pending its activation, search and rescue operations are the responsibility of the Senior Air Traffic Control Officer on duty at Salisbury. The Centre is manned by the personnel on duty at the FIC at the time of the emergency.

^{10/} The Commission also considered the special instructions issued for Ndola Airport by the Federal Department of Civil Aviation under the title "Crash and Alerting Procedures". It found, however, that these instructions had no particular relevance to the matters dealt with in the present part of the report.

163. The action to be taken in an emergency is divided into "uncertainty", "alert" and "distress" phases, bearing the code names INCERFA, ALERFA and DETRESFA, respectively. Paragraphs 8 to 10 of the regulations define the conditions under which each of these three phases is considered to exist. The provisions of these paragraphs which appear to be relevant to the emergency arising from the loss of radio contact with SE-BDY after 2210 on 17 September 1961 are as follows:

"8. Uncertainty phase. An uncertainty phase is considered to exist 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.

"9. 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;

.....

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.

"10. Distress phase. A distress phase is considered to exist when:

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

.....

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."

164. As regards air search, paragraph 11 of the regulations states that the Royal Rhodesian Air Force "has agreed to provide so far as possible such aircraft as are required for search purposes whenever this becomes necessary". These aircraft are placed under the control of the Civil Aviation Authority, and paragraph 15 of the regulations specifies that during the uncertainty phase the Department of Civil Aviation shall appoint a senior officer of the Department to serve as Civil Air Search Officer (CASO). Paragraph 20 provides that "when the conditions detailed at para. 10 exist" - in other words, when the distress phase comes into being - "the Rescue Co-ordination Centre will notify the Royal Rhodesian Air Force and request that they commence search".

165. The regulations also provide that the Rescue Co-ordination Centre "will request the police or any other local authorities to co-operate by organizing ground search parties as circumstances require ..." (para. 29).

B. CHRONOLOGICAL ACCOUNT OF THE SEARCH AND RESCUE ACTION TAKEN
AFTER THE DISAPPEARANCE OF SE-BDY

166. It will be recalled that all contact with SE-BDY was lost after the aircraft had acknowledged at 2210Z on 17 September a signal from the Ndola Control Tower instructing it to report "reaching 6,000 feet" and confirming the QNH barometric pressure setting for the altimeter.

167. The loss of contact with SE-BDY led to the initiation of a search and rescue operation which is summarized chronologically in the following paragraphs. Since the amount of daylight available is an important factor in any such operation, all times indicated are local or "B" time, which is two hours ahead of "Z". First light at Ndola on 18 September 1961 was at 0538B, and sunrise was twenty minutes later.

168. Shortly after the loss of contact at 0010B on 18 September the Ndola tower began calling SE-BDY repeatedly but received no reply. At 0030 Captain Deppe, the pilot of CO-RIC, asked clearance to take off for Salisbury and was instructed by the tower "to hold position until the landing of SE-BDY". With the approval of the tower he too called SE-BDY but received no reply. At 0035B Captain Deppe took off and again called SE-BDY without success. At

0115 the Ndola tower telephoned the police and asked if any crashes or explosions had been reported in the area. The reply was negative. The Airport Manager of Ndola also called the Duty Controller at Salisbury and the tower at Lusaka and was told that nothing was known of SE-BDY.

169. At 0150B the Salisbury FIC received from the Ndola tower priority signal No. Z.40 requesting news of SE-BDY and stating that contact had been lost with the aircraft. The Centre relayed the signal by teleprinter to Johannesburg for transmission to Leopoldville. At 0142B the Ndola tower originated the first INCERFA signal. The signal, numbered ZC.41, reached the Salisbury FIC at 0216 and was relayed by teleprinter to Johannesburg for transmission to Leopoldville.

170. At some time between 0200B and 0300B - the evidence is contradictory as to the precise time - the Manager of Ndola airport left the airport and retired for the night to his hotel in Ndola. At 0310B the Air Traffic Controller on duty at Ndola asked the FIC at Salisbury for permission to close the control tower for the night. The permission was granted and the Air Traffic Controller closed the tower, leaving a communicator on duty. It may be explained that a communicator is a radio operator who receives and transmits messages originated by an Air Traffic Controller but does not normally initiate messages.

171. Shortly afterwards, two police officers arrived at Ndola airport and informed the communicator on duty that at approximately 0020B Assistant Inspector van Wyk had seen an aircraft fly over the Ndola airfield and disappear from sight in a westerly direction. A few minutes later van Wyk had observed a flash in the sky in the direction in which the aircraft had disappeared. At the request of the communicator, who was unable to reach the Airport Manager by telephone, the two police officers went to the Manager's hotel and told him about the flash. They also informed him that the police were sending patrols to investigate the flash. The Manager stated that nothing else could be done before first light and retired to his room. The Ndola and Mufulira police sent out several patrols in

"Landrovers" in the direction where the flash had been seen, but nothing was found.

172. At 0550B an Air Traffic Controller arrived at Ndola Airport and the tower resumed operations. At 0645B the Controller sent the following signal to the Salisbury FIC:

"ZC.2 INCERFA. PERSON REPORTED TO THE POLICE HERE SEEN GREAT FLASH
IN THE SKY AT AIRPORT. 2300Z IN DIRECTION OF MUFULIRA."

173. At 0653B the RCC of Salisbury issued a DETRESFA signal reading as follows:

"DETRESFA RCCI REQUEST REPLY IMMEDIATE TO NDOLA SIGNAL ZC.40 REFERENCE
SE-BDY OVERHEAD NDOLA AT 2210 NIL ARRIVAL NDOLA EX LEOPOLDVILLE STOP
SEND FLIGHT PLAN DETAILS - NIL DEPARTURE SIGNAL RECEIVED"

The signal was sent to Ndola, Elisabethville and Johannesburg for transmission by teleprinter to Leopoldville. Efforts were also made to contact Leopoldville by radio. These were not immediately successful although the high frequency (HF) air ground facilities at Leopoldville operated by ICAO personnel were manned throughout the night. While this was not a recognized channel for point to point communication, it had, according to ICAO personnel at the Leopoldville FIC, been used previously between Salisbury and Leopoldville as the only reliable means of communication.

174. At 0720B Johannesburg advised Salisbury that it had not been possible to transmit to Leopoldville any of the signals referred to above and that it was not expected that contact could be made with Leopoldville before 0800B.

175. At 0744B the RCC of Salisbury received a signal from Leopoldville stating that they had no news of SE-BDY. Shortly afterwards, the Centre alerted the police in the area to the disappearance of SE-BDY.

176. After a telephone conversation with Ndola reported to have occurred at approximately 0900B, the RCC confirmed by signal a request that the Royal Rhodesian Air Force detachment stationed at Ndola began an air search for SE-BDY. This signal was received by the RRAF at 0942B. The air search started at 1000B.

177. At 1410B the Director of Civil Aviation appointed the manager of Ndola Airport as Civil Air Search Officer.

178. At 1510B one of the aircraft participating in the search sighted the wreckage of SE-BDY from the air. Meanwhile police officers informed by local inhabitants who had sighted the wreckage, arrived at the crash site.

C. ANALYSIS OF THE SEARCH AND RESCUE ACTION AND REPLIES
TO THE QUESTIONS ASKED BY THE GENERAL ASSEMBLY IN
PARAGRAPH 3 (c) OF RESOLUTION 1628 (XVI)

179. Paragraph 3 (c) of General Assembly resolution 1628 (XVI) in effect requests the Commission to answer the following three questions:

- (1) Did SE-BDY, after having established contact with the Ndola tower, lose that contact?
- (2) Did the fact that SE-BDY had crashed become known only after a delay of several hours?
- (3) If so, what were the reasons for that delay?

With respect to the first question, the Commission observes that the crash occurred approximately 5 minutes after the last radio communication between the Ndola tower and SE-BDY. It found no evidence to show that in those last 5 minutes the tower or the aircraft attempted to communicate with each other and were prevented from doing so by radio failure.

180. As regards the second question, the Commission observes that while apprehension about the fate of SE-BDY increased during the night of 17-18 September, especially when by the early morning of 18 September the endurance of the aircraft must have been exhausted, the fact that it had crashed was not definitely established until a ground party reached the wreckage shortly after 1500B.

181. In order to answer the third question, the Commission has analysed the Search and Rescue operation summarized in the preceding section and has come to the conclusion that delays occurred in issuing the first INCERFA and DETRESFA signals and in initiating an air search.

1. The delay in the issuance of the first INCERFA signal

182. Under paragraph 8(b) of the "Procedures for Search and Rescue Action", the uncertainty phase for SE-BDY began at 0050B, or 30 minutes after the estimated time of arrival last notified by the aircraft to the Ndola tower (see para. 163 above). The first INCERFA signal, however, was originated by the tower 52 minutes later, at 0142B. Moreover, another 34 minutes elapsed before the signal reached the FIC at Salisbury.

183. Officials of the Department of Civil Aviation heard as witnesses by the Commission attempted to justify this delay by referring to what the report of the Federal Commission of Inquiry called the "attitude of mind" of the Manager of Ndola airport.

184. This attitude of mind appears to have been caused by two sets of circumstances. First there was the nature of the flight of SE-BDY. In this respect, the Airport Manager, in the course of the hearings before the Federal

Commission of Inquiry, was asked whether he was "particularly worried about this plane" when SE-BDY failed to land after its last communication with the Ndola tower. He answered: "No, bearing in mind the nature of the flight and the very circumstances which this flight started with, I was not concerned at this stage". When he was asked what he meant by "the nature of the flight", he said: "This is a flight of which we had no flight plan, no departure signal, no information passed to Control in the conventional or normal manner which is usual under an ICAO operation for any flight operating in the Federation or in or around the Federation".

185. The Commission believes that at least some of the mystery which surrounded the flight of SE-BDY in the mind of the Airport Manager might have been dispelled if he had been adequately informed of the signal announcing the departure of the Secretary-General for Ndola addressed by Ambassador Riches to Lord Alport, the British High Commissioner for the Federation of Rhodesia and Nyasaland. It will be recalled that in this signal Ambassador Riches specifically stated that "flight details will be notified direct from the aircraft". However, the actual text of the signal, and in particular the sentence quoted above, was not known to the Department of Civil Aviation and to the aviation officials who in fact received the flight details from the aircraft.

186. The second set of circumstances which influenced the Airport Manager's attitude of mind arose from the presence of Lord Alport at Ndola during the night of 17-18 September 1961. In a statement given to the Federal Commission of Inquiry, Lord Alport explained that when he had been informed that contact had been lost with SE-BDY after COLOB, he had thought that:

"... the reason for breaking off contact with Ndola might be that Mr. Hammarskjöld's plane had been informed by one of the United States attaché's planes on Ndola airfield that Lord Lansdowne had only just taken off and that, in view of Mr. Hammarskjöld's expressed wish, the Leopoldville plane had gone off for a short time to allow for a definite interval between Lord Lansdowne's departure and Mr. Hammarskjöld's arrival. Alternatively, I thought that Mr. Hammarskjöld's plane might be remaining airborne until the transmission of the message or telephone conversation, on which it was engaged, had been completed.

"After thirty minutes or more had elapsed, I thought it possible that something had occurred in Elisabethville or that Mr. Hammarskjöld had received a message from Leopoldville or New York which made him decide to postpone his meeting with Mr. Tshombé and to go elsewhere. It did not strike me as strange that Mr. Hammarskjöld should not notify Ndola of his intentions, partly because of the circumspect attitude of the aircraft in its contact with Ndola Control, and partly because I thought that he would wish, if indeed he had changed his mind, to have a proper opportunity of dealing with the publicity which would ensue. At 0115 hours Mr. Williams [the Ndola Airport Manager] asked me whether I thought that he should put into operation the normal overdue procedures which I understood were due to operate 60 minutes after contact had been lost. I said to him that he should institute whatever procedures were proper in the circumstances and as far as I was aware this was immediately done.

"Mr. Williams, at my request, had, throughout this period, kept me in close touch with the position as far as it was known to Ndola Control and was, of course, aware of my view that something must have caused Mr. Hammarskjöld to change his mind and to decide not to land at Ndola as previously intended. It is natural that this, together with the failure of the Leopoldville plane to follow routine procedures, influenced Mr. Williams' subsequent actions."

187. The Commission regrets that impressions of a political nature were allowed to influence the action of aviation officials engaged in a search and rescue operation. It observes, furthermore, that these impressions were in marked contrast to the views of Lord Lansdowne, who told the Commission:

"I am absolutely convinced in my own mind, from the conversations I had with the late Secretary-General, that he was determined to go to Ndola and to put himself at the disposal of Mr. Tshombé for the talks which he regarded as so important. I am absolutely convinced of that, from everything that Mr. Hammarskjöld said to me and from everything that we discussed together ...

So far as I am concerned, this was a plan that the Secretary-General had made and that he was determined to carry out."

Unfortunately it would appear that Lord Alport and the aviations officials were not aware of this.

188. The Commission also observed that, unlike Lord Alport and the officials at Ndola Airport, Lord Lansdowne became very apprehensive when he was informed that contact had been lost with SE-BDY. He told the Commission that, while flying to Salisbury on OO-RIC, he noticed that "Captain Deppe, a very experienced pilot, was clearly perturbed by this absence of contact. Naturally, speaking

/...

to him about this matter, Mr. Wilford and I became very apprehensive, too. When we landed at Salisbury, my first question to the Deputy High Commissioner, Mr. Scott, was, 'Have you any news of the Secretary-General's aircraft?' To my dismay he said that he had none. By then I was in a state of very considerable disquiet. I could not think what on earth had happened ... I do not think that there was any doubt in Mr. Scott's mind that Captain Deppe, the Captain of our aircraft, Mr. Wilford and I were all extremely apprehensive".

2. The delay in the issuance of the first DETRESFA signal

189. The first DETRESFA signal was issued by the RCC of Salisbury at 0653B, 4 hours and 37 minutes after the reception of the first INCERFA signal. There appear to have been two main reasons for this delay.

190. In the first place, the evidence before the Commission shows that the attitude of mind of the Manager of the Ndola airport was shared to a great extent by the officials on duty at the Salisbury FIG. This is demonstrated by the following examples.

191. At 0120B on 18 September, the Manager of the Salisbury airport called the Director of Civil Aviation and told him that SE-BDY had flown over Ndola and "pushed off again".

192. The controller on duty at Salisbury from 1930B on 17 September to 0600B on 18 September testified that he had derived the impression from a conversation with the Deputy High Commissioner "that it was quite likely that the aircraft was returning to Leopoldville".

193. In a hearing before the Commission, the Senior Air Traffic Controller of Salisbury expressed the view that "had this been a normal flight, by that I mean, had we received a flight plan and had there not been the security check on the aircraft, and had the pilot done what we would normally expect him to do and been cleared down to 6,000 feet and we had lost contact with him, I think we might have gone into the alert stage ...". The witness had in mind the rules laid down in paragraph 9(b) of the "Procedures" for an aircraft which had been "cleared to land and fails to land within five minutes of the estimated time of landing".

194. Officials of the FIC of Salisbury and of the Federal Department of Civil Aviation testified that they did not expect Captain Hallonquist to respect the prescribed rules since he had been "secretive" in his communication with Salisbury and Ndola and since aircraft chartered by the United Nations often violate the Standards and Recommended Practice laid down by ICAO for international flights. As regards the first point the Commission finds that the log of communications between SE-BDY and Salisbury or Ndola does not substantiate the accusation of secrecy. The Commission believes that the second point is entirely irrelevant. It fails to see any connexion between the search and rescue operations concerning SE-BDY and the past behaviour of other aircraft chartered by the United Nations. It considers, therefore, that the allegation that aircraft chartered by the United Nations engaged on international flights have violated ICAO Standards and Recommended Practice falls outside of its terms of reference. However, as a body of an organization dedicated to the respect of international rules, it cannot fail to bring this allegation to the attention of the appropriate authorities.

195. In the second place, it was argued before the Commission that no DETRESFA signal would normally have been issued so long as the FIC at Salisbury had received no reply to the INCERFA's addressed to Leopoldville. The official who originated the 0653B signal testified that, in issuing the signal before the reception of a reply from Leopoldville, he had "jumped the gun".

196. The Commission is unable to find in the "Procedures for Search and Rescue Action" any provision which would require that no DISTRESFA-signal be issued so long as one of the flight information centres concerned had failed to reply to an INCERFA signal addressed to it. The Commission further observes that the FIC at Salisbury made no effort to ascertain from Johannesburg whether the teletype signals which Johannesburg had been requested to relay to Leopoldville had actually been received by the latter. It finds this omission all the more surprising in view of the fact that the evidence before it shows that delays in communication between flight information centres in Africa were not limited to communications between Salisbury and Leopoldville.

197. At the same time, the Commission cannot but deplore the disorganized state of the teletype communications at Leopoldville airport as revealed by the evidence before it.

3. The delay in the initiation of an air search

198. The Commission observes that no air search for SE-BDY was undertaken by the RRAF until LOCOB on 18 September - that is, more than eight hours after the issuance of the first INCERFA signal. It further observes that eighteen aircraft were stationed at Ndola at the time and that their commanding officer testified that, with one hour's notice, he could have sent them up at first light. In fact, it was only at 0942B that the signal from the RCC at Salisbury was received which the RRAF required to begin the search.

199. It should also be noted that seven hours before the beginning of the air search the communicator on duty at the Ndola airport had been informed by the police that Assistant Inspector van Wyk had reported seeing a flash in the sky in the direction in which SE-BDY had disappeared. Commenting on the significance of the information supplied by Assistant Inspector van Wyk, the Rhodesian Commission of Inquiry writes in its report:

"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." (annex III, part 9).

200. The Commission entirely subscribes to this view expressed by the Rhodesian Commission of Inquiry. It notes, however, that in another passage of the report the Federal Commission appears to place the entire responsibility for the delay in the initiation of a search on Mr. Williams, the Manager of Ndola Airport. The passage reads:

"It is true that responsibility for liaison with the R.R.A.F. is ... 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" (ibid.).

201. The Commission must observe in this respect that, while it is true that Mr. Williams took no action when he was informed of Assistant Inspector van Wyk's report, the Air Traffic Controller at Ndola originated at 0645B a signal transmitting the substance of the report to the Flight Information Centre of Salisbury (see para. 172 above). The Commission can only regret that an additional 2 hours and 45 minutes elapsed before the issuance by the RCC at Salisbury of the signal requesting the initiation of an air search. It is true that the Director of Civil Aviation who assumed the functions of Civil Air Search Officer until 1410B testified that it was only at 0900B that he had been informed of the signal originated at 0645B by the Air Traffic Controller of Ndola. This, however, in the Commission's view, cannot absolve the Federal Department of Civil Aviation of the responsibility for the delay in the initiation of an air search.

V. SUMMARY OF THE VIEWS OF THE COMMISSION

202. In concluding its report, the Commission wishes to submit the following summary of its views on the conditions and circumstances surrounding the tragic death of Dag Hammarskjöld and the members of his party.

Preparation for the flight

203. The Commission believes that the decision to leave for Ndola by air in the afternoon of 17 September 1961 was taken by the Secretary-General himself in view of the mission which he had to perform. In taking that decision the Secretary-General was fully aware that the flight would have to be carried out without escort and that most of it would be made by night. The Commission also believes that the crew of the aircraft chosen for the Secretary-General was fully qualified to undertake the flight, to navigate in radio silence and to land at Ndola in darkness. The Captain and the other crew members were experienced, competent and conscientious. No violation of the rules limiting flight hours of crew members appears to have been committed.

204. The Commission is satisfied that the Secretary-General's aircraft had been properly maintained and was fully airworthy. It believes, in particular, that the damage suffered by the aircraft at Elisabethville on the previous night had been adequately repaired. The Commission observes that no flight plan or departure message was communicated to the FIC at Salisbury. It is of the opinion that the situation created by the hostilities in Katanga, in particular by the activity of the jet aircraft equipped for aerial combat which was at the time in the service of the Katangese armed forces, explains this departure from the rules applicable to international civil aviation.

205. The Commission regrets, however, that before the take-off from Leopoldville, information was not given to a responsible official of ONUC of the route which the pilot intended to follow. It also believes that special security measures should have been taken to guard the Secretary-General's aircraft at N'Djili airport before the take-off. Though it has no reason to believe that either of these omissions was a contributing cause of the crash, it considers that both were potentially dangerous.

Possible causes of the crash

206. The Commission has carefully examined all possible causes of the accident. It has considered the possibility of sabotage or of attack and the material or human failures which could have resulted in an accident. It has found no evidence to support any of the particular theories that have been advanced nor has it been able to exclude the possible causes which it has considered. In this connexion it notes that the United Nations and the Swedish observers who participated in the work of the Rhodesian Board of Investigation also expressed the opinion that it was impossible to exclude any of the possible causes which they considered or to establish an order of priority among them.
207. With respect to sabotage it has noted that the aircraft was without special guard while it was at N'Djili Airport in Leopoldville and access to it was not impossible. The Commission is aware that there are many possible methods of sabotage. No evidence of sabotage has come to its attention but the possibility cannot be excluded.
208. The possibility of attack from either the air or the ground has also been fully examined. The Commission has found no evidence that an attack of any kind occurred. It has also noted the opinion of experts that it is improbable that the plane would have been in the apparently normal approach position indicated by the crash path and wreckage analysis had it been under attack. Nevertheless it cannot exclude attack as a possible cause of the crash.
209. The Commission has also considered various possibilities of material failure, including technical or structural defects, altimeter failure or fire in flight. A thorough analysis of that part of the wreckage capable of being examined was made by technical experts, including members of the Rhodesian Board of Investigation and United Nations and Swedish observers. The altimeters were examined in the United States by the Civil Aeronautics Board and the manufacturer. No evidence of material failure of the aircraft was found, but this possibility cannot be excluded, mainly because of the destruction of a major part of the aircraft by fire.
210. The Commission also considered various possibilities of human failure. It found no evidence that any of the pilots had been incapacitated. It cannot, however, completely exclude this possibility as some forms of incapacity might

not be revealed by a post-mortem examination. It also considered various possibilities of pilot error, including the use of a wrong instrument approach chart or a misreading of altimeters. It noted that the Rhodesian inquiry, by eliminating to its satisfaction other possible causes, had reached the conclusion that the probable cause of the crash was pilot error. The Commission, while it cannot exclude this possibility, has found no indication that this was the probable cause of the crash.

211. The Commission considered the possibility that during the course of a visual or semi-visual approach or through the use of an instrument procedure involving a descending turn, the aircraft might have come below the accepted safety margin of 1,000 feet above ground level. On some landing charts, information concerning exact elevations in the approach area is not provided and should the aircraft have descended below the accepted margin a momentary distraction, either from inside or outside the aircraft, might have caused the pilot to lose the remainder of his margin of safety. The Commission, however, has found no evidence that this could have been a possible cause of the crash.

212. The Commission considers it its duty to record that it has examined the various rumours that have come to its attention concerning the cause of the crash and has found no evidence in their support.

Search and rescue operations

213. As regards search and rescue action, the Commission notes that, although SE-BDY crashed 9.5 miles from an airfield on which eighteen military aircraft capable of carrying out an air search were stationed, the wreckage was located by the Rhodesian authorities only 15 hours after the crash and more than 9 hours after first light on 18 September 1961. The Commission is fully aware of the difficulty of conducting an air search over an area covered with bush and forest. It believes, nevertheless, that in the present case the delay in commencing search and rescue operations was increased by shortcomings in liaison and co-operation between the aviation officials concerned, by lack of initiative and diligence on their part and by delay in applying the prescribed procedures. Undue weight appeared to be attached to the groundless impression that the Secretary-General had changed his mind after flying over Ndola and decided to land at another airport

without informing the Ndola tower. Had that degree of diligence been shown which might have been expected in the circumstances, it is possible that the crash could have been discovered at an earlier hour and Sgt. Julien's chances of survival materially improved. Had he survived, not only would one life have been saved but there would have existed a possible source of direct knowledge of the conditions and circumstances surrounding the tragedy.

The present report is transmitted to the Secretary-General for submission to the President of the General Assembly in accordance with paragraph 4 of resolution 1628 (XVI) of 26 October 1961.

The Commission places on record its appreciation of the services rendered by the Secretariat during its mission.

DONE at the European Office of the United Nations on the eighth day of March, one thousand nine hundred and sixty-two.

(Signed)

Rishikesh SHAHA, Chairman

Raúl QUIJANO, Rapporteur

Samuel Bankolé JONES

Emil SANDSTRÖM

Nikola SRZENTIĆ

Blaine SLOAN
Principal Secretary
