

**R E P O R T**  
**OF THE**  
**COMMITTEE OF INQUIRY**  
**ON THE**  
**ACCIDENT TO SUPER KING AIR AIRCRAFT**  
**VT-EOA ON 27.08.92 NEAR IGI AIRPORT**  
**NEW-DELHI**

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REPORT ON ACCIDENT TO BORDER SECURITY FORCE  
BEECH SUPER KING AIR B-200 C AIRCRAFT VT-EOA ON  
27.8.92 NEAR IGI AIRPORT, NEW DELHI.

1. AIRCRAFT :  
TYPE : BEECH SUPER KING AIR  
MODEL : B200 C  
NATIONALITY : INDIAN  
REGISTRATION : VT-EOA
2. DATE & TIME OF ACCIDENT : 27.8.92 1159 hrs, IST (APPROX.)
3. OWNER/OPERATOR : DIRECTOR GENERAL-BORDER SECURITY FORCE, F BLOCK, NIRMAN BHAWAN, NEW DELHI.
4. POINT OF DEPARTURE : DELHI AIRPORT
5. INTENDED POINT OF LANDING : DELHI AIRPORT
6. TYPE OF OPERATION : CIRCUITS & LANDINGS
7. PHASE OF OPERATION : DOWN WIND LEG OF RUNWAY 28.
8. PLACE OF ACCIDENT : ABOUT 2.75 KMS. SOUTH OF AIRFIELD CLOSE TO NATIONAL SECURITY GUARD (NSG) UNIT/ GURGAON ROAD.
9. CREW : SOLE OCCUPANT PILOT-IN-COMMAND CAPT. T.S. DHALIWAL.
10. INJURIES : FATAL

( All Timings are in IST )

## 1.1 BRIEF NARRATION OF THE ACCIDENT

- 1.1.1 On 27.08.92 VT-EOA operated flight Delhi-Leh-Delhi to pick up D.G. ITBP from Leh to Delhi with Capt. A. K. Jha as Pilot-in-Command, Wg. Cdr. S. Beri as Navigator and Mr. M. Nair as Radio officer. The aircraft had departed from IGI Airport, New Delhi at 0700 hrs. and had landed at Leh at 0900 hrs. After a halt of 15 minutes, the aircraft took off from Leh at 0915 hrs. and landed back at IGI Airport at 1100 hrs. No abnormality was reported by the crew with the aircraft.
- 1.1.2 In the meantime at 1030 hrs. IST, late Capt. Dhaliwal had filed a flight plan with ATC Palam for local flying circuits & landings to be carried out at 1130 hrs on this aircraft. On arrival of the aircraft from Leh the aircraft was accepted by Late Capt. Dhaliwal and Co-pilot Capt. A.K. Jha for circuits. Aircraft taxied out from the BSF apron and at 1133 hrs., reported its position on 'Echo', when the Tower asked the aircraft to line up and hold. At 1136 hrs., the aircraft was cleared for take-off from Runway 28, turn left and climb to 2500 ft. and report down wind on QNH 1006 HPA. The wind reported was 260/03 knots. At 1138 hrs. the aircraft reported down wind on Runway 28. At 1140 hrs. the pilot reported finals with landing gear lights 'Three Green'. On a query from tower to confirm making a 'Full Stop Landing' or 'Touch and Go', the aircraft reported to be carrying out 'Touch & Go'.
- 1.1.3 The aircraft touched down at 1141 hrs. After touch down, it requested permission for Short Circuit/ Bad Weather Circuit. The tower cleared the aircraft for the same and told to report down wind on runway 28. At 1143 hrs., after the second circuit when the aircraft reported for the finals, the aircraft was cleared for 'touch & go' but the pilot informed the tower that he will be doing a 'full stop landing' and the aircraft was cleared for the same. Tower cleared the aircraft to back track and asked for vacating the runway on 'B'. The pilot informed the tower that he will go to the B.S.F Hanger.
- 1.1.4 After landing, the pilot again requested the ATC at 1145 hrs. that he will like to go for one more circuit if the traffic permits. The Tower gave a consent for the third circuit and asked to line up on Runway 28. At 1146 hrs., the aircraft informed the tower for lining up on runway 28. The tower cleared the aircraft for take-off giving winds 260/03 knots. At 1147 hrs., the tower was informed

by the aircraft that it is rolling. Immediately after the above transmission, the pilot reported to the tower that it was vacating the runway for two minutes. The pilot asked the Tower about the duration of the delay. The tower informed that there were 'two departures and one arrival'. The Tower asked the pilot to confirm about duration of delay on their part. The aircraft reported back that they are checking up because something has gone wrong with the door and it will take just about 2 to 3 minutes. At this stage Capt. A.K. Jha Co-pilot on board the aircraft was disembarked on E taxi track. At 1151 hrs., the aircraft requested to the tower for lining up, to which the Tower reported to hold position. At 1152 hrs., the aircraft asked the tower for the duration of delay. The tower informed the delay is expected to be of 15 mts. At 1153 hrs., another aircraft VVF (Air Force Aircraft) called the tower. The tower asked VVF aircraft to line up on runway 27 and hold. At 1155 hrs., tower advised the BSF aircraft to line up on runway 28 and hold which was confirmed by the aircraft. The Air Force VVF Aircraft which was lining up on runway 27 was given ATC clearance for Chandigarh.

- 1.1.5 At 1156 hrs., VVF aircraft was cleared by the tower for take off. At this juncture the BSF aircraft was also seen rolling and was instructed by the tower to hold position. The tower made repeated calls to BSF aircraft to cancel take off as VVF aircraft was rolling. At 1157 hrs., VVF aircraft abandoned take off and averted a dangerous situation as the directions of runway 27 and 28 converge.

At 1158 hrs. after the repeated calls by Delhi Tower, the BSF aircraft responded by saying 'Go Ahead Sir', which was the last transmission from the BSF aircraft. The tower informed the aircraft that it was not cleared for take off and asked how the take off was done without the ATC permission. The take off clearance was given to VVF aircraft from runway 27. After this there were repeated calls from the tower to the BSF aircraft for the confirmation but there was no response from the aircraft. The aircraft was seen going down after it had turned for down wind leg. At 1159 hrs. another Air Force aircraft VVR coming to Delhi from Hindon Airport informed tower that probably the BSF aircraft has crashed.

- 1.1.6 The NSG personnel have their training camp close to the accident site and were undergoing their routine training schedule at the time of accident. As per eye witness statements, the aircraft approached from the airport side and took a turn and after that appeared to be going down in a pitch down attitude. The engine sound was there and the aircraft propellers were reported turning. There was no fire to the aircraft. A loud thud sound was reported to have been heard during impact with ground. The fire emerged immediately after the aircraft impacted the ground.
- 1.1.7 NSG personnel were the first to reach the site of accident. They cordoned off the area and put out the fire with the help of fire extinguishers and buckets of water before airport fire tenders could reach the site of accident. The airport fire services reached the site of accident in about ten minutes. The aircraft impacted the ground in a pitch down attitude, caught fire and somersaulted in a pond at the site of accident which was filled with water. Capt. T.S.Dhaliwal who was the sole occupant on board the aircraft got killed due to post impact forces.
- 1.1.8 Dead body of late Capt. Dhaliwal got deshaped and was lying on the slope of the water pond. It was removed by airport fire services and was carried in the airport fire Ambulance to the airport M.I. Room. The body was later removed to the Safdarjung hospital where post-mortem examination was carried out.

## 1.2 INJURIES TO PERSONS

Capt. T.S.Dhaliwal who was the sole occupant on board the aircraft received fatal injuries and died instantly. The general pattern of injuries is that of decelerative type crush injuries as expected in a fairly high velocity impact.

The face was split into two portions. There were lacerations through the skin of the lower lip. These injuries could be due to hitting sharp object in the cockpit structure. There were multiple fractures to the bones.

## 1.3 DAMAGE TO AIRCRAFT

The aircraft was totally destroyed due to impact forces and subsequent fire.

1.4 OTHER DAMAGE

There was no other damage.

1.5 CREW INFORMATION

1.5.1 PILOT IN COMMAND

Name : Sh. Trilok Singh Dhaliwal  
Date of Birth : 1.5.1940  
Licence No. : ALTP No. 773  
Valid upto : 12.11.92 ( Initially issued on 17.6.75)  
Category : Single/multi engine land aircraft.  
Type of aircraft endorsed : DC-3, HT-2, Harvard, Queen Air-80.

Open rating was issued for all conventional types of airplanes having an all up weight not exceeding 2500 kgs. on 12.5.77. In continuation open rating was issued for all types of airplane having all up weight not exceeding 5700 kgs.

He was DGCA approved Examiner on Super King Air B-200 and HS-748 aircraft.

Endorsed on Super King Air B-200 and HS-748 aircraft. FRTO NO. 2112 Valid up to 12.5.93.

His Instrument ratings on HS-748 aircraft was last renewed on 6.8.91 and was valid upto 5.8.92. Instrument rating on Super King Air B-200 aircraft was last renewed on 3.9.91 and was valid upto 6.9.92.

His last route check and local check on HS-748 aircraft was carried out on 12.2.92 and is valid for six months with a grace period of one month.

Total flying experience as on date of accident : 13519 hrs. 46 mts.



Flying Experience on  
Super King Air B-200  
from March 1988 till  
date of accident

: 1099 hrs. 51 mts.

Flying experience on  
Super King Air B-200  
aircraft during last  
30 days

: 2 hrs. 45 mts.

Prior to the date of accident he had flown HS-748 aircraft to Amritsar on 23.08.92.

His last medical for renewal of ALTP licence was done on 28.4.92 at Air Force CME New Delhi. He was found fit subject to wearing of corrective bi-focal/look over glasses while exercising privileges of his licence.

Capt. Dhaliwal was involved in an incident prior to subject accident on 21.7.84 on Super King Air aircraft at Safdarjung airport. The aircraft had abandoned takeoff and during the process it over shot the runway and went into kutchra for nearly 90 ft. before coming to rest. Investigation has revealed that the aircraft was overloaded.

Late Capt. T. S. Dhaliwal had joined BSF (Air Wing) on deputation from Indian Air Force on 7.2.72 as a pilot and was later absorbed in BSF on 19.1.78. He was given acting rank of Deputy Director (Air Ops.) with effect from 16.5.78 and was confirmed in that rank from 11.11.80. He was placed in the acting rank of IG (Air Wing) w.e.f 21.6.88 and was subsequently confirmed in this rank from 8.11.89, with designation Director, BSF(Air Wing), which he was last holding at the time of accident.

1.5.2 Capt. A. K. Jha holder of CPL No. 1205 had flown with Capt. Dhaliwal during the first two circuits and landings at IGI airport on 27.8.92 prior to the eventful third sortie. Earlier on the eventful day Capt. Jha had flown VT-EOA aircraft Delhi-Leh-Delhi to bring DG ITBP from Leh to Delhi. Capt. Jha had got CPL licence on 22.9.78. He had joined BSF (Air Wing) as Trainee pilot on 21.11.85. After passing the technical examinations conducted by DGCA on DC-3 and HS-748 aircraft, he was appointed as a Co-pilot of BSF (Air Wing) w.e.f. 11.12.88.

As a holder of CPL licence, Capt Jha is authorised to act as pilot in command in the airplanes having all up weight up to 5700 kgs. He had pilot in command endorsement on Super King Air aircraft. He had flown as pilot in command for 550 hrs. (Approx.) on Super King Air aircraft during past two years.

1.5.3 Wg. Cdr. S. Beri had gone as Navigator in Super King Air aircraft during its flight from Delhi to Leh and back on 27.8.92. He is in possession of 1st class Navigation licence issued by DGCA and holder of Cat. A in the Indian Air Force on HS-748 aircraft.

1.5.4 Sh. M. Nair had gone in the aircraft to Leh and back as Radio Officer on 27.8.92. He is qualified Aeronautical Radio Maintenance Engineer on Super King Air aircraft. There is also an endorsement in his licence for Avro aircraft to act as Radio Maintenance Engineer.

## 1.6 AIRCRAFT INFORMATION

### 1.6.1 HISTORY OF AIRCRAFT:

Beechcraft Super King Air Aircraft B-200C bearing manufacturers S.No.BL-129, was manufactured by beech Aircraft Corporation, Wichita, Kansas, U.S.A. on 19th May,1987. The aircraft was fitted with two Pratt and Whitney PT6A-42 turboprop engines bearing S.NO.PCE 94102 on Port side and S.NO.PCE 94100 on starboard side, driving 3 blades Hartzell variable pitch Propellers, Type HC-B3TN-3N bearing hub S.NO.BV17132 at Port side and BU-17182 at starboard side.

A certificate of compliance, indicating that all the FAA mandatory modifications and Beech aircraft Corporation Class I Service Instructions applicable to the aircraft were complied with, as issued by the manufacturers.

The aircraft was bought by Director General Border Security Force through M/s Indamer (P) Ltd., Juhu Bombay, from the manufacturer's plant at Wichita, U.S.A. After the aircraft was issued with FAA Export Certificate of Airworthiness No.E16437 on 22nd June, 87, it was ferry flown to Bombay on 22nd July,87 with American Registration No.N72401 issued by FAA. The aircraft was cleared by Air Customs, Bombay on 24th July,1987.

After arrival of the aircraft in India, the aircraft was issued with the Indian Certificate of Registration S.No.2387 on 7th August,87. The first Indian Certificate of Airworthiness No.1891 was issued on 7th Aug.,87 by the Director General of Civil Aviation under the category 'Normal', sub-division 'Private aircraft'. The maximum all up weight was 5669.90 Kgs. or 12500 lbs. The said certificate was valid upto 21st June, 88. The C of A certificate specifies minimum crew necessary for the aircraft as one.

Before issue of Indian Certificate of Airworthiness, the aircraft was subjected to schedules approved by the D.G.C.A. at the maintenance facilities of M/s Indamer (P) Ltd., Bombay, which is an approved organisation.

The aircraft and engine hours as on the date of accident are as follows :

AIRFRAME :

|                                      |   |                 |
|--------------------------------------|---|-----------------|
| Hours since New                      | = | 1347 hrs 24 mts |
| Hours since last C of A              | = | 157 hrs 29 mts  |
| Number of landings Since New         | = | 981             |
| Number of landings Since Last C of A | = | 95              |

ENGINES :

The aircraft is fitted with two Pratt & Whitney Turboprop PT6A-42 engines.

|                       | <u>Port Engine</u><br>(S.NO. PCE 94102) | <u>Stbd Engine</u><br>(S.NO. PCE 94100) |
|-----------------------|---|---|
| Hrs since New         | 1347 hrs 24 mts                         | 1347 hrs 24 mts                         |
| Hrs since last C of A | 157 hrs 29 mts                          | 157 hrs 29 mts                          |

PROPELLERS :

Hartzell variable pitch propeller type HC-B 3TN-3N are installed. The propellers were overhauled by M/s Cama Aviation at their facilities at Juhu aerodrome, Bombay on completion of 1189:55 hrs. on 21.1.92.

|                          | <u>Port Eng.Prop.</u> | <u>Stbd Eng.Prop.</u> |
|--------------------------|-----------------------|-----------------------|
| Sl. No.                  | BU 17132              | BU 17182              |
| Hrs. Since New           | 1347:24 Hours         | 1347:24 Hours         |
| Hrs Since Last<br>C of A | 157:29 Hours          | 157:29 Hours          |

1.6.2 The aircraft was maintained by BSF (Air Wing) & m/s Indamer Bombay in accordance with the programme drawn up on the recommendations of the manufacturers and approved by DGCA as follow :-

- i) Pre-flight
- ii) D.I.
- iii) 15 days / 25 hrs
- iv) 30 days / 50 hrs
- v) 90 days / 100 hrs
- vi) 180 days / 200 hrs
- vii) 270 days / 300 hrs
- viii) 360 days / 400 hrs
- ix) C of A inspection

1.6.3 MAINTENANCE WORK/INSPECTION ON AIRCRAFT IN 1992 :

The 1000 hrs./ 1 year maintenance schedule on the aircraft auto pilot system and its components was done on 11.2.92 by M/s Indamer. The Inspection schedule on fuel manifold adopter and nozzle which is required to be done at every 400 hrs. of operation was accomplished on 9.4.92 by M/s Indamer when both the engines had done 1189.55 hrs. since new. Prior to the accident, the last renewal of C of A on the aircraft was accomplished on 9.4.92 by M/s Indamer when both the engines had done 1189.55 hrs. since new. The aircraft was also subjected to Check IV (400 hrs./360 days) and the lower inspection schedules in addition to the following major maintenance works:

1. All landing gear assemblies and associated hydraulic components were overhauled.

2. Electrical accessories were bench checked/overhauled as per the requirements.
3. Flaps and Flight Control surfaces including tabs were inspected for condition, cracks, damages and corrosion.
4. All pulleys, bell cranks and push pull rods of aircraft flight controls were inspected for condition and security.
5. Rudder torque shaft was inspected as per Beech mandatory SB NO.2422 and was found satisfactory.
6. Flight control surface trim tab free play inspection was carried out as per Beech mandatory SB No.2211 Rev 1 and were found satisfactory.
7. Movement of flight control surface and cable tension were checked and recorded.
8. Both propellers were overhauled on 22.1.92 on their completion of 1189.55 hrs. since new.

Apart from the major inspections which are carried out by M/s Indamer and the following inspection schedules were carried out by BSF Air Wing since issue of last C of A

- i) 25 hrs/15 days : ON 23.04.92 by AME NO. 2367
- ii) 50 hrs/30 days : ON 06.05.92 by AME NO. 2367
- iii) 25 hrs/15 days : ON 21.05.92 by AME NO. 2367
- iv) 50 hrs/30 days : ON 05.06.92 by AME NO. 2367
- v) 25 hrs/15 days : ON 13.06.92 by AME NO. 2367

- vi) 100 hrs/90 days : ON 24.06.92 by AME NO. 2367
- vii) 25 hrs/15 days : ON 14.07.92 by AME NO. 3093
- viii) 50 hrs/30 days : ON 30.07.92 by AME NO. 2367
- ix) 25 hrs/15 days : ON 14.08.92 by AME NO. 2367

The Certificate of Flight Release was valid till 28.8.92.

All the applicable modifications on the aircraft were complied with.

1.6.4 BRIEF HISTORY OF DEFECTS ON AIRCRAFT, ENGINES AND THE PROPELLERS DURING THE YEAR 1991 & 1992:

The following are the reported defects during the period 1991 & 1992 and the rectification action taken :-

18.6.91      PDR  
Weather radar intermittent.

RECTIFICATION

Reracking and cleaning of connectors carried out, checked and found satisfactory on ground. To check the proper functioning of the radar in terms of correct weather presentation and endurance, a test flight of long duration is required. Checked on test flight, operation O.K.

14.7.91      PDR  
Omega navigation unit data base is outdated. System unserviceable.

RECTIFICATION

KNS660, Omega system is updated in Indamer Co. Bombay. The system is serviceable.

26.10.91    PDR  
Pilot side storm window leaking.

RECTIFICATION

Seal found detached. Re-done with adhesive. Window closing O.K.

22.4.92      PDR  
1. No transmission from co-pilot side on VHF/HF.

2. No smoking and cabin light coming ON when 02 system is put to system ready position.

RECTIFICATION

1. Normal/oxygen S/W connection found loose and disconnected. Same reconnected and system checked on ground, found satisfactory.
2. Removed Pt. No.101-384034-1 pressure switch and reinstalled new switch. System checked for operation. Found satisfactory.

No snag was reported on the aircraft during the flight Delhi-Leh-Delhi prior to accident and in the first two circuits and landing before the fateful circuit.

1.6.5 REPLACEMENT AND MAJOR REPAIR CARRIED OUT DURING LAST ONE YEAR FROM THE DATE OF ACCIDENT :

1. 24.7.91  
Volt/load meter was replaced due its becoming unserviceable (not reading)
2. 1.8.91
  1. Wind shield temperature controller (RH) was replaced as it became unserviceable.
  2. Digital clock was replaced as it became unserviceable.
3. 5.8.91  
ITT indicator (LH) was replaced as it became unserviceable.
4. 9.8.91  
LH out board tyre was replaced due it becoming worn out.
5. 22.8.91  
Artificial Horizon was replaced due erratic with new after bench check.
6. 26.8.91  
TSI was replaced as it become unserviceable.
7. 6.9.91  
Right hand out board flap switch was replaced due it malfunctioning.
8. 16.12.91  
Compass check. Swing check was carried out.
9. 3.4.91  
Pressure switch was replaced as it was malfunctioning.
10. 13.4.92  
Cabin air temperature gauge was replaced due not reading.

11. 14.8.92  
Out board (No.1 LH Side) pane assembly was replaced as it was found cracked.

1.6.6 WEIGHT & BALANCE :

|                              |   |            |
|------------------------------|---|------------|
| Empty weight of the aircraft | = | 3642 Kg    |
| Radio Equipment Weight       | = | 127 Kg     |
| Oil wt.                      | = | 10 Kg      |
| Weight of Crew               | = | 75 Kg      |
| Weight of Fuel at Take-off   | = | 730 Kg (*) |

(\* Full tank fuel = 3900 lbs minus fuel used for Leh flight i.e. 2300 lbs = 1600 lbs = 730 Kg approx.)

Total weight at the time of take-off thus works out to be 4585 Kg. The CG limits for all up weight 5116 Kg or less in forward is 459.74 cm and in aft is 498.86 cm. Since the total weight of the aircraft at the time of take-off was less than 5116 Kg, the CG was within limits.

1.7 METEOROLOGICAL INFORMATION :

The relevant meteorological data was made available to the aircraft by the tower before take-off. The weather conditions over IGI Airport were above minima for take off and landing. The weather prevailing at IGI airport as per METARS issued by meteorological Department at Palam at 0600 U.T.C & at 0630 UTC were as follows :

At 0600 U.T.C

|              |          |                      |
|--------------|----------|----------------------|
| Surface Wind | 280/06   | Knots                |
| Visibility   | 4500     | m.                   |
| Clouds base  | 5/8      | 750 m. (2500 ft.)    |
|              | 1/8      | 1200 m. (4000 ft.)   |
|              | 5/8      | 3000 m. (10,000 ft.) |
| Temperature  | 31°      | C                    |
| Dew Point    | 27       | C                    |
| QNH          | 1010 HPA | 29.69inch            |
| QFE          | 978 HPA  | 28.89inch            |
|              | Tempo.   | T.S.                 |



At 0630 U.T.C

|              |  |
|--------------|--|
| Surface Wind | 260/03 Knots   |
| Visibility   | 4500 m.  |
| Cloud base   | 5/8 750 M (2500 ft.)<br>1/8 CB 1200 m (4000 ft.)<br>5/8 3000 M (10000 ft.) |
| Temperature  | 31° C<br>Tempo. T.S.   |
| QNH          | 1005 HPA 29.68 INCHES  |
| QFE          | 978 HPA 28.89 inches   |

Tempo T.S.

27.8.92

The accident had occurred at 1159 hrs. IST (0629 UTC). The weather was not a factor to the accident.

1.8 AIDS TO NAVIGATION :

Delhi Airport and the Super King aircraft are equipped with the required nav aids/instruments. As the aircraft was doing local VFR circuits, aids to navigation are not relevant.

1.9 COMMUNICATION :

Super King Air B-200 aircraft is equipped with 2 VHF sets. In the event of failure of one set, the communication can be continued with the second set. If both these sets fails, communication can still be continued on HF.

From ATC tape transcript of the accident flight, it is observed that after the aircraft took off without ATC clearance and it was approximately 40 secs. before the crash that late Capt. Dhaliwal replied "go ahead Sir" on repeated calls from the Tower. Since the aircraft had no reported snag and radio equipment were serviceable during Delhi-Leh-Delhi flight as well as during the first two circuits and upto the commencement of the last circuit, the probability that there was a total communication failure can be safely ruled out.

## 1.10 AERODROME INFORMATION :

1.10.1 IGI Airport is located approx. 15 kms from Delhi at a bearing of 228°. The administrative authority of the airport is vested with International Airports Authority of India, New Delhi and Air Navigation Services is provided by National Airports Authority. The aerodrome is operational for full 24 hours and serviceable during all seasons. The airport has Category IX Fire Protection facility provided by the IAAI.

1.10.2 The IGI airports has two runways available for operation for which runway 10/28 is declared as the main instrument runway. The physical characteristics of this runway is as follows :

| Runway Designation | True Bearing | Dimension          | Runway PCN | Surface  |
|--------------------|--------------|--------------------|------------|----------|
| 10/28              | 104°/284°    | 12500 ft<br>150 ft | 55/F/B/W/T | Concrete |

1.10.3 The Runway 28 which the aircraft was using is provided with runway edge, threshold and centreline high intensity lights. The approach lighting on runway 28 consists of CAT II lighting system extending upto 3051 feet from displaced threshold. It is provided with 3 Bar PAPI. Runway 28 is equipped with ILS CAT II and VOR/DME approach.

The visual ground marking aids available are runway designation, centreline, threshold and touchdown zone.

1.10.4 On the northern side of runway 28, there are two fire stations of IAAI. The main fire station is located on the eastern edge of Delta taxi track and the sub fire station I is located on the eastern edge of runway 15/33 adjacent to B taxi track. The watch tower on main fire station has a clear view of all aircraft touching down on runway 28. For any aircraft emergency on runway 10/28, the fire safety vehicles from the two fire stations can enter runway 10/28 from their stands by means of connecting taxiways i.e. fire vehicles from main stations can use D taxiway to enter on runway 10 side and fire vehicle from sub station I can enter runway from 28 side via E taxiway.

1.10.5 In the instant case the fire was extinguished by National Security Guards fire extinguishers who have their training camp near to the accident site. The airport fire services had reached the accident site in about 10 minutes after the accident and carried out the salvage for the aircraft wreckage.

1.11 FLIGHT RECORDERS :

No flight recorders are installed on this aircraft nor it is required under the rules. As per CAR series I part II aircraft with all up weight of 5700 kgs and above are required to be fitted with CVR and FDR. Beechcraft Super King Air aircraft's maximum all up weight is 5669 kgs, which is marginally lower than the cut figure of 5700 kgs. Keeping in view that VIPs are flown by this aircraft, provision of at least a CVR is necessary.

1.12 WRECKAGE AND IMPACT INFORMATION :

The layout of the main wreckage and position of main components at the crash site is indicate in wreckage plot at Annexure 'C' and in the photographs.

The main wreckage was found lying in a ditch, having water, approx. 350 feet from the initial point of impact of the aircraft. The main structure of the aircraft was totally crushed except the tail portion. The aircraft main wreckage was found in inverted position indicating that it had over turned while falling into the ditch.

a) IMPACT INFORMATION :

Aircraft first impacted the ground in disused area close to Gurgaon road (approx. 2.7 Km. south of runway 28/10) in pitch down and more or less wing level attitude. Fire had initiated immediately after the impact and its signs could be seen on the scattered wreckage pieces along the flight path after bounce. Some bushes also caught fire. General pattern of the fire damage indicated that fire was more intense on the port side. Tall bushes were found trimmed by the moving aircraft just prior to the impact which gave indications about the aircraft attitude at the time of impact. Initially nose undercarriage hit the ground closely followed by main undercarriage and the engines. Initial impact was very severe which led to crushing and disintegration of the aircraft. The crashed

aircraft bounced and moved ahead for about 350 ft. before falling into a water pond wherein it over turned.

b) WRECKAGE EXAMINATION AT SITE :

After the bounce the broken structure pieces kept on falling down in the path till it fell into the ditch. Some of the detached portions had flown ahead of main wreckage with the forward momentum. Nose undercarriage, the detached propeller blades and servo control units were found in the initial impact area.

Both the engines had detached and were lying along with the main wreckage. The needle of one of the air speed indicators was found stuck at 210 knots, indicating the probable aircraft speed at impact.

The needle of the starboard engine torque indicator was found stuck at reading 1800 ft. lbs. which is close to full power.

Undercarriage was down and locked and flaps were at 40% positions at the time of impact. Flap position was indicated by the flap actuator extension and the selection lever position. This is the take off/ approach flap position.

No aircraft part was located before the first impact point indicating that there was no inflight disintegration of the aircraft.

c) RETRIEVAL OF WRECKAGE :

Though tail portion of the aircraft was found separated from rest of the wreckage, yet the control cables run was continuous. Therefore, it was not possible to retrieve the complete wreckage in single stretch and it necessitated cutting of control cables, wires etc. After cutting the control cables, these were properly identified and masked.

d) BUILT-UP OF WRECKAGE IN HANGAR :

The aircraft wreckage was spread, as per plan view of the aircraft, in the BSF hangar. Following salient observations were made in general.

- i) The empennage portion of aircraft was almost intact. The starboard elevator was found bent and twisted, however, there was no damage either to port side elevator or to rudder including trim tabs.
- ii) Bottom portion of the fuselage was completely crushed.
- iii) Most of the windows were intact. Inner pane of few of them was found cracked and some were having fire damage.
- iv) Cockpit was completely crushed along with the crew windows and storm windows. Wind screen was detached from the main structure and shattered.
- v) All the seats were found liberated from the fittings. No seat fitting was found intact. Seats and seat rests were also found separated. Two seats had little fire damage. Seat belts were also found damaged and separated from their fittings.
- vi) Both the port and starboard wings were broken in number of pieces and had extensive fire damage.

After the wreckage built-up and placing of the structural parts/components, engines, landing gears etc., it was found that by and large wreckage was complete.

#### EXAMINATION OF AIRCRAFT SYSTEMS/COMPONENTS :

##### i) EXAMINATION OF FLIGHT CONTROLS :

###### a) ELEVATOR :

Following were the salient observations :

- i) Starboard elevator was bent and broken. However, it was secured properly with the hinges. Minor damage was observed on the hinges.

- ii) Port elevator had small damage near the tip. No other damage was observed on the port elevator. All the hinges were also intact.
  - iii) Elevators movement was found to be in order.
  - iv) Both the starboard and port tabs were moving properly.
  - v) Elevator servo cables were found attached to the main cables.
  - vi) Both the attachment joints of the bell crank with the cable were found intact with stop bolts properly locked. Link rod was properly secured with the column weld assembly, however, it was found detached from the bell crank side.
- b) RUDDER :
- i) No apparent damage was noticed on the rudder.
  - ii) On application of input from the control cable in the tail cone, rudder movement was in the correct sense.
  - iii) Rudder tab was intact and was responding positively on application of input from the cable.
  - iv) Rudder servo cables were found attached with the main cables.
  - v) Attachment of the rudder cable to the bell crank was intact, however, the circular portion of the bell crank was found broken into three pieces.
  - vi) Both the support assemblies along with the rudder arms were intact. Out of four rudder arms, three were found damaged by impact.
- c) RUDDER BOOST SYSTEM :
- Both the pneumatic rudder servos were intact and found attached to the primary rudder cable. With manual input, operation of rudder boost system was found to be satisfactory.

d) PORT AILERON :

- i) All the components of the aileron control system in the cockpit namely weld assembly, universal joint, control column were found badly damaged and separated from each other. However, chain was attached at both the ends and chain safety mechanism was fully secured at three places.
- ii) Cable joints to the central control quadrant were fully secured, however, the cable was heavily damaged with many strands of wire coming out. The central control quadrant was found attached to the main structure and was free to rotate.
- iii) The port side control cables in the wing from the quadrant were attached to the quadrant though it was broken into pieces.
- iv) The bell crank in the wing was found bent from the middle, however, the cable joint was secured.
- v) The aileron was found broken in two pieces near actuator. The outer hinge bracket was also found twisted. Inner broken part of aileron containing trim tab was badly crushed.

e) STARBOARD AILERON :

- i) The joints of the cable with the quadrant servo and the turn buckles was fully secured. However all of these were badly damaged and broken into pieces.
- ii) It was possible to move the link rod by operating the two cables. The link rod was attached to the aileron and its operation was in correct sense.
- iii) The aileron was found broken in two pieces at actuator attachment point. Mid and outboard mounting brackets of the aileron were found damaged.

f) FLAPS :

Flap lever was found along with the broken piece of the central console. Micro switches attached to the flap lever were found damaged and the electrical connections to the motor were found disconnected.

I) PORT FLAP :

i) The inboard and outboard flaps were badly damaged and broken. Flexible drive shaft from gear box to inboard actuator was intact, however, it was found detached at the gearbox end. The flap tracks were not found damaged.

ii) The inboard and outboard flaps actuator position in-situ condition was measured and found to be at 40 percent.

II) STARBOARD FLAP :

i) The inboard and outboard flaps were found totally crushed and damaged. The flexible drive shaft was found detached from the actuator end as well as gear box end.

ii) The inboard and outboard flaps actuator positions measured in this case too revealed flap selection in 40% position which could be either in takeoff or approach.

All the failures of control cables/rods fittings and the surfaces of the flying control as discussed above were observed due to impact forces.

ii) EXAMINATION OF LANDING GEAR :

i) Both the main landing gears and nose landing gear were found stuck in down and locked position.

ii) On the port landing gear, the lock was displaced due to bend in the upper and lower drag braces. However on the starboard main gear, the drag braces were fully secured with the strut assembly. Upper drag brace of nose landing gear was found broken from both the ends. Lower drag brace of nose gear was broken from eye end.



- iii) All the three landing gears were found separated from the main wreckage.
- iv) No fire evidence was noticed on the nose gear as well as the port main gear. However, extensive fire damage was observed on the starboard main gear.
- v) Both the torque knees for main landing gears were found sheared off at the eye end.

It can be concluded that landing gears were down and locked at the time of impact.

iii) EXAMINATION OF WINGS :

a) GENERAL CONDITION :

- i) Both the wing tips were totally crushed on bottom and upper side. Navigation/strobe light portion were also crushed and smashed.
- ii) Both the wings were found separated from the fuselage and were in pieces.

b) PORT WING :

- i) Portion of wing from tip to Station No. 194.829 was extensively damaged due to fire on both upper and lower side. However, beyond Station No. 194.829, the fire damage was confined near the leading edge only. The flexible tank in the leading edge was found burnt and burst. The other two tanks in this area were found burst without any fire damage.
- ii) Wing integral tank and wing tip flexible tanks were completely destroyed due to fire.
- iii) Small fire damage was observed on the upper side of aileron near the trailing edge.

- iv) Fire damage was observed to a portion of the auxiliary tank near inboard flap with concentration at fuel quantity probe. However, the fire damage was confined to the tank portion.
- v) By and large the port wing had extensive fire damage except the main wheel well area, inboard flap and wing root leading edge between engine and fuselage.
- c) STARBOARD WING :
  - i) Wing tip portion upto Station No. 194.829 has no fire damage. Both the integral and flexible tanks were, however, found crushed.
  - ii) Wing portion from Station No. 194.829 upto engine has extensive fire damage. All the three flexible tanks were consumed by fire.
  - iii) Landing gear area has also fire damage.
  - iv) Although the auxiliary fuel tank was found burnt, the fire was confined to small portion of tank only.
  - v) In general, the fire damage was internal. Externally there was no fire damage.
- iv) EXAMINATION OF COCKPIT AND CABIN :
  - a) WINDOW CONDITION :
    - i) Windscreen was found detached from the fuselage with both the glasses shattered.
    - ii) Cockpit windows on both the sides were found crushed and liberated. The panel of port side window adjacent to the windshield was found broken along with the fitting.
    - iii) Main cabin windows were more or less not damaged. However, few inner panes were slightly cracked and found missing.

iv) Except for front two windows on port side, there was no fire damage on others.

b) FLOOR CONDITION :

The floor was totally damaged and almost crushed into small pieces. All the frames were found separated from fuselage skin. Stringers were also crushed and badly damaged. The upholstery was also found in pieces.

c) SEATS CONDITION :

All the seats were found separated from the fittings along with the floor board. No seat fitting was found intact. Seats, seat rests and seat belts were also damaged. Two cabin seats had small fire damage. Pilot's seat belt was found locked indicating that it was not used by the pilot at the time of crash.

d) COCKPIT CONDITION :

Cockpit was found completely crushed along with central console, CB console panel and instrument panel. Pilot and co-pilot control columns were found broken. Engine and Propeller have been examined separately and findings on them are reflected in Chapter 1.16, Test & Research.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION :

From the accident site deshaped dead body of late Capt. T. S. Dhaliwal was recovered in the pond where crashed aircraft finally rested. The body was removed to Mahipalpur police station in the IAAI ambulance. Dr. Major B. K. Singh, Medical officer IAAI accompanied the body to the police station and had carried out the preliminary examination. Following were his observations :

As fragmented and completely distorted human body has been rescued from site. No viscera is preserved. No sample could be collected in such case.

Skull is open and torso is fragmented. All bony contours are distorted. Face is smashed, both upper limb are broken, left upper limb is attached with trunk, whereas right upper limb is completely crushed from mid arm. At torso vertebral column is fractured and pelvis is also crushed on right side. Both

interior extremities are damaged ( right int. ext. is missing while left interior extremity is amputated below knee).

A few bowel pieces are bulging out from right side of trunk and also few pieces of flesh, bones, skin and body parts are placed by the side of body separately. Accumulation of clotted blood, mud, bush leaves also present along with flesh and torso.

POST MORTEM :

The postmortem examination was carried out at Safdarjung Hospital by Dr. G. K. Chaubey, Forensic Medicine specialist. During autopsy examination Dr. Bhalla ADG medical services, IAF and Dr. L. K. Banerjee, Dy. Director (Medical), BSF were present. As per autopsy report, "Death was caused due to blast injury of head & crush injury of chest and abdomen, along with multiple injuries".

Face was observed split into two halves along with scalp. There were multiple injuries on the body. Lungs were crushed into multiple pieces. Heart and aorta had the rupture of right auricle and ventricle and of ascending and descending aorta. Stomach was empty with bilious fluid present approx. 50 ml. Kidney was observed slightly enlarged, pale wt. 200 gms. Liver was crushed into multiple pieces.

The forensic medicine specialist had forwarded following viscera to SHO Mahipalpur for conducting chemical examination.

i) Heart tissue ii) Blood sample iii) kidney, a piece of intercostal muscle v) A piece of skin from cheek with carbon particles vi) Carbon particle vii) Brain tissue vii) Phial of 'Mentat.'

Heart tissue was taken by DGCA official to Institute of aviation Medicine Bangalore where detailed pathological examination was carried out.

Other viscera was sent to Central Forensic Science Laboratory for examination.

1.14 FIRE :

Aircraft caught fire immediately after the impact. The fire was on broken wing structure pieces, on the Stbd undercarriage area and on the bushes. National Security Guard Commandos who have got a unit close to accident site reached the site immediately and did the fire fighting with their unit equipment. They managed to put out the fire with fire extinguishers and buckets of water. The fire fighting personnel of fire training centre of IAAI which is nearby located to crash site reached shortly after the crash. However by that time fire was extinguished and they cordoned the area.

1.15 SEARCH, RESCUE & EVACUATION :

BY AIR TRAFFIC CONTROL TOWER :

As per ATC tape transcript at 1158 hrs. the BSF aircraft responded to repeated calls of Delhi Tower Control by saying 'Go Ahead Sir'. At this stage, the Tower officer saw the aircraft taking a turn behind cargo complex terminal - II near Centaur Hotel and was seen losing height. At 1159 hrs. an Air Force helicopter coming from 'Hindon Airport' informed Delhi Tower that 'VOA' had crashed on down wind. At 1200 hrs., the Tower sounded 'crash siren' to inform Sub fire station, Police control & Airport Manager. Crash siren however does not sound at Airport Health officer's/IAAI MI Room. The tower subsequently informed on intercom Approach control, Watch Supervisory Officer (WSO) & Airport Reporting Officer (ARO) about the crash.

BY NATIONAL SECURITY GUARDS (NSG) :

At approximately 12.00 hrs. NSG personnel who were undergoing at their training camp near to the site of accident saw the aircraft coming from airport side and taking a U-turn when near to Centaur Hotel. The aircraft crossed passed them and crashed approx. 300 meters away with a loud thud sound & caught fire. The NSG commandos rushed to the spot and cordoned off the area and put out the fire with the help of fire-extinguishers and buckets of water. They reached first at the site of accident. The airport fire training school personnel reached the site subsequently after about 5 minutes.

BY AIRPORT FIRE SERVICES :

At 1158 hrs., Shri Jagdish Chander, Fire Officer who was taking a class of fire trainees reported to have heard the sound of an explosion. Immediately he

disrupted the class and ordered the fire trainees to keep the fire extinguishers in the water tanker and get the ambulance ready. On conforming that the sound was that of an air crash, he rushed to the crash site with Asstt. Fire officer and fire trainees along with fire tenders and ambulance. The fire was already extinguished by N.S.G. personnel. Immediately Shri Jagdish Chander along with Asstt. Fire Officer Shri K.M. Dhyani entered into the water pond to search for the casualties. In the mean time, the airport fire services people reached the site of accident along with airport doctor. The body was removed by Airport fire services in a stretcher and was rushed in the ambulance to airport M. I. room. Rest of the crew was engaged in search of another bodies. Dewatering of the pond was also started to locate for more casualties which was abandoned after BSF personnel told there was only one person on board.

#### 1.16 TEST AND RESEARCH :

##### 1.16.1 PATHOLOGICAL EXAMINATION AT IAM BANGALORE OF THE HEART SAMPLE (Exhibit No. 6) :

A portion of the heart and aorta of late Capt. Dhaliwal was sent to Institute of Aerospace Medicines Bangalore, for Histopathology/Toxicology examination. The IAM test report is as follows:-

#### A. GROSS EXAMINATION :

A portion of heart received. This includes a part of left atrium including left auricle; a part of mitral valve ring with anterior cusp of the mitral valve, and a small portion (2-1/2" x 1") of left ventricle. One cm. of first part of aorta present and shows atheromatous plaques. Both the coronary ostia are patent. The left coronary (main trunk) shows atherosclerotic narrowing. The right coronary (main trunk) appears normal. The first portion of the pulmonary trunk also attached.

#### B. HISTOPATHOLOGICAL EXAMINATION :

1. Myocardium : of left atrium and ventricle appear histologically normal.
2. Aorta : shows mild atherosclerotic changes.

3. Coronary arteries : The left coronary artery (main trunk) shows grade II atherosclerosis (over 50% occlusion of lumen). The right coronary artery (main trunk) shows grade I atherosclerosis (mild with less than 50% narrowing of lumen). No calcification/haemorrhage in the atheromatous plaque.

C. TOXICOLOGICAL EXAMINATION :

No sample received for toxicological analysis.

REMARKS: Both coronaries show atherosclerotic narrowing (more severe in the left coronary artery). But these sections have been taken from the main trunks of coronaries within one cm. of their origin in the aorta. Since the entire heart was not available, serial section study of the coronaries to detect any blockage could not be carried out. No other pre-existing disease detected in small portion of heart received.

1.16.2 CENTRAL FORENSIC SCIENCE LABORATORY REPORT :

Following test samples of late Capt. Dhaliwal were removed during autopsy examination and were sent to Central Forensic Science Laboratory, Lodhi Road, New Delhi (Exhibit No. 7) for chemical analysis.

The CFSL laboratory report is as follows:

DESCRIPTION OF TEST SAMPLES :

1. One sealed small plastic Jar containing a piece of kidney and intestinal muscles marked as Exhibit No.1.
2. One sealed small plastic jar containing a one small plastic bottle labelled as 'MENTAT' tablets marked as Exhibit. No.2.
3. One sealed small plastic jar containing blood gauze marked as Exhibit. No.3.
4. One sealed small plastic jar said to contain brain tissue marked as Exhibit. No.4.

5. One sealed small plastic jar said to contain carbon particles marked as Exhibit. No.5.
6. One sealed small plastic jar containing 20 ml (approx.) of blood marked as Exhibit. No.6.
7. One sealed cloth parcel said to contain clothes of the deceased marked as Exhibit. No.7.
8. One sealed envelope said to contain carbon particles marked as Exhibit. No.8.

RESULT OF ANALYSIS :

1. The Exhibit No.1 and 4 gave negative tests for ethyl alcohol and common intoxicated substances.
2. No opinion is offered about the Exhibit. No.2 as contents of tablets are said to be Herbal.
3. No opinion is offered as Exhibit. No.3 is dried blood gauze.
4. No opinion is offered with respect to query No.5 and 8 in connection with Exhibit No. 5 and 8.
5. The Exhibit No.6 gave positive tests for Ethyl Alcohol.
6. The opinion regarding blood grouping in Exhibit No.3, 6 and 7 is attached herewith from Biology Divn. separately.

1.16.3 MENTAT TABLETS EXAMINATION :

Request was made by the committee to Central Forensic Laboratory (CFSL) for carrying out the examination of Mentat tablet in respect of any intoxicant present in the tablet. Following are the CFSL comments:

1. Small plastic bottle labelled as Mentat were containing 23 blue colour tablets



2. Test of these tablets gave negative results for Barbiturates and Alkaloids.

#### 1.16.4 ENGINES AND PROPELLERS EXAMINATION:

##### a) ENGINE EXAMINATION :

Both the engines type PT6A-42 having S.No. PC-E94102 and PC-E94100 which were installed on Super King Air B-200 aircraft VT-EOA were stripped examined in the presence of Mr. Alex Hall, Lead Air Safety Investigator, Pratt and Whitney, Canada manufacturers of the engines at New Delhi. S/Shri J.S. Bhatnagar, Dy. Chief Engineer, BSF (Air wing), New Delhi, Lalit Gupta and R.S. Passi, Assistant Directors Air Safety at D.G.C.A. Hqrs. also associated in the investigation. The examination report is at Exhibit No. 2. The findings made during strip examinations of the engine is as follows :

##### Port Engine :

1. The engine had suffered heavy impact damage, particularly on its underside.
2. The propeller shaft was severed aft of the propeller flange and the reduction gearbox case was broken.
3. The exhaust case was creased and compressed by impact. The right exhaust port was flattened rearwards and the left exhaust port was extended outwards, twisted and flattened top to bottom.
4. The gas generator case exhibited distortion and torsional creasing particularly aft of the engine mounting pads.
5. Disassembly of engine revealed severe impact damage throughout the power turbines and drive train. The power turbine shaft was severed between the No. 3 bearing and No. 3 bearing was severely distressed. Nature of damage to power turbine shaft indicated that it had broken under torsion.

6. The second stage power turbine rotor was damaged by contact with the downstream exhaust duct and about 30% of the blades were pushed rearward in their fixing. Blades were broken at various spans and the remaining airfoil sections were found bent against the direction of rotation due to contact with the upstream stator vanes trailing edges which were as a result, also got damaged.
7. The first stage power turbine stator had been pushed rearward and contacted with the compressor turbine disk and the stator inner drum was separated from its vanes which was removed by hands.
8. The compressor turbine disk was heavily machined at the blade root diameter due to contact with the first stage power turbine stator. At blade root end, heavy machining effect was observed on a band of about 1/2 inch.

Starboard Engine :

Findings :

1. The external damage to the engine due impact was of lesser magnitude. The propeller shaft was severed aft of the propeller flange. The reduction gearbox casing was fractured on top and broken open on the bottom. Second stage power turbine rotor blades were not having any damage. The shaft however, was found seized.
2. First stage turbine stator baffle had machining marks and a portion of the inter-stage baffle had come out.
3. Nut for the first stage power turbine disk had smearing marks as a result of interference with baffle.
4. Inner drum of the first stage stator housing had machining marks at the circumference.

5. Machining marks on the first stage power turbine blade root leading edges due to interference with downstream stator.
6. The exhaust case found crushed, crumpled and have about 45 degrees crease.
7. First stage compressor blades were found intact with no evidence of Foreign Object Damage. However, some of the blades were found bent against the direction of compressor rotation as a result of interference with the stators due to impact.
8. Oil pressure filter was found free from contaminants.

b) PROPELLER EXAMINATION :

Propellers and Servo Cylinder and Pistons for both the engines were examined in the facilities of M/s Cama Aviation, Bombay. Shri D.Ghosh, AME and Shri V.K.Chandna, Director of Air Safety conducted the investigation. Both the propellers are of Hartzell make of Model HC-B3TN-3N. The propellers and blades serial numbers are as follows:

L.H. PROPELLER (SL. NO. BU-17132) :

|                   |         |         |         |
|-------------------|---------|---------|---------|
|                   | No.1    | No.2    | No.3    |
| Blades<br>Sl. No. | F-80697 | 80671   | F-80670 |
| Clamps<br>Sl. No. | EL-6715 | EL-6957 | EL-6977 |

R.H. PROPELLER (SL. NO. BU-17182) :

|                   |         |         |         |
|-------------------|---------|---------|---------|
|                   | No.1    | No.2    | No.3    |
| Blades<br>Sl. No. | F-80690 | F-80679 | F-80678 |
| Clamps<br>Sl. No. | EL-7385 | EL-7414 | EL-7061 |

Observation made on propellers assemblies and its associated servo piston and cylinders assemblies are as follows:

L.H. PROPELLER :

(i) PROPELLER ASSEMBLY :

Propeller hub broke off along with engine flange remaining connected to it.

Only one blade remained attached to hub, while other two blades detached with clamps giving way due to impact. Out of the two detached blades one came out along with pilot tube while the other blade detached with broken pilot tube. One blade is bent rear ward (at a distance around midway of span from butt end). The other detached blade curled back wards.

The depression marks on the Face of butt of the blades, the pattern of fracture and the stretch/compression in the butt end portion of the blades indicate the blade pitch on the finer side at the time of impact of blade with ground.

The comparative study was carried by comparing the blades angles of new propellers on the fixture for assembling and checking the blade angle.

(ii) CYLINDER AND PISTON ASSEMBLY (Pt. No.C.3021 - 5) :

Piston ruptured at one place and heavily dented around 80 degree from ruptured position.

All link rods to blade clamps are bent. Piston is retracted (like in feathered condition).

Base of cylinder though threaded but wrenched out due to impact cylinder is bent in the bottom end on one side.

All 3 low stop rods are bent (2 rods bent and 1 rod broken). Guide Collar broken. Spring retainer broken. Pilot tube along with spring bent.

Front nut was removed. Spring still jammed in position due to bent cylinder. Piston was cut to take out cylinder.

No specific observations could be made on the cylinder and inside of piston.

R.H. PROPELLER :

(i) PROPELLER ASSEMBLY :

Propeller hub broke off along with engine flange remaining connected to it.

Out of 3 blades 2 remained attached to hub with the clamps intact but the blades rotated inside the clamps. One blade rotated for about 40 degree while the other rotated for about 90 degree. The blades are intact except for some bending near the tip end. The third blade which got detached is bent almost 180 degree at the midway of blade span. The pilot tube is broken.

The detached blade showed pull out marks on the clamps on the butt end (3" long on cambered side starting 1/2" from L.E. and on blade backside starting 1" away from L.E.)

The depression marks on face of butt of detached blade, stretch/compression of the butt end position of blade indicate the propeller blade pitch on the finer side at the time of impact.

(ii) CYLINDER AND PISTON ASSEMBLY :

Piston is intact. Two link rods are slightly bent but third one is badly bent but they are attached. Guide collar is missing.

Low stop rods are bent and twisted and broken at the collar end. Front nut from pilot tube retaining removed.

Spring assembly came out and bent with retainer housing.

Piston stuck at a position of about 1" extended out indicating movement towards finer angles. The cylinder was pulled out from the threaded portion of the hub and got bent on one side.

Following conclusion were drawn from engine and propeller examination :

1. The port engine sustained heavy impact damage both externally and internally. No anomalies which might have prevented normal engine operation were perceived. Heavy machining of the compressor turbine disk forward face (downstream) indicates that the engine gas generator was operating at medium/high power at the time of accident. The power turbine damage is indicative of severe interference with other static engine components as a result of ground impact and sudden propeller stoppage.
2. No anomalies which would preclude normal engine operation were found on the starboard engine. Diagonal torsional creasing of the gas generator case and machining of the forward (downstream) face of the compressor turbine disk are indicative of engine power at the time of the accident.
3. At the time of initial impact the right propeller blades pitch was on coarser side while the pitch on left propeller was on finer side. Also the condition of the some of blades of both the propellers and the fracture/damage pattern of related components are indicative of power at the time of impact.

#### 1.16.5 EXPLOSIVE EXAMINATION BY BOMB DETECTION AND DISPOSAL SQUAD, BCAS :

Bomb Detection & Disposal Squad headed by Major T.V. Narayanan (Retd.) carried out detailed inspection of aircraft and site around the crash. The team also visited BSF Hanger at Safdarjung Airport. Explosive sniffer dogs and latest electronic explosive vapour detectors were used to sniff some of the doubtful parts of the aircraft to ascertain presence of any explosives.

#### CONCLUSION :

- a) Study of secondary metallic fragments for such as curled fragment, curved fragments, fissured fragments, surface erosion, pitting, metal disposition, reverse slant fractures which are distinct features of explosion effects.
- b) Study of disbursement of aircraft parts/fragments in and around the scene of the crash.

- c) Negative indication by explosive sniffer dogs about the traces of explosives from the doubtful fragments collected from the scene.
- d) Negative indication of presence of traces of explosives from fragment by the latest electronic explosive vapour detectors.
- e) Absence of any primary fragments of Bomb mechanism such as parts of detonators, power sources, switches explosive containers etc.
- f) Absence of any evidence of fragment/aircraft parts before the touch down of the aircraft (point of initial impact).
- g) Absence of any craters and penetration of fragments in the soft wet ground at the scene of crash.

Examination of parts of aircraft thrown in an around the scene of crash and subsequently at BSF Hangers, study of fragment's structure, pattern and marks, absence of any bomb mechanism such as explosives, power sources, detonators, switches, the team is of the opinion that chemical explosion may not be cause of crash of BSF Beechcraft, aircraft VT-EOA on 27 Aug.,92 near IGI Airport.

1.16.6 METALLURGICAL EXAMINATION REPORT OF FAILED FLIGHT CONTROL CABLES AND PROPELLER ATTACHMENTS :

The failed flight control cables and propeller attachments of Super King Air B-200 aircraft VT-EOA were sent to Research and Development Director of D.G.C.A. for metallurgical examination to find the type of failure. The detailed Report is as follows:

Metallurgical examination of the failed ends of most of wires of all the strands showed necking and a cup & cane type of fractures indicating failure under overload conditions. No worn and abraded areas were found at and away from the failed ends of all the strands of the broken cables. There was also no evidence of any progressive damage and corrosion. The fracture surface of the failed propeller attachment showed a shining and fibrous fracture in appearance having presence of equiaxed dimples indicating failure under overload conditions. There was no presence of any progressive damage.

CONCLUSION :

The flight control cables and the propeller attachment of BSF aircraft appears to have failed under overload conditions.

1.16.7 SPECTRUM ANALYSIS REPORT OF NAL OF WORDS "GO AHEAD SIR" IN THE ATC TAPE TRANSCRIPT OF ACCIDENT FLIGHT :

The spectrum analysis of the words "Go ahead Sir" spoken at counter No. 275 and 397 contained in the ATC transcript of the accident flight was carried out at NAL Bangalore. The report is at (Exhibit No. 3)

The observations made in the report are as follows :-

- Time taken of the words "Go ahead Sir" at both the counters is equal to 0.5 sec.
- The sound intensity level are identical at both the counters.
- Duration of the word spoken "ahead" is more at counter No. 397 than the duration of the same word at counter No. 275.
- Duration of the word " Sir" spoken at counter 275 is more than the duration of the same word spoken at counter No. 397.
- The intensity of the word " Sir" is feeble at counter No. 397 compared to the same word spoken at counter No. 375.

From the sound intensity pattern alone it can be concluded that the utterances at counters No. 275 and 397 belong to the same person. However to further strengthen the observations, six pitch period measurements were taken on the voice segments at both the counters.

- The pitch contours of both the time plots are identical.
- The variations in the pitch periods are within the prescribed limits set for the pitch period variations associated with a person ( 1 milli sec.).



- The LPC spectrum of the part of the word " go" in the two time plots exactly match

From the above observations made it is concluded that the words spoken " go ahead sir" at counter No. 275 and 397 belong to the same person Late Capt. Dhaliwal.

1.17 ADDITIONAL INFORMATION :

1.17.1 SALIENT OBSERVATIONS MADE BY DOCTORS :

- a) Dr. Wg. Cdr Bhalla (Aviation Medical Specialist IAF)

Dr. Bhalla in addition to his own agreement he had been looking after the duties of ADG Medical Services Civil Aviation on Wg. Cdr. Gupta was on leave on the date of accident he was requested to associate with the autopsy of Late Capt. Dhaliwal which was done by Dr. Chaubey at Safdarjung Hospital. Dr. Bhalla made following observations when question by the committee.

I am an aviation medical specialist and in addition to my normal responsibilities towards India Air Force have been looking after the task of ADG Medical Services, Civil Aviation during his absence. On 27.8.1992, at 1430 hrs. I was informed that a message has been received from DGCA that there has been an air crash at Palam airport and I was required to assist. I got in touch with the office of Director of Air Safety, DGCA Hqrs. and was told that Asstt. Director (Air Safety) will be coming to pick me up and take me to the accident site. I accompanied him to the site of accident where I saw the site of accident and learnt that the body of the diseased pilot had been removed by the doctor from IAAI and had been taken to Safdarjung hospital for autopsy and I was required to go to Safdarjung to assist the autopsy.

- 2. At Safdarjung hospital I first saw the body lying in a mangled state outside the autopsy room. The Forensic medicine specialist at Safdarjung hospital was called and requested to set the body in a shape so that some photograph could be taken. The photographer was arranged and photographs were taken.

3. Prior to the start of autopsy, it was felt desirable that some history of the accident was made available. However except for hear say accounts by some BSF officers and a sketchy note from SHO Palam nothing else was available. It was requested that it would be better if we could talk to Capt. Jha who was the co-pilot to the deceased in the sortie immediately preceding the fatal one. However, Capt. Jha was not available.
4. The findings at autopsy were duly recorded in the post mortem report. Certain special specimen (in addition to those normally collected) by the forensic specialist) were collected at my behest. namely plain muscle, tissue, heart, pieces of brain, blood mixed with urine and water from the pelvis and piece of lip muscle.
5. The BSF officers and Doctors present at the site were requested to arrange for air lift of the samples to the Institute of aero special medicine, Bangalore for specific aviation related studies. They were informed that they could do so by using the good offices of DGCA or in any other way suitable to them. The samples were handed over to the local police and before being transport to IAM they had to be taken charge of from the police. The police was informed of the requirement and they have agreed to do so.
6. The BSF officers present at the site were also requested to arrange if possible a visit for the forensic specialist and self to Palam airport to see the cockpit of the aircraft similar to the one which had crashed. This was necessary to correlate the injuries patterns with the aircraft structure. I later learnt that the only tissue specimen to reach IAM Bangalore was the heart tissue. BSF could not organise a visit to Palam to enable us to see the aircraft of the type desired. The required visit was finally proposed by the Committee of Inquiry about a week back.
7. It was also impressed by all concerned that the specimens were required to be kept refrigerated or stored in a flask full of ice and salt mixture till such time as they reached IAM. This requirement I understood could

not be met as neither the Police nor concerned authorities are geared up for the same.

QUESTIONS RAISED BY THE COMMITTEE AND ANSWERS THERE OF :

Q.1. It is correct that you were representing Civil Aviation during the autopsy?

A. Yes.

Q.2. What guideline of Civil Aviation you had followed?

A. I had no guideline to follow.

Q.3. You must be aware the guidelines of the Air Force for the air crashes used.

A. Yes.

Q.4. Do you consider that the checks carried out during the autopsy and the samples taken are complete in all respects as per the laid down guidelines?

A. The special samples which could have contributed to finding the cause of accident were collected by the Forensic Medical specialists at my request besides the specimen which he was supposed to collect routinely.

Q.5. Why it was not considered fit to take the viscera sample?

A. I am not aware that the viscera sample was not collected.

Q.6. Samples of the contents in the stomach?

A. The stomach was examined autopsy. It was found to be empty except for some bilious liquid. Thereafter, it was of no special interest to me.

Q.7. What are your comments on the pattern of injuries on the head?

A. It appears that Capt. Dhaliwal's face had been split into 2 portions as if it had been chopped by a knife. There were two lacerations through the skin of the lower lip. These injuries could have risen from mark of sharp object in the cockpit or frame of the aircraft. Thereafter the bones had multiple fractures which could be attributable to the multiple crash forces.

Q.8. Was there any evidence for the gun shot?

A. That there could be a gun shot injury. However, on final analysis especially the neat splitting of the facial bone into two make me feel that it was not a gun shot injury.

Q.9. Was any requirement/observation laid by the BSF Doctor?

A. No. There was no requirement from the BSF Doctor. It is only we requested him to provide the necessary storage condition if possible.

Q.10 Did you requirement met into by them?

A. The BSF doctors and even the administrative people like Shri H. Rao were requested for arrangement for preservation/transportation for which the agreed to do.

Q.11 Why the full heart was not sent to IAM/

A. I want to make it clear that authority for conducting the post mortem examination is with the Forensic specialist alone. My presence at the post mortem was in the advisory capacity and not covered by any authority from any one whatsoever. Regarding hear, the FM specialist felt that he would like to go into sections, examine the coronary arteries for patency and sent the suspect tissue for examination. The right side of the heart was ruptured. and nothing could be salvaged from that part. The other coronaries were examined and the portion which appeared to be narrow was targeted for microscopic laboratory examination. The other portions were obviously patent.

Q.11 Please have a look on the report of IAM on the piece of the heart sent. Taking this report and the examination of heart at the time of autopsy, what are your comments on the functioning of the heart at the time of accident?

A. The lumen of the coronaries examined with the microscopic eye was patent. The segment which appeared narrow has been examined at IAM and the report suggests that pathology leading to severe inflammation could not have been in this segment also. As such the possibility of cardiac arrest leading to death can be safely ruled out.

- Q.12 What you think could be effect of the Himalaya drug (mentat) which was found the clothing of the diseased?
- A. I am not well conversant with the effects of this medicine.
- Q.13 In your opinion were all actions taken correctly on medical angle in such a case of air crash?
- A.
1. The body should not have been removed from the site of accident.
  2. If the removal was must, the clear photographs should have been taken before removal.
  3. The investigating team should have been clearly identified and worked out in co-ordination right from survey of the wreckage to completion of the investigation.
  4. All facilities required for an investigation like meeting eye witnesses, examining air of like nature and proper authorities for conducting all the investigation.
  5. Facilities for proper refrigeration of samples and cold chain of transmission till they reach the laboratory.
- Q.14 What is your experience in aviation autopsy?
- A. It is my first autopsy in this nature.
- Q.15 In you opinion do you think that Capt. Dhaliwal strapped up in the cockpit at the time of accident?
- A. It appears that he was not wearing the harness.
- Q.16 When you had expressed the requirement of refrigeration/ transpiration by air of the viscera to BSF and local police but they had at any stage shown inability to do so?
- A. BSF had expressed their inability to take the viscera to Bangalore by Air. They were apprised that they could approach DGCA to arrange for the same. DGCA was personally apprised of this requirement also. DGCA had posted Mr.Khola to arrange the transpiration for the samples to Bangalore.

Q.17 Why only heart sample was sent? In your opinion was it necessary to sent to other items of viscera preserved during the autopsy?

A. I had requested Dr. Choubey that all the aviation specific items collected by us to be sent to IAM. The Forensic Medical specialist had reservations on this because the investigation procedure as laid down by law require that he sent this specimen to Forensic laboratory.

Q.18 Is there any way to finding out the pilot was in his sense at the time of crash?

A. We can say that we was alive at the time of crash but whether he had control over his sense cannot be said.

Q.19 What are the improvements you think could be made while providing medical cover to crash victims?

A. A definite procedure should be there to be followed by doctors of all airport authorities and it is advisable that Airport authority and agencies operating aircraft services should have post graduate (MD) qualified aviation medicine specialists on its strength.

b) Dr. G.C. Choubey, Forensic Medicine Specialist :

On 27 Aug.1992 I conducted post mortem on the body of Trilok Singh Dhaliwal, Age-52 years IG BSF Air Wing, Delhi. The body and the inquest papers were brought by Nanak Chand, Sub Inspr. Police Station Mahipalpur on 27.8.92 at 330 PM.

There was a alleged history of Air crash on 27.8.92 at 12 noon died on the spot. My detailed report is already handed over the police which is in my hand writing and bears my signature. The photostat copy of the report is already here with the Court of Inquiry.

I am doing Forensic Medicine from June 1982. I am in Safdarjung Hospital as specialist in Forensic Medicine Nov.89. This was my first case of Air Crash. The body was grossly mutilated and mingled. He was wearing a shirt, a banyan, underwear and pant with belt and socks. There were blood stained. On search of pocket of trouser three identity cards were recovered and also a pack unsealed mentat tablet were recovered.

Cause of death was due to blast injury of head and crush injury of chest and abdomen, along with multiple injuries mentioned in the post mortem report.

During autopsy examination Dr. Bhalla from Air Force and Dr. K.K. Banerjee, Dy. Director (Medical) were present.

CROSS EXAMINATION BY THE COURT :

- Q. Dr. Choubey will you please tell us that how many autopsy you have carried out till date?
- A. Approx. I must have conducted 6 to 8 thousand autopsies.
- Q. What internal organs do you preserve for finding out the toxic elements in the stomach?
- A. We preserve following:-  
Stomach, part of small intestine, a piece of liver and half of each kidney and a sample of blood.
- Q. Did you preserve these specimens in case of Dhaliwal?
- A. Normally the viscera is preserved on the request of investigating authorities or when the cause of death is not apparent on conduction of post mortem examination. In this case both the things were absence, however, suitable tissues and organs were preserved to analyses the toxic element.
- There was a wide spread crash injury to the abdomen and there were lot of blood and water present in perennial cavity so not much purpose would have been served by following the routine viscera preservation.
- Q. Since Capt.Dhaliwal containing mentat tablet was recovered from a person of the deceased pilot, did you not think it necessary to preserve the viscera. Moreover in this particular case it is not only necessary to find out the cause of death but it was equally important to find out the actual physical and mental condition of deceased just before he died.
- A. I did not think it fit to preserve routine viscera but selectively we did preserve the tissues and kidney and brain tissue and blood sample and

inter costal muscle to get the analysis specially for the narcotic drugs. This selective preservation in my opinion would have been better than preserving the whole mingled mass of viscera which was also contaminated.

- Q. Is it correct that you did not accept the suggestion of Dr. Bhalla, (Aviation Med. Expert from Air Force) to send these samples of tissues for detailed examination and analysis to IAM Bangalore as you wanted to send these samples to FSL?
- A. There is no question of my accepting or rejecting his request because we preserve the relevant things and hand over it to investigating authorities. Now it is upto them where they get the analysis done. We only request the investigating authorities to get the chemical analysis done. Further more there had there been any request it should have been made to investigating authorities which in the present case was Delhi Police.
- Q. In the PM report submitted by you, you have given the cause of death as blast injury of head. Did you suspect any fire arm injury or did you mean this injury to be caused by some other ?
- A. I did not suspect any fire arm injury, the term blast is being used for the sudden impact of any force blunt in nature. In this case it seems some blunt object has hit the head in the area of face in mid line extending from root of nose to vertex.
- Q. After visiting Palam and having a look of a similar aircraft from the inside what is your opinion could have cause that injury?
- A. It is difficult for me to comment exactly but it is more likely that head might have hit the window angle.
- Q. On the basis of information available to you from the post mortem examination is it possible for you to comment on the alertness of the deceased Pilot immediately before he died?
- A. It is not medically possible to comment on the alertness in such a case.
- Q. What is the difference between conducting a post mortem of an Air Crew died in air accident to that of other unnatural death cases? Are



- there any guidelines provided by the DGCA to this effect?
- A. For practical purposes there is no difference in conducting the post mortem examination, in cases of air crash death of air crews and other un natural deaths. I have not received any DGCA guidelines regarding deaths in air crash by DGCA or any other government bodies.
- Q. As per Dr. Bhalla's statement he wanted all the preserve tissue to be sent to IAM Bangalore whereas only a portion of the heart was sent? Whose decision this?
- A. I am unaware who sent the heart to IAM Bangalore because it is for investigating authorities to get the analysis done from his specified laboratories.
- Q. It was observed by the committee that special specimens were kept at the police station Mahipalpur under ambient conditions and not under refrigerated conditions? Did you apprise to Police Authorities of the requirement of refrigeration and did they express their inability to do so.
- A. After handing over the tissues or viscera to the investigating authorities it is the responsibilities of the investigating authorities to get the analyses done. Neither I was aware of such a circumstances nor I was informed by the Police authorities of such a situation.
- Q. The special specimen were kept in the Police Station under ambient condition for over two months? In you opinion will they serve any purpose if send for analyses at this stage?
- A. There is very small percentage of chance that analyses will prove fruitful nevertheless attempt should be made.
- Q. After going through IAM report can you ruled out the possibility of Heart Attach?
- A. After going through the report I am quite convinced that he did not have any heat attack before death.

STATEMENT OF DR. G.K.CHOUBEY :

For chemical examination all the internal organs are preserved in saturated

solution of common salt and blood is preserved as such in this case also kidney, brain were preserved in saturated solution of common salt. Blood was preserved without any preservative. Addition of solution of salt to the blood will vitiate the findings. The preservative for the blood is used only when there are special requirements and the case deserves the same. When the case is not clear about its circumstances it will better not to add any preservative to the blood. After seeing the CFSL report I am of the opinion the deceased was not under the influence of liquor because the brain tissue and kidney tissue came negative result for alcohol. The presence of ethyl alcohol in blood is because of petrification. In case the preservatives are used for the viscera refrigeration are not required approximately 3 to 4 months. Police were not told to keep the blood in the sub zero condition as the presumption is that they are supposed to hand over the CFSL same day. It is not possible to detect the case of heart failure due to cardiac arrhythmia, low blood pressure, low blood sugar by carrying out the postmortem. By carrying out postmortem one can detect coronary disease. There are 10% of cases were cause of death cannot be ascertained even after carrying out detailed postmortem examination. General "black out" is caused by cardiac arrhythmia, low blood pressure, low blood sugar and also certain forms of epilepsy. All these diseases can not be detected by carrying out postmortem examination. If the blood sample was preserved under refrigerated conditions all along it would have been possible to determine the blood sugar lever at a later date.

STATEMENT OF DOCTOR R.J.AGNIHOTRI, CHIEF MEDICAL OFFICER  
(AYURVEDIC HOSPITAL) :

I am Post Graduate in Ayurvedic having approximately 35 years experience (Clinical) regarding the mentat tablets of Himalaya Drug Company as per I know the composition is:

Brahmi, Vacha, Shankha Pushpi, and Jatta Mansi and other similar ingredients in smaller percentage. These tablets are normally prescribed for enhancing the mental faculties and for calming down frayed nerves. This has the effect of a mild tranquilliser and is milder than the calmpose. This prescribed both as medicine and a tonic. Normal dose for the adults is two tablets twice daily. Though this medicine is reported to be without any side effects if taken in prescribed quantity but I do not know what will be its effects if some body consume an over dose of this medicine. In the normal course the drug does

not impair the routine activities of a human being but an over dose may cause drowsiness. This drug is not considered to be habit forming. Sudden stoppage of its use does not produce any withdrawal symptoms. This drug can be taken either on empty stomach or after meals. There are no contra indications. this medicine reduces the blood pressure if taken in excess. I categorise excess dosage as consuming more than six tablets at a time. If excess dosage is taken its manifestation will be seen after about three hours.

CFSL FINDINGS :

In connections with case No.DD No.10 dt. 27.8.92 eight sealed parcels were received in the Laboratory on 24th November'92 from Police Station Mahipalpur from SHO. There were some queries with respect to nature of investigation required. There were queries with the respect to Alcohol presence about kidney, brain tissue and blood sample. There were also queries regarding intoxicates in brain and kidney. There were also query with the respect of intoxicates in mentat tablets. Now with the respect to result of the analysis after chemical analysis:-

- i. Brain and kidney gave negative tests for ethyl alcohol and common intoxicated substances like barbiturate and alkaloids.
- ii. No opinion is offered about the contents of mentat tablets as they are said to be of herbal preparations.
- iii. The blood samples gave positive tests for ethyl alcohol. In case in blood when purification has occurred are must exercise extreme caution in interpreting alcohol levels obtained by the analysis of putrid samples. this is due to the fact that alcohol may be lost or produced by bacterial action during the putrefactive process. If the blood sample is preserved by addition of sodium fluoride this will prevent loss of alcohol and production of alcohol as the result of bacterial action. Since alcohol at equilibrium should have been found in brain and it has been found negative in brain, it could have been found in blood due to putrefaction if it has not been preserved.

Q.1 Where the preservation of the viscera samples was adequate?

A. Along with the exhibits which were sent to the laboratory there was no documents along with them whether they were preserved or not. Hence no definite conclusion can be given for this question.

- Q.2 Is there any possibility of the correct analysis not coming out if the samples are not preserved properly?
- A. If samples are not properly preserved the correct results quite possible may not be available.
- Q.3. What is a maximum period sample can be kept at ambient condition for correct analysis?
- A. This will depend upon the nature of the poison to be detected.
- Q.4. In this particular case what is the period as per you ?
- A. In case of proper preservation and standard conditions of keeping the samples before analysis are maintained the quality of analysis will improve.
- Q.5 As per you what is the idle condition of preservation os samples?
- A. In my opinion were samples cannot be taken for analysis immediately. They must be stored in cold storage where temperature is below zero.
- Q.6. In the instant case since the samples had not been kept under sub zero conditions do you think the result of your analysis is not correct?
- A. If the samples have been preserved under sub zero conditions the results would not have been different qualitatively but for the sample of blood which had purified.

#### 1.17.2 Training and Checks for the BSF Pilots :

The Commercial Aviation organisations engaged in passenger carrying do give technical/performance refresher courses at regular intervals to their pilots to maintain the high standard of pilot proficiency. At present the BSF pilots are not given any such refresher course. In view of the fact that the BSF pilots carry out the VIP duties, they also should undergo such refresher courses. Although BSF has been categorised as a private operator, and under the prevailing rules it is not mandatory on the part of BSF to conduct refreshers for the pilots, but as pointed out above such courses will maintain the high level of proficiency of the BSF pilots in case these are regularly carried out.

Secondly at present, no procedures are laid down by DGCA for providing training and checks for BSF pilots holding ALTP licence if there is long break in their flying. Instructions exist only for commercial operators. It is desired that DGCA should lay down such instructions for non-commercial operators as well to ensure proficiency of pilots is ensured before they operate a flight.

1.17.3 Crew Requirement for Twin Engined Aircraft :

At present, the ICAO guidelines on the crew requirements for the aircraft operations require only one pilot for the aircraft below 5700 Kgs maximum All-up-weight. Super King Air is certified as single pilot operation. However, keeping in view that this aircraft is normally used for VIP flights, two pilot operation for all twin engined aircraft needs serious consideration.

1.17.4 Training and Refresher for Airport Medical Officer/Ambulance Attendants :

It has revealed that Airport Medical Officers of the IAAI have not been imparted training on the aviation medicine aspect. If such a training is imparted to the doctors posted at the airport, it can expose them to the requirements of the medical standards of the aviation personnel and the aspects to be looked for in case of air crashes. The Ambulance Attendants do not undergo any refreshers which if given shall ensure their proficiency all the time.

1.17.5 Annual Medical Checks of the BSF Officials, Pre-flight Examination of the Crew and Flight Duty Time Limitations for the Crew :

As per the practice followed by the BSF, All the Officials undergo medical examination annually. Late Capt. Dhaliwal had undergone the medical in 1990 and after that he had not undergone the annual medical as revealed by his medical records. This medical check up is an internal requirement and the medical check up for the licence renewal is done in a different manner. As per this medical for licence renewal, he was found fit. At present no practice is existing in BSF for carrying out the pre-flight medical of crew. The pre-flight medical examination ensures that pilot is in good health condition to operate the flight.

Recently, the DGCA has come out with Aeronautical Information Circular No. 28 of 1992 on Flight Duty Time Limitation which encompasses all the crew members engaged in different operations and is applicable to BSF crew members also. The compliance of this Circular shall ensure that the fatigue due to flying duties is kept in limits.

1.17.6 Aircraft Maintenance Personnel of BSF :

The Border Security Force holds one Super King aircraft, five Avro aircraft and one Chetak helicopter. To maintain this fleet of aircraft, the BSF has got a sanctioned strength of one Chief Engineer, four Dy. Chief Engineers, five Sr. Aircraft Maintenance Engineers, eight Jr. Aircraft Maintenance Engineers and eight Aircraft Mechanics. In addition they have got two Aircraft Radio Maintenance Engineers and two Radio Mechanics. At present, they have got one Dy. Chief Engineer, One Jr. Aircraft maintenance Engineer, 35 Aircraft Mechanics and four Radio Mechanics.

1.17.7 BSF Air Wing Security Arrangements :

Security Officer (Air Wing) BSF, Shri Dinesh Singh, Asstt. Comdt., was interrogated by the Committee of Inquiry. He has stated that the security staff of BSF (Air Wing) security staff has 3 Inspectors, 1 Naik and 12 constables who carry out hanger security and personnel security. On the night intervening 26th/27th August,92, the aircraft was parked inside the BSF hanger at Palam and its doors were locked and keys were retained by sentry on duty. A register is maintained by the sentry. Before drawing the keys, the name of the person drawing the keys is entered in the register. Sh Dinesh Singh further intimated that on the night intervening 26/27th August,92 nobody had entered the hanger. In the morning of 27th August 92 Shri R.Ramesh, Jr. Aircraft Technician had withdrawn keys for carrying out pre-flight inspection and refuelling of the aircraft as the aircraft was detailed for operating flight from Delhi to Leh to escort D.G., ITBP from Leh to Delhi.

Shri Dinesh Singh informed that when the aircraft was parked at Bay No. 22 for inspection and refuelling, one guard was kept at the hanger on Bay No.21 and one guard was posted to Bay No.22. Before the flight the baggage of the passengers is got identified. The baggage is again checked near the aircraft before these are put inside the aircraft. Their security staff is equipped 10 Hand Held metal detectors for this purpose. Personnel of para-military organisations are identified with the help of their Identity cards. In case of passengers travelling with VVIPS, the identification of passengers is done with the help of personal staff of VVIP.

After refuelling and inspection by the AME, Inspector Baljeet Singh of BSF Air Wing checked the aircraft before it left for Leh carrying following crew.

1. Shri A.K.Jha, Pilot-in-command
2. Shri Suresh Beri, A.D. (Air Ops.)
3. Shri M. Nair, ARME
4. Shri Kamaljit Singh, Niak (Cabin Crew)

Shri Dinesh Singh further informed the Committee of Inquiry that from his long association with the Air wing, he could categorically say that both at Delhi and Leh no outsider had entered the aircraft except the VIP passenger at Leh. On return from Leh he himself was present at Palam and no outsider had entered the aircraft. At Delhi technician Shri B.N.Shukla of BSF entered the aircraft to check the quantity of fuel on board the aircraft, before it was released for local circuits and landings.

The aircraft carried out first two local circuits/landings with Late Capt. Dhaliwal as pilot-in-command and Shri A.K.Jha as co-pilot. After two sorties, before the aircraft took off for the 3rd sortie and none else had access to the aircraft. Only Capt. Jha was dropped out by Capt. Dhaliwal before take off for the final eventful third sortie. No malfunctioning of aircraft controls and engines was reported during or prior to the eventful sortie or in the earlier flying of the day. From examination of aircraft wreckage no signatures of sabotage with aircraft or engines were observed.

Shri Dinesh Singh has stated that there should be more man power to have an effective watch over the BSf properties including aircraft at the Palam airport. This stated deficiency of man power, however, needs evaluation by the BSF authorities.

2. ANALYSIS :

2.1 WAS THE AIRCRAFT FULLY SERVICEABLE PRIOR TO IMPACT?

2.1.1 MAINTENANCE RECORDS :

The involved aircraft King Air B-200C VT-EOA was issued with initial Certificate of Airworthiness in August,87 after the aircraft was subjected to schedules approved by the D.G.C.A. As per the maintenance records and the relevant documents since the introduction of the aircraft in the BSF no major defect effecting the airworthiness of the aircraft was reported. All the test flights since the issue of initial Certificate of Airworthiness till the issue of last Certificate of Airworthiness were carried out by late Capt. T.S.Dhaliwal and no abnormality of any nature including flying characteristics of the aircraft and/or the performance of the engine were reported. Perusal of maintenance records reveal that all the related mandatory Service Bulletins issued by the manufacturer and the modifications were complied with and the aircraft was being maintained strictly following the D.G.C.A. approved schedules. The maintenance records also reveal that since the induction of the aircraft in service, no abnormal snags were reported which could have jeopardized the safe operation of the aircraft.

Aircraft had the valid flight release certificate. On the date of accident before operating the flight to Leh daily inspection was carried out and the aircraft was declared serviceable. Aircraft operated the Leh flight normally without any problem on any of the aircraft systems and engines.

Aircraft was accepted for the circuits and landing by late Capt. Dhaliwal without any observation on the aircraft serviceability. Two circuits were completed satisfactorily and during the last circuit though some sound was reported on the door by late Capt. Dhaliwal but same was not confirmed by Capt. Jha who was disembarked from the aircraft.

2.1.2 WRECKAGE EXAMINATION :

a) AIRCRAFT ATTITUDE, SPEED AND ITS STRUCTURE DISINTEGRATION :

After take off from runway 28 the aircraft was seen turning for down wind leg, and after that it was observed steadily going down. The tell-tale marks on the ground near and at the accident site indicate that



before the aircraft finally impacted the ground it was a rather in a steeper attitude.

The ground marks at the initial impact point are indicative that the aircraft suffered major impact loads on first impact itself. The main wreckage was in a ditch having water at a distance of about 350 ft. from the initial impact point. In between the main wreckage and the initial impact point there was no ground mark. No presence of any ground mark within the approximate distance of 350 ft. indicates that the initial impact was so high the aircraft bounced up in the air and travelled for such a distance with its residual forward momentum before again hitting the ground. This, also suggests that the speed of the aircraft at the time of initial impact was very high. One of the air speed indicator needle was found stuck at 210 kts due to impact which corroborates the possibilities of aircraft hitting the ground on its nose with high speed.

The main structure of the aircraft was found completely crushed and the tail portion found loosely attached with the main structure lying in inverted portion. After the initial impact point, throughout on both the sides of the flight path, the aircraft components/parts were found lying scattered. No components or any of the aircraft part was found before the initial impact point. The above suggest that the disintegration of the aircraft started after the initial impact only and there was no inflight structure failure.

b) INITIATION OF FIRE :

Port wing had suffered fire damage on the outboard side near the leading edge. Integral fuel tanks and the flexible tanks were completely consumed by fire. Comparatively fire on stbd. wing was less, although the auxiliary fuel tank was burnt. Starboard main landing gear also suffered fire damage. Fire pattern on the wreckage indicated a fire growth on the ground only.

No evidence, such as soot and streak marks or any other such evidence was available on the wreckage which could suggest the evidence of inflight fire. The main fire effected part of the aircraft was port wing.

Prior to initial impact the tall bushes which were cut but by the wings did not have any fire evidence. The evidence of fire on small bushes started at about 50 ft. away after initial impact point. All the fire evidence on the bushes were on the port side only. As per the statements of the witnesses, those who were present near the site of accident have seen the aircraft coming down and hitting the ground, the fire started only after the aircraft had hit the ground with high impact sound. Thus it can be concluded that the fire started initially on the aircraft after it hit the ground.

c) PRIMARY FLYING CONTROLS, FLAPS AND LANDING GEARS :

i) ELEVATOR, RUDDER, AILERONS CONTROLS :

Both port and starboard elevators were found connected with the hinges and the elevator movements were found to be in order. Both starboard and port elevator tabs were moving properly and the elevator servo cables were found attached with main cables. Both attachment points of the bell crank with cable were intact and the link rod was also found attached with column assembly. The control cables were also intact except that pulley and attachment bracket over which the cables run were damaged due to impact loads.

There was no apparent damage to the rudder and rudder tab. All the control cables including the ruder servo cables were intact and attached with the systems. Both the pneumatic rudder servos were intact and were attached with the primary rudder boost system.

All the components of port aileron control system in the cockpit were badly damaged and were found separated from each other. The chain was attached at both the ends. Cable joints to the central control quadrant were fully secured. However the cable was badly damaged. The cable joints with the quadrant servo of the starboard aileron were found fully secured though these were badly damaged and broken. However it was possible to move the link rod by operating the cables.

The cables which were found frayed and broken were examined in R&D Laboratory of DGCA (Exhibit No. 1) All the fractures were overload fractures as a result of impact loads.

All the above observations suggest that the primary flying controls had no pre-impact failure which could have contributed to the loss of aircraft control.

ii) FLAPS :

Port side inboard and outboard flaps were badly damaged. Though the flexible drive from gear box to inboard flap was found detached from the gear box end, but it was intact. The inboard and outboard flaps actuator extension position when measured was found to be close to the 40 percent position. The starboard side inboard and outboard flaps were also badly damaged but the flexible drive shaft was detached from both the ends i.e. actuator end as well as gear box end. The actuator extension position also indicated the flap selection in 40 percent. Forty percent flap selection could be in take off or the approach phase.

iii) LANDING GEARS :

All the three landing gears were found detached from the main structure in the down and locked position. However both the torque knees for the main landing gears were found sheared off at the eye end. It can be concluded that aircraft impacted the ground with undercarriage down and locked.

iv) ENGINES :

Both the engines were found in the main wreckage and were lying detached from the aircraft. The damage was particularly on the front and on the underside of engines. The propellers were separated from the engines. The propeller shaft was found sheared just aft of the propeller mounting flanges. The crushing damage to the port side engine was more compared to the starboard side of the engine. The reduction gear box on both the engines were detached from its bottom attachment.

After retrieval of both the engines a detailed examination was carried out at Safdarjung Airport in BSF hangar by Mr. Alex Hall, a technical expert of M/S. Pratt and Whitney, the manufacturer of the engine. DGCA officers also associated in the investigations. The report is placed in Exhibit. No. 2.

During detailed investigation, the condition of the engines and of the fuel control system precluded functional testing. No abnormalities and/or anomalies which could have prevented normal operation of the involved engines were noted.

The damage to the exterior and interior of the port engine was suggestive of a very severe impact at an operating condition of moderate to high power. Impact forces on the starboard engine appear to have been considerably less and as a result the rearward axial deformation of the engine structural casing was also reduced. However the diagonal creasing of the major structural casing was quite evident. The rearward axial deformation of the static structural casing pushed the first stage power turbine stator baffle into contact with the compressor turbine. As a result the baffle was machined/trepanned completely through its centre and the compressor turbine disc exhibited corresponding machining marks at its hub and fir tree diameter. The torsional creasing of the major structural casing together with the machining of the compressor turbine disk and the first stage power turbine stator baffle it may be concluded that at least moderate power was in use at the time of the accident on the starboard engine.

Scrutiny of the maintenance records reveals that the involved engines had done 1347 hrs. and 24 mts. since new and 157 hrs. and 29 mts since last C of A. Both the engines were maintained following DGCA approved schedules. Since the induction of the aircraft in operation no malfunction was reported relating to the performance of the engines till the date of accident.

v) PROPELLERS :

Both the propellers were found separated from the engines and got heavily damaged due to the impact. Both the propellers were sheared off from their engines along with the flanges. Out of the three blades of the starboard propeller assembly two blades remained attached with the hub and were free to rotate inside the clamp. The third blade which got detached was bent rearward almost at 180 degrees at the midway of blade span. Whereas the port side propeller had only one blade attached to hub and the remaining two blades were found detached. Out of the two detached blades, one blade was found bent rearward at a distance around midway of the span and the other one was curled backward.

Both the propeller servo assemblies and the propeller blades were subject to examination at the overhauling facilities of M/S. Cama Aviation, Bombay (Report at Exhibit No. 2). As per the investigation report,, though at the time of initial impact the starboard propeller blades pitch setting was on coarser side and the pitch setting of port propeller blades were on finer side, the condition of both the propeller blades and the fracture/damage pattern of related components were indicative of "power" at the time of initial impact.

The scrutiny of the maintenance records of the propellers indicated that the involved propellers had done 1347 hrs. and 24 mts. since new and 157 hrs. and 29 mts. since issue of Last C of A. No defect was reported on propellers since then.

Hence taking into account the engine examination which suggested that both the engines were operating with power and the results of the propeller investigation it can be concluded that at the time of impact both the engines were running with sufficient power and there was no engine malfunction or loss of power which could have contributed to the accident.

## CONCLUSION :

Taking into consideration the above derivatives the committee is of the view that aircraft had no malfunctions on its flying controls, engines and the other related systems which could have contributed directly and indirectly to the accident. It is considered that Late Capt. Dhaliwal probably continued to fly with take off flaps, and undercarriage down, keeping in view of a short circuit which is a normal feature of such circuits. Further had the pilot experienced any malfunction and if he was forced to land, he would have communicated to the tower and tried to land in the airfield being very close to it (around 2.7 km. south), however the same was not done. Even if the pilot was forced to land, in the down wind area, he would have landed with undercarriage retracted in the disused area to avoid damage but the same was however not done. Thus the circumstantial evidence also rules out any possibility of aircraft malfunction prior to crash.

## 2.2 WAS IT A SABOTAGE?

The enquiry committee closely examined the possibility of sabotage leading to the crash of BSF aircraft B-200 (Super King Air) VT-EOA on August 27, 1992 resulting in the death of T.S. Dhaliwal, Director (Air), BSF Air Wing. The following points emerged after carefully analysing the oral and documentary evidences collected during the enquiry relevant to this aspect:-

1. The medical experts who handled the dead body after the accident and were also connected with the post-mortem opined that the injuries sustained by the deceased were not caused either by fire arms or explosives. The nature of injuries was similar to those sustained in a normal air crash. This view was also supported by the Police Officer who performed the inquest on the dead body.
2. According to a number of eye witnesses including those present in the Air Traffic Control Tower at the time of crash and those working near the crash site, no smoke was noticed coming out of the ill fated aircraft while in the air. There was no disintegration of the plane either and almost the entire wreckage of the plane was confined to a small area completely ruling out the possibility of a midair explosion. No body saw any missile hitting the aircraft and examination of the wreckage did not

reveal any bullet hole etc. There is enough evidence to indicate that the aircraft and its fuel tank was absolutely intact when it reached the ground and disintegration of the aircraft took place afterwards.

3. The eye-witnesses did not notice any abnormality either at the time of take off or while in the air. Even when it was losing height its wings were level and the dive was steady though the dive angle was more steep. The eyewitnesses also heard the sound of the engine and saw the propellers rotating.
4. Maj. T.V Narayanan, Officer incharge of Bomb Detection Disposal Squad, BCAS carried out detailed inspection of the crash site and debris of the ill fated aircraft. The team used explosive sniffer dogs and electronic explosive vapour detectors to check the presence of explosives during their investigation. However, no such presence of explosives was detected and the team concluded that the disintegration of the aircraft was due to structural failure associated with the crash and not by explosive device.
5. No extremist/terrorist groups active in Kashmir, Punjab, North-East or in the South claimed the responsibility for this crash. There is no evidence to link the activities of insurgent/extremist groups active in the country, with this crash. Further there are no reports to indicate the presence or movement of such groups near Palam area during July-August, 1992.

The question of someone tampering with the aircraft or indulging in deliberate mischief to cause this crash was also examined and the following points were taken into consideration:-

- a) Capt. Dhaliwal's plan to do local flying was not known to anybody before August 27, 1992. This aircraft B-200, VT-EOA had gone to Leh on the morning of August 27, 1992 to bring back the D.G., ITBP. It was around 1000 hrs. or so that Capt. Dhaliwal enquired about the expected time of arrival of this plane from Leh and instructed Asstt. Commandant, Dinesh Singh, Security Officer BSF Air Wing to keep the aircraft ready on its return from Leh

as he wanted to some local flying. After its return to Delhi, the aircraft remained under the constant presence of senior officers and barring a technician who checked the quantity of fuel in the aircraft, nobody entered the aircraft.

- b) Capt. Dhaliwal did not mix much with his colleagues and subordinates in the BSF Air Wing and was not popular with them. He was considered to be a hard task master and short tempered. However, during the last few months before the crash, people noticed that Capt. Dhaliwal had considerably mellowed down and become more accessible. He was found to have become more religious and had stopped taking alcohol. There was some decline in his physical fitness and was noticed taking special care about his food. He carried his own drinking water and milk in a thermos flask. There is a suspicion that he was suffering from some sort of stomach problem which necessitated consumption of milk at frequent intervals. As per the evidence collected, people in the BSF Air wing did not bear any grudge against him.
- c) Capt. Dhaliwal did not care much for the cockpit discipline. He did all his flying in civies and generally did not put on the shoulder harness or lap strap while flying. He also occasionally violated instructions from the ATC. He appeared to be a man in hurry and this perhaps resulted in his violating safety precautions sometimes.
- d) Though it is not a normal practice in the BSF to flying the B-200 Super King Air with the single pilot and Capt. Dhaliwal had also never flown alone in this aircraft earlier, on August 27, 1992 on the last circuit he was the sole occupant of this aircraft.
- e) During the night intervening August 26-27, 1992, the aircraft B-200 VT-EOA was parked inside the BSF Hangar at Palam Airport. Its doors were locked and the key was in the key box. The BSF Hangar located inside the Palam, a well protected area is further



guarded by unarmed sentries of the BSF. Assistant Commandant, Dinesh Singh is incharge of the security of BSF Air Wing and has got a complement comprising 3 inspectors, 1 Naik and 12 Constables for this purpose. All the BSF men on the security duty are subjected to periodical reverification by Delhi Police and 'G' Branch of the BSF. The lighting arrangements both outside and inside the BSF Hangar are adequate. The key of the key box remains with the Sentry on duty and a record is kept whenever the key of the aircraft is withdrawn from the key box. The possibility of any unauthorised person gaining access to the aircraft is non-existent. All the technicians, Senior Officers and Security personnel who were on duty in the BSF Hangar on the night intervening August 26-27, 1992 or who had access to this aircraft on the morning of August 27 were found to be above board after a thorough record check.

- f) The ill fated aircraft left Palam Airport at 0700 hrs. on August 27, 1992 and landed at Leh around 0900 hrs. the same day. It took off from Leh around 0915 hrs. and landed at Palam around 1100 hrs. During the flight both ways the aircraft behaved alright and no snag was detected, a fact corroborated by all the crew members who were on board the aircraft. Capt. A.K.Jha of BSF who piloted the flight from Delhi to Leh and back acted as co-pilot with Capt. Dhaliwal when latter went for local flying in the same aircraft. Capt. Jha completed two circuits along with Capt. Dhaliwal and did not notice any trouble whatsoever in the aircraft. He, however, noticed that while doing these circuits, Capt. Dhaliwal reduced the engine RPM abruptly which Capt. Jha had to set right each time. After second circuit, on request, the ATC cleared the aircraft to return to BSF Hangar. However, later Capt. Dhaliwal desired Capt. Jha to seek permission for one more circuit and this was also cleared by the ATC. It appears that Capt. Dhaliwal was not very firm on doing the third circuit as at least thrice the aircraft went up to the runway and returned to the taxi holding 'E' on the pretext of checking the door. Capt. Dhaliwal every time asked his co-pilot Capt. Jha to check the aircraft door for some imaginary

noise which Capt. Jha himself did not notice. Twice Capt. Jha was made to go out of the aircraft to check the door and on the second occasion Capt. Dhaliwal did not want him to come back into the aircraft to accompany him on the third circuit. It is not clear as to why Capt. Dhaliwal behaved in this manner as any malfunctioning of the door is indicated on the instrument panel and if panel was not showing any abnormality, there was no reason to carry out manual inspection of the door time and again.

- g) Though the ATC had allowed the third circuit to B-200 VT-EOA, it did not give it take off clearance due to some other traffic. However, Capt. Dhaliwal violated the ATC's instructions and went ahead with the third circuit forcing the other Air Force aircraft to abort its take off. Repeated calls/queries from the ATC directed towards Capt. Dhaliwal remained un-answered. Only a feeble 'Go ahead' was heard from him a little before the crash.

On the basis of the aforementioned, the possibility of sabotage being the cause of this crash is totally ruled out. Similarly, the possibility of some body intentionally tampering with the aircraft appears to be non-existent.

## 2.3 HUMAN FAILURE ASPECTS :

### 2.3.1 WAS IT A CASE OF SUICIDE ?

- a) FACTS ON RECORD :  
i) CREW COMPOSITION :

Though the Super King Air aircraft is certified to be flown by a single pilot crew, the practice followed in B.S.F. was that along with a pilot, the co-pilot's seat was occupied by either another pilot, engineer, radio officer or a technician. Capt. Jha and Shri Nair, Radio Operator were to accompany Capt. Dhaliwal for his local flying sortie on the fateful day. As Shri Nair was closing the door after coming inside the aircraft Capt. Dhaliwal told him that he need not come on board as he had already done the sortie to Leh and back the same morning. The committee is of the opinion that there is nothing abnormal in Shri Nair getting down as there being two pilots on board, there was no necessity for a third

member. After doing two circuits the aircraft was cleared to go back to BSF hanger by the ATC when Capt. Dhaliwal decided to do one more circuit. After having commenced the take off roll for the third circuit Capt. Dhaliwal reported to ATC that there will be a delay of two to three minutes as there was something wrong with the door. Capt. Jha, the co-pilot, went back and checked the door from inside and found nothing wrong. The aircraft taxied out but Capt. Dhaliwal was not satisfied with the door. He again returned to the taxi holding point and asked Capt. Jha to recheck the door from outside. Capt. Jha got down and locked the door from outside and after confirmation from Capt. Dhaliwal through sign signal, was asked to come inside. This exercise was repeated once again; but this time Capt. Dhaliwal told Capt. Jha to stay out only and decided to go for the third circuit alone, which was quite strange to say the least. The fateful third circuit had Capt. Dhaliwal as the sole occupant of the aircraft. Though there is more probability of the pilot without the head set to hear any sound from the rear of the cabin, it could not be ascertained as to what noise Capt. Dhaliwal could have heard. Capt. Jha never found any thing wrong with the door and even the door warning light which illuminates whenever the door is open remained off.

It was well within the rules for Capt. Dhaliwal to fly single pilot in the aircraft, though as a practice it has never been done before. The acute uncertainty of the pilot leads one to conclude that there was some confusion creeping into his mind. The noise he heard could have been a figment of his imagination. His leaving Capt. Jha on the taxi track and not in the dispersal and proceeding on a solo circuit is in violation of laid down norms of flying discipline and leads one to think that at this stage his mental frame had been affected severely enough to lead him to undertake a chain of unwarranted actions.

R/T TRANSMISSION :

HS-748 aircraft call sign VVF and Capt. Dhaliwal's aircraft were cleared to line up and wait on the two different runways, R/W 27 and R/W 28 respectively. Later VVF was cleared for take off by the air traffic control. As VVF started rolling for take off Capt. Dhaliwal also started rolling

and did not respond to the Air Traffic Control's instructions not to do so. The pilot of VVF saw Capt. Dhaliwal's aircraft getting airborne and he abandoned his take off avoiding a possible dangerous situation after getting airborne. After repeated calls by the Air Traffic Controller, Capt. Dhaliwal just replied once "Go ahead Sir". On the time scale Capt. Dhaliwal replied the air traffic controller approximately 40 seconds before the crash. It can be reasonably assumed that R/T set of Capt. Dhaliwal's aircraft was working normal till the aircraft crashed.

Capt. Dhaliwal was not a disciplined flier, having a casual attitude to cockpit discipline as stated by Witness No. 21 Capt. Jha and Witness No. 22 Mr. Nair. Capt. Dhaliwal took off without clearance from the Control Tower. There is a possibility that Capt. Dhaliwal mistook the clearance for VVF as for him and started rolling, but the fact that subsequent calls of the ATC instructing him to cancel his take-off were not adhered to by him, shows that he intentionally violated the ATC instructions.

The Committee is of the opinion that if he had mistook the take-off clearance given to VVF by the ATC as for him, his R/T receiver was working satisfactorily and as such he must have also heard the ATC's further instructions asking him to cancel his take-off after he had commenced his take-off run. The possibility of deliberate take-off violating the instructions of ATC cannot be ruled out.

#### COCKPIT DISCIPLINE :

Capt. Dhaliwal was not a very disciplined pilot having a casual attitude towards cockpit discipline as stated by witness No. 21 Capt. Jha and witness No. 22 Mr. Nair. He used to fly in civil clothes and was reluctant to wear his seat harness during flying. This was evident by the fact that his body was found clear of the pilot's seat and the seat harness was found in the locked position.

#### AIRCRAFT CONFIGURATION :

While carrying out circuits and landings, undercarriage and flaps are retracted after take-off at a safe height and speed but when executing

short circuits, it is a normal practice that undercarriage is left down and flaps left at 40 percent after getting airborne during the circuit.

The detailed examination of the wreckage revealed the inboard and outboard flaps actuator position measured to flap selection of 40 percent and both the main gears and the nose gear were found stuck in the down and locked position.

#### ENGINE POWER :

As per witness No. 8 Sq. Ldr. Rajiv Gupta, pilot of VVF, who saw Capt. Dhaliwal's aircraft losing height on down wind, the props of Capt. Dhaliwal's aircraft seemed turning indicating that engines were not shut down and propellers feathered.

This has been substantiated by the engine report which says that the starboard engine had a moderate power and the port engine was running at moderate to high power at the time of the accident. This was further substantiated by the fact that the starboard torque meter was found stuck at 1800 ft lbs. which means very high power setting.

#### AIRCRAFT ATTITUDE :

As per witness No. 8 Sq. Ldr. Rajiv Gupta, who saw Capt's Dhaliwal's aircraft going down on down wind, the attitude of the aircraft did not look very steep though it was steeper than a normal approach. As per witness No. 21 Capt. Jha, the dive angle appeared to be that of an approach without power. As per these eyewitnesses, both pilots, the attitude was not very steep when the aircraft crashed though the manner in which the tall grass was cut at the point of impact indicates a steep angle of about 22 degrees. The needle of one of the air speed indicators was found stuck at 210 knots. This indicates that the aircraft has impacted the ground at high speed in a nose down attitude with moderate to high power causing disintegration on impact.

After going through the facts on record as mentioned above, the Committee is of the opinion that the possibility of a deliberate attempt to take one's life cannot be ruled out in the case of Capt. Dhaliwal.

- b) The Committee carried out further investigations to find out if any reason could be found which could have compelled Capt. Dhaliwal to commit suicide. The following aspects were looked into :

FAMILY BACKGROUND :

Late Capt. Dhaliwal's family consisted beside him, his wife one son who is studying in college and one daughter who is a Doctor. The family is financially sound and Mrs. Dhaliwal is running a school at Gurgaon in their private residential house (the property is worth several lakhs of Rupees). The impression that the Committee members got after meeting the family was that it was a well knit family where every one cared for each other. This was substantiated by some witnesses also who were closely associated with Capt. Dhaliwal.

A number of persons with whom Capt. Dhaliwal came in close contact on the fateful day when cross-examined said that on the day of accident they did not observe any change in his general behaviour and appearance.

CAREER IN B.S.F. :

Capt. Dhaliwal was inducted in the BSF on deputation from the Air Force on 7.2.72 and was given the acting rank of I.G. on 21.6.88. He was confirmed in the rank of Director (Air) w.e.f. 8.11.89. He was decorated with Police medal for Meritorious Service in 1979 and President's Police Medal in 1988. He was the founder member of the BSF Air Wing. His promotions and awards suggest that his career was progressing well in the B.S.F.

DEPARTMENTAL INQUIRY :

A paper cutting was made available to the Committee (Exhibit No.... Evidence Folder) in which it was stated that there was some secret inquiry ordered against Capt. Dhaliwal by 'G' branch of BSF and that the school premises being run by his wife were raided. On inquiring from the D.G., B.S.F. regarding any departmental inquiry against Capt. Dhaliwal, the Committee was told that no such inquiry was ordered or

held against Capt. Dhaliwal during the last 6 months preceding his death. To confirm any truth in the paper statement one of the committee members visited Gurgaon Police Station to check if the school premises run by Capt. Dhaliwal's wife was ever raided. It was confirmed that no such raids was ever conducted at the school premises.

DIFFERENCES WITH THE D.G. :

Witness No. 21 Capt. Jha says that ever since Shri Anantachari took over as D.G., B.S.F. Capt. Dhaliwal's relations with him were not very cordial. He said that earlier whenever the previous D.G. went on a tour, Capt. Dhaliwal used to fly the aircraft for him. But, he never flew Shri Anantachari. He further stated that on many occasions it was observed that the present D.G. did not attach the same importance to Capt. Dhaliwal as was accorded to him by previous DGs. Witness No...Shri Beri, Asstt. Director (Air) Operations, B.S.F. said that after Shri T. Anantachari took over as D.G., B.S.F., he started exercising full control over the Air Wing. This was naturally not liked by Capt. Dhaliwal but with the passage of time late Capt. Dhaliwal reconciled to the changed circumstances.

EXECUTION OF WILL :

Mrs. Dhaliwal in her statement says, "I am not aware of any will executed. There is no will in the house. Even in office I was told he had not left any nomination. My children had to sign a bond stating that the entire gratuity be given to me. I am aware of only his PLI having my name as nominee. On scrutiny from the personal files of Late Capt. Dhaliwal it was ascertained that he had not made any nomination for his provident fund and his gratuity.

GENERAL BEHAVIOUR :

Capt. Dhaliwal was a very religious person. He was very strict in his dealings with his subordinates. Of late he had calmed down considerably. All the witnesses who had come in contact with him on the fateful day of the crash did not find any difference in his behaviour from normal. Wg. Cdr. Beri who is looking after the operations in the BSF AIR WING met Capt. Dhaliwal just before he entered the aircraft

to ask him if he would like to do the Home Minister's flight the next day. Capt. Dhaliwal told him that he would like to fly the Home Minister the next day as he had not flown with him for a long time.

It is evident from this that Capt. Dhaliwal's behaviour on the day of the crash was normal and he did not give any indication that he was perturbed on anything.

#### FLYING SKILL :

Capt. Dhaliwal was an examiner pilot on the Super King Air and the HS-748 of the B.S.F. He was a very experienced pilot having more than 13000 hrs. to his credit. He last flew this type aircraft on 5th Aug., 92 for 2 hrs. 45 Mts.

Capt. Jha who accompanied him for the previous two circuits and landing, apart from noticing him reduce the power abruptly on circuit did not notice anything abnormal in his handling of the aircraft.

It is evident that the aircraft could not have crashed due to Capt. Dhaliwal's inefficiency in flying skill.

Although the probability of Capt. Dhaliwal committing suicide cannot be ruled out, the Committee could not arrive at any convincing reason which could have compelled Capt. Dhaliwal to take his life.

#### 2.3.2 WAS IT A CASE OF PILOT'S INCAPACITATION ?

The aspect of incapacitation was looked into at length by the Committee. The following aspects were covered :

#### MEDICAL HISTORY :

Capt. Dhaliwal used to undergo medical tests twice a year at the Central Medical Establishment of the Air Force for his license renewal. The last medical was done in April, 92 and he was declared fully fit for flying duties.

During cross examination witness No. 41 Mrs. Manjit Dhaliwal, said "He had a very sensitive stomach. He had stomach trouble first time in 1972. He ever



since started taking light food only. Every time he went outstation he would invariably return with stomach trouble."

It is evident that though Capt. Dhaliwal had no medical history, he had been suffering from stomach ailment.

HEART AILMENT :

Witness No. 3 Dr.Choubey, in his post mortem report initially said that it could be ascertained that the death of Capt. Dhaliwal was not caused by heart attack. On further cross examination he said "By carrying out post mortem one can detect coronary disease. There are 10% of cases where cause of death cannot be ascertained ever after carrying out detailed post mortem examination. It is not possible to detect the cause of heart failure due to cardiac arrhythmia, low blood pressure and low blood sugar by carrying out post mortem."

This implies that heart failure due to cardiac arrhythmia, low blood pressure or low blood sugar cannot be ruled out.

SELF MEDICATION :

Capt. Dhaliwal though medically fit on record was suffering from stomach ailment since 1972. Witness No. 41 Mrs. Manjit Dhaliwal wife of Capt. Dhaliwal said "He used to regularly take ayurvedic medicines such as Hajmola churn to overcome this problem. He had even stopped taking alcohol for the past 4 to 5 years. At home he used to prefer soup, corn flakes, honey, chutney, papaya, jams and daliya. He never went to a Doctor with his ailment." When asked about Capt. Dhaliwal taking Mentat tablets, she replied that she was not aware that he took mentat tablets at all, though she said that he used to take new medicines on recommendation of known people who had tried the medicines themselves to overcome his stomach problems. New medicines such as Zymnet, Kayam Churn and Sualin in tablets were found on his person on a few occasions.

It is evident that Capt. Dhaliwal was suffering from stomach disorder. He never reported the matter to his doctors and to overcome his disorder used to rely on ayurvedic medicines prescribed by his friends.

#### MENTAT TABLETS :

A unsealed packet of mentat tablets was recovered from the pocket of Capt. Dhaliwal after the crash. Witness No. 5 Dr. Agnihotri in his statement said that if mentat tablets are taken in excess on an empty stomach it can cause a drop in blood pressure and induce drowsiness and sleep. Its manifestation can be seen after about 3 hour. There exists a possibility that Capt. Dhaliwal who according to his cook had taken only porridge (daliya) in the morning and post mortem examination showed him empty stomach took these mentat tablets before he went to the airport. As per witness No. 7 Dr. Panda gastric disorders can also cause drop in blood pressure and mental black outs, there by seriously affecting the decision making capability of the pilot. If this black out is prolonged the pilot can loose consciousness as well. The committee after seeing the circumstantial evidence feels that if Capt. Dhaliwal had taken Mentat tablets before the flight, the possibility of his becoming drowsy and subsequently blacking out cannot be ruled out.

#### ALERTNESS IN THE COCKPIT :

When witness No. 3 Dr. Choubey was specifically asked whether it was medically possible to determine if the pilot was alert and in senses at the time of crash, his answer was that it was not medically possible to comment on this aspect. Witness No. 1 Wg. Cdr. Bhalla ADG medical services Civil Aviation when put this specific question, said that whether the pilot had control over senses or not could not be ascertained medically.

After deliberating on the circumstantial evidence available and the statements of the witnesses and in the absence of a CVR, FDR or an eye witness the committee is of the opinions that incapacitation of the pilot under the circumstances cannot be ruled out.

Summing up the above paras 2.3.1 & 2.3.2, it can be said that the probability of a deliberate attempt to crash the aircraft on the part of late Capt. Dhaliwal cannot be ruled out. But in the absence of any justifiable reason which could have compelled late Capt. Dhaliwal to act in such a manner and take the extreme step, the probability of his incapacitation during the last circuit can also not be ruled out.

## 2.4 POST CRASH ACTIONS :

### 2.4.1 Photography of Dead Body at Crash Site :

The dead body of late Capt. Dhaliwal was removed from the site without photography although it is laid down in the Air Safety Circular No. 3 of 1984 of DGCA that the Police Authorities shall take the photographs prior to the dead body removal. Body was removed by IAAI Fire Services without taking the photographs. Fire Service staff was also not aware of this requirement. Photographs of the body were only taken after the body was removed from the site.

### 2.4.2 Post Mortem and Preservation of Viscera :

The post mortem of the crew bodies have to be carried out as per the guidelines laid down in the Air safety Circular No. 3 of 1984 of DGCA. In this case, doctor Wg. Cdr. Bhalla, an aviation medicine specialist of Air Force was requested by the DGCA to associate with the post mortem. Though he was not given the Air Safety Circular 3 of 1984, he being aviation medicine expert, was fully aware of the requirements of the detailed examination in case of air crashes. Viscera was preserved as per the guidance of Dr. Bhalla. DGCA deputed one of their officer's to take heart sample to the IAM, Bangalore to check the possibility of a heart attack. Rest of the viscera was taken in possession by the Mahipalpur Police Station for sending the same to Central Forensic Scientific Laboratory (CFSL) as per the directions of Forensic expert of Safdarjung Hospital. It takes about a week to send the viscera to CFSL from the Police Station in the normal course. The Police Station and the CFSL maintain viscera in the ambient conditions only due to non-availability of refrigeration facilities. Most of the viscera is kept in preservatives except for the blood. In the instant case, the blood sample was not having preservative and neither is it recommended and hence it got putrefied with the passage of time in the ambient temperature conditions. Except for blood, the other viscera samples could be properly analysed due to preservatives being used.

3. CONCLUSIONS :

3.1 FINDINGS :

1. Super King Air Aircraft B-200 C VT-EOA was having a valid Certificate of Airworthiness and was being maintained as per the DGCA approved schedules.
2. This aircraft was a comparatively new aircraft (purchased in 1987) and had done 1347 hours since new. Both the engines had also done the same hours.
3. No defect was reported on the aircraft after April,92 and on the date of accident the morning flight Delhi-Leh-Delhi was operated without any reported snag. Also the two circuits before the accident were completed without any snag.
4. Aircraft weight and centre of gravity were within limits and there was sufficient fuel to carry out the circuits.
5. Weather was good and not contributory to the accident.
6. Late Capt. T.S. Dhaliwal was having current ALTP licence No.773 and was holding examiner approval on the Super King Air and Avro aircraft. He had total flying experience of 13519 hrs. out of which he had around 1100 hrs. on Super King Aircraft.
7. On 27.8.92 Late Capt. Dhaliwal filed the flight plan for carrying out local flying on this aircraft after its return from Leh.
8. This aircraft arrived from Leh at 1100 hrs. and at 1133 Late Capt. Dhaliwal with Capt. Jha as co-pilot taxied out to runway 28 for carrying out circuits and landings. It took off at 1136 hrs. and landed back at 1140 hrs. After this he did touch and go for carrying out the second circuit which was a short circuit.
9. After the second circuit, initially, late Capt. Dhaliwal decided to do a full stop landing but later on changed the idea and requested Air Traffic Control for third circuit which was cleared. After the aircraft lined up Late Capt. Dhaliwal informed tower that he was vacating runway due to some problem with the door. On 'E' taxi track Capt. Jha checked the door and was disembarked. Later

on Late Capt. Dhaliwal lined up on runway 28 at 1157 hrs. and took off without clearance from the tower.

10. Aircraft was repeatedly called by the tower and the last transmission was 'Go ahead Sir' by late Capt. Dhaliwal approximately 40 seconds before the aircraft crashed. The aircraft was seen going down after it turned on down wind. The aircraft hit the ground in pitch down and wing level attitude and suffered severe impact leading to disintegration of the aircraft.
11. The crushed aircraft main wreckage after initial impact remained in air for about 350 ft. before falling into the ditch in inverted condition. Wreckage was scattered all along the path of main wreckage travel. The pilot was killed during the crash.
12. Fire started immediately after the impact due to disintegration of aircraft with fuel catching fire. The fire was extinguished by the NSG Commandos whose unit is located nearby the accident site.
13. Wreckage analysis revealed that aircraft made a high speed impact with the ground in a steep angle. Undercarriage was down with the flaps in take off position of 40 percent.
14. Flying controls, engine and propellers examination revealed no pre crash failure. Any aircraft system failure contributing to accident is ruled out.
15. Wreckage examination by explosive experts, perusal of intelligence reports connected with activities of various terrorist/extremist groups active in the country and also examination of the conduct of personnel connected with BSF Air Wing rule out the possibility of sabotage.
16. Post mortem report of Late Capt. Dhaliwal has revealed that his death was as a result of injuries inflicted during crash.
17. Pathological examination of blood, heart, brain, muscle, kidney and the mentat Ayurvedic tablet has not revealed any positive symptom for cardiac arrest and effect of narcotics.

#### CAUSE OF ACCIDENT :

The exact cause of the accident could not be confirmed, however, on the basis of the evidence on record, the probability of a deliberate attempt to crash the aircraft on the part of late Capt. Dhaliwal cannot be ruled out. However, in the absence of any justifiable reason which could have compelled late Capt. Dhaliwal to act in such a manner and take the extreme step, the probability of his incapacitation during the last circuit can also not be ruled out.

#### RECOMMENDATIONS :

Consideration be given to ensure that twin engined aircraft are flown by two pilots irrespective whether it is being used by VIPs or not.

Air Safety Circular No.3 of 1984 should be widely circulated specially to all major hospitals and all Airport Police Stations and its compliance be ensured during air crashes.

DGCA may take steps to ensure that complete viscera of dead air crew be sent to IAM, Bangalore for analysis after an air crash.

Consideration be given for installation of CVR with under water locator on all the twin engine aircraft irrespective of their all-up-weight.

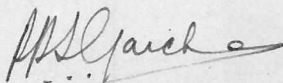
DGCA should lay down the requirements of technical/performance refresher courses for pilots engaged in flying other than those in commercial organisations to ensure high standards in flying are maintained at all times.

DGCA may consider for laying down norms for dual training and checks in case of break in flying of ALTP holders other than those employed in commercial organisations as well.

All the medical officers employed for Air crew/Airport duties should undergo basic courses in Aviation medicine at Institute of Aviation Medicine IAF Bangalore.

Instructions may be issued to operators and airport authorities that before removal of dead bodies of air crash victims from the site, photographs should invariably be taken.

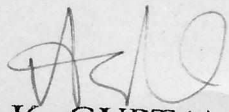
9. Crash siren/Alarm facility should also be made available at the Airport Medical Inspection rooms.
10. Airport authorities should ensure that attendants of ambulances are given refresher training at regular intervals.
11. BSF should ensure that requirements of Flight duty time and Flight time limitations, as stipulated in AIC 28/1992 dated 10.12.92, be complied for their pilots.
12. DGCA to consider introducing preflight medical requirements for crews engaged in flights where passengers are involved.
13. BSF may review the present strength of maintenance personnel and fill up the vacancies to ensure higher standards of maintenance all the time.
14. Police authorities be issued instructions that relevant viscera, as suggested by doctors conducting post mortem of air crew killed in air crashes, be preserved for enquiry at the hospital having refrigeration facilities.
15. BSF may re-evaluate the present security arrangements for its Air Wing at the airport.



(R.P.S. GARCHA)

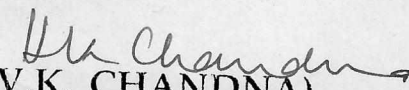
Air Commodore

CHAIRMAN, COMMITTEE OF INQUIRY



(A.K. GUPTA)

Dy. Director, IB  
MEMBER



(V.K. CHANDNA)

Director Air Safety  
MEMBER SECRETARY

Place : New Delhi

Date : 28th February, 1993

2 ✓

TAPE TRANSCRIPT OF DELHI GROUND

121.9 MHZ

| <u>TIME</u> | <u>FROM</u> | <u>TO</u> | <u>TEXT</u>  |
|-------------|-------------|-----------|--|
| 0558        | VOA         | DG        | Calling.   |
|             | DG          | VOA       | Go Ahead.  |
|             | VOA         | DG        | Req. start-up for local flying, Sir.<br>Parked in front of BSF Hangar,<br>Would like to do 2 or 3 circuits<br>landings, Sir. |
| 0559        | DG          | VOA       | Roger, Alpha, report total no. of<br>persons on board.   |
|             | VOA         | DG        | 02 Sir.  |
|             | DG          | VOA       | Start-up approved  |
|             | VOA         | DG        | (Oscar)  |
| 0601        | VOA         | DG        | Req. taxi clearance, parking in<br>front of BSF hangar.  |
|             | DG          | VOA       | Taxi via Echo, holding point<br>(runway) 28.   |
|             | VOA         | DG        | Roger, Sir, Echo, (R/W) 28<br>May we change over to 118.1  |
| 0602        | DG          | VOA       | Delhi Tower, 118.1   |
|             | VOA         | DG        | Roger. Sir, switching over to<br>118.1   |
|             | VOA         | DG        |  |

*Burgh*

*(L.H. Case)*



ATC TAPE TRANSCRIPT PERTAINING TO THE ACCIDENT TO SUPER  
KING AIR B-200C AIRCRAFT VT-EOA ON 27.8.92(Tower)

| <u>TIME</u> | <u>FROM</u> | <u>TO</u>   | <u>TEXT</u>  |
|-------------|-------------|-------------|--|
| 0602        | VOA         | Delhi Tower | DELHI TWR VOA  |
|             | DD/TWR      | VOA         | VOA DELHI TWR GO AHEAD   |
|             | VOA         | DD/TWR      | ON "E" SIR.  |
|             | DD/TWR      | VOA         | REPORT HOLDING SHORT ON "E"                                    |
|             | VOA         | DD/TWR      | ROGER  |
|             | VOA         | DD/TWR      | WILL LIKE TO DO CIRCUIT AND LANDING IF TRAFFIC PERMITTING SIR. |
|             | DD/TWR      | VOA         | ROGER  |
|             | VOA         | TWR         | CALLING  |
|             | 0603        | DD/TWR      | VOA  |
| 0605        | VOA         | DD/TWR      | VOA LINING UP 28 SIR.  |
|             | DD/TWR      | VOA         | ROGER, LINE UP AND HOLD  |
|             | VOA         | DD/TWR      | WE ARE CLEAR TO LINE UP AND HOLD.                              |
| 0606        | VOA         | DD/TWR      | VOA READY FOR TAKE OFF   |
|             | DD/TWR      | VOA         | HOLD POSITION  |
|             | VOA         | DD/TWR      | ROGER  |
|             | DD/TWR      | VOA         | VOA CLEAR FOR TAKE OFF WIND 260/03 kts.                        |
|             | VOA         | DD/TWR      | VOA ROLLING SIR.   |
| 0607        | VOA         | DD/TWR      | VOA 2500' TURNING PORT, WILL REPORT DOWN WIND SIR.             |
|             | DD/TWR      | VOA         | REPORT DOWN WIND ACKNOWLEDGED.                                 |
| 0608        | VOA         | DD/TWR      | VOA REPORTING DOWN WIND  |
|             | DD/TWR      | VOA         | ROGER, REPORT FINAL FOR RWY 28                                 |
|             | VOA         | DD/TWR      | VOA  |
| 0609        | VOA         | DD/TWR      | VOA TURNING BASE LEG.  |
|             | DD/TWR      | VOA         | REPORT FINAL   |

*(Handwritten Signature)*  
 (G. N. LAKH) *(Handwritten Signature)*  
 (GURMUKH SINGH)

| <u>TIME</u> | <u>FROM</u> | <u>TO</u> | <u>TEXT</u>   |
|-------------|-------------|-----------|---|
| 0610        | VOA         | DD/TWR    | VOA TURNING FINALS, THREE GREENS.                               |
|             | DD/TWR      | VOR       | VOA CLEAR TO LAND WIND 310/08 kts.                              |
|             | VOA         | DD/TWR    | VOA   |
|             | DD/TWR      | VOA       | VOA CONFIRM MAKING FULL STOP LANDING OR TOUCH AND GO.           |
|             | VOA         | DD/TWR    | TOUCH AND GO  |
|             | DD/TWR      | VOA       | ROGER CLEAR FOR TOUCH AND GO WIND 310 CORRECTION 280/08 KTS     |
| 0611        | VOA         | DD/TWR    | VOA ROLLING   |
|             | VOA         | DD/TWR    | ACKNOWLEDGED.   |
|             | VOA         | DD/TWR    | WOULD LIKE TO DO A SHORT CIRCUIT                                |
| 0612        | DD/TWR      | VOA       | BAD WEATHER CIRCUIT.<br>CLEARED FOR SHORT CIRCUIT VOA.          |
|             | VOA         | DD/TWR    | ROGER CLEAR FOR SHORT CIRCUIT.                                  |
|             | DD/TWR      | VOA       | REPORT DOWN WIND RWY 28   |
|             | VOA         | DD/TWR    | (ROGER) VOA   |
|             | VOA         | DD/TWR    | VOA REPORTING DOWN WIND   |
|             | DD/TWR      | VOA       | REPORT FINAL  |
| 0613        | VOA         | DD/TWR    | VOA TURNING FINAL<br>THREE GREEN SIR.                           |
|             | DD/TWR      | VOA       | ROGER CLEAR FOR TOUCH AND GO<br>WIND <del>270</del> /03 KTS     |
|             | VOA         | DD/TWR    | VOA WILL DO FULL STOP SIR.                                      |
| 0614        | DD/TWR      | VOA       | ROGER CLEAR FOR FULL STOP LANDING<br>WIND 240/04 KTS            |
|             | VOA         | DD/TWR    | ROGER   |
|             | VOA         | DD/TWR    | VOA RETURNING BACK TO BASE SIR.                                 |
| 0615        | DD/TWR      | VOA       | ROGER CLEAR FOR BACK TRACK,<br>REPORT VACATING RWY ON "B" .     |
|             | VOA         | DD/TWR    | ROGER SIR, WE WILL GO TO BSF HANGER                             |
|             | DD/TWR      | VOR       | ROGER   |
|             | VOA         | DD/TWR    | SIR WOULD LIKE TO DO ONE MORE<br>CIRCUIT IF TRAFFIC PERMITTING. |

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| <u>TIME/C.No.</u> | <u>FROM</u>                 | <u>TO</u> | <u>TEXT</u>  |
|-------------------|-----------------------------|-----------|--|
| 0615              | DD/TWR                      | VOA       | ROGER, ROGER.  |
|                   | DD/TWR                      | VOA       | ROGER LINE UP FOR RWY 27,<br>CORRECTION 28.  |
|                   | VOA                         | DD/TWR    | ROGER LINING UP 28   |
| 0616              | DD/TWR                      | VOA       | ROGER LINE UP.<br>RWY 28<br>VOA LINE UP RWY 28 AND CLEAR<br>FOR TAKE OFF WIND 260/03 KTS/                                |
|                   | VOR                         | DD/TWR    | ROGER (VOA)  |
| 0617              | DD/TWR                      | VOA       | CLEARED FOR TAKE OFF   |
|                   | VOA                         | DD/TWR    | VOA ROLLING SIR.   |
|                   | VOA                         | DD/TWR    | SIR WE ARE CLEARING RWY 28 FOR TWO<br>MINUTES.   |
|                   | DD/TWR                      | VOA       | ROGER, .   |
| 0618              | <u>272</u> DD/TWR           | VOA       | VOA HOW MUCH DELAY   |
|                   | <u>J273</u> VOA             | DD/TWR    | 1 MINUTE   |
|                   | <u>274</u> DD/TWR           | VOA       | SAY AGAIN  |
|                   | <u>J</u><br><u>D275</u> VOA | DD/TWR    | STAND BY ONE...<br>HOW MUCH MARGIN IS THERE FOR DELAY.   |
|                   | DD/TWR                      | VOR       | WE GOT TWO DEPARTURE AND ARRIVALS<br>ALSO.   |
|                   | <u>D276</u> VOA             | DD/TWR    | ROGER  |
| 0619              | DD/TWR                      | VOA       | VOA DD/TWR<br>VOA DD/TWR   |
|                   | <u>D287</u> VOA             | DD/TWR    | GO AHEAD SIR   |
|                   | DD/TWR                      | VOA       | CONFIRM HOW MUCH IS DELAY  |
|                   | <u>D288</u> VOA             | DD/TWR    | WE ARE JUST CHECKING UP, THERE IS<br>SOMETHING WRONG WITH THE DOOR SIR.<br>IT IS JUST ABOUT TWO TO THREE<br>MINUTES SIR. |
|                   | DD/TWR                      | VOA       | ROGER, EXPEDITE  |
| 0621              | <del>VOA</del> VVR          | DD/TWR    | DD/TWR <del>VOA</del> VVR<br>DD/TWR <del>VOA</del> VVR   |
| 0621              | DD/TWR                      | VOA       | VOA LINE UP  |
|                   | DD/TWR                      | VVR       | GO AHEAD   |

*(Handwritten signatures and notes)*  
 (L. N. Carter)  
 Bugh

| <u>TIME</u> | <u>C.No.</u> | <u>FROM</u>   | <u>TO</u>     | <u>TEXT</u>  |
|-------------|--------------|---------------|---------------|--|
| 0621        |              | VOR           | DD/TWR        | AIR BORNE HINDON FOR, YOU MAINTAINING 2500' PERMISSION TO CALL 10 NM NORTH   |
|             |              | VVR<br>DD/TWR | DD/TWR<br>VOR | SAY AGAIN.<br>ROGER REPORT 10 NM INBOUND NORTH, VOR  |
|             | <u>D318</u>  | VOA           | DD/TWR        | VOA LINE UP.   |
|             |              | DD/TWR        | VOA           | VOA HOLD POSITION<br>VOA TO HOLD POSITION  |
| 0622        | <u>D319</u>  | VOA           | DD/TWR        | CONFIRM WE WILL BE DELAYED NOW   |
|             |              | DD/TWR        | VOA           | AFFIRMATIVE EXPECT DELAY 15 MINUTES  |
| 0624        |              | VVF           | DD/TWR        | CALLING<br>GOOD MORNING  |
|             |              | DD/TWR        | VVF           | STANDBY ONE, VVF LINE UP RWY 27. AND HOLD.   |
|             |              | VVF           | DD/TWR        | LINE UP RWY 27, VVF  |
|             |              | DD/TWR        | VOA           | VOA TO LINE UP RWY 28 AND HOLD.  |
|             | <u>D361</u>  | VOA           | DD/TWR        | ROGER SIR VOA CLEAR TO LINE UP AND HOLD.   |
| 0626        | <u>D371</u>  | VOA           | DD/TWR        | VOA LINING UP.   |
|             | <u>372</u>   | DD/TWR        | VOA           | ROGER LINE UP AND HOLD   |
|             | <u>375</u>   | VVF           | DD/TWR        | VVF READY FOR DEPARTURE  |
|             |              | DD/TWR        | VVF           | VVF COPY ATC, CLEARED TO CHANDIGARH,<br>CLIMB AND MAINTAIN 90, DEPARTURE SP1,<br>TAKE OFF HEADING 3500'.   |
|             |              | VVF           | DD/TWR        | (READ BACK ATC)  |
|             | <u>380</u>   | DD/TWR        | VOA           | VOA TAKE OFF -<br>- HOLD POSITION, VOA TO HOLD POSITION  |
|             | <u>D381</u>  | VOA           | DD/TWR        | ROGER  |
| 0627        |              | DD/TWR        | VVF           | VVF IS CLEARED FOR TAKE OFF WIND<br>280/02 KTS<br>280/02, rolling VVF, VOA SOME TRANS-<br>MISSION ASKING HOLD POSITION.<br>(BACK GROUND VOICE)<br>VOA TO HOLD POSITION |
| 0627        | <u>386</u>   | DD/TWR        | VOA           | VOA I SAY AGAIN CANCEL TAKE OFF.   |
|             |              | DD/TWR        | VOA           | VVF IS REJECTING TAKE OFF,<br>ABANDONING TAKE OFF SIR.   |
|             |              | VVF           | DD/TWR        | DELHI/TWR VVF IS ABORTING TAKE OFF   |
|             | <u>390</u>   | DD/TWR        | VVF           | ROGER WILL CALL UP.....TO ATC<br>(TRANSMISSION NOT CLEAR)  |

*James Co*  
*11-1-1960*

*Prugh*

*(Handwritten signature)*

| <u>TIME/c.No.</u> | <u>FROM</u>      | <u>TO</u> | <u>TEXT</u>  |
|-------------------|------------------|-----------|--|
| 0628 391          | DD/TWR           | VVF       | VVF TO HOLD POSITION   |
|                   | VVF              | DD/TWR    | REQUEST BACK TRACK 27.   |
|                   | DD/TWR           | VVF       | ROGER APPROVED.  |
|                   | DD/TWR           | VOA       | VOA DD/TWR   |
|                   | DD/TWR           | VOA       | VOA DD/TWR   |
|                   | DD/TWR           | VOA       | VOA DD/TWR   |
|                   | DD/TWR           | VOA       | VOA DD/TWR   |
|                   | DD/TWR           | VOA       | VOA DD/TWR   |
| <u>D397</u>       | VOA              | DD/TWR    | GO AHEAD SIR   |
|                   | DD/TWR           | VOA       | YOU HAVE NOT BEEN TOLD TO FOR<br>TAKE OFF, HOW COULD YOU TAKE OFF<br>WITHOUT PERMISSION. TWR HAS GIVEN<br>TAKE OFF CLEARANCE ONLY TO VVF<br>FROM RWY 27.<br>(NO REPLY)<br>VOA DD/TWR CONFIRM COPIED. |
|                   | DD/TWR           | VOA       | VOA DD/TWR<br>VOA DD/TWR   |
|                   | DD/TWR           |           | VOA SEEMS TO HAVE CRASH.   |
| 0629              | VVF              |           | DD TWR/VVR, VOA HAS CRASHED ON<br>DOWN WIND SIR.   |
|                   |                  |           | ROGER COPIED.  |
| 0630              | VVR              | DD/TWR    | VVR MAY WE SET COURSE AND WILL<br>CALL YOU 5 MILES NORTH   |
|                   | DD/TWR           | VVR       | NEGATIVE DELHI HANDLING EMER<br>GENCY AND AIRCRAFT HAS CRASHED<br>YOU GO BACK TO HINDON AIRSPACE   |
|                   | (sound of siren) |           |  |
|                   | TWR              | VVR       | VVR CONFIRM COPIED   |
|                   | VVR              | TWR       | ROGER  |
|                   | VVF/             | VVR       | DIVERTED.  |

NB:

J = Capt. Jha

D = Late Capt. T.S. Dhaliwal.

*(Handwritten signature)*  
C. M. CHAWLA

*(Handwritten signature)*  
AC  
(G. M. CHAWLA)