

**REPORT ON ACCIDENT TO
M/S AERIAL SERVICES Pvt. Ltd. SUPER KINGAIR
B-200 AIRCRAFT , VT-EIE , ON JULY 29, 2000 ,
NEAR VILLAGE JHUGGI , H.P.**

BY

A.K.CHOPRA

INSPECTOR OF ACCIDENTS

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"*" **Important Timings**

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- 0657 - Start up asked from Delhi Ground. Message from Kullu about weather given.
- 0704 - Again asked for start up as emergency evacuation is there.
- 0708 - Taxying
- 0712 - Airborne
- 0725 - First contact with Chandigarh ATC
- 0728 - 36 miles from SP Radar F 170
- 0730 - 28 miles from SP Radar, changed over by Delhi Radar.
- 0731 - Asked 5 - 7 miles deviation left of track from Chandigarh ATC
- 0736 - Asked descent from Chandigarh ATC to F 105
- 0738 - Overhead SP F 170
- 0739 - Set course directly to Kullu
- 0741 - Reported F 105 requested descent to F 90 - 22 miles East abeam Chandigarh
- 0750 - Reported F 90
- 0755 - HF contact with Kullu passed ETA 0808 - position 42 miles descending F 90
- 0758 - Lost Chandigarh VOR - 35 miles to Kullu - requested change over from Chandigarh ATC.
- 0802 - Approx. time of crash

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INVESTIGATION REPORT OF ACCIDENT
TO SUPER KING AIR B-200 AIRCRAFT VT-EIE
NEAR VILLAGE JHUGGI
ON 29.07.2000

1. AIRCRAFT

Type : Beech Super King Air
Model : B 200 C
Nationality : Indian
Registration : VT-EIE

2. OWNER / OPERATOR : M/S Aerial Services Pvt. Ltd.,
Bombay

3. DATE & TIME OF ACCIDENT : 29.07.2000 AT 0802 Z
(Approx.)

4. SITE OF ACCIDENT : Near Village Jhuggi, Distt. Mandi
(H.P.) at GPS coordinates of

Lat 31 ° 27' 43" N
Long 077 ° 05' 03" E

0. SUMMARY

Super King Air B 200 aircraft VT-EIE took off from Delhi for Kullu with five persons on board for evacuation of an injured person. Enroute Chandigarh - Kullu, aircraft descended below minimum sector altitude in IMC. Aircraft hit a hill and crashed killing all on board.

NOTE: All timings in this report are in GMT unless stated otherwise.

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0.0. PREVIOUS HISTORY

Delhi - Kullu air route has proved to be disastrous for the Civil Aviation for the last 6-7 years. The present accident is the third major accident on this route. Earlier Punjab Government Super king air aircraft VT-EUJ met with an accident on 9th July, 1994. The accident wiped out almost the entire family of Shri Surendra Nath, the then Governor of Punjab & Himachal Pradesh. Two years later Archana Airways L-410 aircraft VT-ETC met with an accident on 11th July, 1996, killing 5 passengers and three crew members. In the present accident all the five person on board lost their life.

These accidents assume the importance for the fact that all the three accidents took place at almost the same place under the similar circumstances and in identical weather conditions. All the three accidents can be technically termed as CFIT. The similarity between these accidents is too glaring to be ignored, all the aircraft hit the hill tops, which were covered with clouds. This gives a scary feeling that history is repeating at a very short interval. Both the earlier accidents were investigated by the "Court of Inquiry" and the reports have been submitted to the Government. A lot of efforts were put by "the Court" and number of recommendations were made. In spite of the same the third accident has taken place in a short span. This raises serious issues and brings out that the efforts put in is probably not adequate.

During the investigation of this accident, the work done by the earlier "the Courts" were given due consideration. Efforts have been made to go to the root cause and to look into whether our follow up action was adequate or some hidden cause was left unattended earlier. It was my view from the beginning that merely stating the cause of

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accident as "human error" will not suffice. Therefore, efforts were directed to probe further including the adequacy of regulations, the existing systems and facilities and the implementation of earlier recommendations . Painsstaking investigation carried out in the present case has revealed a wide range of areas which need to be addressed if this route is to be made safe and nexus of repeated accidents is to be broken. The investigation report is, therefore, written keeping this objective in mind.

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1. FACTUAL INFORMATION

1.1 HISTORY OF FLIGHT

Super King Air B 200 aircraft VT-EIE owned and operated by M/s Aerial Services Pvt. Ltd was to undertake a flight from Delhi to Kullu and back. Capt. Ghuman was in command with Capt. Selvam as Co-pilot. There were three passengers on board.

- 1.1.2 Flight plan was submitted to Delhi ATC wherein Flight was to be conducted under Instrument Flying Rules(IFR) on route W 35. Aircraft was to fly at F 170 upto Sarsawa(SP) and thereafter at F 160 to Kullu. Cruising speed of aircraft was given as 240 knots. Duration of flight was one hour whereas endurance of aircraft was five hours. Chandigarh was designated alternate airport. Purpose of flight was shown as Ambulance flight. Take-off timing was 0330 Z, which was revised number of times. Capt. Amarjeet Singh was to be the pilot - in - command.
- 1.1.3 However aircraft took off from Delhi at 0712 Z with three passengers and two crew on board. Aircraft climbed to F 170 and when 28 miles from SP Radar at 0738 Z, Delhi Radar control was terminated. Aircraft was permitted to deviate 5 -7 miles left of track by Chandigarh ATC.
- 1.1.4 At 0736 Z pilot asked for descent and set course directly to Kullu from ONOGI, with the permission of Chandigarh ATC.
- 1.1.5 At 0750 Z aircraft descended to F 90. Aircraft contacted Kullu HF and gave its position and ETA as 0808 Z.
- 1.1.6 Frequency change was approved by Chandigarh ATC at 0758 Z.
- 1.1.7 When aircraft did not contact Kullu, a number of RT calls were given without any response from aircraft.
- 1.1.8 Aircraft subsequently was found to have crashed in hills near village Jhuggi, Distt. Mandi (HP) about 21 nm from Kullu. Accident site is located at GPS co-ordinates of Lat 31 ° 27' 43" N, Long. 077 ° 05' 03" E at an altitude of 8800 ft. (Approx).
- 1.1.9 Accident occurred in day light in cloudy weather. Aircraft was destroyed due impact. There was no fire. All on board were killed in the accident.

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1.2 INJURIES TO PERSONS

INJURY	CREW	PASSENGERS	OTHERS
Fatal	2	3	-
Serious	-	-	-
Minor	-	-	-

1.3 DAMAGE TO AIRCRAFT

Aircraft was destroyed due impact.

1.4 OTHER DAMAGES

There was no third-party damage other than two buffaloes those were reported missing after the accident.

1.5 PERSONNEL INFORMATION

1.5.1 PILOT

Name : Capt. J.S. Ghumman
Date of Birth : 01.10.1945
Licence No. : ALTP 1615
Validity : 16.08.2000
Endorsement : As PIC As Co-Pilot
Pushpak DO - 228
HS - 748
FRTO : No. 3857 Valid upto 17.08.2000

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Flying Experience as on
the date of accident

: 8340:05 out of which 776:50 hrs.
were as PIC on type

Flying done before the accident in last:-

- 30 days : 22:05 hrs.

- 7 days : 14:10 hrs.

- 24 hours : 2:30 hrs.

Last IR Check done on : 20.01.2000

Last Medical done on : 24.05.2000

1.5.1.1 Capt. Ghumman was advised to wear corrective bifocal look-over glasses.

1.5.1.2 Operator has no record of flying done/checks/validity of licences etc. of pilots. Capt. Ghumman's personal log book was recovered but handed over to his relatives by police; thus flying details were not available. So was the case with Journey Log Book. Thus all flying hours are computed from the available documents; these hours are only approximate and may not be accurate.

1.5.1.3 Capt. Ghumman's ALTP was suspended from 19.07.98 to 31.8.98 for flying without valid medical.

1.5.1.4 As per the documents Capt. Ghumman did his IR Check on B-200 aircraft on 17.12.98. As per the regulations same should have been repeated before 16.12.99. There is no documentary evidence of the same. IR check report is not available nor the same was submitted to DGCA. However, Operator has informed that IR Check was carried out by Capt. Tyagi on 20.01.2000. As an evidence, entries in journey log book of aircraft VT-EID were submitted. Even if the same is accepted Capt. Ghumman had flown from 17.12.1999 to 20.01.2000 without valid IR. During this period he has flown for 25 hours (Approx.) under IFR in violation of regulations.

1.5.2

CO - PILOT

Name : Capt. A. Selvam

Date of Birth : 20.12.1975

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Licence No. : CPL No. 3331
Validity : 02.06.2001
Endorsement : As PIC
: C-152A , Super King B 200
FRTO : No. 5998 valid upto 02.06.2001
Flying experience upto 30.12.1999. : 526:55 Hrs.

Flying done before the accident in last:

- 30 days : 5:30 Hrs.
- 7 days : 5:30 Hrs.
- 24 hours : NIL

Last IR Check done on : 03.07.99 on B-200 aircraft

Last medical done on : 03.06.1999

1.5.2.1 Operator has not maintained records of flying as well as of licence. Capt. Selvam's flying log book is held-up with police. Thus, his total flying hours and flying done on B-200 aircraft is not available. Remaining hours have been worked out from available documents which are only approximate and are not accurate.

1.5.2.2 IR Check of Capt. Selvam was valid only upto 02.07.2000. He has been flying under IFR since then in violation of regulations.

1.6 AIRCRAFT INFORMATION

Manufacturers : Beech Aircraft Corporation,
Wichita, USA
Type : Super King Air B 200 C
Constructor's Sl.No. : BL - 63

31/07/1999

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Year of Manufacture : 1983

Certificate of Airworthiness (C of A) : No. 1768 issued on 29.12.83
Valid upto 16.03.2001
Category - Normal
Sub-Division - Passenger

Certificate of Registration (C of R) : No. 2238/2, Issued on
20.02.95 in Cat. "A"

Owner : M/s. Aerial Services Pvt. Ltd.,
Bombay

Minimum Crew required : One

Maximum authorised AUW : 5669:90 Kg.

Total hours/landings done : 6243:35 Hrs.) Since new upto
5646 Landings) 27.07.2000

105:35 hrs.) Since C of A upto
103 Landings) 27.07.2000

Last Major Inspection : 100 Hrs. on 06.06.2000 at
6206:30 hrs. since new

Last Flight Release Issued : On 06.07.2000 valid upto 2400 hrs.
05.08.2000 or 50 flying hours

Radio Check Valid upto 03.08.2000

Last Minor Inspection : Daily Inspection on 29.07.2000

1.6.1 ENGINE

Manufacturers : Pratt & Whitney Aircraft
Canada

Type : PT 6A - 42

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1.6.1.1 R.H. ENGINE

Serial Number : PCE 94260
Hours done : 3275:45 Hrs. since new as on
29.07.2000
461:35 hrs. since overhaul
Date of Last Overhaul : 13.08.2000
Last Major Inspection : 100 hrs. on 06.06.2000 at
424:30 hrs. since overhaul

Drop in Torque and fuel flow was reported on 14.1.98 at engine hour 2813:20 since new. Defect could not be rectified; therefore, engine was removed prematurely for overhaul.

1.6.1.2 L.H. ENGINE

Serial Number : PCE 93540
Hours Done : 5831:05 hrs. since new
as on 29.07.2000
3030:55 Hrs. since overhaul
Date of Last Overhaul : 28.04.1989
Last Major Inspection : 100 Hrs. on 06.06.2000 at
2993:50 hrs. since overhaul

Engine was under life development program, overhaul life was increased from 3000 hrs. to 3200 hrs. with inspection at every 50 hrs.. Engine was subjected to Hot Section Inspection on 06.06.2000 at 2993:50 engine hours.

1.6.2 PROPELLER

Manufacturers : Hartzell Propellers Inc.
Ohio, USA
Type : HC - D4N - 3A

3124-21951

1.6.2.1 L.H. PROPELLER

Serial Number : FY 1322
Hours Done : 939:50 hrs. since new as
on 27.07.2000
Date of Installation : 06.12.1995
Last Major Inspection : 100 hrs. on 06.06.2000
at 902:45 hrs.

Propeller was not removed from engine for major repairs nor any damage was reported .

1.6.2.2 R.H. PROPELLER

Serial Number : FY 1323
Hours done : 939:50 Hrs since new as
on 27.07.2000
Date of Installation : 06.12.1995
Last Major Inspection : 100 hrs. on 06.06.2000
at 902:45 hrs.

Other than routine maintenance propeller was not removed from engine nor any damage was reported.

1.6.3 RADIO APPARATUS

Aircraft is installed with dual VHF and HF for communication. ADF, DME, Radio Altimeter, Transponder, Weather Radar, VHF Nav. System and GPS are the Navigation and landing aids. Besides these GPWS and ELT are installed as warning and locating aids.

Last Radio Check : 30 days inspection done on 4.7.2000
at 6219:45 aircraft hours.

Aircraft Station Licence : No. A-261/3 dated 31.12.96
Valid upto 31.12.2001
(However as per CofA renewal records ,
it was valid upto 31.12.2000)

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1.6.4 There was no major snag reported on engine or flying controls. In last six months only one snag was reported on Weather Radar, which is not realistic. It is obvious that snags were not being recorded.

Aircraft was not involved in any accident or major damage earlier.

1.7 METEOROLOGICAL INFORMATION

Accident occurred between Chandigarh and Kullu . Therefore detailed study of existing meteorological conditions was carried out . The weather conditions prevailing at various stations as per the METARs issued by the Meteorological department were as follows :

1.7.1 AT DELHI AIRPORT

Aircraft took off from Delhi at 0712 Z. Weather conditions existing at Delhi were

1.7.1.1 METAR 0700 Z

Runway	:	29	
Visibility	:	3500 mtrs.	
Winds	:	240 ° / 03 kts.	
Clouds	:	BKN 3000 ft.(900 mtrs) SCT 10,000 ft(3000 mtrs.)	
Temperature	:	32 °C	
Dew Point	:	27 ° C	
QNH	:	1003 HPA	2964 INS
QFE	:	977 HPA	2985 INS
Trend	:	NOSIG	

1.7.1.2 METAR 0730 Z

Runway	:	29	
Visibility	:	4000 mtrs.	

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Winds	:	Calm
Clouds	:	BKN 3000 ft.(900 mtrs.) SCT 10,000 ft.(3000 mtrs.)
Temperature	:	33 ° C
Dew Point	:	27 ° C
QNH	:	1003 HPA 2964 INS
QFE	:	976 HPA 2884 INS
Trend	:	NOSIG

1.7.1.3 Terminal Area Forecast was issued at 2100 Z on 28th July, 2000 which was valid till 1200 Z on 29th July, 2000 for 50 nm around Delhi airport. As per the same, the weather at around 0700 Z was expected to be:-

Visibility	:	5000 mtrs. Haze
Winds	:	120 °/10 kts.
Clouds	:	SCT 3000 ft. SCT 10000 ft.

Thunder storm and Rains were predicted with FEW CB at 3000 ft.

1.7.2 AT CHANDIGARH

As per the Airforce Meteorological office , weather conditions prevailing at Chandigarh were as follows:-

1.7.2.1 METAR 0730 Z

Visibility	:	6 km.
Winds	:	180 ° / 07 kts. (14 km per hour)
Weather	:	MOC
Clouds	:	2 SC 3000 ft. (900 mtrs.) 2 AC 10,000 ft.(3 kms.) 6 CS 20,000 ft.(6 kms.)

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Total Clouds : 7 / 8
 Temperature : 32.4 ° C
 QNH : 1004 HPA 29.67 INS 753 mb
 QFE : 968 HPA 28.59 INS 726 mb
 Trend : NOSIG

1.7.2.2 METAR 0830 Z

Visibility : 6 kms.
 Winds : 270 ° / 03 kts. (06 km per hour)
 Weather : Overcast
 Clouds : 2 SC 2500 ft. (750 mtrs.)
 1 SC 3000 ft. (900 mtrs.)
 3 AC 10,000 ft. (3000 mtrs.)
 6 SC 20,000 ft. (6000 mtrs.)
 Total Clouds : 8 / 8
 Temperature : 32.4 ° C
 QNH : 1004 HPA 29.66 INS 753 mb
 QFE : 967 HPA 28.57 INS 725 mb
 Trend : TEMPO RA / DZ

1.7.2.3 Terminal Area Forecast was issued at 2100 Z on 28th July, 2000 valid upto 1200 Z on 29th July, 2000. As per the same the weather at about 0800 Z around Chandigarh was expected to be:-

Visibility : 2500 mtrs. Haze
 Winds : 120 ° / 5 kts.
 Clouds : SCT 3000 ft.
 SCT 10,000 ft.

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Thunder storm and Rains were predicted with FEW CB at 3000 ft. and clouds BKN at 9000 ft.

1.7.3 AT KULLU

Weather conditions prevailing at Kullu Airfield as per METARs issued by the Meteorological Department were as follows:-

1.7.3.1 METAR 0800 Z

Visibility	:	6 kms.
Winds	:	140 ° / 12 kts.
Clouds	:	FEW 1500 ft. (450 mtrs.) BKN 3000 ft. (900 mtrs.) OVC 8000 ft. (2400 mtrs.)
Temperature	:	27 ° C
Dew Point	:	20 ° C
QNH	:	1009 HPA 29.80 INS
QFE	:	886 HPA 26.16 INS

1.7.3.2 METAR 0900 Z

Visibility	:	6 kms.
Winds	:	180 ° / 12 kts.
Clouds	:	FEW 1500 ft. (450 mtrs.) BKN 3000 ft. (900 mtrs.) OVC 8000 ft. (2400 mtrs.)
Temperature	:	27 ° C
Dew Point	:	20 ° C
QNH	:	1008 HPA 29.79 INS
QFE	:	885 HPA 26.15 INS

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1.7.3.3 Terminal Area Forecast was issued at 2100 Z on 28th July, 2000 valid upto 1200 Z on 29th July, 2000. As per the same the weather around Kullu/Shimla was expected to be:-

Visibility : 3000 mtrs. Haze
Winds : 090 ° / 10 kts.
Clouds : SCT 2500 ft.
BKN 10,000 ft.

Thunder storm and Rains were predicted with FEW CB at 3000 ft.

1.7.4 ROUTE FORECAST

A route forecast was issued by the Meteorological Department, Delhi for Delhi - Kullu route at 2330 Z on 28th July, 2000, which was valid for departure at 0230 Z on 29th July, 2000. Winds and temperatures between Delhi and Kullu were expected to be:-

F 140	160 ° / 05 kts.	:	6 ° C
	Changing to 320 ° / 10 kts.		
F 100	330 / 10 kts.	:	12 ° C
F 70	330 / 10 kts.	:	17 ° C
F 50	360 / 15 kts.	:	22 ° C
	Changing to 330 ° / 10 kts.		

Visibility was expected to be 3000 Mtrs. in Haze, which was likely to reduce to 1200 Mtrs. in thunder storm with rain. Isolated thunder storm and rain and moderate to severe turbulence was predicted with icing in CB. Freezing level was F 180.

1.7.5 At the time of briefing Meteorological Department at Delhi has specifically brought out that cyclonic circulation extending upto 1.5 kms. ASL were persisting over J & K and neighbourhood.

1.7.6 SATELLITE CLOUD IMAGERY

Visual and Infra-red Satellite picture were obtained. Satellite imagery of 0600 Z reveals Broken Low and Medium clouds with embedded isolated weak to moderate convection on Chandigarh - Kullu route. Cloud top temperature at 32 ° N, 77 ° E was - 10 ° C. This weather continued and satellite picture of 0900 Z do not reveal any change in weather.

1.7.7 Besides the Meteorological Reports, the pilot who was flying in same area was asked about prevailing weather enroute. As per him area beyond Sunder Nagar was fully covered with clouds. As he was not getting any opening, he diverted back.

1.7.8 Weather has played a significant role in the accident.

1.8 AIDS TO NAVIGATION

1.8.1 Chandigarh Airport is equipped with VOR/DME, which was serviceable at the time of accident. Pilot was using the same for position reporting

1.8.2 The only navigational aid available at Kullu is NDB. The same was reported to be working normal at the time of accident. However, due to location of the NDB and the surrounding terrain, the performance of NDB is not satisfactory. It has poor range with fluctuations in bearings. There is no evidence that aircraft could home on to the same before the accident.

1.8.3 Aircraft was equipped with GPS. Whether Delhi - Kullu - Delhi route was stored in it or if pilot was making use of the same, could not be established.

1.9 COMMUNICATION

1.9.1 Kullu Airport is equipped with HF and VHF communication. Due to surrounding terrain, Kullu VHF has very poor range and aircraft come in contact with Kullu ATC only in the vicinity of Pando. The aircraft was not in contact with Kullu on VHF R/T. However, aircraft had contacted Kullu on HF R/T at 0755 hrs. to pass its position and ETA. That was the only contact with Kullu.

1.9.2 There is no direct communication link between Kullu ATC and Delhi FIC, ATC Chandigarh or Alpha control. Kullu ATC can only contact these places on normal P&T telephone line. The AFTN link is also not direct but is through Amritsar, which has to retransmit all messages. This in any Air Traffic Control System, is not an healthy/acceptable situation.

1.9.3 However, aircraft was in contact with Chandigarh/Alpha control on VHF R/T almost upto the time of accident.

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1.10 AERODROME INFORMATION

1.10.1 Kullu airport is under the management of the Airports Authority of India. It is situated in the Kullu Valley on the Western Bank of Beas river. There are steep hills on both sides of the airport.

1.10.2 The aerodrome is located 10 kms. South of Kullu town at an elevation of 3556'. The airport reference point is located at Lat. 30 ° 50' 38" N and Long. 77 ° 09' 24" E.

1.10.3 There is only one runway designated as 34/16. The runway is 3700' long and 100 ' wide. The runway surface is of tarmacadam with LCN of 14. Kullu is unidirectional airfield . Landing is permitted only on Runway 34 and take off only from Runway 16. The declared distances are:

RUNWAY 16

T O R A : 3450 ft..

T O D A : 3870 ft.

A S D A : 3450 ft.

RUNWAY 34

L D A : 3450 ft.

1.10.4 There are no approach, runway, threshold or taxi lights. The signal area is unlighted.

1.10.5 The threshold of runway 34 is displaced by 180' due to obstruction of overhead wires on the approach. The over-run areas at both ends of runway need improvement.

1.10.6 Cat. IV fire fighting facilities are available. The airfield is only cleared for VFR operations.

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1.11 FLIGHT RECORDER

1.11.1 Super King B 200 aircraft is not fitted with Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR). Thus vital analysis of Flight path based on CVR and FDR could not be made.

1.11.1.2 As per the existing regulations FDR/CVR is not required to be installed on aircraft having maximum AUW less than 5700 kg. Maximum take-off weight of Super King Air is 5669 kg. But this aircraft is being extensively used for VIP/Executive flying under private/non-scheduled category. Regulations in this regards need to be reviewed.

1.11.2 R/T communication between aircraft and ATC Units at Delhi, Chandigarh, Alpha Control and Sarsawa is recorded. However HF communication at Kullu is not recorded. These recorders use channel No. 1 for generating a time code. Various communications can be related with the time and flight path can be reconstructed to some extent using the same. Transcript of various channels were obtained/prepared, the salient points observed from these transcripts are:-

- Before giving start-up to aircraft, pilot was advised of message from Kullu that VUM landed at Chandigarh due bad weather enroute Kullu.
- Pilot again asked for start-up after about seven minutes stating he will take a chance as there is emergency evacuation.
- Aircraft got airborne at 0712 Z.
- Aircraft asked for deviation 5 to 7 miles left of track at 0731 Z From Chandigarh ATC which was approved.
- Pilot requested and was given descend, firstly to F 105 and then to 9000 ft.
- Aircraft set course directly to Kullu after 'SP' on a route crossing 22 miles East of Chandigarh.
- Only transmission with Kullu was on HF at 0755 Z when aircraft gave its estimate and position as 42 miles from Kullu and descending to F 90.
- Pilot requested for change over to Kullu at 0758 Z, which was approved

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WRECKAGE AND IMPACT INFORMATION

1.12.1

Accident site is located at GPS Coordinates of Lat. 31 °27' 43" N and Long. 077 ° 05' 03" E near village Jhuggi, Distt. Mandi (H.P.). Accident site is approx. 21 nm from Kullu at an altitude of 8800' (Approx.)

1.12.2

The accident site was flat area of Approximately 500' x 300' with a slope of 30° - 40°. Area was free of obstacles like trees etc. The wreckage was inspected by a team of DGCA Officers. Significant observations are:-

- Aircraft impacted hillock while in climbing attitude with high forward speed. This resulted in very high impact forces and portion of it got embedded.
- Due to severity of impact cockpit was completely crushed and fuselage broke into two pieces.
- Pilot's seat had detached but was found inside crushed cockpit.
- Co-pilot's seat was thrown away and was found 40' on LH of fuselage. Seat mountings was found pulled out alongwith structure.
- Tail portion including horizontal stabilizer fin and rudder got separated from fuselage and was lying on LH side on engine.
- Pieces of both the wings with flaps and aileron were found scattered in the area.
- All the landing gears were found separated:
 - : RH landing gear, oleo and wheels were intact.
 - : LH Landing gear had detached from outer cylinder. However both the wheels and torque links were intact.
 - : Nose landing gear after detaching was thrown away. It was found 35' behind RH Propeller with both wheels burst.
- Piece of wing L.H. edge (Approx. 5') along with ruptured fuel cell was found 50' ahead of fuselage.

1.12.3

Attempts to overturn fuselage to examine wreckage underneath were not successful. Thus ELT, GPWS & GPS could not be traced.

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1.12.4

Some of the cockpit instruments could be retrieved from exposed front portion of the broken fuselage. Readings of these instruments were recorded as follows:-

INSTRUMENTS	READING
Altitude Alert Controller	19,400'
Encoding altimeter	8,560' Baro setting 1004 mb / 29.66"
Cabin Air Temp. gauge	95 ° F
Load Meter	0
Frequency Meter	380
Pneumatic Pressure Gauge	8.5
Oxygen Pressure Gauge	> 2000
Torque Meter (Port)	1700
Rpm gauge (Stbd.)	95%
Oil Pressure Gauge (Stbd.)	150 lbs.
Oil Temp. Gauge (Stbd.)	65 ° C
Cabin Altitude Pressure Gauge	4 psi

1.12.5

L.H. Propeller was found at about 20' from first impact point. RH Propeller was found embedded in the soil close to engine nacelle only one blade was visible. Propellers were retrieved from accident site and examined. Following salient points were recorded.

1.12.5.1

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- Propeller drive shaft had sheared in torsion.
- Hub on one of blade attachment was completely broken/shattered. At other location it was cracked.
- Feathering ring adjuster was bent and ring was missing.

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- Propeller pitch change housing was missing. Two of attachment bolts were broken; other two were pulled out and bent.
 - All propeller blades fly weight except one was missing.
 - One of the blades was broken at mid span.
 - One blade was found detached, twisted forward with deep scoring mark.
 - Other blades were twisted and bent backward.

1.12.5.2

R.H. PROPELLER

- Propeller drive shaft was found sheared in torsion.
- Propeller flange bolts were intact.
- Propeller pitch change housing was missing. Housing attachment bolts were pulled out and bent - one was broken.
- Fly weights of all blades were missing.
- Feathering piston housing had sheared from root.
- Broken feathering ring flange was attached with propeller hub.
- Leading edges of all blades were broken and damaged.
- One blade was found twisted and bent forward; it had deep scoring marks. Other three blades were found twisted and bent backwards.

1.12.5.3

No pre-impact damage/defect was identified during examination of propellers. Damage to the propeller was indicative of straight, head on impact with solid obstruction when rotating under considerable power.

1.12.6.1

L.H. Engine was found below tail portion. After initial examination at site engine was transported to Delhi for detailed examination and following observations are recorded:-

- Engine had separated from Pylon and engine cowl was missing.
- The propeller shaft was found broken, failure being in torsion, which indicated sudden stoppage of propeller when engine was in power.
- There was no indication of engine fire.

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- The exhaust was found crushed.
 - Fuel control unit, starter generator and outer casing of combustion chamber were found damaged due impact.

1.12.6.2

R.H. Engine was found about 35' behind main wreckage. After initial examination at site engine was transported to Delhi for detailed examination. Following are the salient points:-

- Engine was without nacelle.
- There were localised fire indication on outer casing. Fuel lines, electric harness upto "B" flange were having fire damage.
- The nacelle was found 5' behind engine. It was badly crushed with indications of fire.
- Reduction gear box was found detached.
- Fuel control unit, starter generator speed governor etc. were all found damaged.
- The Propeller shaft was found broken in torsion.

1.12.6.3

Both the engines were partially stripped to see internal condition:-

- Turbine disc and blade assembly of both the engines were in satisfactory condition. There was no sign of over-heating or cracks.
- The combustion chamber liner had no cracks or signs of over-heating.
- The condition of shroud housing segment, air-seals were satisfactory.
- Compressor turbine vane ring of LH engine was found partly damaged. Few of vanes were found broken. RH engine was satisfactory.

1.12.6.4

Strip examination of engine did not bring out any pre-impact problem/abnormality.

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1.13 **MEDICAL AND PATHOLOGICAL INFORMATION**

- 1.13.1 All the occupants died as a result of accident. The bodies after identification were subjected to post-mortem at Sub-divisional Hospital at Sunder Nagar. As DDMS of Civil Aviation was not present at the time of post-mortem and doctors at Sunder Nagar had no experience of conducting Post-mortem as required for Aviation accident, they followed normal procedure.
- 1.13.2 As per the Post-mortem report Capt. Ghumman suffered multiple traumatic and crush injuries with extensive head injury with damage to the brain, spinal cord, internal and external organs of chest and abdomen and multiple compound fractures to the skull, vertebral column and limbs. These caused instantaneous death.
- 1.13.2.1 Samples were collected from body of Capt. Ghumman and histopathological examination was done at IAM, IAF Bangalore. These did not reveal any pre-existing disease. No inflammatory exudation/reaction in the tissues was observed. However, all specimen showed partial autolysis.
- 1.13.2.2 Analysis of medical records of Capt. Ghumman does not reveal any significant medical History. However, there was suspicion of Coronary Artery disease.
- 1.13.3 As per Post-mortem report Capt. Silvam suffered multiple, traumatic and crush injuries with extensive head injury with damage to the brain, spinal cord, internal and external organs of chest and abdomen and multiple compound fractures of the skull, vertebral column and limbs, which resulted in his instantaneous death.
- 1.13.3.1 Samples collected from the body of Capt. Silvam were subjected to Histopathological examination at IAM, IAF Bangalore. As per the same no evidence of inflammation was seen in the tissues. However, samples showed partial autolysis.
- 1.13.3.2 Analysis of medical records of Capt. Silvam does not reveal any significant medical condition.
- 1.13.4 Injuries suffered by both the pilots are indicative of very high impact forces to which they were subjected.

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FIRE

There was no in-flight fire. There was no post-impact fire also other than minor localised fire on R.H. engine. The wreckage or bodies did not reveal any signs of fire or soot. Due impact wings disintegrated and fuel spread out on the wet ground so it did not trigger or support fire.

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SURVIVAL ASPECTS

Accident resulted in very high impact forces, which ruled out any possibility of survival of occupants. Any of additional measures like helmet etc. would have made no difference to the fatal outcome of the accident.

Accident was not survivable.

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2. ANALYSIS

2.1 AIRCRAFT SERVICEABILITY

2.1.1 The detailed examination of the wreckage was carried out at the site and at Delhi. All aircraft parts, especially flight control surfaces were accounted for. After evaluation of evidence and detailed examination of the wreckage, following inferences were drawn:-

- There was no evidence of either lightning or bird-strike damage.
- No evidence of any explosive device having detonated was found. Thus sabotage is ruled out.
- Possibility of accident due to failure/serious problem of power plant, controls or instruments was discounted.
- There was no evidence of structural failure or of disintegration of aircraft in the flight.
- No evidence of vibration or flutter having set-in during the flight was observed.

2.1.2 Records reveal that no major snag was reported by the pilot prior to or during the accident flight. It can thus safely be concluded that the aircraft was in airworthy condition upto the time of accident.

2.2 PRE - FLIGHT PREPATIONS

For any successful flight proper pre-flight checks play major role. There are certain regulatory requirements to be followed before any flight. Observations on the same for accident flight are:-

2.2.1 FLIGHT PLAN

2.2.1.1. Flight plan was submitted to Delhi ATC on Fax. Capt. Amarjeet Singh was shown as PIC with take off time as 0230 Z. Flight was to be conducted under IFR. Number of persons on board were not mentioned, which were to be notified. Operator never informed ATC about details of passengers.

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2.2.1.2 Take-off time was revised three times by Fax by PIC. Finally, aircraft took off at 0712 Z with Capt. Ghumman in command, Change of PIC was not intimated to ATC either in writing or on RT.

2.2.1.3 Endurance was shown as 5 hours on flight plan, which is not correct. With the amount of fuel on board, aircraft would have 03:45 hrs. to maximum 04:00 hrs. of endurance.

2.2.1.4 Giving correct information on flight plan needs no emphasis. ATC require precise information on flight plan to properly coordinate flight and to locate aircraft if any mishap takes place. Filing wrong PIC or incorrect number of passengers is not only misleading but illegal also. Wrong endurance on flight plan can lead to dangerous situation.

2.2.2. FLIGHT UNDER IFR

2.2.2.1. As per the flight plan aircraft was to fly on W 35 air-route to Kullu i.e. Delhi - Sarsawa - Chandigarh - Kullu. Aircraft was to fly at F 160 on Sarsawa - Kullu Sector. Kullu is an VFR airfield, thus there is no approved let-down for the same. Operator could not explain what procedure was to be adopted for descending from F 160 overhead Kullu for landing on runway which is at an elevation of 3556'.

2.2.2.2 Operator has no SOP in this regard and nor has worked out aircraft capability for overhead descent to Kullu. Leaving everything to the discretion of Pilot who does not appear to be familiar with the procedure. It would have created dangerous and hazardous situation had aircraft reached overhead Kullu at F 160.

2.2.2.3 It is on record that pilots were not aware of frequency of Chandigarh VOR, which is the main navigational aid on this route, this clearly points to the fact that neither ATC briefing was taken properly nor route charts were on board aircraft.

2.2.3. LICENCES OF PILOTS

2.2.3.1 Capt. Ghumman's IR check was to be carried out before 16.12.99. No records are available either with DGCA or the Operator, that this check was done. Only record submitted was entries of journey log book of 20.01.2000. It is to be accepted with reservations only that he had valid Instrument Rating at the time of accident. But he flew IFR flights with expired IR for more than a month.

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- 2.2.3.2 IR check of Capt. Selvam was to be carried out before 02.07.2000, which was not done. At the time of undertaking the accident flight he did not have valid Instrument Rating.
- 2.2.3.3 It is surprising that pilots still insisted on flying IFR with expired IR in utter violations to the regulations, but it is also true that this has not in any way contributed to this accident.
- 2.2.4 ROUTE FAMILIARISATION
- 2.2.4.1 Section 2, series 'O', Part-I, Issue IV of CAR lays down minimum requirements to be complied by Operator engaged in scheduled, non-scheduled, aerial work, flying training and private flight Operations. Para 6.4 of said section states " The first pilot shall have made two flights either as first pilot without passengers or as second pilot along the route over which he is required to fly in conditions permitting visual contact flying and shall himself have landed and taken off at each of the scheduled aerodromes on the route ".
- 2.2.4.2 DGCA vide Operations' Circular 8 of 1995 has stipulated that pilots before being permitted to operate as P.I.C. to airports in hilly terrain should be given additional training. Pilots are to be specifically checked and cleared on the type of aircraft for each airfield for such operation. In addition pilots have to maintain recency of flying in hilly areas and should operate atleast once during the preceding twelve months to such airports.
- 2.2.4.3 Records reveal that Capt. Ghumman had not undergone any special training nor was checked and cleared for operations to Kullu Airport. Thus regulatory requirements were violated in this regards.
- 2.2.4.4 Capt. Ghumman flew three times to Kullu in last two years. Though he was very experienced pilot and had flown a variety of aircraft but apparently was not familiar with Delhi - Chandigarh - Kullu route. Pilots who regularly fly to Kullu follow recommended Chandigarh - Sunder Nagar - Pondo - Lurgi - Kullu route. Pilots are checked on this route only. Whereas Capt. Ghumman decided to fly on W 35 route.
- 2.2.5 PRE-FLIGHT BRIEFING
- 2.2.5.1 As per the proviso of AIC Co-pilot or approved Flight Despatcher can take ATC and Weather Briefing for scheduled and non-scheduled operations; however, it is the responsibility of PIC to get properly briefed before undertaking flight. For private operations PIC himself is required to take Me. And ATC briefing. For hilly region during the period when weather is usually bad, besides requirements , safety of operations demand that

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pilot himself get first hand information about enroute weather and available facilities.

- 2.2.5.2 It is established fact that neither pilot nor co-pilot took Met. Briefing. Records further reveal that it was office boy who reported for Met. Briefing (and signed briefing register) that too four hours before departure of flight. Besides being illegal it is dangerous too. It reveals casual and careless attitude and utter disregard to the regulations.
- 2.2.5.3 On Kullu route where weather conditions change so fast., taking Met. Briefing four hours in advance has no meaning. By the time aircraft took off from Delhi, validity of Met. Forecast had expired. At that time Kullu Weather had also become unsuitable for landing.
- 2.2.6 WEIGHT & TRIM SHEET
- 2.2.6.1 Weight and trim sheet was not prepared. Though as per operations Manual of the Operator same is to be prepared for each flight, weight and trim sheet has not been submitted to DAW for approval.
- 2.2.6.2 As per the requirements if aircraft is in private category weight and trim sheet is not required to be prepared; however, it is the responsibility of the pilot to ensure that aircraft is properly loaded and its CG is within limits.
- 2.2.6.3 In the present case there is no record of fuel carried on board. However, as per the statement of AME, 1659 liters of fuel was on board. If same is accepted, take-off weight of aircraft was slightly less than maximum permitted, but endurance given in flight plan was incorrect. There was no efforts on the part of pilots to ensure that take-off and CG was within limits.
- 2.2.6.4 It is regulatory requirement that passenger manifest be prepared and notified to ATC. Operator did not follow the same. After accident bodies of three passengers were recovered but as per the records of Airport Authority of India four persons were issued passes to board this flight. It was also observed that passenger who actually traveled on aircraft were different and not person on whose name passes were issued. This could have serious legal implications.
- 2.2.6.5 Most of the private/non-scheduled operators do not prepare or submit passenger manifest to ATC. While submitting flight plan invariably number of person on board is shown as "to be notified", which is never followed. This ambiguity needs to be removed.

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2.2.7 It is amply evident that Operator has not established any system to ensure proper flight planning . Operation was conducted in most haphazard way with very casual attitude.

2.3 ENROUTE WEATHER

2.3.1 As per the proviso of AIP Weather conditions required for flight under VFR are:-

- Visibility : 5000 mtrs.
- Distance from clouds : 1500 mtrs. horizontally
: 1000ft. vertically

2.3.2 Analysis of weather data clearly brings out that enroute weather was not suitable for flights under VFR.

2.3.3 The satellite imagery indicated broken low and medium clouds. As per the METAR issued from Kullu, the sky was overcast at 8000 ft. Statement of pilot who diverted back to Chandigarh almost at same time has corroborated these observations.

2.3.4 Eye-witnesses at the site of accident have reported that it was cloudy/raining and visibility was poor.

2.3.5 It is thus evident that route between Sunder Nagar and Kullu was cloudy with top of cloud being at 8000 ft - 10,000 ft. Clouds had enveloped and obscured hills.

2.3.6 At the expected time of landing at Kullu, aircraft would have encountered more than 10 kts. of tail wind. As per the SOP maximum tail wind component for landing at Kullu is 10kts. Even 10 kts. tail wind would impose heavy weight penalty.

Thus weather condition at Kullu airfield were not suitable for landing.

2.4 **FLIGHT PATH**

2.4.1 **MISSING INPUT DATA**

Most of input data required to work out exact flight path was not available or was not accessible.

2.4.1.1 **CVR/FDR**

This was one accident in which CVR and FDR would have been invaluable tool in cause determination. Since there was none, investigation was greatly handicapped.

The accident has again brought out the urgent need to have FDR/CVR installed on all aircraft engaged in passenger flying. This would not only be helpful in investigation but would supplement prevention work.

2.4.1.2 **RADAR CONTROL**

In absence of CVR/FDR Radar data would have been of great help to work out speed etc. by taking different time frames and position data from them.

Though aircraft was being monitored by Radar at 'A' Control almost upto the time of accident. Radar data/video recording could not be obtained from Airforce.

2.4.1.3 **GPS DATA**

Data obtained from GPS could have been very useful in determining the last portion of flight path and working out speed etc. However in spite of best efforts GPS could not be retrieved from the wreckage.

2.4.1.4 In view of the same exact sequence of events/exact flight path perhaps can never be known. However, with available inputs/data it is still possible to reconstruct most probable sequence of the events.

2.4.2 **PROBABLE SEQUENCE OF EVENTS**

2.4.2.1 **START UP**

At 0657 Z aircraft asked for start up from Delhi Ground. Capt. Ghumman was informed of message from Kullu ATC about VUM diverting to Chandigarh due weather. Pitot did not start up. It is on record that pilot talked to somebody on his mobile telephone and again asked for start up at

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0704 stating there was an emergency evacuation and he would make an attempt.

Person with whom pilot talked could not be traced and whether he exerted any pressure would never be known. But how could pilot with the experience of Captain Ghumman allowed himself to be pressurised. But chain of accident had started with pilots' mental block set on " Mission must be completed."

2.4.2.2 Aircraft took off at 0712 Z and was changed over to SP (Sarsawa) at 0728 when 36 miles from it at F 170 aircraft took deviation to left and reported overhead SP at 0738 and set course directly to Kullu from ONOGI. Thus, pilot deviated from published ATS route to a track which probably he was not used to.

2.4.2.3 DESCENT CLEARANCE

Aircraft asked for descent from Chandigarh ATC firstly to F 105 and then to F 90. At 0741 Z aircraft reported abeam Chandigarh 22 miles east at F 105. Links of accident chain were completed when pilot descended below 'Minimum Sector Altitude' in IMC and Chandigarh ATC approved the same. Both violated established procedures and safety regulations.

2.4.2.4 Only contact with Kullu was on HF at 0755 Z when aircraft was 42 miles and F 90. ETA Kullu was given as 0808 Z. Correlating with available weather data, it is evident that aircraft must be flying in clouds from this point. Aircraft further descended probably to avoid clouds and entered wrong valley. Eye-witnesses have reported aircraft flying very low, 6500' - 7000' near Jhuggi village in rain.

2.4.2.5 With hills obscured with clouds, it is not possible to establish whether pilot himself saw hills or got GPWS warning. Whatever may be the reason, he initiated steep climb to gain height for clearing hill top. Given the steepness of hill side and distance available it was not within performance capability of aircraft to clear hill top.

2.4.2.6 At approx. 0802Z aircraft crashed into hill in climbing attitude.

2.4.2.7 Aircraft was installed with ELT. After accident it never got activated. ELT could not be retrieved from wreckage. In earlier accidents under similar conditions, same observation was made. On impact ELT itself gets damaged and does not transmit. Very purpose and utility of the same is defeated. ELT mounting and location of installation needs to be reviewed.

2.5

PURPOSE OF FLIGHT

- 2.5.1 Accident flight was shown as ambulance flight in the flight plan. It was meant to airlift a Belgium tourist from Kullu. Operator has stated that no money was taken by them for said flight.
- 2.5.2 DGCA has issued non-scheduled permit No. 3/1992 to M/s. Aerial Services Pvt. Ltd., Bombay. Aircraft VT-EIE is not endorsed on this permit. There is utter confusion and contradiction in the documents about status of this aircraft. This aircraft is shown as operating under non-scheduled permit in the Quality Control Manual approved by DAW, servicing schedules also have accordingly been approved. It is not understood how this manual could be approved. Similarly, C of A of aircraft is issued and renewed under 'Passenger Category'. Unless aircraft is endorsed on non-scheduled permit this C of A should have been in private category. Despite contradiction in documents, as aircraft is not endorsed on non-scheduled permit, it cannot operate under the proviso of the same.
- 2.5.3 Aircraft operating under private category are not supposed to carry passengers for hire and reward. M/s. Thomas Cook engaged Dr. Shaw for this evacuation and rescue mission on behalf of Euro Insurance. Dr. Shaw was paid consolidated amount for air-lifting, providing medical aid etc. Thus, it is hard to believe that when Dr. Shaw got hefty sum for this operation, M/s. Aerial Services have provided aircraft on humanitarian grounds.
- 2.5.4 This aircraft was positioned at Delhi whereas Aerial Services have their headquarter at Bombay. Operator could not clarify for what corporate purpose these flights were being undertaken. Thus, beyond any reasonable doubts it can be concluded that aircraft was being flown for hire and reward in violation of the regulations.

2.6

REGULATORY CONTROL

- 2.6.1 Investigation has brought out very painful aspect of operator cutting corners everywhere and in the process violating rules and regulations; be it proviso of Operations Manual or statutory instructions. It may be due to inadequate supervision/operations control or lack of safety culture or due ambiguity of responsibilities. It is also true that this is not the only operator who is in this situation, most of the private/non-scheduled operators are in same boat.

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2.6.2 It is not understood why situation should come to this pass that such violations are detected only after the accident. Before issuing/renewing permit these glaring discrepancies could have easily been detected. This probably leads to inadequate supervisory control of regulatory authorities also.

2.6.3 Whereas regulatory authority has issued comprehensive CARs/AIC and other statutory orders but agency responsible to monitor/implement these orders is neither identified nor defined. It is left to the better judgement of the operator to follow the same, which in quite a few cases is lacking. It is felt that every order/CAR must define person/office/directorate responsible for implementing/monitoring these orders and ways and means to do so. Action to be taken for violations be also defined.

2.7 FACILITIES AT KULLU AIRPORT AND EN-ROUTE

2.7.1 Though communication and navigational facilities did not contribute to the accident but proper navigational, communication and Meteorological facilities would probably have averted this accident.

2.7.2 Range of VHF R/T at Kullu is very poor. Effective range is hardly 10 nm. There is virtually no communication zone between Sunder Nagar and Pondo when aircraft is often not in contact with any ATC unit.

2.7.2.1 Due to this inadequate communication facility aircraft taking off from Kullu will remain on Kullu QNH whereas reciprocal aircraft into Kullu, would remain on Chandigarh QNH. Therefore, adequate vertical separation cannot be ensured. Secondly, aircraft flying on Chandigarh QNH and not on Kullu QNH, which can vary considerably, will have incorrect altimeter reading in hilly terrain. This is a flight safety hazard.

2.7.3 Same is the situation with only navigational aid at Kullu. Range of NDB is about 10 nm which is of no use because by that time aircraft comes in visual contact with airport.

2.7.4 Transmitter/Receiver for NDB and VHF communication are installed at airport which is surrounded by hills. This restricts the range. This point was deliberated by earlier Court of Inquiries also and it was recommended that VOR should be installed alongwith VHF Tx/Rx on hill top near airport. Action in this regard is yet to be taken. Once this

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recommendation is implemented VHF range will increase considerably and navigation to Kullu will become accurate.

- 2.7.5 There is no direct land line communication between Kullu ATC with Delhi FIC, Chandigarh ATC and Alpha Control.
- 2.7.6 Chandigarh - Kullu route falls under the category of airspace where only flight information service is to be provided. However, Delhi FIS and aircraft have no two-way communication, thus no flight information service is being provided though required. Chandigarh ATC is handling these flights without coordinating with FIS. This situation can only be remedied if Extend Range VHF is installed on this route to have direct two-way communication with FIS Delhi.
- 2.7.7 The METARs at Kullu are being issued at hourly intervals. As weather in this area changes fast, the weather information to the operator is not adequately updated.
- 2.7.8 It is common complaint that weather forecast given is normally much different than actual weather en-route. All accidents on this route have been in bad weather conditions, which points to inadequacy of weather information provided on this route. There is an urgent need to upgrade Sunder Nagar observatory to aviation standards so as to provide latest weather to pilots on this route.
- 2.7.9 Unless these safety measures are taken to provide communication, navigational and Meteorological facilities on this route, the operations on this route should be suspended from 1st April to 15th October being unsafe in adverse weather conditions.

2.8 DELHI - CHANDIGARH - KULLU ROUTE

- 2.8.1 Designated route from Delhi to Kullu is W 35 via Sarsawa - Chandigarh. Aircraft is to fly to Sarsawa on track 011 which is 88 nm from Delhi. From Sarsawa aircraft follows track 333 for Narayangarh (ONOGI) which is 27 nm, then to Chandigarh on track 307 for 26 nm. Aircraft flies direct to Kullu from Chandigarh on track 013 for 75 nm. Width of air-route is 20 nm. Minimum sector altitude between Delhi - Sarsawa is 2400 ft, Sarsawa - Narayangarh is 3700 ft., Narayangarh - Chandigarh is 3100 ft and for Chandigarh - Kullu sector is 12600 ft. Upper and lower limits for IFR flights on Delhi - Chandigarh sector is F 460 and F 75 but for Chandigarh - Kullu sector is F 460 and F 150.

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- 2.8.2 The only designated route to Kullu is seldom used by any civil flights because most of the aircraft operating on the route are unpressurised, which cannot climb to required minimum flight level of F 150. Secondly Kullu is designated only as VFR airfield. No procedure has been established, worked out or published for the aircraft to descend from overhead at F 150 to 3556 ft. for landing in a narrow valley of limited width. This is besides being time consuming is an hazardous manoeuvre and may exceed performance capability of aircraft.
- 2.8.3 After the earlier accidents, another route for unpressurised aircraft under VMC was worked out by the Operators and SOP was issued. As per the same aircraft follow W 35 upto Chandigarh thereafter fly on track of 006 abeam Bilaspur for 39 nm, then to Sunder Nagar 15 nm. Sunder Nagar - Pondo sector is flown on track 043 for 12 nm. From Pondo to abeam Largi track is 065 and distance of 6 nm. Aircraft then turns on track 340 covering 10 nm for landing at Kullu. Aircraft is at height of 9000 ft. upto Sunder Nagar, 8000 ft. at Pondo and 6500 ft. at Largi. Entire route is to be flown in VMC with positive identification of Sunder Nagar - Pondo and Largi.
- 2.8.4 Though most of aircraft fly this route but the same has never been published or incorporated as air route. Thus private and new operators as well as ATC is not aware of this route. Though this route is considered safe for VFR flights but is only known to the people by word of mouth and without any authenticated documents from ATC or regulatory authorities. In absence of the same casual operators devise their own route which may not be safe.

2.9 ATC CONTROL

- 2.9.1 Control Zone of Chandigarh ATC is upto 20 nm on north side. Thus, legally they can exercise air traffic control only upto this.
- 2.9.1.1 Local flying area of Chandigarh extends almost upto Pondo. Controlling authority for this area is Chandigarh ATC. However, jurisdiction of controlling authority of local flying area do not extend / apply on designated air route.
- 2.9.2 Airforce 'Alpha' control was established to monitor defence aircraft and to intercept enemy aircraft. As far as civil aircraft are concerned 'Alpha' control is to only monitor these aircraft so that these do not deviate from designated route. As per established regulations Alpha control has no air traffic jurisdiction nor is to provide any air traffic services to civil aircraft.

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- 2.9.3 As per regulations, flight information service is to be provided to all aircraft on ATS route, outside controlled air space . The distance between Chandigarh and Kullu is 75 nm leaving aside 20 nm of Chandigarh control zone and 5 nm of Kullu controlled air space, flight information service is to be provided on remaining 50 nm of the route.
- 2.9.3.1 Flight Information Centre is located at Delhi. There is no two-way communication between aircraft and FIC on this route. Thus no Flight Information Services are being provided in this area.
- 2.9.4 However in practice , Chandigarh ATC and Alfa control both are exercising Air Traffic Control on W 35. Descent etc. is being given by Chandigarh ATC without coordinating with Delhi FIC. It is not known how this practice of unauthorised jurisdiction started and how come Delhi ATC did not intervene or objected. Both ATC authorities were evasive on the issue. However, a wrong and unauthorised procedure followed for a long period does not legalise it .
- 2.9.4.1 If at all Chandigarh ATC was exercising jurisdiction outside its control zone, they should have coordinated with FIC Delhi. Both the ATC authorities admit that no coordination procedure has been worked out or established. The same was adversely commented upon by earlier Court of Inquiries also but situation remains the same.
- 2.9.5 In the present accident also Chandigarh ATC exercised Air Traffic Control outside its controlled zone. It cleared aircraft to descend to 9500 ft. which is much below published minimum sector altitude. The argument that pilot asked for descent and they agreed , is not acceptable. No ATCO is permitted to allow any IFR flight to descend below the minimum sector altitude. Minimum published Flight level on this sector of W 35 is 150. Chandigarh ATC thus exercised illegal jurisdiction and gave incorrect descent to aircraft below minimum sector altitude which became a contributory cause to this accident.
- 2.9.6 The gray areas of ATC jurisdiction and control between Civil and Airforce, ATC needs to be sorted out immediately. Coordination procedure be established, handing-over and taking-over points be worked out. A monitoring procedure be established to over see its implementation.
- 2.9.6.1 Alternatively a sub-area control be established which should have jurisdiction on northern region .

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2.10 COORDINATION WITH AIRFORCE

- 2.10.1 Airforce and Civil Airports provide landing , navigational and ATC facilities to each other. In unfortunate event of an accident, the Investigators require certain information/clarification from organisations on which he has no direct control or jurisdiction. Procedure to be followed in such events has not been documented, which causes delay and unnecessary obstruction to the investigation.
- 2.10.2 In the present case aircraft was in RT contact with Chandigarh and Alfa control upto the time of accident. Search and Rescue was also undertaken by Airforce. Therefore, in the course of investigation it became necessary to obtain this vital evidence. In the absence of any existing procedure or contact officer, extreme difficulty was faced.
- 2.10.3 Various Airforce Stations do not act on direct request from Civil Aviation Authorities, these have to be routed through Air Headquarters. Airforce was requested to arrange for tape replay of ATC tapes of Chandigarh, Alfa Control and Sarsawa. Necessary information/statement from ATCO's was also requested.
- 2.10.3.1 After one month it was informed that Chandigarh tape has been erased; thus, most vital evidence was lost. Though tapes of Alfa Control and Sarsawa were handed over but Chandigarh did not agree for replay of these. Airforce uses tapes of 20 channels and considerable difficulty was experienced to find suitable replay unit.
- 2.10.3.2 Chandigarh SATCO did not agree to replay certain queries regarding vital action taken by them - like giving descent to the aircraft. They were not prepared to put any thing in writing.
- 2.10.4 Vice Chief of Air Staff, when informed, agreed to take necessary action in the matter. Transcript of Chandigarh ATC tape was provided. In absence of tape this can be taken as evidence with reservations only.
- 2.10.5 Probably same difficulty is being faced by Airforce Court of Inquiries also. It is, therefore, imperative that procedure for exchange of documents and evidence in such cases be worked out, documented and circulated to all concerned. Nodal Officers to coordinate from both sides be designated.
- 2.10.6 The lack of coordination between Civil Aviation and Airforce was adversely commented upon by earlier Court of Inquiry. Though it was recommended by the Court to form a committee to coordinate, same is not yet implemented.

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2.11 ROLE OF POLICE

2.11.1 It is the responsibility of Civil Aviation Department to investigate all civil air accidents and to take necessary preventive action. Rules 68 to 76 of Indian Aircraft Rules 1937 lays down the procedure to be adopted for such accident investigation and defines powers of Inspector of Accidents, Committee of Inquiry and Court of Inquiry.

2.11.2 As Police authorities were not aware of role they had to play in such accidents, air safety circular No. 3 of 1984 was issued and was circulated to Police authorities in all states through Home Ministry. Salient points of the same are:-

- Inspector of Accidents/Investigator-in-Charge shall be the final authority in all matters;
- He will have unrestricted control over the aircraft wreckage and accident site;
- Police will carry out their functions in coordination with and without interfering with smooth functioning of Inspector of Accidents;
- Police will initiate action to remove dead bodies, to arrange for medical aid and to arrange fire fighting;
- Only Inspector of Accidents is authorised to issue instructions to release bodies of crew;
- For offences under Indian Aircraft Rules, the prosecutions are normally launched with the approval of Government of India.

2.11.3 It is our experience that most of Police officers neither have any knowledge of such circular nor are aware of actions expected out of them. Thus due to their actions, instead of being of assistance to investigation they become hindrance.

2.11.4 In the present accident though Police reached accident site and removed dead bodies but some of their actions caused considerable delay to investigation and resulted in loss of vital evidence. Few of these are:-

- Police registered an FIR under Sections 304A and 336 of IPC, which deals with causing death by negligence and act endangering life or personal safety of others;

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- Police authorities insisted on having their own investigation and dealing with the case.
 - Bodies of crew were released and handed over without taking permission from Inspector of Accidents.
 - Police tried to stop Inspector of Accidents from taking over certain evidences like, Instruments, Propellers etc.
 - Police demanded charges for guarding wreckage.
 - Police guard was removed without any instructions from Inspector of Accidents.

2.11.5 Before investigation team reached site of accident certain important documents like - Journey Log Book, Pilots' Licences and Log Books, Flight Plan, Fuel records etc. were removed and taken over by police. The Superintendent of Police, Mandi was apprised of existing rules and was requested a number of times to hand-over these documents, which were of vital evidence. Instead these were handed-over to brother-in-law of Capt. Ghumman on the pretext that these were his personal property. Thus, a vital evidence was lost. Bringing the matter to the notice of DGP was of no avail.

2.11.6 Action of SP Mandi amounts to obstructions of proceedings as defined in Rule 76. Thus proviso of this rule as read with Annexure-VI be applied against SP, Mandi for obstructing the investigation.

2.12 MAINTENANCE PRACTICES

Aircraft VT-EIE owned by M/s. Aerial Services Pvt. Ltd. was being maintained by M/s. Indamer Company Pvt. Ltd., Bombay. Quality Control was being exercised from Bombay where all the major checks were being carried out. Some of the significant observations from the documents are:-

2.12.1 Certificate of Airworthiness of aircraft was wrongly obtained in "Passenger Category" instead of "Private Category". QCM took no action to rectify discrepancy and to get Quality Control Manual and C of A amended.

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- 2.12.2 Scrutiny of records reveal that in last four months, prior to accident, only one snag was reported, which is not realistic. It appears defects/snags were not being reported/recorded, contrary to instructions on the subject.
- 2.12.3 Total fuel on board aircraft during accident flight could not be verified from any document as same was not recorded. Fuel and Oil register as being maintained does not give total fuel on any flight. It needs to be amended.
- 2.12.4 Average fuel consumption of this aircraft suddenly jumped to 240 ltrs./hr/engine. Such abnormally high fuel consumption should have alerted QCM to investigate the same. It appears fuel/oil records were never scrutinised and were being maintained only to satisfy requirements of C.A.R..
- 2.12.5 M/s. Indamer Company is maintaining a number of aircraft in Delhi. They don't have any hangar space. Thus maintenance work is being carried out in open which is not considered in order.

2.13 INVESTIGATION PROCESS

- 2.13.1 It is an admitted fact and there is no ambiguity in the rules that at the crash site Inspector of Accidents is the final authority in all matters, same was reiterated by Air Safety Circular. As he is responsible for rendering final investigation; therefore, it is imperative that investigation is carried out by him or under his supervision or with his coordination.
- 2.13.2 For quite sometimes it has become the practice that after accident Officers from various organisations like, BCAS / AAI / Police and Operator and also from different directorates of DGCA rush to accident site and start their own investigation. Inspector of Accidents has no control over the team which he is supposed to lead. He remains unaware of evidence collected, though he is still expected to render final investigation report.
- 2.13.3 Obviously, this is not conducive to proper investigation. Inspector of Accidents has to be undisputed leader and coordinator of the investigation team. Firstly, team members should be of his choice, secondly they should work under his control and guidance. Team members must render their report on workdone/evidence collected by them to Inspector of Accidents. All documents/evidence collected must be placed under the control of Inspector of Accidents.
- 2.13.4 In the present accident team of Officers from DGCA worked in coordination of Inspector of Accidents. However, BCAS sent their

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representative for Investigation without consent/coordination with Inspector of Accidents or DGCA, reasons of which are not understood. If it was to find out suspected sabotage then firstly person concerned was not qualified for the purpose , secondly he has not touched this aspect in his report , thirdly Inspector of Accidents are trained to identify if accident was caused due explosive detonation or due sabotage. In such cases assistance from experts group is always taken.

2.13.5 In the present case certain evidence were collected, some of these very important one by various officers of DGCA. These were not passed on to Inspector of Accidents in time, thus vital information was withheld.

2.13.6 There is an urgent need to issue the statutory orders on composition of investigation team, collection/control of evidence and conduct of investigation to be under the supervision , control and guidance of Inspector of Accidents.

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3. FINDINGS

- Documents of aircraft were generally in order and aircraft was maintained in approved manner.
- Capt. Ghumman had neither undergone special training nor was cleared for operations to Kullu. Instrument Rating of co-pilot had expired.
- Enroute weather was not suitable for flight conducted under VFR. Cloud top being 8000' - 10,000' and obscuring hills.
- Aircraft descended below minimum sector altitude in IMC and ATC Chandigarh permitted the same.
- Aircraft crashed into hill in climbing attitude.
- Accident was not survivable.
- There was no evidence of bird hit, explosion or lightning strike. Power plant, Instrument or controls problem leading to crash were discounted.
- Quality Control by Operator was lax.
- Operation was conducted in haphazard way with casual attitude and no flight planning. There were number of discrepancies in ATC flight plan, number of passengers, aircraft endurance and pre-flight briefing.
- Aircraft was being used for hire and reward in violation of the regulations.
- There is lack of operations control and inadequate supervision.
- Navigational facilities enroute and at Kullu airport are not adequate.
- Flight Information Service is not being provided on the route as required. There is confusion and ambiguity about Air Traffic Control on this route.
- Coordination between Civil and Airforce is non-existent.
- It is not practicable to follow W 35 route and land at Kullu. Other route being followed has not been published.
- Police authorities are not aware of their role in air accidents. Instead of assisting they interfere with functioning of Inspector of Accidents.

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4. CAUSE OF ACCIDENT

Accident was caused as pilot descended below minimum sector altitude in IMC in hilly area.

ATC Chandigarh contributed to the accident by permitting IFR flight to descend below minimum sector altitude.

Inadequate Supervision, lack of safety culture, poor pre-flight planning were the contributory causes to the accident.

5. RECOMMENDATIONS

5.1 GENERAL

- Action to be taken by concerned authorities on observations and points raised in analysis and findings .
- Operator be subjected to special safety audit , and action as deemed fit to be taken based on the findings .
- Every CAR/Order should mention agency responsible for its implementation and action proposed for violations.
- Supervisory control on private and non-scheduled operators need to be made effective and meaningful.
- Coordination procedure, in case of accident, between Civil Aviation and Airforce be worked out and documented. Nodal Officers be designated.
- Orders be issued on composition of investigation team and its working under supervision, control and guidance of Inspector of Accidents .

5.2 POLICE AUTHORITIES

- A Chapter dealing with role of police in air accidents be got incorporated in police manual.

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- Penal action for obstruction of proceedings be initiated against Shri O.C. Thakur, SP, Mandi (HP)

5.3 AIR TRAFFIC CONTROL

- Area of jurisdiction and control between Civil and Airforce ATC should be sorted out, coordination procedure between two be published.
- Sub Area Control be established with jurisdiction on Northern Region .
- VFR route Chandigarh - Pondo - Largi - Kullu be published in AIP.
- Airforce Authorities be informed of wrong and unsafe descent clearance given by Flt.Lt. A.Sahay , DATCO at Chandigarh, for taking necessary action .

5.4 FACILITIES ENROUTE AND AT KULLU

- VOR be installed alongwith VHF Tx/Rx on hill top near Kullu.
- Direct line be provided between Kullu and Delhi FIC/Chandigarh .
- Extended VHF be installed some where near Sunder Nagar to have effective two way communication between aircraft and FIC Delhi
- Meteorological department at Kullu should issue METARs at half an hour intervals.
- Sunder Nagar observatory be upgraded to Aviation standards or new observatory for aviation be established in the area.
- ATC/Communication department at Kullu should have rational watch hours from early morning till Sunset.

- 5.5 Till safety measure of 5.4 are implemented Operations on this route should be suspended between 1st April to 15th October every year.

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6. COMPLIANCE WITH REGULATIONS

During conduct of investigation proviso of Rule 71 of Indian Aircraft Rules 1937 were complied with.

- 6.1 It was not considered appropriate to send notice to legal heir of pilot.
- 6.2 Notice was issued to Shri Richard G. Kozarek , Director of M/s. Aerial Services Pvt. Ltd. Personal hearing was given on his request. Clarifications given by him were duly considered and acted upon before finalising report.
- 6.3 Notice was issued to Flt. Lt. A. Sahay, DATCO at Chandigarh, who neither made written submission nor came for personal hearing which was granted on his request.

7. HINDI VERSION OF REPORT WILL FOLLOW.

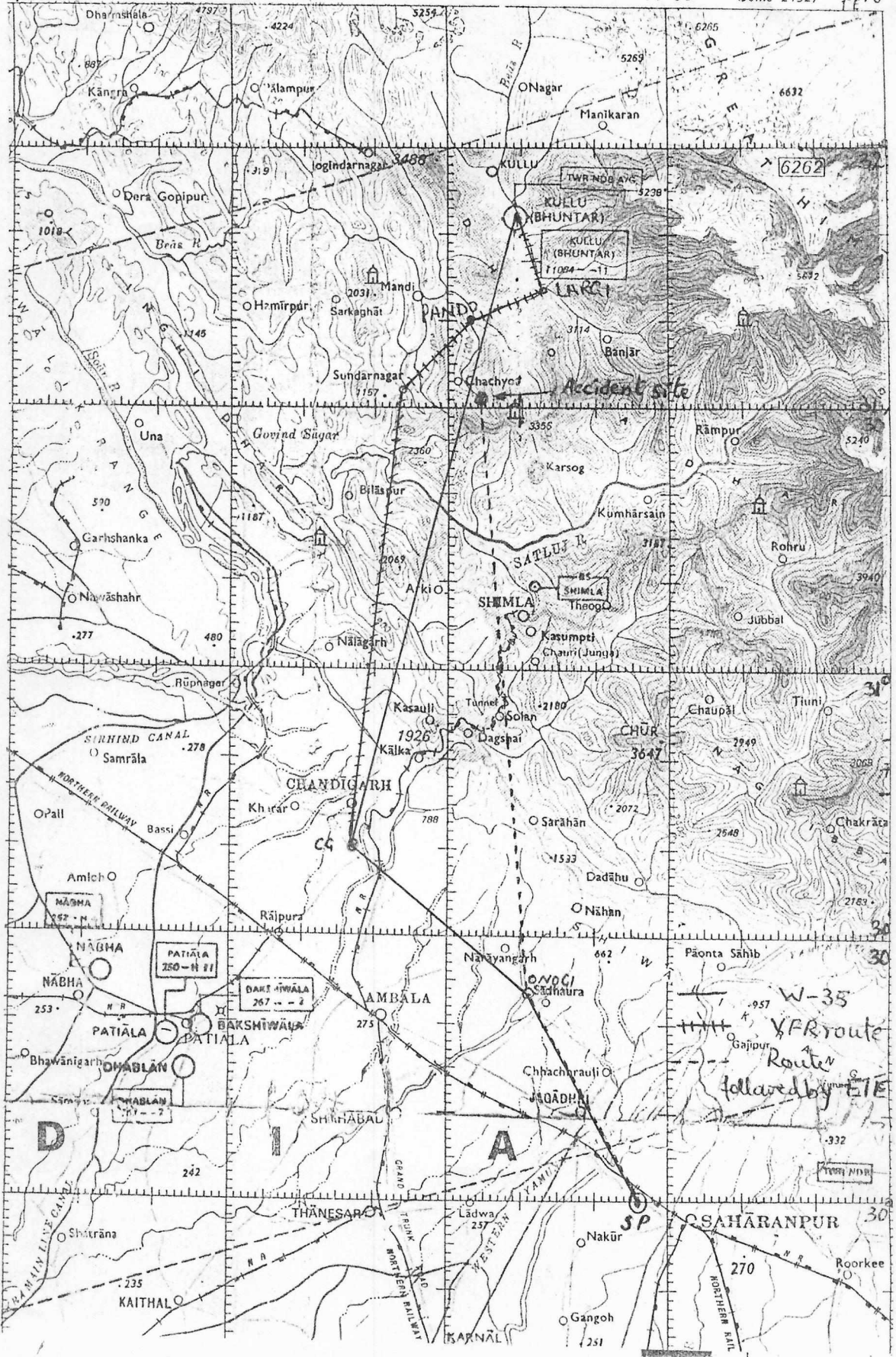
Dated: 08.01.2001

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(A.K. CHOPRA)

DIRECTOR OF AIR SAFETY

INSPECTOR OF ACCIDENTS



W-35
VFR route
Route followed by ETE