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FINAL INVESTIGATION REPORT ON ACCIDENT TO
DIRECTORATE OF AVIATION,
GOVERNMENT OF MADHYA PRADESH (DoA, GoMP)
SKA B200GT AIRCRAFT VT-MPQ
AT GWALIOR AIRPORT ON 06.05.2021

INVESTIGATION TEAM VT-MPQ

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FOREWORD

In accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and Rule 3 of Aircraft (Investigation of Accidents and Incidents), Rules 2017, the sole objective of the investigation of an accident shall be the prevention of accidents and incidents and not to apportion blame or liability. The investigation conducted in accordance with the provisions of above said rules shall be separate from any judicial or administrative proceedings to apportion blame or liability.

This document has been prepared based upon the evidences collected during the investigation and opinion obtained from the experts. Consequently, the use of this report for any purpose other than for the prevention of future accidents or incidents could lead to erroneous “interpretations.

The investigation team wanted to thank the following experts for their inputs.

- 1. Dr. (Mrs.) Punita Masrani*
- 2. Mr. Sandip Acharya*
- 3. Capt. Mohit Malani*

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SUMMARY

1	Aircraft Type	Beechcraft Super King Air (SKA) B200GT
2	Nationality	INDIAN
3	Registration	VT-MPQ
4	Owner	Directorate of Aviation, Government of Madhya Pradesh (DoA,GoMP)
5	Operator	Directorate of Aviation, Government of Madhya Pradesh (DoA,GoMP)
6	Pilot-In-Command	ATPL Holder
	Extent of Injuries	Minor
7	Co-Pilot	CPL Holder
	Extent of Injuries	Major
8	Place of Accident	Gwalior Airport (VIGR)
9	Coordinates of Accident Site	26 17 13.820 N 078 12 52.650 E
10	Last Point of Departure	Indore (VAID)
11	Intended place of Landing	Gwalior (VIGR)
12	Date & Time of Accident	6th of May 2021, 1515 UTC (Approx) / 2045 IST (Night)
13	Passengers on Board	01
14	Extent of Injuries	Serious
15	Crew on Board	02 (Cockpit)
16	Phase of Operation	Landing
17	Type of Accident	CFIT: Collided with an obstacle (Arrester Barrier) short of the landing threshold

(All timings in the Report are in UTC, unless otherwise specified)

SYNOPSIS

Beechcraft Super King Air B200GT aircraft, VT-MPQ belonging to the Directorate of Aviation, Government of Madhya Pradesh (DoA,GoMP) was involved in an accident on 06.05.2021 while operating a flight from Indore Airport to Gwalior. The flight was under the command of an ATPL holder with another CPL holder as Co-Pilot. There was one passenger on board in addition.

The flight crew contacted ATC Indore for clearance to operate the flight to Gwalior. The aircraft was cleared for Gwalior via airway W10N and FL270. Aircraft departed from RWY25 at Indore and climbed to FL 270. Aircraft descended into Gwalior in coordination with Delhi and Gwalior. Approaching Gwalior the crew were advised by the ATC that RWY24L was in use. ATC then asked the crew if they would like to carry out a VOR approach for the opposite RWY 06R. The crew requested for a visual approach for RWY 06R in the night time and were cleared to descend 2700 ft and called field in sight at 25 NM. Crew then requested for right base RWY 06R and were cleared to circuit altitude. Crew called turning right base with field visual and were cleared to land which the crew acknowledged. Just before landing the aircraft and short of the threshold, the main gear collided with the raised arrester barrier and came to a halt on the Runway 06R just beyond the threshold markings at 1515 UTC. The aircraft was substantially damaged, however there was no post impact fire. The 2 crew and 1 passenger received minor to serious injuries.

The Director General, Aircraft Accident Investigation Bureau (AAIB) ordered an Investigation under Rule 11 of Aircraft (Investigation of Accidents and Incidents) Rules 2017 vide AAIB Order no. 11011/4/2021-AAIB dated 10.05.2021 and corrigendum of even number dated 4th Jan 2022.

1. FACTUAL INFORMATION

1.1 History of the Flight

Beechcraft Super King Air B200GT aircraft, VT-MPQ belonging to DoA,GoMP was involved in an accident on 06.05.2021 while operating a flight from Indore Airport to Gwalior. The flight was under the command of an ATPL holder with another CPL holder as Co-Pilot. There was no published roster for the said flight and was planned at the last minute due to a requirement to carry medical supplies (COVID-19). There was one passenger on board in addition to the 2 flight crew members. Flight was the third of the five sectors that the flight crew were scheduled to operate on the day.

The crew manifest included names of the flight crew and passenger along with the sectors as given below : -

FROM	TO	ETD (UTC)	ETA (UTC)
Bhopal	Ahmedabad	1100	1215
Ahmedabad	Indore	1300	1345
Indore	Gwalior	1400	1500
	<u>ACCIDENT</u>		<u>15:15:24 (UTC)</u>
Gwalior	Jabalpur	1515	1615
Jabalpur	Bhopal	1630	1715

Both the crew reported for the flight at Bhopal and had their pre-flight Breath-Analyzer test carried out at approximately 1600 IST (1030 UTC). The crew then reviewed the Pre-Flight Briefing Folder and the Co-Pilot proceeded to the aircraft to carry out the pre-flight checks as deputed by the PIC. The Co-pilot noticed that the 6 seats from the cabin had been removed and was then informed by the ground crew that the flight was to carry Cargo (Medical supplies) in the cabin.

The first 2 sectors Bhopal - Ahmedabad - Indore of the planned flight were flown by the Co-Pilot (occupying LH Seat as he was flying under supervision of the PIC/Rated Examiner on type) and both these sectors were uneventful. The third sector was flown by the PIC occupying the LHS from Indore to Gwalior (VIGR). The aircraft departed from Indore as planned and

proceeded to Gwalior as per the filed flight plan, routings and Flight levels as cleared by ATC. At the time of departure the aircraft had 1800 lbs of fuel on board as per 'Load & Trim'.

Approaching Gwalior, the crew contacted ATC and were cleared to Gwalior as per flight plan and FL 270. The Co-pilot coordinated descent with Delhi Control. When the aircraft came in contact with Gwalior, crew were advised to monitor the ATIS for the latest weather update, which the crew complied with and requested ATC for the Runway in use.

ATC advised the crew that RWY 24L was in use and reported winds were 080/06kts. ATC then asked the crew if they would like to carry out a VOR approach for the opposite RWY 06R, to which the crew replied and requested for a Visual Approach for RWY 06R. ATC cleared the aircraft for the visual approach. The crew were then asked to call for descent and report the airfield visual. The flight was cleared to descend to 2700ft and report distance inbound. The crew reported 25NMs inbound and airfield visual and further requested to call right base RWY 06R.

ATC cleared the aircraft for a visual approach and were advised to descend to circuit altitude and report right base for a visual approach for RWY 06R. The flight crew reported right base and were asked to report finals for RWY 06R. The ATC then cross checked with the crew if the runway was visual and the crew reply in "Affirmative". The aircraft was then cleared to land by ATC and the same was acknowledged by the flight crew.

ATC then informed the flight crew that the aircraft was visual from the Tower, which the crew again acknowledged as "Thank you Sir". This was the last communication from the aircraft to ATC (20:42:12 IST).

At 15ft Above Ground Level (AGL), the aircraft main landing gear collided with the raised Arrestor Barrier, which was installed at 240 ft before the landing threshold of RWY 06R. The aircraft came to a halt on the centreline just beyond the threshold markings of RWY 06R.



Figure: 01



Figure: 02

Subsequently, ATC tried to contact the aircraft 3 times but there was no response.

There was no post impact fire. Two crash fire tenders (CFT 1 and CFT 2) along with the crash ambulance from ATC reached the accident site. There were no fatalities in the accident, however 1 flight crew member and 1 passenger received serious injuries and 1 flight crew member received minor injuries. The Co-Pilot and the passenger exited the aircraft on their own, but the PIC was assisted by the airport ground staff and were taken immediately to the base Station Medicare Centre, where the flight crew and the passenger were given first aid and then sent to Government Hospital.

The aircraft was substantially damaged in the accident.

1.2 Injuries to Persons

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	NIL	NIL	NIL
SERIOUS	01 (Co-Pilot)	01	NIL
MINOR	01 (PIC)	NIL	NIL

1.3 Damage to Aircraft

The aircraft was substantially damaged during the accident. Details are available in “Wreckage and Impact Information” (Para 1.12)

1.4 Other Damages.

The raised Arrestor Barrier which is located 240 ft before the threshold of RWY 06R was substantially damaged and broke away from the assembly as it remained entangled with the main landing gear of the accident Aircraft.



Figure: 03



Figure: 04



Figure: 05

1.5 Personnel Information

1.5.1 Pilot-in-Command

Pilot-In-Command (Pilot Flying- PF)	
Age	56 years
Licence	ATPL
Date of Initial Issue	19-06-2001
Valid Upto	18-06-2021
Type Endorsements/Aircraft Ratings	C-150,C-152A, Pushpak MK1, SKA B200, SKA B200 GT
Date of Medical Examination	28-10-2020
Validity of Medical Examination	06-11-2021
Date of Last IR/PPC check on Aircraft/ Simulator	25-02-2021 (Aircraft)
Total Flying Experience	12324 hrs: 15 mins
Total Experience on Type	9362 hrs: 50 mins

Total Type Experience as PIC	5696 hrs: 00 mins
Hours flown in the last 180 days	188 hrs: 15 mins
Hours flown in last 90 days	106 hrs: 10 mins
Hours flown in last 30 days	44 hrs: 30 mins
Hours flown in last 7 days	18 hrs: 30 mins
Hours flown in the last 24 hours	NIL
Rest Period before flight on 06/05/2021	43 hrs: 05 mins

PIC Training Details

TYPE OF TRAINING	DATE OF TRAINING / CHECKS
IR/LR	B200 - 25/03/2019 (AIRCRAFT) B200 - 23/03/2020 (AIRCRAFT) B200GT - 25/02/2021 (AIRCRAFT)
PPC	B200 - 20/09/019 (AIRCRAFT) B200GT - 22/09/2020 (AIRCRAFT)
SIMULATOR TRAININGS	B200 INITIAL - 03/2002 B200 RECURRENT - 07/2009
GROUND REFRESHER	B200 - 10/07/2018 - DoA, GoMP 05/07/2019 - DoA, GoMP
GROUND REFRESHER/MEL/LOAD & TRIM	B200GT - 27/08/2020 - Saraya Aviation Pvt Ltd
CRM	28/02/2018 - Foundation of Aviation and Sustainable Tourism 10/02/2019 - Foundation of Aviation and Sustainable Tourism 24/02/2020 - MAK Airways Pvt Ltd 23/01/2021 - MAK Airways Pvt Ltd
DANGEROUS GOODS	13/08/2018 - Foundation of Aviation and Sustainable Tourism 30/11/2020 - DGM Academy of Logistics
SEP	12/08/2018 - Ligare Aviation Ltd 06/08/2019 - Air One Aviation Pvt Ltd 29/09/2020 - Ligare Aviation Ltd
MONSOON/ADVERSE WEATHER	28/02/2018 - MAK Airways Pvt Ltd 11/02/2019 - MAK Airways Pvt Ltd 24/01/2020 - Foundation of Aviation and Sustainable Tourism

AVSEC	11/09/2019 - ASTI (Spicejet) 03/03/2021 - ASTI (Spicejet)
PRE FLIGHT TRANSIT TRAINING POST FLIGHT REFUELING	B200GT - 26/12/2020

1.5.2 Co-Pilot

Co-Pilot (Pilot Monitoring- PM)	
Age	37 years
Licence	CPL
Date of Initial Issue	09-05-2008
Valid Upto	08-05-2023
Type Endorsements/Aircraft Ratings	C-152A, C-172, DA-42, BE200, DHC-8, Super King Air 250
Date of Medical Examination	28-7-2020
Validity of Medical Examination	04-08-2021
Date of Last IR/PPC check on Aircraft/Simulator	18-01-2021 (Simulator)
Total Flying Experience	5135 hrs: 10 mins
Total Experience on Type	50 hrs: 30 mins
Total Type Experience as PIC	14 hrs: 55 mins
Hours flown in the last 180 days	50 hrs : 30 mins
Hours flown in last 90 days	50 hrs : 30 mins
Hours flown in last 30 days	21 hrs: 05 mins
Hours flown in last 7 days	07 hrs: 30 mins
Hours flown in the last 24 hours	NIL
Rest Period before flight on 06/05/2021	63 hrs : 30 mins

Co-Pilot Training Details

IR/LR	B200GT - 18/01/2021 (SIMULATOR)
PPC	B200GT - 18/01/2021 (SIMULATOR)
ENDORSEMENT TRAINING (SYSTEM TRAINING) SIMULATOR TRAINING SIMULATOR CHECKS	KING AIR 250 FUSION 5/01/2021 - 17/01/2021 18/01/2021
RHS TRAINING	B200GT - 20/02/21 (AIRCRAFT)
GROUND REFRESHER/MEL/ FAMILIARISATION	B200GT - 19/02/2021
CRM	26/06/2020 - RWSI (Rotary Wing Society of India)
DANGEROUS GOODS	16/08/2019 - SpiceJet
SEP	08/02/2021 - Ligare Aviation Limited
MONSOON/ ADVERSE WEATHER	02/07/2020 - RWSI (Rotary Wing Society of India)
AVSEC	29/08/2019 - ASTI (SpiceJet)
PRE-FLIGHT, TRANSIT TRAINING, POST - FLIGHT, REFUELING	NOT QUALIFIED

1.5.3 DATCO Training Details provided by Indian Air Force

ATC Basic Training	JUNE - DEC 2018
On the Job Training (OJT)	JAN - MAY 2019
Aerodrome Rating	MAY 2019
Approach Rating	JULY 2019

1.6 Aircraft Information

1.6.1 Super King Air B200GT Aircraft Description

The Super King Air B200GT is a twin-engine turboprop aircraft produced by the Beech Aircraft Corporation, today Hawker Beechcraft Corporation. The King Air B200GT is a member of the Beechcraft King Air family. The King Air B200GT is built based on the King Air B200, with higher wing loading. Pratt & Whitney Canada PT6A-52 engines, designed specifically for the King Air B200GT, deliver a maximum cruise speed of 308 knots (570km/h), an impressive climb performance, and the elimination of the 10000 ft takeoff altitude limitation found on King Air B200. The King Air B200GT is capable of carrying up to 9 passengers in the cabin. The King Air B200GT is equipped with Collins Pro Line Fusion cockpit avionics.

VT-MPQ was also equipped with "Pro Line Fusion" cockpit avionics.

The PIC (PF) has been flying the same type of aircraft for the last 7 years. The Co-pilot (PM) was recently endorsed on the B200GT type of aircraft.

All figures in this section have been extracted from the AFM / FCOM / POH.

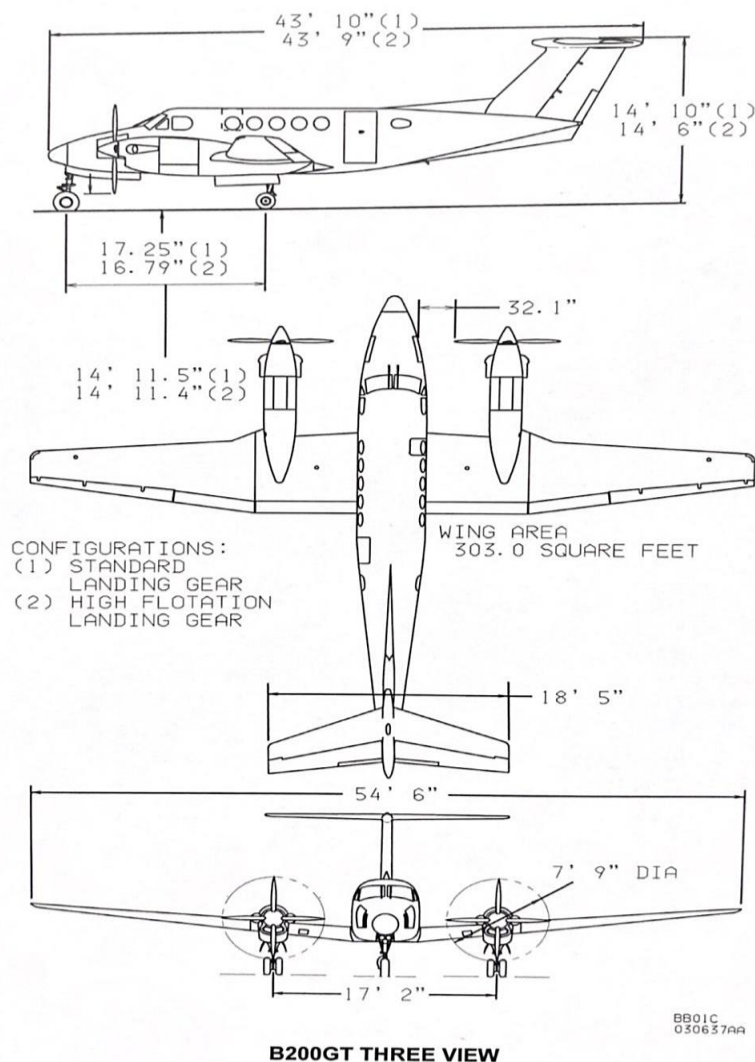


Figure 06: Aircraft dimensions

1.6.1.1 Aircraft Systems Relevant to the Accident

Integrated Terrain Awareness Warning System (iTAWS)

The Collins Aerospace iTAWS system includes a Class 'A' Terrain Awareness and Warning System (TAWS) displayed on the PFD and MFD. The system provides predictive warnings with enhanced TAWS visual cues including TAWS alerts shown on the synthetic vision.

Part of the iTAWS is the Surface Management System (SMS) which provides annunciation and aural alerts to enhance safety. Given below is information from the Rockwell Collins Training module.

Surface Management System (SMS)

The Surface Management System (SMS) provides target runway identification and alerts to ensure the aircraft can take off or land safely. The intended purpose of the SMS system is to enable the aircrew to maintain situational awareness and improve information management on the ground.

The system can be used at any airport within the Flight Management System (FMS) navigation database. SMS runway alerts displayed on the Attitude Direction Indicator (ADI). The SMS system is activated on all displays by the TLAF-5000 function key.

SMS Modes

The SMS has an alert mode for the following conditions:

Mode 1: Not a Runway during Take-off. This mode informs the flight crew that they are attempting to take-off from a surface that is not a runway.

Mode 3: Runway Disagree during Take-off. This mode informs the flight crew that they are attempting to take-off from a runway that disagrees with the selected in the flight plan.

Mode 4: Not a Runway during landing. This mode informs the flight crew that they are attempting to land on a surface that is not a runway.

SMS Alerts

An SMS Mode 1 or Mode 4 condition results in a flashing 'Runway' warning message displayed on the ADI and an associated 'Not a Runway' Aural alert being sounded. The 'Runway' message will be displayed with white text on a red background.

An SMS Mode 3 condition results in a flashing 'Runway ' caution message displayed on the ADI and an associated "Runway Disagree" Aural alert being sounded. The 'Runway' message will be displayed with black text on a yellow background.

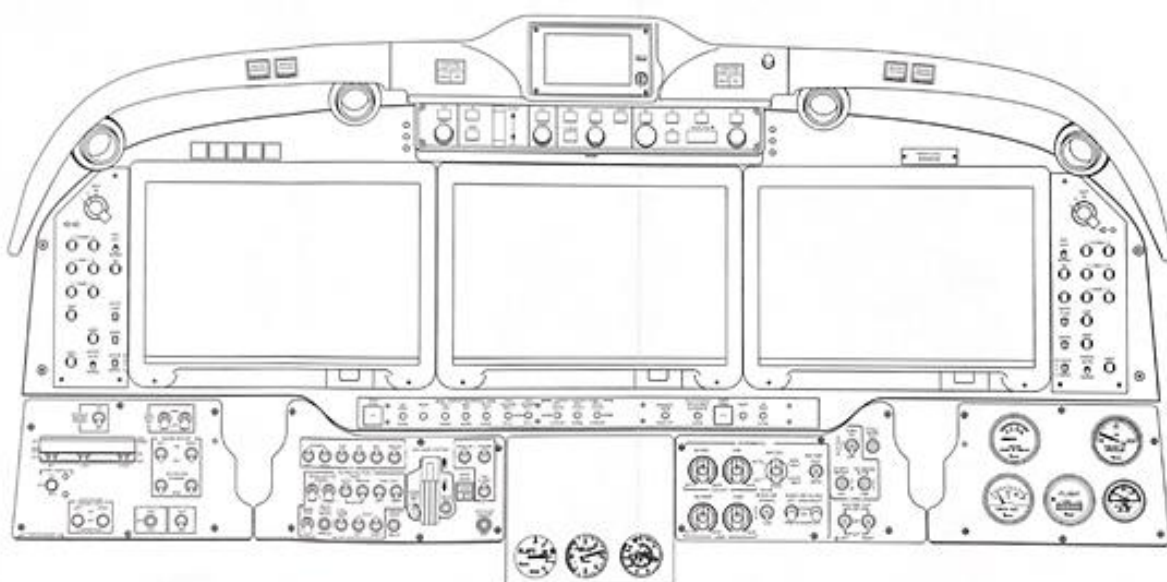
If the conditions for more than one SMS Alert Mode are met, only SMS Alert Mode with the highest priority will be activated. SMS Alert Modes are displayed in order of priority with 1 being the highest and 4 being the lowest.

SMS INHIBIT

The SMS INHIBIT is located under the PFD menu, TAWS/SMS Config and will prevent all SMS Mode alert messages and aural from being asserted when selected. The SMS Inhibit CAS message will be displayed when selected.

SMS RUNWAY HIGHLIGHT

The SMS Runway Highlights is displayed on the Airport Chart when the Airport Chart for the origin or destination airport is displayed and the flight plan contains a valid take-off or landing runway. The SMS Runway Highlight can be turned on (selected) or off (deselected) from the SMS Runway Highlight control located on the Chart Touch screen Toolbar. When selected , a semi transparent highlight is drawn on the runway on displayed geo-referenced airport charts. The runway highlighted includes an arrow for direction indication and displays the flight plan departure runway in cyan or flight plan arrival runway in magenta.



INSTRUMENT PANEL (BY-324 AND AFTER; BZ-2 AND AFTER)

Figure 07: SKA B200GT Instrument Panel



Figure 08: Pilot Instrumentation View



Figure 09: Pilot Instrumentation View

SATELLITE COMMUNICATION

As per CAR Section 3 Series C Part X Issue I dated 2nd June 2010 Para 5.4, **Quote** “The Organization shall nominate a person responsible for operational control of each flight. Such person shall preferably maintain radio contact by any means including satellite communication with the flight crew and should be able to monitor crew actions.” **Unquote**

Refer Appendices (B) : Ministry of Communication Aircraft Station Licence given in Para C Item no. 17 mentioning VT-MPQ was fitted with Satellite Communication in addition to other standard equipment fitted in the aircraft as in Para C Item 1-16.

1.6.2 Aircraft History.

The details of aircraft Super King Air B200GT with registration VT-MPQ are given below :-

Type of Document	Details	Date of Issue
Certificate of Registration (COR)	MSN No. BY-373 Year of Manufacture 2020 Imported and Operated by - Directorate of Aviation, Government of Madhya Pradesh	01/09/2020
Certificate of Airworthiness (COA)	Category - Normal Sub-Division - Passenger Minimum Crew - ONE	03/11/2020
Airworthiness Review Certificate (ARC)	Flight hours at Date of issue 49:30 hrs	03/11/2020
Operator Permit No. 07/2012	SKA B200GT (VT- MPQ) endorsed on Operator Permit	09/11/2020
MEL	Issue 1 Rev 0 dated September 2020	13/10/2020
Aircraft Station Licence	A-003/WRLO-20	01/10/2020
Noise Certificate		03/11/2020
Certificate of Release to Service (Base Maintenance)	A7/MPQ/1203	29/04/2021

1.6.3 Aircraft Maintenance

VT-MPQ was owned by DoA, GoMP, however the Maintenance was outsourced to Air Works India (Engineering) Pvt Ltd. (AWIEPL) under the oversight of DoA, GoMP.

Technical Specifications

Aircraft Type	Super King Air B200GT
Aircraft Manufacturer Serial number	BY-373
Engine Type	PT6A-52 Turboprop Engine
Left hand Engine serial number	PCE RX 1068
Right hand Engine serial number	PCE RX 1069
Propeller Type	Hartzell Propeller, Inc Constant-speed, Full-feathering, Reversing, Counter-weighted, Hydraulically Actuated
Left hand Propeller serial number	NR 523
Right hand propeller serial number	NR 530

No service was due and the aircraft complied with DGCA requirements wrt to maintenance. The aircraft was airworthy and no abnormality was reported before the collision with the arrester barrier.

1.7 METEOROLOGICAL INFORMATION

On 06.05.2021, the visibility at Gwalior was good (6 Kilometers) and the flight crew had been provided with a detailed MET BRIEFING folder at Dispatch prior to their planned 5 Sector flight. The reported visibility met the company requirements to carry out an Instrument and a Visual Approach.

MET BRIEFING FOLDER (VAID-VIGR) provided to the flight crew before the flight on 6th of May 2021. Refer Appendices for details.

On the day of accident i.e. 06.05.2021, the following was the weather reported at GWALIOR (VIGR) :-

METAR	1430 UTC	1500 UTC	1530 UTC
Wind	060 /09 knots	070/06 Knots	110/08 Knots
Visibility	6 Km	6 Km	6 Km
Clouds	SCT 3000 SCT 9000	FEW 3000 SCT 9000	SCT 3000 SCT 9000
Temp/Dew point	27° C /18	27/18	27/18
QNH	1006	1007	1007
Trend	NOSIG	NOSIG	TEMPO - RA

ATIS received by VT-MPQ flight crew in-flight from Gwalior

VIGR (Gwalior) ATIS at 1436 UTC:

FOXTROT / RUNWAY 24L / TR LVL 055 / WIND 060/09 / VISIBILITY 6000M FEW 020/SCT 030/S090 / TEMP 27 DEGREES DEW POINT DEGREES 18 / QNH 1006 / NO SIG.

1.8 AIDS TO NAVIGATION

Navigation Systems on SKA B200GT

- VOR/DME
- ILS
- GPS
- FMS

Enroute Navigation

- VOR/DME (112.8 MHz)

Instrument Approaches

- VOR/DME (RWY 06R)
- ILS (RWY 24L)

There was no report on any Nav-Aid being unserviceable.

1.9 COMMUNICATIONS

VT-MPQ was always in positive contact with ATC throughout the flight on VHF (Indore ATC, Nagpur Control, Delhi Control & Gwalior ATC). After the accident, the investigation team had obtained ATC recordings and transcripts from Gwalior ATC. The crew had contacted and communicated with the channels given in the table below :-

Call Sign	Channel
Gwalior Tower/ Gwalior Approach	122.7 Mhz

The first contact by the crew with Gwalior ATC on channel 122.7 Mhz was at 14:49 UTC. Based on analysis of ATC transcript and recordings, timeline of various events was prepared and made available in the appendices (Appendix J):

NOTE: MPQ in the ATC Tape Transcript to be read as VT-MPQ. ATC tape transcript made available in the Appendices J.

1.10 AERODROME INFORMATION

1.10.1 GWALIOR AIRPORT (VIGR)

Gwalior Aerodrome (Unlicensed) is a Defence airfield with a civil enclave operated by Airports Authority of India. The aerodrome is located 10km North-East of Gwalior, Madhya Pradesh. Its ICAO nomenclature is **VIGR**. The aerodrome is an Indian Air Force (Defence) Airfield with day and night operations, The aerodrome is used by IAF, Scheduled Operators, Non-Scheduled and General Aviation.

The coordinates of Gwalior Airport are 26.17.31.230°N, 078.13.37.160°E and elevation is 619 feet ASL. The airport has two parallel runways, RWY 06L/24R and RWY 06R/24L. The primary Runway is 06R/24L.

Gwalior RWY 06R/24L is an instrument runway. The watch hours are as per operational requirements. The VHF Approach / Tower frequency is 122.7 MHz.

1.10.1.1 WHAT IS AN ARRESTER BARRIER ?

Arrester Barrier (AB): Arrester Barrier is installed at Defence airports where high performance aircraft are operating. The Arrester Barrier as the name suggests is a device which ensures that on landing if the aircraft overruns the runway or during take-off if the take-off is rejected and the aircraft is unable to stop on the runway, the arrester barrier stops the aircraft. By doing so the aircraft is not badly damaged or destroyed. AB is all along the width of the runway when raised and up to a height of 15 feet AGL (approx.). In general, the AB poles on the runway edge are at a height of “28 feet”. Arrester Barrier is only used for IAF high performance aircraft. At Gwalior base the Arrester Barrier Position Indicator lights” was not serviceable for a while in control tower.

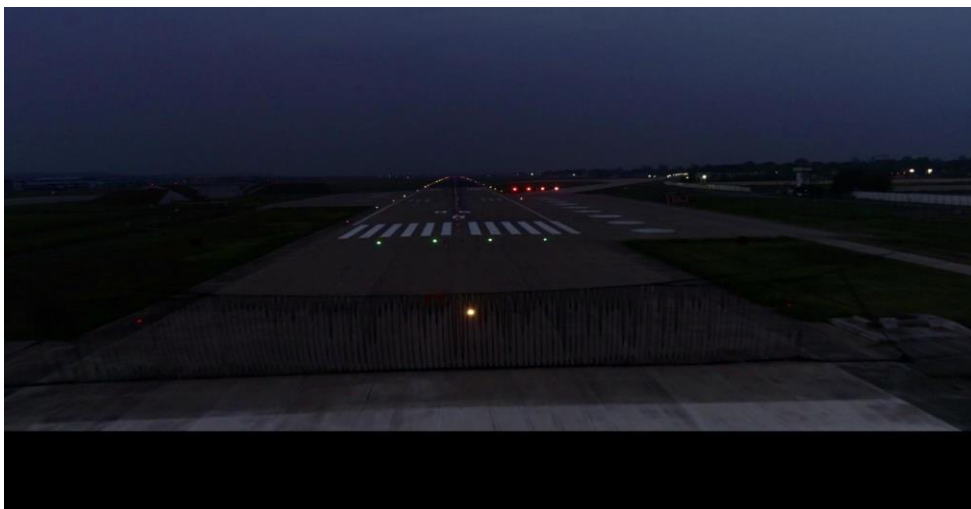


Figure 10: Actual Photo of the Arrester Barrier at Gwalior (VIGR) at dusk.



Figure 11: Indicative picture of Arrestor Barrier

1.10.1.2. THE AIRPORT LAYOUT IS PLACED BELOW:

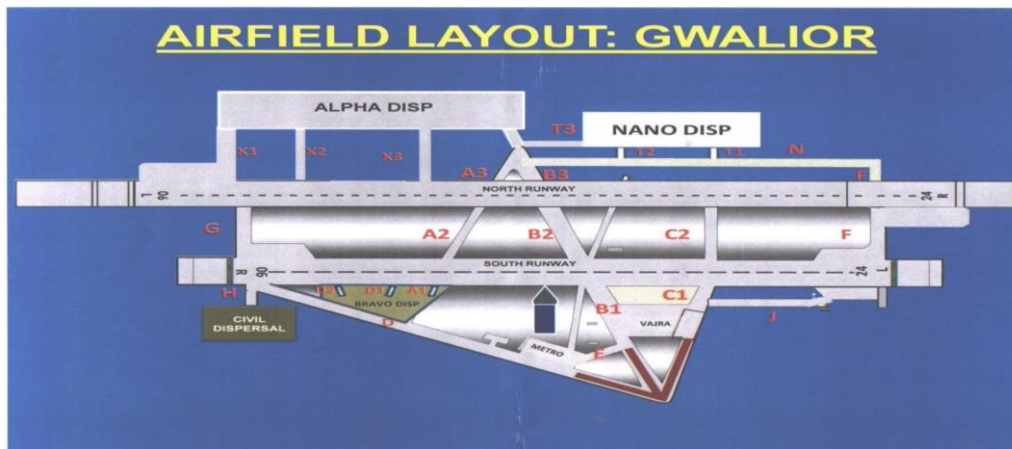


Figure 12: Airport Layout



Figure 13: Location of Arrestor Barrier wrt to the Runway

1.10.1.3. RUNWAY INFORMATION

As depicted on the Instrument Approach Charts :-

RUNWAY	APPROACH TYPE	LENGTH	APPROACH LIGHTS	PAPI	RUNWAY LIGHTS
06R	VOR 06R	9793 ft	SALS	3.0 Degrees	STANDARD
24L	ILS 24L VOR 24L NDB 24L	9793 ft	CAT II	3.0 Degrees	STANDARD
06L	VOR 06L	10025 ft	STANDARD OWL(Czech Type)	2.5 Degrees	STANDARD
24R	VOR 24R	10025 ft	STANDARD OWL(Czech Type)	2.5 Degrees	STANDARD

1.11 FLIGHT RECORDERS

1.11.1 CVR AND DFDR

The aircraft was equipped with a Cockpit Voice Recorder (CVR) and not fitted with any Digital Flight Data Recorder (DFDR).

- As per the current DGCA requirement CAR Section 2 Series I Part V Issue III dated 30th October 2018, DFDR should be fitted on an Aircraft with take-off mass 5700 kgs or less.
- As per an email correspondence with the DGCA office dated 11/10/2019, the operator did cross check about the requirement for installation of a DFDR. Please find below the reply from the DGCA office in this regard:

Quote

“As per Para of CAR Section 2 Series I Part V dated 30.10.2018, Installation of FDR in the Super King Air B250 Aero plane is recommended.”

Unquote

Details of CVR installed on VT-MPQ :

CVR Model: FA2100

Part No. : 2100-1025-22



Fig 14: Photograph of actual recovered CVR

The CVR was removed from the accident site under the supervision of the DGCA officials by the DoA, GoMP Aviation engineering team and handed over to the DGCA officials. No damage was observed to the CVR. The unit was later handed over to the AAIB investigation team, by the DGCA Air Safety Directorate (WR). The CVR was downloaded at the DGCA CVR lab in New Delhi.

A total of 04 audio channels were recovered from the CVR which consisted of recording from 02 Crew mikes, Cockpit Area Mike and a mixed channel. The duration of recording in each channel of the CVR was 02 hrs 04 minutes 13 seconds.

1.11.1.2 COCKPIT VOICE RECORDER

CVR and ATC recordings were analysed and CVR recording was correlated with the ATC recording to synchronise CVR elapsed time with UTC. The CVR was operational and working normally all through the flight till the collision with the arrester barrier. Communication between the ATC & Flight crew was normal and the flight crew were using the proper ICAO phraseology during their RT communications.

1.11.1.3. CVR RECORDING TRANSCRIPT IS GIVEN BELOW:

<u>TIME CVR ELAPSED</u>	<u>TIME UTC</u>	<u>TRANSMISSION BY</u>	<u>CVR CONVERSATIONS AND ALERTS</u>
98:32	14:47:52	NAGPUR RADAR	VT-MPQ NAGPUR RADAR
98:35	14:47:57	VT-MPQ	(CO-PILOT) GO AHEAD SIR
98:39	14:48:01	VT-MPQ	(CO-PILOT) GO AHEAD VT-MPQ
98:41	14:48:03	NAGPUR RADAR	VT-MPQ RADAR SERVICE TERMINATED CONTACT DELHI CONTROL 125.7 AND ALTERNATE GWALIOR FREQ 122.7
98:50	14:48:12	VT-MPQ	(PIC) 125.7 AND 122.7 JAI HIND SIR
99:23	14:48:45	VT-MPQ	(CO-PILOT) DELHI NAMASKAR VT-MPQ
99:28	14:48:50	DELHI RADAR	VT-MPQ DELHI RADAR REPORT IN CONTACT WITH GWALIOR
99:34	14:48:56	VT-MPQ	(CO-PILOT) ROGER CALL YOU TWO WAY WITH GWALIOR VPQ
99:43	14:49:05	VT-MPQ	(CO-PILOT) GWALIOR VT-MPQ
99:56	14:49:18	VT-MPQ	(CO-PILOT) GWALIOR CONTROL VT-MPQ
100:01 100:09	14:49:23 14:49:31	GWALIOR TOWER	VPQ GWALIOR VPQ GWALIOR
100:12	14:49:34	VT-MPQ	(CO-PILOT) SIR NAMASKAR VT-MPQ INDORE TO GWALIOR / MAINTAINING FLIGHT LEVEL 270 / SQUAWK 1410 / ESTIMATING YOUR FIELD AT 1512
100:24	14:50:46	GWALIOR TOWER	VPQ REPORT RELEASED FROM AREA
100:29	14:50:51	VT-MPQ	(CO-PILOT) ROGER CALL YOU RELEASED BY DELHI VPQ
100:34		INTER-CREW CONVERSATIONS	(PIC) OVERLAPPED CONVERSATION “LATEST GWALIOR PLEASE”
100:48	14:51:10	VT-MPQ	(CO-PILOT) DELHI VT-MPQ TWO WAY WITH INDORE, CORRECTION GWALIOR
100:52	14:51:14	DELHI RADAR	ROGER REMAIN WITH GWALIOR, DELHI HAS NEGATIVE TRAFFIC FOR YOUR DESCENT
100:57	14:51:19	VT-MPQ	(CO-PILOT) THANK YOU SIR CHANGING JAI HIND GWALIOR VT-MPQ RELEASED BY DELHI
101:06	14:51:28	GWALIOR TOWER	ROGER MONITOR ATIS 122.8
100:10	14:51:32	VT-MPQ	(CO-PILOT) SIR UNABLE TO READ YOU CAN

101:13	14:52:35	GWALIOR TOWER	VPQ MONITOR ATIS ON 112.8
101:18	14:52:40	VP-MPQ	(CO-PILOT) OVERLAPPING CONVERSATION SAY AGAIN THE FREQUENCY____ CORRECTION QNH
101:22	14:52:44	GWALIOR TOWER	VPQ MONITOR ATIS ON VOR FREQUENCY 112.8
101:28	14:52:50	VT- MPQ	(CO-PILOT) MONITORED SIR AND REQUESTING UH RUNWAY IN
101:32	14:52:54	INTER-CREW CONVERSATIONS VT- MPQ INTER-CREW CONVERSATIONS	(PIC) OVERLAPPING CONVERSATION "REQUESTING RUNWAY IN USE SIR" (CO-PILOT) OVERLAPPING CONVERSATION REQUESTING RUNWAY IN USE SIR (PIC) "REQUESTING 06"
101:36	14:52:58	GWALIOR TOWER	RUNWAY IN USE 24L / SURFACE WINDS 080/06 / CONFIRM WISH TO CARRY OUT VOR 06R
101:43		INTER-CREW CONVERSATIONS	(PIC) 06R VISUAL
101:44	14:53:06	VT-MPQ	(CO-PILOT) AFFIRMATIVE SIR RUNWAY 06R VISUAL
101:48	14:53:10	GWALIOR TOWER	ROGER VISUAL 06R APPROVED / REPORT WHEN AIRFIELD VISUAL AND READY FOR DESCENT
101:52	14:53:14	VT-MPQ	(CO-PILOT) CALL YOU FOR DESCENT AND NEGATIVE TRAFFIC WITH DELHI FOR DESCENT THANK YOU
101:58	14:53:20	GWALIOR TOWER	ROGER
102:01			SOUND OF "GWALIOR ATIS HEARD"
102:55		INTER-CREW CONVERSATIONS	(CO-PILOT) "1006"
103:02		INTER-CREW CONVERSATIONS	(PIC) "GWALIOR SE DESCENT MANG LE" (CO-PILOT) "YES SIR"
103:08	14:54:30	VT-MPQ	(CO-PILOT) GWALIOR INFORMATION FOXTROT MONITORED VPQ REQUESTING DESCENT QNH 1006

103:18	14:54:32	GWALIOR TOWER	VPQ DESCEND 2700 FT QNH 1007 TRANSITION LEVEL 55
103:23	14:54:37	VT-MPQ	(CO-PILOT) DESCEND 2700 FT AND TRANSITION FLIGHT LEVEL 55 COPIED
103:50		INTER-CREW CONVERSATIONS	(CO-PILOT) READS DESCENT CHECKLIST
104:14		INTER-CREW CONVERSATIONS	(PIC) “ ____ ? HE NA” (CO-PILOT) “YES SIR”
104:39		INTER-CREW CONVERSATIONS	(CO-PILOT) “GWALIOR ____? ____CHECK POWER AS REQUIRED” SOUND OF “ <i>ALTITUDE ALERT HORN</i> ” (CO-PILOT) “CHECKED”
106:03		INTER-CREW CONVERSATIONS	(CO-PILOT) “ WEATHER ____? REQUIRED/ WEATHER HE HEH SIR” “LIGHTNING RAIN” (PIC) “ ____ ? DIKH RAHA” (CO-PILOT) “HAH” (PIC) “AGEH HEH”
112:31		INTER-CREW CONVERSATIONS	(PIC) “ ? ” (CO-PILOT) “ ? ”
113:16		INTER-CREW CONVERSATIONS	(PIC) “ ____JHANSI ____ ? ” HINDI (CO-PILOT) ?
113:51		INTER-CREW CONVERSATIONS	(CO-PILOT) “QNH 1006” (PIC) “CHECKED”
114:01			SOUND OF “ <i>MASTER CAUTION CHIME HEARD</i> ”
114:25		INTER-CREW CONVERSATIONS	(CO-PILOT) READS BEFORE LANDING CHECKLIST
115:52		GWALIOR TOWER	VPQ REPORT DISTANCE INBOUND
115:56	15:07:06	VT-MPQ	(CO-PILOT) 25 DME INBOUND SIR
115:59	15:07:09	GWALIOR TOWER	ROGER

116:01		INTER-CREW CONVERSATIONS	(PIC) “ ? ” (CO-PILOT) “ ? ”
116:34		INTER-CREW CONVERSATIONS	(PIC) “KYA BOLA YEH” “KYA BOLA” (CO-PILOT) “ROGER BOLA WO” ? (CO-PILOT) “HE SAID REPORT FIELD IN SIGHT” (PIC) “FIELD IN SIGHT / CAN WE CALL YOU / CAN WE CALL YOU UHH RIGHT BASE 06
116:51	15:08:01	VT-MPQ	(CO-PILOT) APPROACH VPQ WE HAVE FIELD IN SIGHT / MAY WE CALL RIGHT BASE RUNWAY 06R
116:57	15:08:07	GWALIOR TOWER	AFFIRMATIVE VPQ CLEARED VISUAL APPROACH / DESCEND TO CIRCUIT ALTITUDE AND REPORT RIGHT BASE TURN RUNWAY 06R
117:04	15:08:14	VT-MPQ	(CO-PILOT) FURTHER DESCEND TO CIRCUIT ALTITUDE AND CALL RIGHT BASE RUNWAY 06R VPQ
117:09		INTER-CREW CONVERSATIONS	(CO-PILOT) “CLEARED FOR VISUAL APPROACH / NEXT REPORT RIGHT BASE 06R”
118:01		INTER-CREW CONVERSATIONS	(PIC) ?
118:01		INTER-CREW CONVERSATIONS	(PIC) “CITY INDIA KI MAP JAISE DIKH RAHA IDHAR SE DEKNE ME” (CO-PILOT) “ GWALIOR ? ” (PIC) “ACHA” (CO-PILOT) “ ? ” ?
118:38			SOUND OF “BEEP HEARD”
119:10	15:10:20	VT-MPQ	(CO-PILOT) REPORTING RIGHT BASE 06R VPQ
119:15	15:10:25	GWALIOR TOWER	VPQ REPORT FINALS / SURFACE WINDS 080/05 KTS
119:20	15:10:30	VT-MPQ	(CO-PILOT)

			CALL YOU NEXT ON FINALS VPQ / WINDS MONITORED
119:31		INTER-CREW CONVERSATIONS	?
120:13		INTER-CREW CONVERSATIONS	SOUND OF "LANDING GEAR" SOUND OF "MASTER CAUTION CHIME HEARD" (CO-PILOT) "LANDING GEAR DOWN 3 GREENS " ?
120:41		INTER-CREW CONVERSATIONS	NOT CLEAR (PIC) "WO GREEN LIGHT HEH RAHA HEH" (CO-PILOT) "WO DIKH RAHA HEH" (PIC) "DIKH RAHA HEH AAPKO" (CO-PILOT) "___?"
120:58		INTER-CREW CONVERSATIONS	NOT CLEAR (PIC) "DIKHA TUMKO" (CO-PILOT) "___? NAHIN" (PIC) "DIKHA"
121:03		INTER-CREW CONVERSATIONS	(PIC) "TURNING FINALS"
121:05	15:12:15	VT-MPQ	(CO-PILOT) TURNING FINALS 06R VPQ
121:11	15:12:21	GWALIOR TOWER	VPQ CONFIRM RUNWAY VISUAL
121:14	15:12:24	VT-MPQ	(CO-PILOT) AFFIRM SIR BOTH RUNWAY VISUAL
121:16	15:12:26	GWALIOR TOWER	VPQ 06R CLEARED TO LAND
121:20	15:12:30	VT-MPQ	(CO-PILOT) CLEARED TO LAND VPQ (CO-PILOT) "AB DIKHA"
121:28		INTER-CREW CONVERSATIONS	(PIC) "AB BOLEGA NOT THE RUNWAY, NOT THE RUNWAY" NOT CLEAR (PIC) "___? /LANDING FLAPS" NOT CLEAR
121:52		INTER-CREW CONVERSATIONS	NOT CLEAR (PIC) "LIGHTS ON KAR DENA"

			"LANDING LIGHTS"
122:07	15:13:17	VT-MPQ	(CO-PILOT) "RECONFIRM CLEARED TO LAND VPQ"
122:12	15:13:22	GWALIOR TOWER	VPQ CLEARED TO LAND 06R
122:15	15:13:27	VT-MPQ	(CO-PILOT) "CLEARED TO LAND 06R VPQ"
122:20	15:13:32	GWALIOR TOWER	VPQ VISUAL FROM TOWER SOUND OF "ALTITUDE ALERT HORN HEARD"
122:22	15:13:34	VT-MPQ	(CO-PILOT) "THANK YOU SIR"
122:25			"AUTOPILOT DISENGAGED SOUND HEARD"
122:31		INTER-CREW CONVERSATIONS	(CO-PILOT) "ALL CHECKS COMPLETED"
122:50		INTER-CREW CONVERSATIONS	(CO-PILOT) " ? WINDS HEADWIND TEES KNOTS"
123:05		INTER-CREW CONVERSATIONS	"500 - AUTO CALLOUT HEARD" (PIC) " LAND GREEN/FULL FLAPS/3 GREENS) (CO-PILOT) "YES SIR ALL CHECKED"
123:27		INTER-CREW CONVERSATIONS	(PIC) "BADEE <u>ZABARDAST</u> STRONG WIND HEH YAAR" (CO-PILOT) "HAH SIR" (PIC) "HEH NAH, JAHAAZ KO THIK SE <u>PAKADNA</u> HEH"
123:36		INTER-CREW CONVERSATIONS	"NOT A RUNWAY – AUTO CALLOUT HEARD" (PIC) "YEH DEKH" "NOT A RUNWAY- AUTO CALLOUT HEARD" ? (PIC) " ____ BHAI"
123:43		INTER-CREW CONVERSATIONS	(PIC) "HO GAYA" (CO-PILOT) "HAH SIR"

123:50		INTER-CREW CONVERSATIONS	(PIC) "YEH DEKH TOWER YEH BAHUT AACHA BANA KE RAKHA HEH YAHAN PAR" (CO-PILOT) "JEE" (PIC) "YEH YEH DIKH RAHA HEH" (CO-PILOT) "HAH SIR" <i>"MOBILE PHONE MESSAGE TONE HEARD"</i>
123:59			<i>"100 – AUTO CALLOUT HEARD"</i>
124:04			<i>"50 – AUTO CALLOUT HEARD"</i>
124:05			<i>"40 – AUTO CALLOUT HEARD"</i>
124:08			<i>"30 – AUTO CALLOUT HEARD"</i>
124:10			<i>"20 – AUTO CALLOUT HEARD"</i>
124:11	15:15:24	INTER-CREW CONVERSATIONS	(CO-PILOT) "SIR SIR" <i>SOUND OF A THUD HEARD FOLLOWED BY THE ELT ALARM</i> END OF RECORDING

NOTE: ? denotes Unintelligible words during Inter-Crew communications (Flight Crew not wearing headsets).

1.12 WRECKAGE AND IMPACT INFORMATION

1.12.1 General Observation

Seconds before the aircraft collided with the arrester barrier, the Co-Pilot (PM) in his statement mentioned that he saw the arrester barrier and by instinct applied back pressure on the control column, which ensured the nose wheel did not impact the arrester barrier, however the aircraft's main landing gears contacted the arrester barrier at 15 feet AGL, which is installed at 240 feet before the runway 06R threshold. Thereafter the aircraft pitched down and impacted the runway in a nose down attitude, and in addition the propellers of both running engines also contacted the runway. Post impact on the runway surface, the aircraft dragged the arrester barrier for a short distance and then came to a halt. Drag marks of the landing gears and impact marks of propellers were observed on the runway. The aircraft was damaged substantially.

The aircraft wreckage was confined to RWY 06R just beyond the threshold markings on the centreline of the runway and short of the Runway designator.



Figure 15: Location of the Aircraft on the Runway

All the aircraft parts were accounted for and were contained within a small area around the aircraft's final resting place.

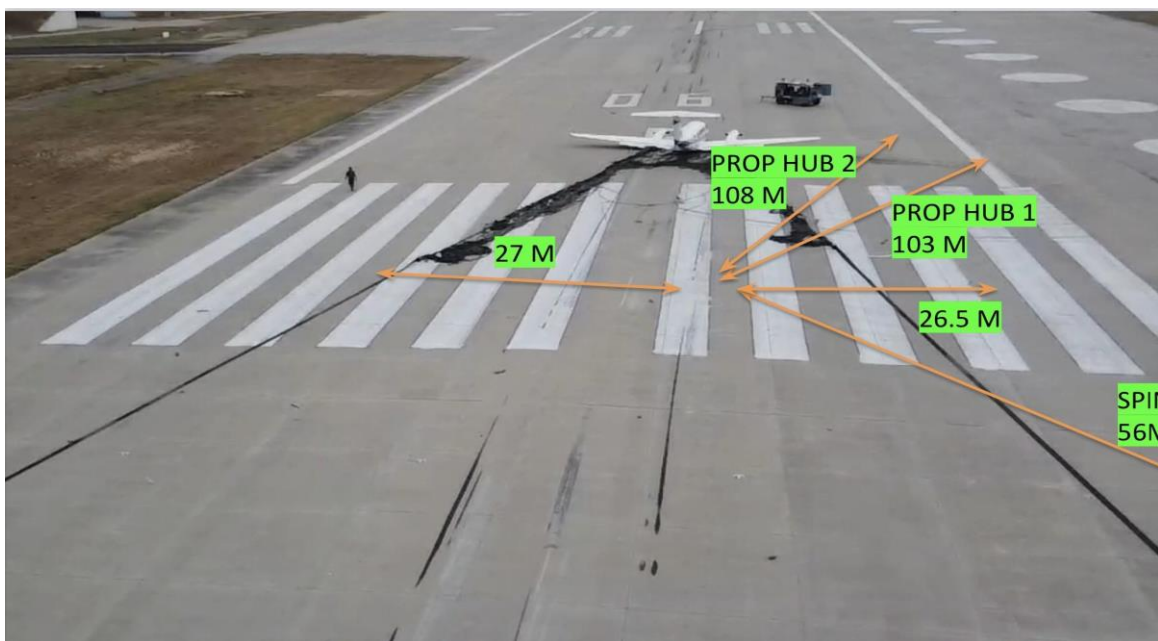
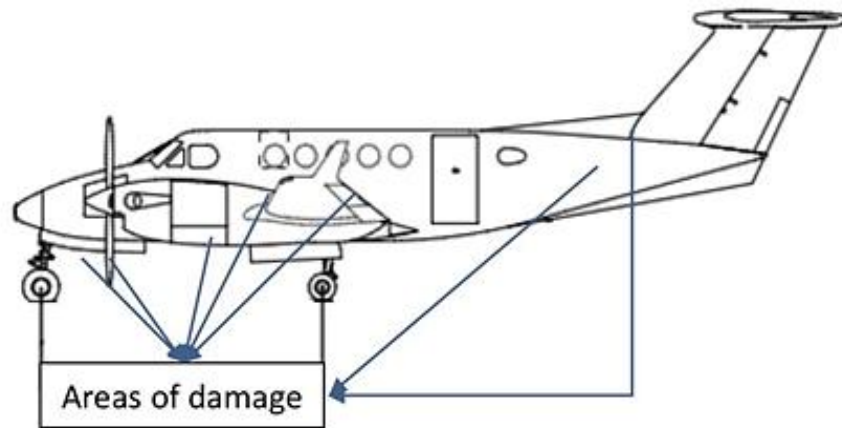


Figure 16: Location of Aircraft parts on the Runway

Post the initial inspection of the aircraft, the aircraft wreckage was moved to an interim position and then subsequently moved to an IAF hangar and kept for further detailed inspection. The wreckage was required to be moved due to IAF operational requirements and also to save the aircraft avionic equipment's from monsoon rains.



General Damage Locations on the King Air Model B200GT

Figure 17

1.12.2 Damage Assessment:



Figure 18: Damaged aircraft

The aircraft sustained significant multiple impact damage to the Nose, all landing gears, forward fuselage skin, both wings, both power plant and its cowling and nacelle structures, both flaps, dorsal fin, vertical stabilizer, rudder and empennage.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

1.13.1 Breath Analyser (BA) examination

The crew reported at Bhopal Airport on time and had their Pre-flight Breath Analyser (BA) examination carried out at approximately 1603 IST (PIC) and 1601 IST (Co-Pilot). The BA examination for both pilots before the flight was satisfactory.

The investigation team reviewed the company policy with reference to the Breath Analyser examination for the Flight Crew, Maintenance staff and the Ground handling staff.

Flight Crew Pre-flight Breath Analyser examination is not recorded on camera as the same is not mandated by DGCA CAR Section 5 Series F Part III for General Aviation and DoA, GoMP Operations Manual Chapter 12 Para 6.20.3 (c).

However, post the accident, the Post-Flight Blood, Urine etc. tests were NOT carried out for the flight crew which is required as per DGCA CAR Section 5 Series F Part III Para 10 and DoA, GoMP Operations Manual Chapter 12 Para 6.20.7 (a).

1.13.2 Injury and Hospitalisation Details

	<i>Nature of injury</i>	<i>Time spent in hospital (approx.)</i>
PIC	Minor (toe fracture, dislocation Right foot)	< 48H
Co-pilot	Serious (blunt trauma to chest and neck and hospitalisation > 48 hours)	8-9 days
Passenger	Serious (haemorrhage, lung contusion)	< 48H

*As per ICAO Annex 13: Aircraft Accident and Incident Investigation, Chapter 1: Definitions

1.13.3 Medical Status of DATCO on duty

Information provided by the DATCO regarding his medical history revealed no significant recent medical illness. As per the records, on the day of the accident, he was not suffering from any physical or mental illness. He has had a past history of a recurrent dislocation of the right shoulder in 2013 for which he was in low medical category. During his interview, he mentioned that he had regained his medical category and was awaiting a return back to flying duties. He has been performing DATCO duties for the past 2 years.

1.13.4 Aeromedical Considerations

PIC and Co-pilot

1. *Fitness for duty based on medical fitness* – There is no evidence of past or present medical/ psychological illness that could have affected their decision making or exercising the safe privileges of their license.
2. *Fitness for duty based on operational readiness* – The crew was informed about the flight at short notice to deliver COVID-19 medicines. The PIC of this flight was in the right seat for the previous two sectors. There is no history or finding suggestive of fatigue or excessive mental workload. They were fit for flying duties.
3. *Fitness for duty based on effect of work environment/ inflight factors* – There were no physiological factors inflight that caused a decrease in flight crew performance.

DATCO

1. *Fitness for duty based on medical fitness* – The DATCO had no present medical / psychological illness that could likely affect his role as an DATCO. Since his low medical category did not allow him to fly as a pilot and was instead on controller duty since two years.
2. *Fitness for duty based on operational readiness* – As mentioned in his interview, his duty hours were:

1.13.5 DATCO Duty Pattern from 03/05/21 - 07/05/2021 as informed to the Investigation Team by the DATCO in his interview

Date	Duty/Rest Period	Duty Timings (IST)	Duty Hours
03/05/2021	Duty <u>REST PERIOD</u> Duty	0600 - 1300 <u>1300 - 2000</u> 2000 - 0600*	7 hrs <u>7 hrs</u> 10 hrs
04/05/2021	<u>REST PERIOD</u> Duty <u>REST PERIOD</u>	0600-1340 1340 - 2200 <u>2200 - 0600*</u>	7hrs 40 mins 8 hrs 20 mins <u>8 hrs</u>
05/05/2021	Duty <u>REST PERIOD</u> Duty	0600 - 1330 <u>1330 - 2000</u> 2000 - 0600*	7 hrs 30 mins <u>6 hrs 30 mins</u> 10 hrs
06/05/2021	<u>REST PERIOD</u> Duty	<u>0600 - 2000</u> 2000 - 0600*	<u>14 hrs</u> 10 hrs

NOTE : * Signifies the following day

1. The DATCO in his statement mentioned that he managed only 3 hours of rest on the 6th of May 2021, between 0600 hrs and 2000 IST hrs due to personal commitments. The DATCO was back on duty from 1930 (Start of Duty was from 2000 hrs IST) to 0600 hrs IST. The Accident occurred at around 2045 hrs (approx.) IST. There is a likelihood of fatigue due to inadequate rest.

2. No Breath-Analyser examination, Blood or a urine test was carried out for the ATC staff post the accident, as currently no regulation exists in this regard in the Indian Air Force.

1.13.6 Summary of Medical, Pathological and Aeromedical Considerations

As per the records provided, Interviews of the Flight Crew, the ATC personnel and the CVR recording, there is no evidence of any subtle or overt incapacitation in either the crew or the DATCO that could have resulted in the accident. There is also no apparent underlying medical condition or medications that could have led to a detrimental performance while flying.

There was no blood or urine testing done for alcohol or drugs post the accident for the Flight Crew or the entire ATC staff.

There were errors and violations at various levels which are discussed under HFACS.

1.14 FIRE

1.14.1 Photographic evidence shows that there was a severe fuel leak post the accident, but no fire was reported or any evidence of fire observed.



Figure 19: Fuel Leakage



Figure 20: Fuel Leakage

1.15 SURVIVAL ASPECTS

The accident was survivable.

1.15.1 Search & Rescue Aspects

The Indian Air Force personnel mentioned in their statement that two crash fire tenders (CFT 1 and CFT 2) along with the crash ambulance of ATC reached the accident site.

- As per the Interviews with the PIC and Co-pilot, both mentioned only that only one SUV vehicle reached the accident site after the accident and until they were transported to the “Station Medicare Centre (SMC)”. Also, the ARFF had not reached the accident site. Evidence shows that a severe fuel leak was observed but no fire was reported or observed.
- Further the Co- pilot mentioned that the passenger and himself exited the aircraft first on their own, however the SUV team assisted the PIC to exit the aircraft.
- The PIC mentioned that it took anywhere between 3-6 mins to rescue him.

However, no video recording was made available to the investigation team to quantify this statement. To capture the “Search & Rescue” efforts on video, is a DGCA requirement as per Air Safety Circular 4 of 2013 & 5 of 2014 (Refer Appendices L& M).

1.16 TESTS AND RESEARCH

1.16.1 Engine Disassembly and Investigation

- Engine examination concluded that both engines displayed rotational signatures characteristic of producing power at impact and examination of available engine components did not show any evidence of pre-impact. Further, the damaged propeller blades indicated that

none of the engine propeller blades were in a feathered position prior to impact with the runway surface.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

1.17.1 Reporting Culture in an Organization with regards to Safety Management System (SMS)

Definition: A reporting culture means cultivating an atmosphere where people have the confidence to report safety concerns without fear of blame and/or consequence. It will also ensure that people understand the SMS processes at a personal level.

1.17.2 Directorate of Aviation, Government of Madhya Pradesh (DoA, GoMP)

As per CAR Section 2 Series F Part III Issue II dated 25th November 2014 Rev 3 APPENDIX C dated 4th September 2017, the operator was authorised for Passenger Operations, NOT for Cargo Operations (Quote - “The aircraft owned by State Government shall be certified in Normal Category Sub-division Passenger Aircraft”).

Directorate of Aviation, Government of Madhya Pradesh is a State Government Operator and was issued an Air Operator Permit No. 07/2012 by DGCA. As per the Para 2.1.1 of Part A of Operations Manual (OM), Madhya Pradesh Govt. has a Super King Air B200GT in its fleet. The organisation structure is given in Para 2.1.1 Annexure 1 of the OM and as depicted below :

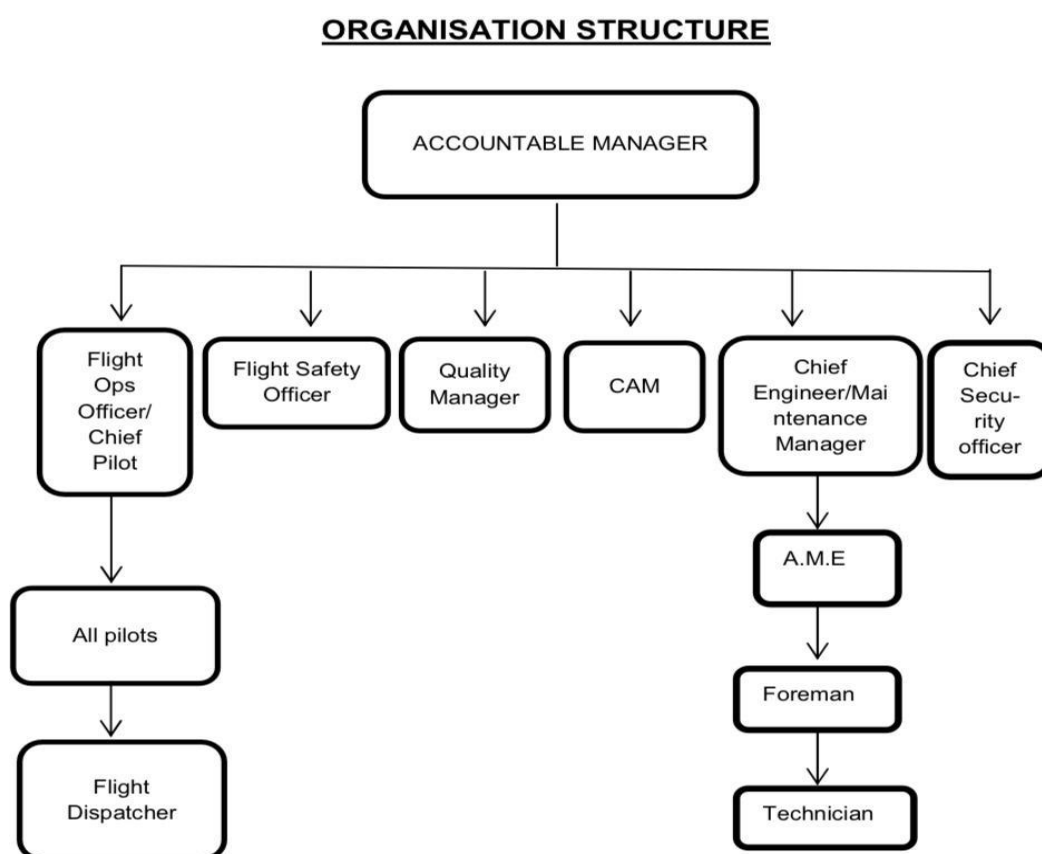


Figure 21: Organisation Chart

As per the requirement of CAR Section 8, Series O, Part III, DoA, GoMP had obtained approval from the DGCA for the following post holders :-

POST	DATE OF DGCA APPROVAL	REMARKS
Accountable Manager	01/03/2021	Notification letter sent to DGCA
Flight Operations Officer	09/2010	-
Flight Safety officer	30/7/2019	Notification letter sent to DGCA
Quality Manager (QM)	08/02/2012	-
Continuous Airworthiness Manager (CAM)	13/12/2011	-

- DoA, GoMP has had 9 Accountable Managers (AM) in the last 4 years. Tenure for each have been given below:

Accountable Managers since 2017

S.No.	Letter No.	Dated
AM 1	1-3/2011/XLV	07-07-2017
AM 2	1-3/2011/XLV	28-05-2018
AM 3	1-3/2011/XLV	25-07-2018
AM 4	1-3/2011/XLV	03-09-2019
AM 5	1-3/2011/XLV	05-03-2020
AM 6	1-3/2011/XLV	01-05-2020
AM 7	1-3/2011/XLV	27-06-2020
AM 8	1-3/2011/XLV	13-07-2020
AM 9	1-3/2011/XLV	01-03-2021

- The PIC was himself the Alternate Accountable Manager at the time of the accident.

1.17.2.1 Operations Manual

Refer below the Extract from Directorate of Aviation, Government of Madhya Pradesh Operations Manual (Chapter 01 Pg 1)

Quote

“The Operations Manual Issue III Rev 0 of dated 13th October 2020 has been prepared in accordance with provisions of CAR Section 8 Series Part III Issue II dated 31st July 2017 and

CAR Section 8 Series O Part VII Issue I Rev 3 dated 9th November 2018 and contains all stipulations of mandatory DGCA requirements.”

Unquote

1.17.2.1.1 Operations Manual Chapter 16

The operator has proactively chosen to categorise various airfields they operate into and the same has been given in Chapter 16 of their Operation Manual. Though it is pertinent to note that OC 02 of 2012 is not applicable to the operator.

Framework for determining Route and Aerodrome Competence Qualification for the Crew is given in the Operations Circular 02 of 2012 issued by DGCA. As per Para 4 of Circular, all operators are required to carry out an assessment of the area of operation and categorize the aerodromes depending upon the safety risk assessment and shall define the training and qualification requirements for those aerodromes.

The Operations Manual should specify a method of categorization of aerodromes into Category A, B and C where Category A is the least demanding aerodromes and Category B and C are applied to progressively more demanding aerodromes. Operators are also required to specify the minimum experience, training and assessment qualifications for each category of these aerodromes. As per the circular, aerodromes satisfying following requirements are to be categorized as Category A aerodromes: -

- "(a) An approved instrument approach procedure;*
- (b) At least one runway with no performance limited procedure for take-off and/or landing;*
- (c) Published circling minima not higher than 1000 feet above aerodrome level; and*
- (d) Night operations capability"*

The circular also provides a list of Aerodromes which should mandatorily be classified as Category C aerodromes.

- The applicable CAR for the operator for operating into a Defence Airfield is CAR Section 3, Series D, Part I “Operations to Defence Airfields by Civil Operators” and CAR Section 4, Series B, Part VI “Minimum Safety Requirements for Temporary / Unlicensed Aerodromes.

1.17.2.1.2 Controlled Flight into Terrain (CFIT)

Company Operations Manual: CFIT - Para 6.17.4 (b) Recommendations: Quote “If IFR, fly published procedures. Fly the full published procedure at night.” **Unquote**

Definition of CFIT: Is defined as an unintentional collision with terrain (the ground, a mountain, a body of water, or an obstacle) while an aircraft is under positive control. Most often, the pilot or crew is unaware of the looming disaster until it is too late. CFIT most commonly occurs in the approach or landing phase of flight.

Company Operations Manual 12.4.5 & DGCA Operations Circular 2 of 2017: Gives reference to GPWS/EGPWS training: During the interview with the PIC (PF), the topic of GPWS/ EGPWS training was brought up, however the PIC was not aware about GPWS training/check.

1.17.2.1.3 Approach Briefing

A detailed Approach Briefing is required to be carried out as per the operators Operations Manual (Chapter 7 Appendix C, 3.0)

3.0 APPROACH BRIEFING	
Aircraft Technical Status	
Notams, Weather, Runway Condition, Expected Approach, DOA, GoMP Minima	
Fuel	Extra Fuel / Time.
Descent (PLAN)	
(a)	TOD
(b)	TERR on ND Required,
(c)	MSA
(d)	Radar Vectors / DME Arc / Overhead Approach
Approach	
(a)	<u>Approach Type</u> : Follow Jeppesen Template / AAI Template (Chart No / date, Freq, Ident, Inbound Crs, (FAF Alt /MDA / DH / PFD), Airfield Elevation, highest obstruction, cautions, Intermediate Approach Alt, Final Approach Point, GS angle, MAP, PAPI, ALS, Missed App callout – actions – proc and use of automation, Minima for GS out.
(b)	<u>In case of NPA</u> – Lateral / vertical profile, Flight path angle, DME altitude crosschecks by PM,
(c)	If reported, review Windshear actions.

1.17.2.1. 4 When does the company call an Approach Stabilised:

Refer: Operations Manual Chapter 1, Para 1.3.238 (Definitions)

An approach which is flown in a controlled and appropriate manner in terms of configuration, energy and control of the flight path from a predetermined point or altitude/ height

down to a point 50 feet above the threshold or the point where the flare manoeuvre is initiated, if higher.

DGCA Operations Circular 03 of 2017 & Company Operations Manual Chapter 7, Para 7.20.2:

Stabilized Approaches:

- A) Is in landing configuration
- B) On the correct flight path
- C) ILS Approach-within one dot of the localiser & glide slope
- D) Visual approach- wings level at 500 feet AGL
- E) Only small heading and pitch changes required
- F) Indicated airspeed is not more than VRef +20 Kts and not less than VRef
- G) During IMC-Stable by 1000 feet AGL
- H) During VMC- Stable by 500 feet AGL
- I) Sink Rate is not more than 1000 feet/min. A special briefing is required if the rate of descent required is more than 1000 feet/min
- J) Power setting appropriate for the aircraft configuration
- K) All briefing and checklists are complete.

- **The Operators Operations Manual provides guidance for landing distance calculations:**

Quote

“16.4.3 Landing Distance. It is the horizontal distance from a point 50 feet above the landing surface to a complete stop. That is, it contains no margins. The following is assumed that the airplane arrives:

- a) 50 ft. above the runway from a 3° glideslope,
- b) at idle power,
- c) at VREF (no less than 1.3 VS), and
- d) continues to a touchdown at a rate of no more than 6 ft./sec (360 ft./min).”

Unquote

1.17.2.1.5 Responsibility of DoA, GoMP to Ensure Compliance with Regulatory Requirements

Reference DoA, GoMP Operations Manual **Chapter 01:**

Quote

“1.1.1 Statement for the Compliance of Operations Manual :

(a) The Operations Manual complies with all applicable regulations and with the terms and conditions of the applicable Air Operator Certificate.

(b) All reference documents for compliance viz. Civil Aviation Requirements and Circulars are placed at Appendix A to this chapter.

(c) The Operations Manual of DoA, GoMP has been prepared in accordance with CAR Sec-8 Series O, Part III Issue II dtd 31st July 2017 and CAR Sec-8 Series O, Part VII Issue I Rev. 3 dated 9th November 2018 and contains all stipulations of mandatory DGCA requirements.

1.1.2 Statement for the Compliance for Operational Personnel :

(a) The Operations Manual is a comprehensive document detailing the company's policies on Operations and contains detailed operational procedures to be followed by DoA, GoMP.

It provides necessary information and instructions to guide personnel connected with Flight Operations in the proper discharge of their duties.”

Unquote

1.17.2.1.6 Operations Manual Chapter 12 (Personnel Qualification and Training)

The DoA, GoMP flight crew undergo Recency Training and Checks as defined in Operations Manual Chapter 12 which is based on DGCA CAR Section 8 Series F Part VII Issue 1 dated July 2015 (Flight Crew training and qualification requirements for Scheduled Commuter and Non Scheduled Operators : Small Aeroplanes). The Investigation Team reviewed the requirements in detail.

1.17.2.2 Refer Pilot Operating Handbook (POH) and Flight Manual Section X “Safety Information”: VFR at Night:

Quote

“Do Not Depend on your ability to see obstacles in the night time to miss them”

Unquote

1.17.2.3 Instrument Approach Charts

Company provided the Flight Crew with Instrument Approach charts including the Defence Airfield charts and were on board at the time of the accident.

1.17.2.4 Maintenance Organisation of DoA, GoMP

General Organization Chart

This chart provides a comprehensive understanding of the whole of the DAMP Management structure.

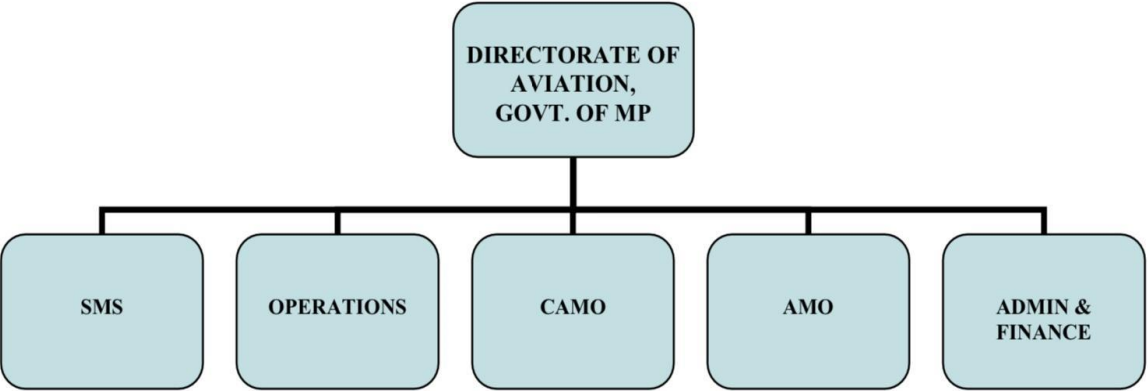


Figure 22: Organisation Chart in DAMP structure

Continuing Airworthiness Management Organization Chart

This chart shows the continuing airworthiness management structure for CAR M Subpart G purposes, and also shows the independence of the quality system.

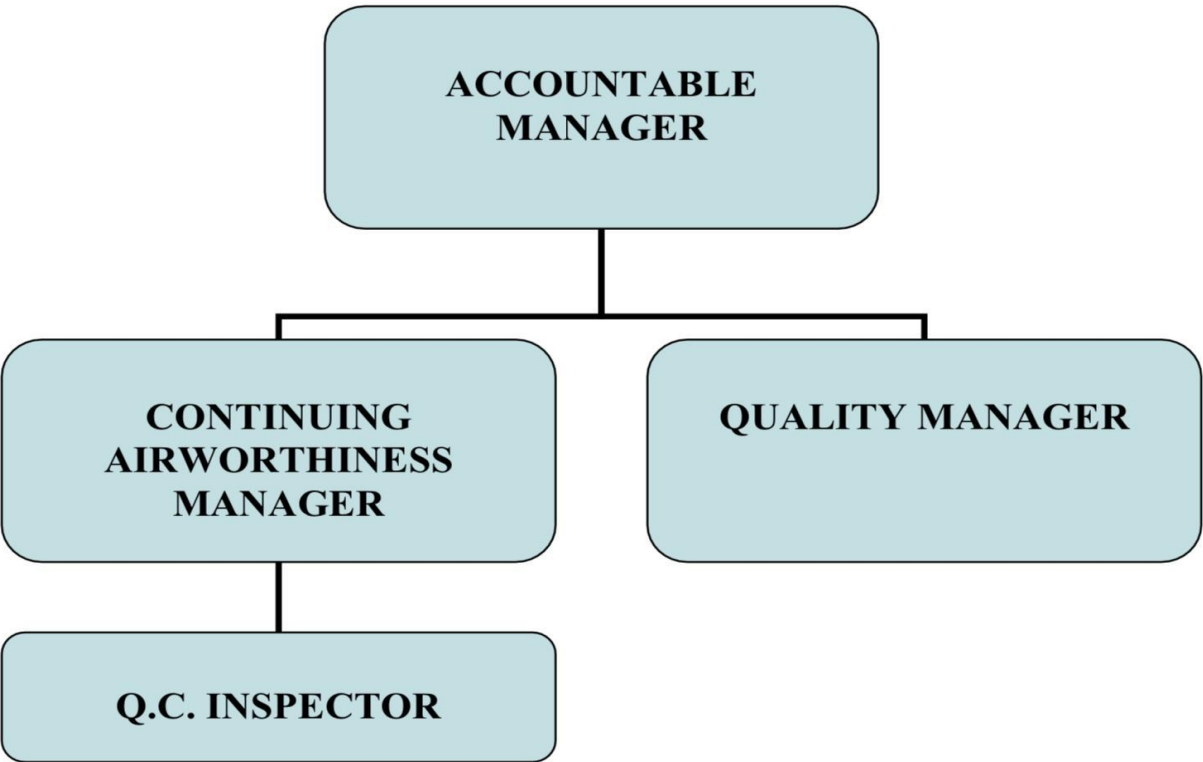


Figure 23: Maintenance Organisation Chart

A brief of the organisation set up for Engineering functions:

"Directorate of Aviation, Govt. of M.P. (DAMP) is a CAR-M, Subpart 'G' approved organisation which is structured under the management of Accountable Manager.

A Quality System is established which works independently and monitors all activities of the continuing airworthiness management system to ensure that it remains in conformity with the applicable CAR-M requirements."

1.17.2.4.1 Continuous Airworthiness Maintenance Exposition

DoA, GoMP has one designated Continuous Airworthiness Manager.

1.17.2.4.2 Maintenance Organisation Exposition

Maintenance for VT-MPQ was contracted to Airworks India (Engineering) Pvt Ltd. (CAR 145 approved organization) from 14th August 2019 and had the requisite approvals for all post holders from the DGCA. The MOE was an Initial Issue Rev 03, dated January 2021.

Relevant extracts from the Agreement between DoA, GoMP and Airworks India (Engineering) Pvt Ltd (AWIEPL) are quoted below and extracts available in the **Appendices (E)**.

1.17.2.4.3 Relevant extract from the MoU between DoA, GoMP and AWEIPL dated 14th Aug 2020 :

Customer's (DoA, GoMP) Responsibilities and Obligations

Reference Para 3 (3.1) Quote: "Use the aircraft in accordance with the technical limitations/Specifications as specified on the Airworthiness Certificate and according to all legal prescriptions and regulations as to OEM's operating, flight and load manuals." **Unquote**
The Investigation Team observed that the DoA, GoMP was responsible for seeking approvals from the DGCA office regarding Carriage of Cargo in the Passenger Cabin, the revised Weight Schedule and Load & Trim sheet for the aircraft, after the seats were removed. However, DoA, GoMP was unable to produce a copy of the revised approvals.

From the foregoing, it is clear that DoA, GoMP was responsible for all the regulatory compliance.

1.17.2.4.4 Responsibility of DoA,GoMP to ensure the aircraft was Insured:

As per the DGCA CAR Section 2 Series X Part VII Rev 7 dated 12th June 2020 requirements for “Documents to be carried on board by Indian Registered Aircraft”, copy of a Current comprehensive insurance policy covering passengers and their baggage, crew, third party risks, hull loss is mandatory.

1.17.2.4.5 Reference Operations Manual Chapter 7, Para 7.21: Documents to be carried on Board the Aircraft:

7.21.1 No person in charge of any aircraft shall allow such aircraft to be flown unless the following valid documents, as applicable (in original or attested copies by a DGCA officer), are carried on board the aircraft:

(v) Current comprehensive Insurance Policy covering passengers and their baggage, Crew, third party risks, hull loss.

1.17.2.4.6 Extract from the MoU between DoA,GoMP and AWEIPL dated 14th Aug 2020 Aircraft Insurance

Reference Para 3 (3.8) Quote: “Obtain and maintain Comprehensive Insurance under the Aviation Insurance policy and Aircraft Liability Insurance according to applicable air law regulations, conditions of carriage,etc. which would cover all risks and perils including-hull, air accidents and mishaps, third party liability,baggage loss, death/injury of passengers and crew , property damage etc.” **Unquote**

The Investigation team was notified by DoA, GoMP that the aircraft (VT-MPQ) was not insured.

The aircraft not being insured was not meeting the requirements laid down by the DGCA the company policy and the MoU between DoA,GoMP and AWEIPL (**Refer Appendices E**).

1.17.2.4.7 Reference Operations Manual Para 11.7.2 Accident Prevent Program, Para 11.7.2.2 (Proactive Program)

Quote

“(c) The value of data retrieved from the Cockpit Voice Recorders (CVR) and Digital Flight Data Recorders (DFDR) has been proven. Periodic monitoring of CVR and DFDR must be carried out by DoA, GoMP. As the DFDR systems are enhanced with greater recorder capacity, they will become even more valuable tools not only for accident investigation but also accident prevention. The recorded data can be analyzed for the purpose of checking deviations in flight parameters beyond acceptable limits which are critical to flight safety. The DoA, GoMP

should get this data analyzed with the help of suitable computer software to determine the deviations of different flight parameters beyond acceptable limits.”

Unquote

1.17.3 Indian Air Force Organization structure at Gwalior

The structure at the station level comprises the SAS&IO assisted by the AS&IO (Admin) and the MS&IO (Maintenance) with respective Warrant Officers and staff. The SAS&IO is directly responsible to the AOC/Stn Cdr for all Aerospace Safety related aspects. The structure is as given below: -

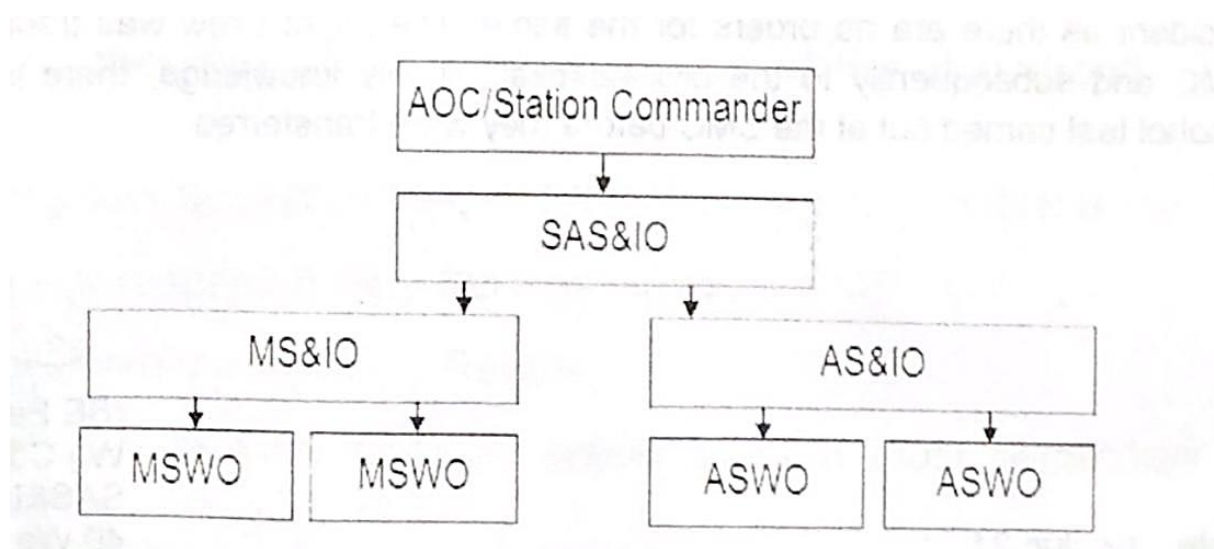


Figure 24: Organisation Chart

1.17.3.1 Duties and Responsibilities of SAS & IO

- a) Advising and assisting the AOC/Station Commander in maintaining a high standard of Aerospace Safety.
- b) Maintaining surveillance to identify Aerospace Safety Hazards in aircraft operating techniques and station environment.
- c) Processing of OHRs.
- d) Coordinating Aerospace Safety publicity and education to enhance safety awareness amongst all station personnel.
- e) Reporting of accidents and incidents in accordance with para 6 of AFO 08/14 on the subject.
- f) Assisting Courts of Inquiry into aircraft accidents and acting as liaison officer for the courts.

- g) Maintaining a statistical record of all accidents and incidents at base and to carry out a trend analysis to identify weak areas in the system. Follow-up the implementation of remedial measures brought out by the Csol/TIs, to prevent similar accidents/incidents occurring in the future.
- h) Preparing AOC/Station Commander's policy on Accident Prevention, activities at base and preparing the station Aerospace Safety Programme.
- i) Organising meaningful meetings involving all personnel on the station to disseminate information about cause factors and remedial measures brought out in the Csol/TIs towards accident prevention activities and acting as secretary to Station Aerospace Safety Council.
- j) Coordinating the Aerospace Safety activities of the Squadron/Unit AS&IOs.
- k) Coordinating with Squadron/Unit AS&IOs in emergency drills training.
- l) Conducting Aerospace Safety Surveys/Audits."
- m) Compiling of Aerospace Safety Reviews.
- n) In cooperation with Unit AS&IOs, preparing of a FOD prevention program.
- o) Coordination with SATCO and C Adm O to evolve effective bird control strategy at base.
- p) Coordination with C Adm O to ensure Aerospace Safety Zone is free of trees and vegetation. Maintaining and Accident Readiness Plan covering all foreseeable contingencies.
- q) Progressing various points raised during Aerospace Safety Meetings, Aerospace Safety Reviews, Aerospace Safety Surveys, or Hazard reports for action required to be taken by Command HQ on normal correspondence channels and through appropriate branches.
- r) Plan and monitor expenditure under AS Code Head 786/10.

1.17.3.2 Observations of the Investigation Team at the ATC Tower

- The AB poles at the edge of RWY 06R at Gwalior were illuminated with "White LED" lights (coiled) and not RED colour obstruction lights as required by DGCA CAR Section 4 Series B Part 1 and ICAO at the time of the accident. However, post the accident when the investigation team visited Gwalior AF Station, the AB poles were illuminated with "Red LED", and the investigation team was informed that the change was made to improve visibility of the AB poles.
- The investigation team observed that with the "White LED" lights on the AB poles at the edge of RWY 06R along with the background lighting of the hangars and the lighting of the perimeter road, it would have been difficult for the DATCO to realise whether the AB was in a raised condition or not.
- In the Control Tower, the DATCO's seating position was such that the approach of RWY 06R/24L is not clearly visible due to the pillars of the control tower obstructing the controller's

line of sight. The DATCO has to make an effort to bend forward to see the aircraft on final approach.

- Additionally, the investigation team observed the existence of a '**Power Distance Index**' (PDI) between Officers and Air Warriors (Non-commissioned officers) to be causing communication related issues.

1.17.3.3 Information Related to Arrestor Barrier Operation

1.17.3.3.1 Normal Operations

- The Arrestor Barrier operation is controlled from the Control Tower and is under the direct control of the Air Traffic Controller (DATCO). The Air Traffic Controller is supported in the tower by an "Airman on Watch and an Airman on Lookout". The AB operation is controlled from the AB control panel (see Fig below).
- ATC Staff are required to complete the "Change of Runway" checklist as per their existing SOP's if there is a change in runway for operations.
- The ATC staff are required to notify all concerned including the "Arrestor Barrier Party" regarding the change of runway for operations, and subsequently the AB Party are required to physically cross-check the position of AB.

1.17.3.3.2 Alternate Procedure for AB Operations when AB Position Indicator and Panel Lights are unserviceable as advised by SAS & IO

As the Station ATC staff were aware of the AB Position Indicator and Panel lights being unserviceable, the alternate procedure was that the "Arrestor Barrier Party" will cross-check the position of the AB physically provided the AB Party was notified about the change in runway.



Figure 25: Arrestor Barrier Panel

Once the AB is raised there is a "Red" light which comes "ON" on the AB panel.

1.17.3.3.3 During the interview with the DATCO the following was brought to the notice of the Investigation team

- The investigation team was made aware by the DATCO that the “Arrester Barrier (AB) Position Indicator” lighting giving indications whether the AB is in a raised position or not, was unserviceable at the time of the accident.
- The background lights of the AB panel were also unserviceable and with the low intensity lights in the control tower it is not possible to see if the AB switch is in a raised or down position.

1.18 ADDITIONAL INFORMATION

1.18.1 DGCA Reference Documents

- Ref DGCA CAR Section 3 Series C Part X Issue 1 dated 2nd June, 2010 (MINIMUM REQUIREMENTS FOR UNDERTAKING AIRCRAFT OPERATIONS WITH AIRCRAFT OWNED BY STATE GOVERNMENTS/ PUBLIC SECTOR UNDERTAKINGS OF CENTRAL/ STATE GOVERNMENTS.)

Accountable Manager

5.1 The organization shall nominate a suitable person having knowledge of aviation regulations and with adequate financial authority to act as Accountable Manager. Such nomination shall be made to the concerned regional office of DGCA. There shall also be an alternate Accountable Manager. Any change in Accountable Manager shall be with prior intimation to the concerned regional office of DGCA.

- **DGCA OC 9 of 2017 dated 18th August 2017 (Approach and Landing Accident Reduction (ALAR) and Control Flight into Terrain (CFIT) reduction tool kit.)**

Annexure 2.18 (3) Visual Approach at night:

3.4 At night whenever an instrument approach is available (particularly an Instrument Landing System {ILS} approach), an instrument approach should be preferred to a visual approach.

3.5 If a precision approach is not available, select an approach supported by VASI or PAPI.

- **DGCA OC 3 of 2017 dated 17th January 2017 (Unstable Approaches)** provides guidance for all operators and pilots :

Quote

“DEFINITION OF UNSTABLE APPROACH

An unstable approach is simply an approach that does not meet the criteria for a stable approach established by the aircraft operator. As an illustration, Flight Safety Foundation defines a stable approach in the following terms:

On the correct flight path:

- ILS Approach – ILS within 1 dot of the localiser and glide slope.
- Visual Approach–Wings level at 500feet AGL.
- Circling Approach – Wings level at 300 feet AGL.
- Only Small Heading and Pitch Changes Required.
- Speed within +20/-0 kts of reference speed.
- Aircraft Must Be in Proper Landing Configuration.
- Maximum sink rate of 1,000’per minute.
- Appropriate power settings applied.
- Briefings and checklists complete.
- During IMC – Stable by 1,000 feet AGL.
- During VMC – Stable by 500 feet AGL.

If the approach is not stable by 1,000 feet AGL or 500 feet AGL (depending on weather conditions), or if the approach becomes unstable below these altitudes, the pilot should initiate a missed approach/go around. The pilot may initiate a go around at any time above or below these altitudes if deemed necessary. It is possible for a pilot to initiate a go around even after touchdown on the runway, but not after the thrust reversers have been deployed.”

Unquote

- **DGCA Operations Circular OC 4 of 2011 dated 21st April 2011 (Managing Disruptions and Distractions)** provides guidance on the effect of distractions which may lead to a unstable approach:

Quote

“5. Effect of Interruptions or Distractions The primary effect of interruptions or distractions is a breakdown of the normal flow of ongoing cockpit activities which, in turn, can lead to errors and associated safety problems. An error may occur if the attention of

the flight crew is diverted while they are engaged in safety-critical tasks such as following SOPs or doing normal checklists or communications or monitoring or problem solving.

An interruption/distraction often leaves the flight crew with a feeling of being rushed and faced with completing tasks of varying priority. This can result in an increase in workload even when the actual task load is reasonable and steady. As a result, a crew faced with concurrent task demands will typically focus on one or a few tasks while inadvertently ignoring all others. This response is typical of most crew when dealing with excessive workload.

Unless mitigated by effective compensatory techniques, a disruption leading to a lapse of attention can result in:

- Failure to monitor the flight path, possibly leading to an altitude or course deviation or even CFIT.
- Missing or misinterpreting an ATC instruction leading to a traffic conflict or runway incursion.
- Omitting an action and failing to detect and correct the resulting abnormal condition or configuration.
- Being “behind the aircraft” because of a task overload due to the combination of flying duties and attention to the interruption or distraction.
- Non-adherence to SOP’s.”

Unquote

1.18.2 Training of Flight Crew

- **The operator is required to follow DGCA CAR Section 7, Series B, Part XVII (effective 01 Oct 2016) for the purpose of “Recurrent Training/IR/PPC” (Ref Para 3.4) :**

Quote:

“The Recurrent training and checks shall be conducted in a Level ‘D’/ ‘C’ simulator or aeroplane. For aeroplanes with less than 3 qualified simulators globally, recurrent training IR/PPC may be carried out in the aircraft, however such training shall be carried out in simulator at least once in two years. However, if no simulator exists for a type of aeroplane, the recurrent training and checks will be carried out on the aeroplane.”

Unquote

1.18.3 DGCA Annual Safety Review of 2020

The investigation team reviewed the contents of the Annual Safety Review of 2020 (Data period 2010-2019) and found the following information as regards to General Aviation which includes the State Governments. Extracts from the Review reproduced below:

5.4 General Aviation Accidents

General Aviation is small but forms an important part of the aviation community. General Aviation in India is broadly classified into following categories:

- a. State Governments/BSF
- b. Flying Training Organisations
- c. Private Aircraft
- d. Experimental aircraft
- e. Gliders
- f. Microlight

Fig 5.3 shows comparison of total accidents and fatal accidents of fixed wing aircraft in the General Aviation category during the period 2010-2019.

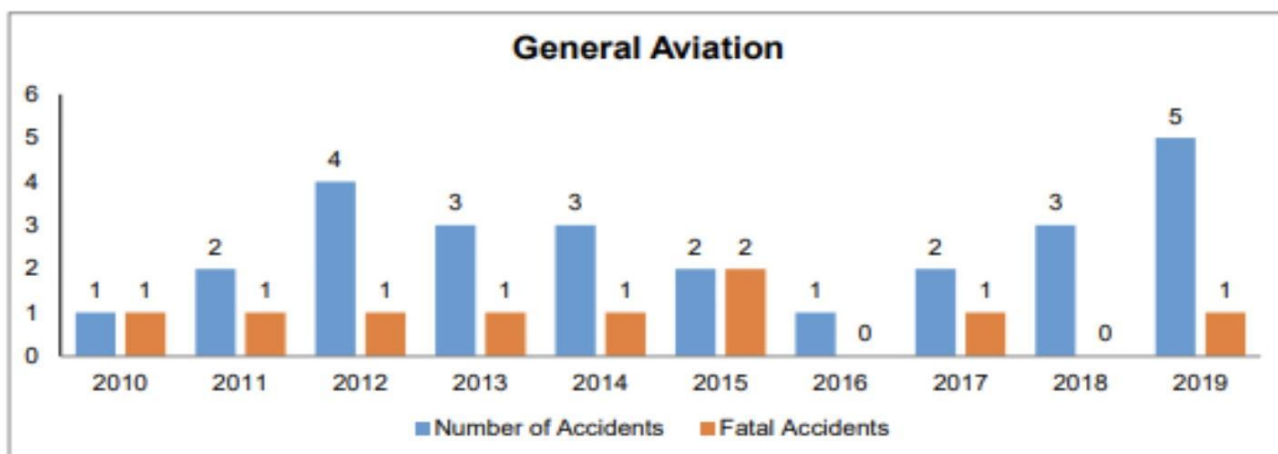


Figure 26

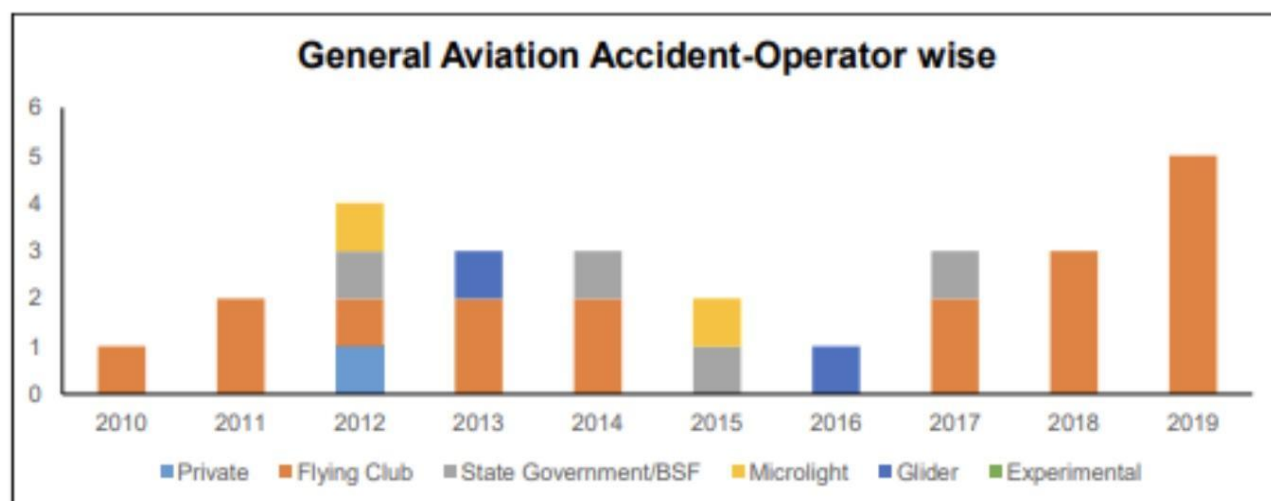


Figure 27

5.5 Classification of Accidents as per ICAO Taxonomy for “State Governments/BSF and Private aircraft”.

Multiple occurrence categories have been assigned to State Governments/BSF and Private Aircrafts from the year 2010-2019 and presented at Fig 5.5(a). This was done using the ICAO CICTT occurrence categories.

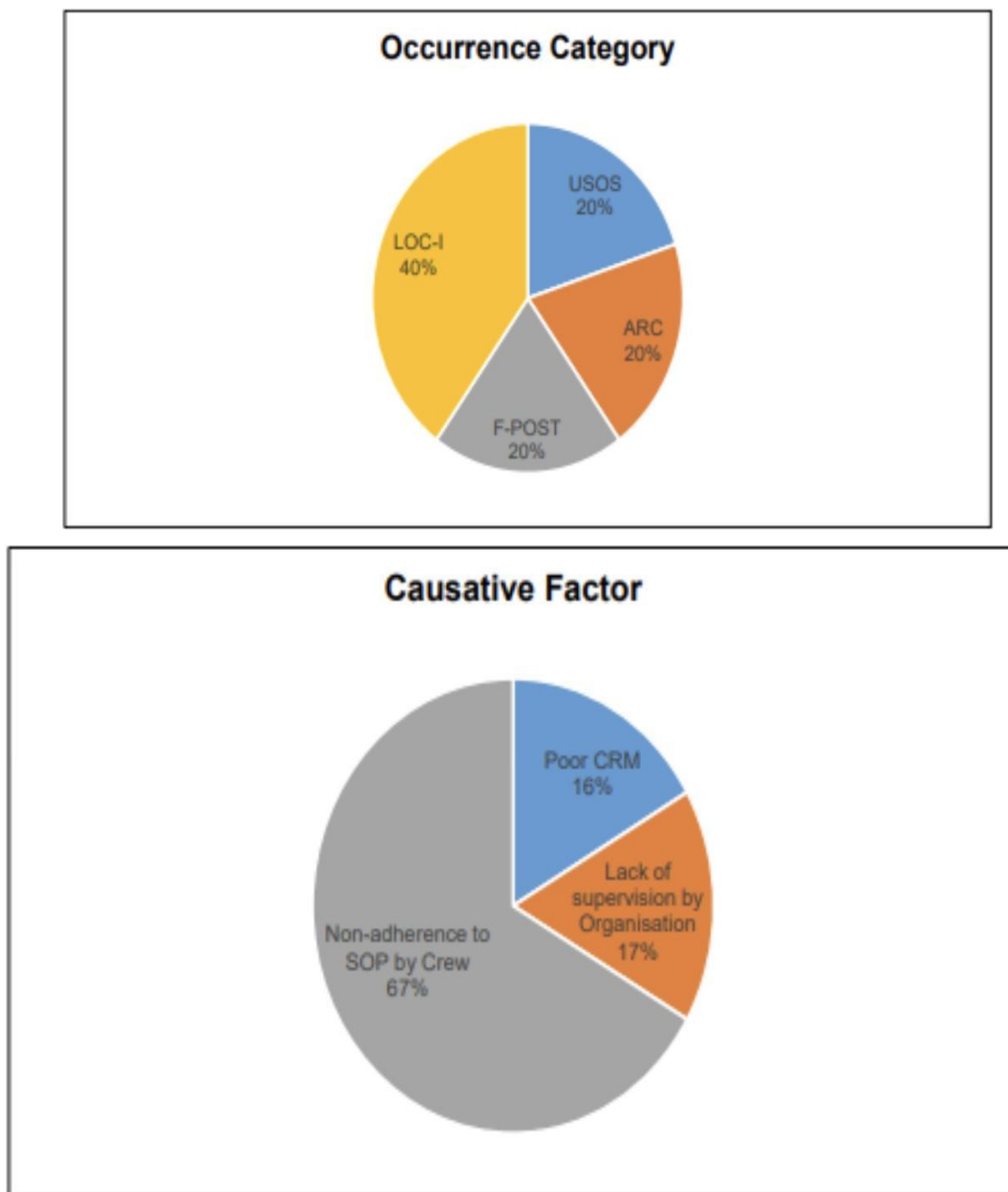


Figure 28

* The above chart shows that the most common causative factor for accidents is Non-adherence to SOP by Crew.

The Annual Safety Review (ASR) by DGCA of the year 2020 State Safety Oversight (Pg XIII) states:

Quote “The regulatory/surveillance findings for the year 2019 have been analysed and categorized in multiple factors. The major deficiencies are in the area of “procedures, documentation and workplace manual which constitutes about 60% of the regulatory audit findings.” **Unquote**

1.18.4 Audits and Enforcement Actions by DGCA

The investigation team was provided copies of the “Surveillance” reports in respect of DoA, GOMP which were carried out by the DGCA office for the last three (3) years. The Surveillance was mainly in the area of Airworthiness, Maintenance and Air Safety. As per the reports provided, a FSD surveillance was also carried out in Feb 2019. A few findings and observations were still open during the course of investigation.

The investigation team reviewed the DGCA Safety Oversight Programme (read all Annual Surveillance Programme (ASP) as Safety Oversight Programme) for the last 5 yrs (2017 to 2021).

The DGCA Safety Oversight Programme has been divided into 8 areas as given below :

1. Surveillance Activities (Planned Inspection)
2. Regulatory Audit (Planned Audit)
3. SOFA (Safety Audit Foreign Airline)
4. Spot Check (Unplanned Inspection)
5. Night Surveillance
6. Ramp Checks
7. Surveillance of Foreign MRO and Maintenance Training Organization (MTO)
8. Inspections carried out under the directions of the DG

Definitions :

1. Surveillance: Purpose is to determine whether compliance with regulations and standards is being maintained, in relation to the approved provisions in the Operator’s Manual or exposition required to be submitted (for acceptance /approval by DGCA) under the entry process, and maintained during the validity of the certificate. The rules place emphasis on the exposition and the management and quality assurance systems that show how the organisation will stay in compliance. During the surveillance, the focus is on checking what is being done, against what the organisation says it will do, as set in the manual(s). The procedures set out in the organisation’s manual will be a combination of those required to

maintain compliance with regulatory (minimum) standards, and those arising from company (additional) standards activities. A deviation from procedures required to maintain compliance with the minimum standards is a finding of non-compliance, and a finding of non-conformance in other cases, and the corrective action will be determined accordingly (Surveillance Procedures Manual).

2. Audit: Means an in-depth review of the activities of an organisation to verify conformance to regulations and standards (Manual of Regulatory Audits).

3. Regulatory Audit: This includes Air Safety, Airworthiness and operational functional areas (Manual of Regulatory Audits).

4. Inspection: Means the basic activity of an audit, involving examination of a specific characteristic of a company (Manual of Regulatory Audits).

5. Station Facility (ASP) & Transit Station Facility Inspection (CAP 8200): Is defined as those support activities required to originate, turn around, or terminate a flight. A Station facilities inspection encompasses both the operations and the facilities required to conduct them.

6. Main Base Inspection (ASP) & Air Operator Base Inspection (CAP 8200): Base Inspections should be performed at the operator's principal base of operations, sub bases, and separate maintenance facilities; and the purpose of the inspection is to assess the suitability of the operator's organization, management, facilities, equipment, manuals, personnel and training records. The operations portion of Base Inspections essentially consists of seven segments as follows :

- a) Operational Control.
- b) Operations Manual.
- c) Flight Deck Management.
- d) Flight and Duty Time Records.
- e) Operations and Flight (trip) Records.
- f) Training Program.
- g) Training and Qualification Records.

1.18.5 As per the DGCA Annual Surveillance Programme (ASP) from the year 2017 - 2021 the following Surveillances were planned for Directorate of Aviation, Government of Madhya Pradesh (DoA, GoMP) for FIXED WING and HELICOPTERS :

YEAR	2017	2018	2019	2020	2021
(FIXED WING)					
AIR SAFETY	PFME FSS DFDR (JAN)	PFME FSS FSDS DFDR (FEB)	PFME FSS FSDS DFDR SMS (FEB)	PFME FSS FSDS (JAN)	PFME FSS FSDS (MARCH)
AIRWORTHINESS	CAR 145 (JAN)	CAMO (SEP)	CAR 145 (MARCH) CAMO (JUNE)	CAR 145 (MARCH) CAMO (JUNE)	CAR 145 (MARCH) CAMO (JUNE)
FSD	NIL	NIL	STATION FACILITY (MARCH)	NIL	NIL
(HELICOPTER)					
FSD	NIL	MAIN BASE (FEB)	MAIN BASE (FEB)	MAIN BASE (FEB)	MAIN BASE (FEB)

Note: The Helicopter division of all State Governments have undergone an Main Base Inspection.

1.18.6 Ground Training of Flight Crew

- The Investigation Team also reviewed the ASP from 2017-2021 for any Surveillances carried out on Organizations which imparted Ground Training for CRM, SEP, Ground Technical and Performance Refresher.

1.18.7 ADS-B Flight Data

In the absence of “Flight Recorder” on VT-MPQ, the investigation team reviewed the available flight data from the ADS-B which was captured by the software “Flight Radar 24”. The Flight data from ADS-B was available from (14:17:32 Z) 8950 feet during climb up to FL270 and descent from FL270 to (15:05:19 Z) 10475 feet only. (**Refer Appendices F**).

The investigation team also cross-checked the ADS-B data feed from Delhi, Nagpur and Lucknow however no data was available below 18000 feet. Gwalior radar was “off” as no Air Force flying was in progress.

However, the available ADS-B data could not used for any analysis.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES

NIL

2 ANALYSIS

- VT-MPQ was only fitted with a CVR and not a DFDR.

The Analysis is based on the Documents made available to the Investigation Team, the CVR analysis, observations made during site visit, wreckage examination and the Interviews of Accountable Manager, PIC, Co-pilot, Flight Safety officer, Quality Manager & Continuous Airworthiness Manager, DATCO & other Indian Air Force staff etc.

- The CVR Spectrum Analysis did not reveal any malfunction of the engines and revealed possible areas where the Flaps and the Landing Gear were selected.
- Information revealed from the CVR and Spectrum Analysis was also cross checked with the Flight Crew Statements for consistency.

2.1 ORGANISATION

2.1.1 Indian Air Force

2.1.1.1 General observation of the Gwalior base

- Due to COVID-19 requirements, the air force base was functioning at a low man-power state resulting in long duty hours especially during night hours. Fatigue was a common element which was brought out by most individuals who interacted with the investigation team.

2.1.1.2 Reporting of Hazards and Safety related concerns

“A Hazard reported today is an Accident averted tomorrow”

Though the Gwalior base has a “Safety Management System” in place, however for Hazard Reporting to be effective, officers & non-officers (Air Warriors) must be encouraged and motivated to report. Safety critical information like the “Arrester Barrier Position Indicator lights” not being serviceable and the same not being informed to the SAS&IO indicates a gap in hazard reporting and the base safety culture.

Audits at Base level: Arrester Barrier Position Indicator lights being unserviceable and the same not being detected in their audits, the matter not getting addressed in a reasonable period also points towards gaps in their quality process.

2.1.1.3 Fatigue Management

Due to COVID-19, the air force base had been functioning with a reduced staff strength and this led to a situation wherein the DATCO and the other ATC staff were carrying out split

duty during a 24 hour cycle every alternate day. This would demand that every individual had to manage his/her rest period in a disciplined manner.

The DATCO did mention in his interview that he was on duty from 2000hrs IST on 5th May to 0600 hrs IST on 6th May, and thereafter reported back on duty at 1930 hrs IST the same day. The accident occurred at around 1515 UTC on 6th of May 2021.

On the 6th of May between 0600 hrs to 2000 hrs IST he was allocated a “rest period” during which he was unable to manage adequate rest due to his family commitments but did manage to get three (3) hours of rest towards the afternoon as per his statement. However, IAF has a system in place for an individual to report “Sick” before, last moment or while on duty for any reason including fatigue, which could have been availed by the DATCO if required.

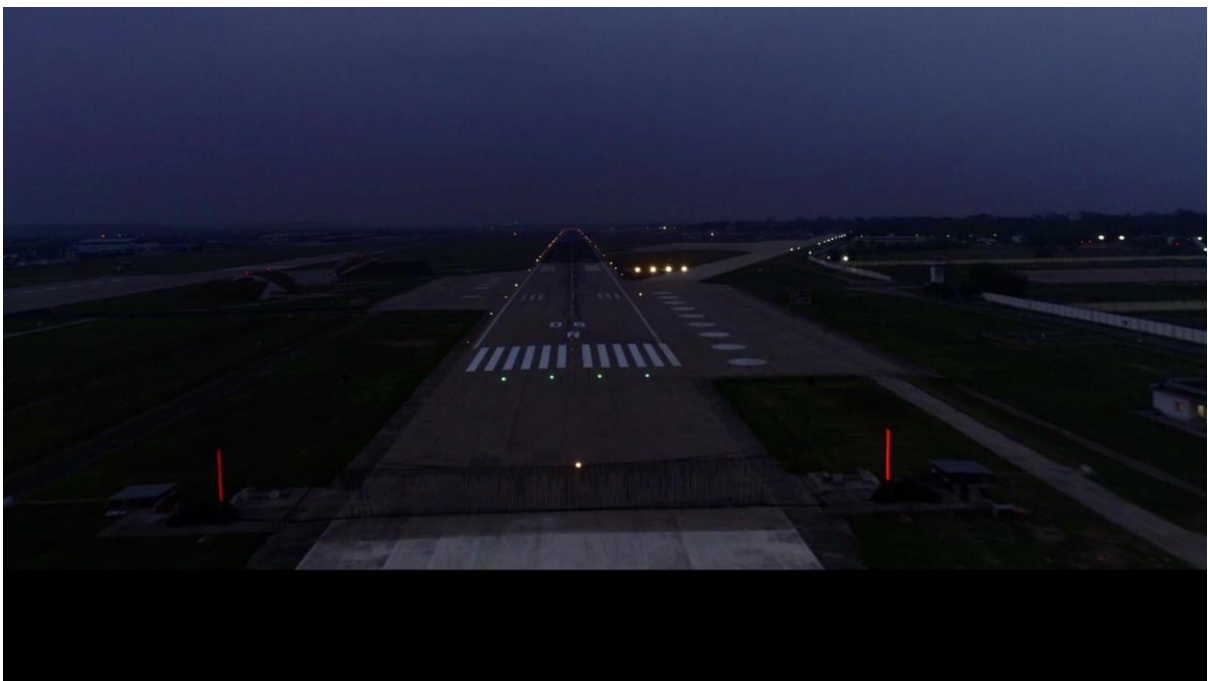


Figure 29: Indicative Arrester Barrier with Red Lights on the poles.

2.1.1.4 The Arrester Barrier remaining in the Raised Position

- The Arrester Barrier was raised for operational readiness of RWY 24L as per the SOP at AF Station Gwalior. Due to the change in runway to RWY 06R, Non- adherence to the “Change of Runway Checklist” by the ATC staff led to the Arrester Barrier remaining in a raised position. At the same time the PIC (PF) due to the Non-adherence to the visual approach profile of 3 degrees as guided by the PAPI indications, placed the aircraft well below the required profile thereby colliding with the Arrester Barrier at 15 ft AGL, which is located 240 ft before the runway threshold.
- The SAS&IO informed the investigation team that Arrester Barrier Position Indicator lights being unserviceable were not brought to his notice. However, the investigation team opined

that such an important requirement which has a direct bearing on safety of aircraft operations and being unserviceable for a long duration should have been detected during their internal base audits.

2.1.1.5. Search and Rescue

Search & Rescue Aspects

- As per the Interviews with the PIC and Co-pilot, both mentioned only that only one SUV vehicle reached the accident site after the accident and until they were transported to the “Station Medicare Centre (SMC)”. Also, the ARFF had not reached the accident site. Evidence shows that a severe fuel leak was observed but no fire was reported or observed.
- Further the Co- pilot mentioned that the passenger and himself exited the aircraft first on their own, however the SUV team assisted the PIC to exit the aircraft.
- The PIC mentioned that it took anywhere between 3-6 mins to rescue him.
- The ARFF personnel mentioned in their statement that two Crash Fire Tenders (CFT 1 and CFT 2) along with the crash ambulance of ATC reached the accident site. However, no video recording was made available to the investigation team to qualify this statement.
- During the visit of the investigation team to Gwalior, it was understood that all Air Force flights taking-off or landing are recorded on video camera, however there is no video recording covering Day or Nighttime operations for Civil flights.
- As per ASC 4/2013 and 5/2014 (**Refer Appendices L & M**), there is a requirement of recording the Search and Rescue operations on video tape. The investigation team was not provided with the recording for the same as the authorities at AF Station Gwalior mentioned that the CCTV facing RWY 06R was faulty.

Hence, the timeline mentioned by the PIC to rescue him could not be ascertained.

2.1.2 DoA, GoMP

2.1.2.1 Role of the Accountable Manager (AM)

Definition of Accountable Manager: A single, identifiable person having responsibility for effective and efficient performance of the State’s SSP or of the service provider’s SMS.

- DGCA during their “Surveillance” dated 30/1/2020 observed that the “Accountable Manager” does not have an aviation background / having knowledge of Aviation Regulations.

Post the reply of DoA. GoMP, the DGCA did not pursue the said Class II finding, however the current situation remains the same. There have been multiple individuals who have taken up the role of “Accountable Manager” over the last few years.

- The AM in his interview clearly mentioned that he comes from a different background and was making all efforts to settle down in his role as AM and was still getting familiar with the rules & regulations of DGCA.
- During discussions with various staff members of DoA, GoMP the Investigation Team was informed that DoA, GoMP has nominated an “Alternate AM” (PIC) who runs the daily operation and manages the entire activity. For all practical reasons the departments in DoA, GoMP reports to him for operational matters.

PIC (Alternate AM) despite being aware of the DGCA requirements of “Carriage of Cargo in Passenger cabin”, chose not to follow the requirements and knowingly violated the laid down norms. {DGCA AIC SI. No. 7/2021 (Order), dated 15th Jan 2021}.

- There were 4 Accountable Managers appointed in the year 2020.

The involved PIC was himself the “Accountable Manager” from 27th June 2020 till 13th July 2020. Hence, he should have been aware of the various rules & regulations of the DGCA office.

Therefore, as the AM was not having an aviation background, he was dependent on the Alternate Accountable Manager, the PIC of the accident aircraft for supporting him in running the daily operations of DoA,GoMP.

2.1.2.2 Safety Management System (SMS) (Company Operations Manual Chapter 3) in DoA, GoMP

- The investigation team reviewed the contents of Chapter 3 (Safety Management System) of the operator’s Operations Manual. It was observed that what is written in the operations manual is not what is complied with during regular operations.

There are many such examples which can be quoted. Few are listed below:

- (a) performing/facilitating hazard identification and safety risk analysis;
- (b) monitoring corrective actions and evaluating their results;
- I providing periodic reports on the organization’s safety performance
- (d) providing independent advice on safety matters;
- I monitoring safety concerns in the aviation industry and their perceived impact on operations;

(4) Refer Operations Manual Chapter 3 Para 3.4.2 , which states the DoA, GoMP would carry out Safety Risk Assessments. However, the Operator could not provide any Risk Assessment for Gwalior Airport.

During the initial interactions with the Flight Safety Officer of the operator, the investigation team was given to understand that SMS is not applicable to DoA, GoMP . However, the investigation team reviewed the contents of various CAR's mentioned below and observed the following:

- The investigation team also reviewed the **DGCA SSP Division Circular No.03 of 2017**. Like the DGCA CAR Section 1 Series C Part I, Issue II which does not clearly define that SMS is applicable to General Aviation operators flying aircraft AUW less than 5700 kgs, similarly the DGCA SSP Division Circular No.03 of 2017 also does not clearly define the requirements for a General Aviation operator flying aircraft AUW less than 5700 kgs. Example: DoA,GoMP.
- Flight Safety officer reiterated that they had submitted their “SMS” manual for approval and the same was not approved till date. However, on closer scrutiny of the operator’s Operations Manual Para 3.2.1 clearly states the following “As per the regulatory requirement, preparation and acceptance of SMS manual is not applicable to DoA, GoMP. However, DoA,GoMP will develop , establish , maintain and adhere to a safety management system as per the size of the organisation”.

The CAR (DGCA **CAR Section 1, Series C, Part 1, Issue II, dated 27th July 2017**) was reviewed and it was observed that the said CAR is not applicable to General Aviation. However, when the investigation team reviewed the. **DGCA CAR Section 8, Series O, Part III, Issue II, dated 24th July 2017**, it was observed that Para 3.3.2 of said CAR deals with “**Safety Management**” and also it was a requirement to have a chapter in the operators Operations Manual on “Safety Management System”. The operator’s approved, current Operations Manual shared with the investigation team has an approved chapter on “Safety Management System”; Chapter 3. Further Chapter 3 clearly mentions in Para 3.1.4 Company Safety Management System will confirm to contents of DGCA CAR Section 1, Series C, Part 1, Issue II, Dated 27th July 2017

Hence, the Flight Safety Officer was not clear about the requirements as per the DGCA CAR on Safety Management System.

For Duties and Responsibilities of Flight Safety officer (**Refer Appendices G**).

2.1.2.3 OPERATIONS MANUAL

Refer table below for one of the examples of the many Observations / Remarks extracted from the Operations Manual: -

Applicable CAR's reference and date at the time of the accident from the DGCA website	CAR reference and date at the time of <u>Approval</u> of M P Govt Operations Manual	CAR reference and date as given in DoA, GoMP Operations Manual dated 13 th October 2020	Observations
Section 8 Series O Part III Issue II dated 24 th July 2017	Section 8 Series O Part III issue II dated 24 th July 2017	Section 8 Series O Part III Issue II dated 31 st July 2017	Date of CAR incorrect in OM Chapter 01 Pg 1
Section 8 Series O Part VII Issue II dated 26 th April 2015	Section 8 Series O Part VII Issue II dated 26 th April 2015	Section 8 Series O Part VII Issue I Rev 3 dated 9 th November 2018	CAR Reference given in OM Chapter 1 Pg 1 does not exist on the DGCA website

The above example indicates that there is improper CAR Compliance references in Operations Manual which needs to be re-looked into.

2.1.2.4 Aerodrome Categorisation (Operations Manual Chapter 16)

- DoA,GoMP had categorised 16 aerodromes as **Category A** aerodrome , 2 aerodromes as **Category B** and 4 Aerodromes as **Category C**. No details regarding Gwalior Aerodrome was listed in either Category A, B or C. Airport Categories are mentioned in the Operations Manual Chapter 16.

Though the DGCA Operations Circular 02 of 2012 is not binding on DoA,GoMP , however, the operator has proactively categorised the airports.

Further no information or guidance for Gwalior or other airports operated to regularly is given in the operators Operations Manual. Few examples of the airports operated to are: Hyderabad / Tirupati / Gondia / Nagda / Umaria / Indore / Lucknow / Rewa / Jabalpur / Satna / Ujjain / Ahmedabad / Nagpur.

- During discussions with the Flight Safety officer, the investigation team was informed that as the operator has been operating to Gwalior for over 30 years, a “Safety Risk Assessment” (SRA) would have been carried out when the operations started.
- Currently DoA, GoMP is not in possession of any SRA and the said statement could not be substantiated by a copy of the SRA. Further on query if an SRA was carried out for any other airfield operated to, the Flight Safety Officer was unable to produce a copy of the same.
- The investigation team opines that the aerodromes operated to by DoA,GoMP were not categorized in the Operations Manual, is an oversight by the Flight Operations Officer, The Flight Safety officer of DoA,GoMP and the DGCA (FSD) office.

2.1.2.5 Information regarding Arrestor Barrier in company Operations Manual

In the entire DoA,GoMP Operations Manual, there is no reference of an ‘**Arrestor Barrier**’ being installed at Defence airports / runways and the precautions one needs to take while operating from such airports wherein an arrestor barrier is installed.

However, during the interview both PIC (PF) and Co-Pilot (PM) mentioned that they were aware that ‘Arrestor Barrier’ was installed at Gwalior but never expected the arrestor barrier being left in the raised position while the aircraft was coming in for landing.

2.1.2.6 VT-MPQ Not Insured at the time of the Accident

The Investigation team was notified by DoA, GoMP that the aircraft (VT-MPQ) was not insured.

During the interview with the ‘Accountable Manager’, it was given to understand that none of the State Government assets are insured and this has been an ongoing practice.

A copy of an advertisement dated 7th May 2021 (one day after the accident) in a local newspaper was shared with the investigation team, mentioning that the DoA,GoMP had advertised for seeking proposals from Govt/Private Insurance Companies to insure their Aeroplane (VT-MPQ) and Helicopter (VT-MPR). **(Refer Appendices I)**

The aircraft not being insured was not meeting the requirements laid down by the DGCA ,the company policy and the MoU between DoA,GoMP and AWEIPL **(Refer Appendices E)**.

This was a clear oversight on the part of the Engineering department, Flight Safety department, Flight Operations of DoA, GoMP and the DGCA office.

Further, No letter of exemption for the Aircraft Insurance was issued by the DGCA office to the DoA,GoMP and the same was not shared with the investigation team.

From the above mentioned paragraphs, it is clear that DoA,GoMP was required to insure the aircraft before being put into use for any operations.

2.1.2.7 Was DoA,GoMP authorised to carry cargo ?

DoA,GoMP was not authorise to carry out cargo operations (cargo in passenger compartment) as per their permission obtained from DGCA office. Refer **Appendices A (Certificate of Airworthiness)**

2.1.2.8 Safety Beyond Regulatory Compliance

Vide DGCA CAR, an aircraft of 'all up weight' below 5700 Kgs, the installation of DFDR is only recommended and not mandatory. The operator also had correspondence with the DGCA (Airworthiness) in this regard to seek clarity and it was advised by the DGCA office that DFDR installation is recommended. On the other hand, the investigation team observed that VT-MPQ was fitted with 'SATCOM' which is not a part of the standard equipment of an aircraft however due to VIP requirements the operator chose to install SATCOM {Refer Operations Manual Chapter 2 Para 2.6.9 (u)} and **Refer Appendices B** (Aircraft Station License Pg 3)

The Investigation team opines that the regulator can define the 'minimum standards' which needs to be complied with by an operator to seek approval, however, it is important to appreciate that the operator is finally responsible for managing safety in their Organisation as DoA, GoMP was involved in carrying VIP passengers.

In the DoA, GoMP company SMS program, it is their responsibility to identify hazardous conditions and mitigate the associated risk to an acceptable level. Had DoA,GoMP installed a DFDR in VT-MPQ, the Flight Safety officer of DoA,GoMP would have observed deviations from SOP's and also unstable approaches being flown by their flight crew in their "Flight Operations Quality Assurance" (FOQA) program (Operations Manual Chapter 11 Para 11.7.2.2 {c}). The above mentioned deviations and hazardous conditions could have been detected and addressed well in time.

Hence the investigation team opines that as the operator installed a SATCOM in VT-MPQ, similarly a DFDR or a data recording device as per DGCA CAR could also have been installed and due importance should have been given to safety rather than take refuge under a DGCA requirement.

The DGCA also mandates that a Co-pilot is required on aircraft having AUW less than 5700 kgs which is involved in VIP operations. Similarly, a DFDR or a data recording device as per DGCA CAR should also be mandated on aircraft which is primarily used for carrying VIPs.

Also refer to Appendices for Duties and Responsibilities of Flight Safety Officer Refer Appendices G).

2.1.2.9 Standard Operating Procedures

The investigation team observed that though the SKA B200GT is an aircraft designed to fly as “Single Pilot” operations, however the company uses two pilots due to VIP operations. However, the SOP’s are not clearly defined in detail for the “Pilot Monitoring” role. Example: No Standard Callouts and Profile to be flown by the flight crew (when to take flaps & landing gear etc. during a Visual approach, Precision approach & Non-Precision approach). Had the operators defined the “Pilot Monitoring Role” in a clear manner, the Co-Pilot would have guidance material to follow and draw strength to be more assertive.

Reference is drawn to Flight Safety Foundation “Report on A Practical Guide on Flight Path Monitoring” in this regard.

2.1.2.10 Training of flight crew

- **Ground Training**

While reviewing the DGCA ASP 2017-2021, it was observed that none of the Organizations which had imparted Ground Training to the Flight Crew in the areas of CRM, SEP, Ground Technical and Performance Refresher were part of the ASP. There were CRM (both flight crew), aircraft performance knowledge (PIC) related issues observed with the flight crew.

- **Simulator Training**

The PIC (PF) had undergone Simulator training only in 2002 and 2009. In the year 2009 (November) the Simulator session of PIC was assessed as ‘Not Satisfactory’. Thereafter DoA, GoMP wrote to the DGCA office seeking approval to carry out “corrective training” for the same in the aircraft. Based on the approval of the DGCA office DoA, GoMP carried out the said training in their company aircraft (VT-MPT) and not in the Simulator where his performance was judged as ‘Not Satisfactory’.

A detailed review of the Training / Check Reports indicated that the PIC had not undergone any assessment for CFIT (GPWS Manoeuvre) either in the Simulator or the Aircraft as per DGCA OC 5 of 2002.

Similarly, there is no way to assess whether the Flight Crew had undergone a systematic assessment of the following manoeuvres/failures e.g. Wind Shear, Electrical failure etc.

- **Pilot Proficiency Training and Checks in the Simulator**

The DoA, GoMP flight crew undergo Recency Training and Checks as defined in Operations Manual Chapter 12 which is based on DGCA CAR Section 8 Series F Part VII Issue 1 dated July 2015 (Flight Crew Training and Qualification Requirement for Scheduled Commuter and Non Scheduled Operators: Small Aeroplanes).

The Investigation Team reviewed the requirements in detail and observed that the applicable DGCA CAR for Recurrent Training requirements for the State Government Operators is **CAR Section 7 Series B Part XVII Issue 1, 25th February 2012 (effective Oct 2016)** and NOT DGCA CAR Section 8 Series F Part VII.

The operator has quoted the contents of CAR Section 8 Series F Part VII in their Operations Manual and taken advantage of Para 9.2.3 – Note. 2 for Turboprop Aeroplanes with seating capacity less than 10 passengers, para 9.2 and 9.3 can be complied with PPC/IR done on aeroplane.

QUOTE

DoA, GoMP Operational Manual Chapter 12 Para 12.4.16:

Note. For turboprop aeroplanes with seating capacity less than 10 passengers, para 12.4.17 & 12.4.18 can be complied with PPC/IR done on aeroplane.

UNQUOTE

Refer DGCA CAR Section 7 Series B Part XVII, Para 3.4:

The investigation team reviewed the availability of Super King Air B200 simulators and found that simulators were available globally for the type of aircraft. A prime example of the same was the Co-pilot (PM) involved in the accident, had undergone Endorsement simulator training in the month of January 2021. When the investigation team interviewed the PIC, it came to light that in the last 19 years, the PIC had undergone simulator training only twice. Once in the year 2002 and 2009.

The investigation team opines that critical emergencies like Emergency Descent, Engine Fire, Electrical Emergency, GPWS Escape manoeuvre etc. can only be practiced in a simulator and any amount of “touch drill” method will never bring the realistic feel which can be reproduced in a Level D simulator.

The investigation team reviewed the contents of the Operations Manual and observed that the practice being followed by DoA, GoMP for undergoing simulator training as per **DGCA CAR Section 7, Series B, Part XVII Para 3.4 (Rev 1, 26th September 2016)** is not in conformance of the DGCA CAR.

- **EGPWS Training**

(Company Operations Manual 12.4.5 & DGCA Operations Circular 2 of 2017) :

During the interview with the PIC (PF), the topic of GPWS/ EGPWS training was brought up, however the PIC was not aware about GPWS training/check at all and his IP/PPC check report mentioned “**Standard**” in the GPWS section (3.4.10) of the IR/PPC check form.

2.1.2.11 Video recording of Breath Analyser Examination for Maintenance & Ground Handling Staff

The investigation team reviewed the company policy with reference to the Breath Analyser examination for the Maintenance staff and Ground handling staff.

- Breath Analyser examination of Maintenance and Ground handling staff is required to be recorded on camera as per CAR Section 5 Series F Part IV and DoA, GoMP Operations Manual Chapter 12 Para 6.20.10.5 (b).
- However, the DoA, GoMP was unable to provide a copy of the video recording as required of the Breath Analyser Examination for the Maintenance and Ground Handling Staff to the investigation team stating the camera footage was not available due to technical reasons.

2.1.2.12 DGCA Annual Surveillance of DoA,GoMP

The investigation team reviewed the DGCA Annual Surveillance Programme from 2017 to 2021.

The team observed that no Regulatory Audits and Main Base Inspections (Fixed Wing) were carried out, only Surveillance and a Station Facility Inspection were planned and carried out in the areas of SMS, FSS, FSDS, PFME, DFDR, CAR M and CAR 145.

Relevant details from the Surveillance carried out by Air Safety / FSD / Airworthiness from 2019 – 2021 are quoted in the table below:

SR NO.	DATE	AREA OF SURVEILLANCE	FINDINGS
AIR SAFETY			

1	FEB 2019	SMS	SMS manual not approved and no SMS is established
2	JAN2020	SMS	SMS is not yet implemented in the Organization
3	FEB 2019	PFME	Control test for the BA equipment's found not done on a daily basis
4	FEB 2019	PFME	On 03.09.2018 BA test performed with equipment which was out of calibration and owned by the Organization
5	FEB 2019	DFDR	Quantum of DFDR data analysed is not as per CAR. DFDR data was not analysed for the quarter Apr-Jun 2018
6	JAN 2020		The nominated Accountable Manager is not from Aviation Background/having knowledge of aviation regulations
7	FEB 2019	FSS & FSDS	Flight safety manual needs review a) Recent amendments w.r.t Aircraft rules 2018 and CAR Section 5 Series C Part I, needs to be incorporated. b) No Checklists (incorporated as annexures) found included in the manual. c) Exceedance values of parameters not incorporated under FOQA
8	FEB 2019	FSS & FSDS	On 04.02.2018, VT-MPR, Kurmi-Bhopal, with Hon. CM of MP on board and had suffered from excessive vibrations during flight. However, it was found that the same was not reported to DGCA.
9	FEB 2019	FSS & FSDS	Load and trim sheets for rotorcraft are prepared by using software which is not approved by DGCA.
10	FEB 2019	FSS & FSDS	Internal Safety Audit checklist needs review with regards to customization.
11	FEB 2019	FSS & FSDS	Monitoring of CVR found inefficient. A satisfactory certificate was given for the CVR monitored but however, the records of filled checklists were not available.
12	JAN 2020	FSS & FSDS	Periodic DFDR monitoring/analysis is not being done for the Helicopter, VT-MPR
13	JAN 2020	FSS & FSDS	CVR monitoring is not incorporated with the take-off, climb and cruise phase of flight.

14	JAN 2020	FSS & FSDS	Flight Safety Documentation System is not yet implemented.
15	JAN 2020	FSS & FSDS	Load and Trim Sheet is not being prepared in duplicate.
16	JAN 2020	FSS & FSDS	The approved load and trim sheet is not being used for Helicopter VT-MPR. However, the Operator is using the OEM developed software for the trim calculation; the procedure for the same is not approved by DGCA.
20	MAR 2021	FSS & FSDS	Officers conducting audits to be trained in auditing Procedures/Methods
21	MAR 2021	FSS & FSDS	Returns of the Internal Safety audit with ATR & other activities of Accident/Incident prevention programme to be sent to DGCA HQ & Regional Air Safety Office.
FSD			
22	MAR 2019		FSDS manual acceptance/approval not available.
23	MAR 2019		FSM safety policy statement and OM foreword not signed in available control copy by accountable manager. Regulations are being viewed casually.
24	MAR2019		FDTL software being maintained in Excel sheet format. It is not fool proof and does not meet the requirement of para 14.1 of CAR. Changes can be made and no audit trail can be found. This is a repeat observation requiring immediate action in the interest of safety.
25	MAR 2019		Breathalyzer control test of both equipment not being carried out on a daily basis.
26	MAR 2019		Operator has inadequate manpower in the operations department. This is a repeat observation requiring immediate action in the interest of safety. 1. The accountable manager/chief pilot is PMU for last three years, he continues to occupy a flying vacancy while not being fit to fly. Other than him, only two pilots are available for flying the SKA B200 which is inadequate. 2. The department has sanctioned posts (for more than one year) of operations manager, flight dispatcher and flight safety officer, the posts are

			lying vacant for more than one year and adversely affecting operations.
27	MAR 2019		Operator does not have a flight following procedure and is not hiring approved manpower for the same. This is a repeat observation requiring immediate action in the interest of VIP safety. Also detrimental to activation of ERP.
28	JULY 2019	CAR-M	Internal Audit by Quality Manager are not being carried out as per audit plan mentioned in the CAME

The investigation team found some of the Findings still open at the time of the accident without any proper closure.

- **International Practices**

Internationally, there are a few organizations which specialise in auditing General Aviation Organizations e.g. Flight Safety Foundation's "Basic Aviation Risk Standards" (BARS) and "IATA Standard Safety Assessment" (ISSA). These programs have been highly successful world over as they help in identifying the areas of risk, which need to be mitigated before they are issued a certificate of having complied with the given Standards. Indian General Aviation companies / State Government operators should be encouraged to undergo such audits which will ensure that our General Aviation / State Govt operations are assessed as per international norms and these audit reports must be shared with the DGCA office for ensuring the Corrective Action Plans (CAP) are implemented.

2.1.2.13 Use of WIFI and receiving Mobile messages inflight

During the interview with the PIC, it came to light that WiFi was available and messages were being received on mobile devices throughout the flight.

As per DGCA CAR Section 5 Series X Part I Issue II dated 24th November 2020 Para 3.9,

Quote

"Flight crew member while in cockpit shall not use mobile phones during the operation of a flight as in para 3.3 above except when the data through Wi-Fi is being used for updation of weather, NOTAM or any other purpose for safety of operations using company supplied/configured PED"

Unquote

During the course of the flight receiving of mobile messages causes a distraction and also violates the sterile cockpit requirement.

2.1.3 Directorate General of Civil Aviation (DGCA)

The investigation team reviewed the Annual Safety Review of 2020 published by DGCA. Similar areas have been highlighted as the causative factors from 2010-2019.

The information made available in the Annual Safety Review of 2019 (published in 2020).

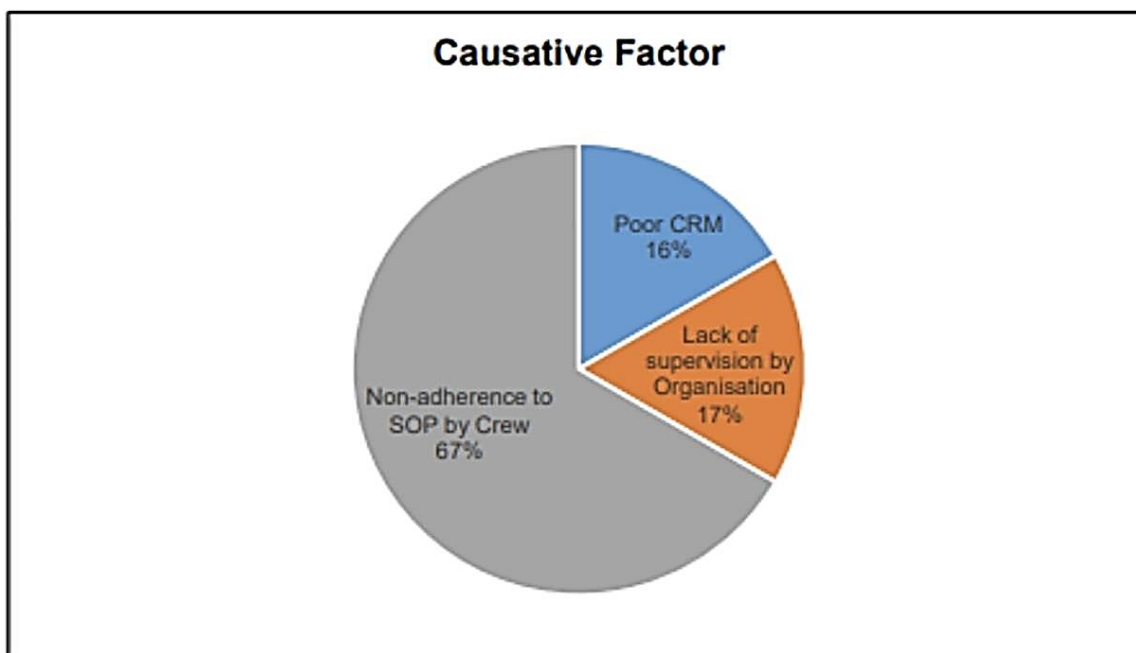


Figure 30

The investigation team reviewed various aspects of SOPs, Training (including CRM) and the Organization structure of various General Aviation operators including State Government and observed a general weakness in the area of Management Control and functioning, Safety Management System, Internal Audit process, Adherence to SOPs, Quality of CRM training provided, Recurrent Aircraft ground and Simulator training. As an example: DoA,GoMP not choosing to install 'DFDR' in the aircraft to track the flight crew performance during FOQA monitoring, leading to missed opportunities e.g. flying below a 3 degree profile on earlier occasions, adherence to SOPs.

2.1.3.1 Comparative Study of the CARs applicable to Scheduled Operators and General Aviation

- The Investigation Team compared the number of requirements, CARs, surveillances, enroute inspections, regulatory audits, which have been laid down for the Scheduled Operators, General Aviation / State Governments and observed that the overall requirements laid down for General Aviation / State Governments is inadequate and leaves enough areas

where safety concerns tend to slip through, leading to serious Incidents and Accidents year on year basis as brought out in the Annual Safety Review of 2020.

Further the Investigation Team connected with a few other General Aviation / State Government operators and observed a general lack of proper management control, issues related to safety management in the organisations. In most cases, the documentation authoring (Operations Manual) is an outsourced activity, leading to a situation where the operators / flight crew are unaware of the information provided in their manuals also they are unaware if they are in-line with the DGCA CAR as per their type of operations.

2.2 Flight Related Information

• Aircraft Engine related issues

During the flight crew interviews, the flight crew confirmed that there were no abnormalities with either engines and the thrust produced by the engines were normal and satisfactory. The same was also confirmed during the CVR and Spectrum analysis.

2.2.1 Non- Adherence to Company Standard Operating Procedures by the Flight Crew

- During the CVR analysis, it was observed that both flight crew were not wearing headsets for the entire duration of the flight from Indore to Gwalior. This is in violation of Company SOP {Refer Company Operations Manual Para 6.4 (c) & (d)}.

Also, no specific approval had been taken by the operator in this regard from DGCA office for not wearing “Headsets” during the COVID-19 period. Further all operators are permitting use of “Headsets” by flight crew after cleaning the head-sets with ‘alcohol swabs’. Hence, not using the Headsets by the flight crew was not justified.

- During the critical phase of the flight (Final Approach), non-essential discussions were being held which may have caused the Co-Pilot (PM) to get distracted and not call out any deviation from the flight path. This is non-adherence to Company SOP {Refer Company Operations Manual Para 7.20.7.2 (b)}. The Sterile Cockpit requirement was not followed.

- There was ‘No’ detailed Approach Briefing carried out by the PIC (PF) at Top of Descent for the landing at Gwalior.

Ref: Company Operations Manual 7.1.11 {h}, 7.20.7.1 {b}, Chapter 7 Appendix C Point # 3.0 Approach Briefing.

- The PIC (PF) only discussed carrying out a Visual Approach for RWY 06R with the Co-pilot and which was not challenged by the Co-pilot (PM).

Ref DGCA Ops Circular 9 of 2017 Annexure 2.3 – Approach Briefing Para 1.4 Scope of Briefing (1.4.2) specifies the inclusion of the aspects of “Terrain, Man-made obstructions and other hazards”. This would imply that the PIC should have covered the aspect of an Arrestor Barrier being present on RWY 06R or RWY 24L during the Approach Briefing to raise their awareness. The above information was not mentioned in the operators Operations Manual.

- At Top of Descent, the flight crew requested ATC for the RWY in use and were asked if they would like to carry out a VOR Approach for RWY 06R, to which the crew requested for a Visual Approach at around 90 Nm approx. ATC cleared the flight for a Visual Approach for RWY 06R. Requesting for a Visual Approach at 90 Nm was a non-adherence to SOP's in the night time in the pre-monsoon season. The PIC (PF) in his interview did mention that he opted to carry out a visual approach to save time.

2.2.2 Did the weather affect the flight?

- During the interviews, the flight crew mentioned that there was No convective activity, No Windshear or any other weather phenomena which could have affected the approach and landing. However, during CVR analysis, it was observed that the flight crew were facing a strong head wind (30 kts) on short finals around 500-300 feet AGL (approx).
- During CVR analysis, it was observed that the flight crew were discussing about some weather activity which was not affecting their flight but well beyond the aerodrome which as per the flight crew had no bearing on their flight and approach. Rain was predicted as per the weather information available to the flight crew. Refer METAR given in Para 1.7.

With the above it can be safely concluded that weather was not a contributory factor in the accident.

2.2.3 Flight Crew Interviews

- The PIC and the Co-pilot in their interviews mentioned that they were operating flights carrying COVID-19 related relief material in the recent past, but all material was carried in the cargo compartment of the aircraft. However, on the 6th of May 2021, they were unaware of the flight being operated with “Cargo in the Passenger Compartment”.
- The investigation team however believes that the PIC was aware of the plan to carry “Cargo in the Passenger Cabin”. This decision to remove the seats could only be carried out after confirmation from the PIC who is also the senior most pilot in DoA, GoMP and the Alternate AM in the given set up. It was therefore pre-coordinated with the Maintenance staff for the planned flight.

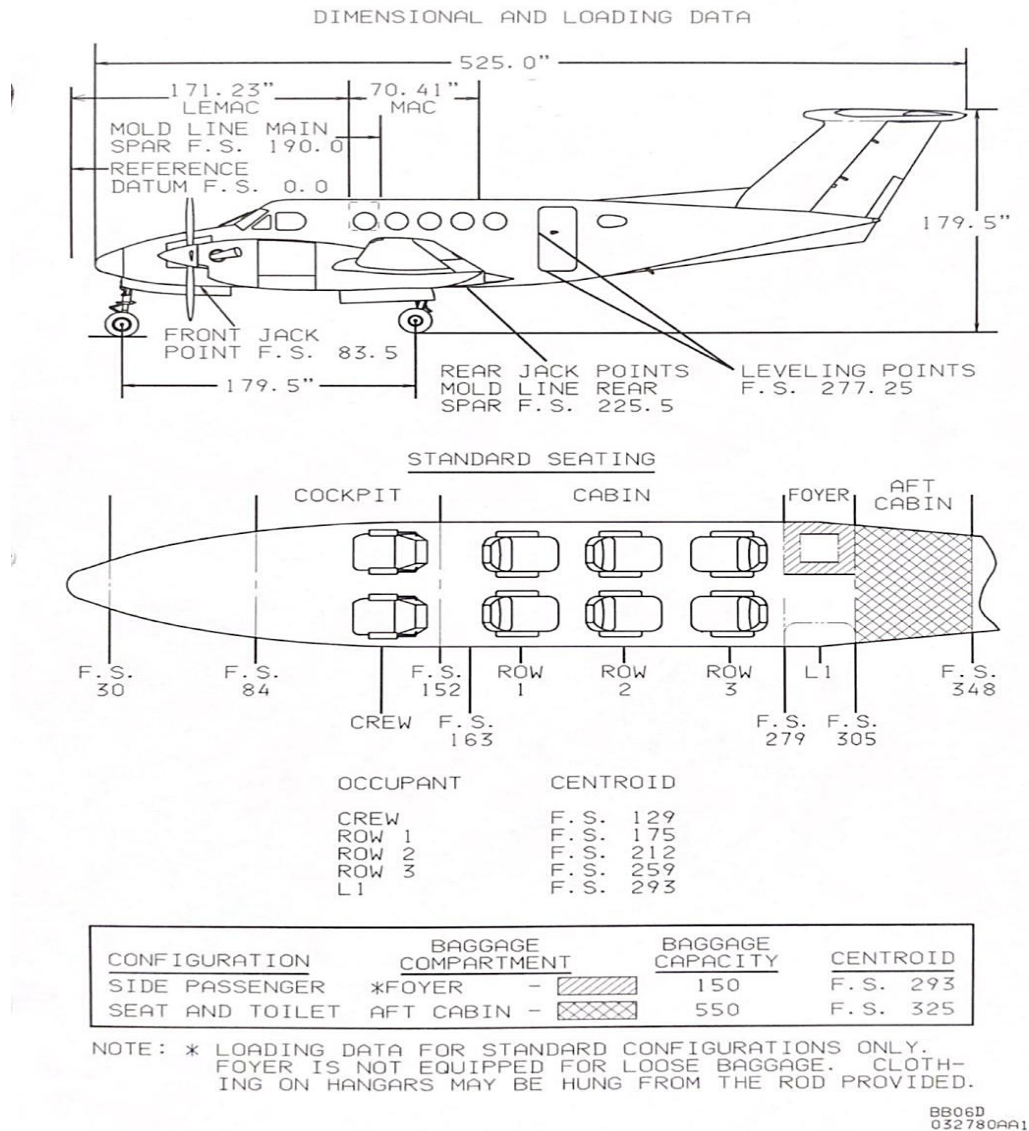


Figure 31: Seating & CG Location as per POH

The AM, PIC and Co-pilot, were aware of the DGCA requirement of seeking permission as per AIC SI. No. 7/2021 (Order), dated 15th Jan 2021.

However, the PIC mentioned that given the scenario in the state with regards to COVID-19, he would have still operated for humanitarian reasons irrespective of the DGCA requirements and permissions.

During the interviews with the AM and PIC, it was mentioned that they had planned to regularise the same with the DGCA office at a later date.

The investigation team deliberated the point of operating the flight without permission and compliance of AIC 7 of 2021 in detail. The investigation team came to the conclusion that given the scenario; with the limited means available to quickly respond to control the pandemic, therefore was to transport medicines within the state as soon as possible, hence the use of the

aircraft seemed justified if DoA,GoMP had notified the DGCA office by an email or telephonically.

On a deeper review of the AIC 7/2021, the investigation team observed that the said AIC did not have any provision to address an emergency situation.

2.2.4 Aircraft Centre of Gravity with Seats Removed

- The investigation team deliberated once the aircraft passenger seats were removed whether the aircraft CG was within limits as per the manufacturer or not.
- During the PIC (PF) and Co-pilot (PM) interview respectively, both mentioned that they had not experienced any handling issues with the aircraft in-flight due to CG issues or during the approach for landing. Further this was also confirmed during the CVR analysis.

Investigation team was informed by the Continuing Airworthiness and Maintenance Officer (CAMO) that post the aircraft seats were removed, the CAMO was not informed about the removal of the seats and hence the DGCA office could not be informed about the same and no revised approval obtained from the DGCA office. CAMO only got to know about the removal of seats post the accident. Therefore, not seeking a revised approval is not in compliance of DGCA CAR Section 2, Series X, Part II “Weight & Balance Control” (Para 4.3).

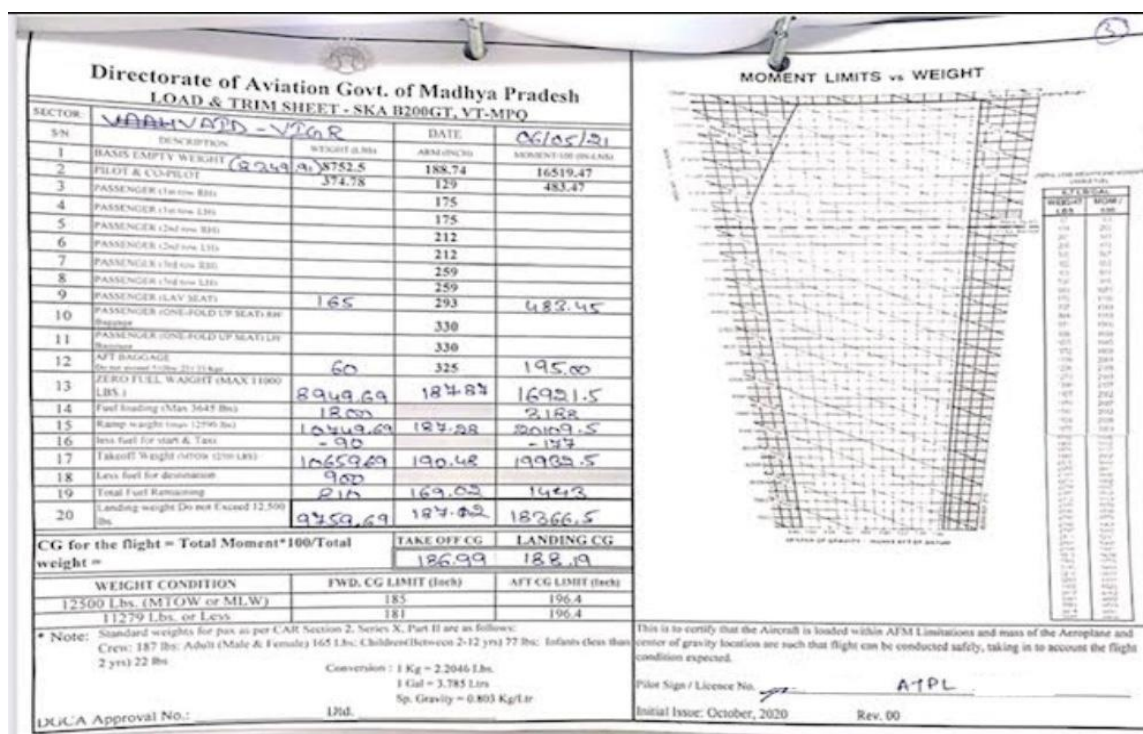



Figure 32: VT – MPQ Load and Trim Sheet – Sector (Indore to Gwalior) on 06/05/2021


DIRECTORATE OF AVIATION
GOVERNMENT OF MADHYA PRADESH
Raja Bhoj, International Airport, Bhopal - 462 030

Telephone : 0755-2641724

PASSENGER MANIFEST

Date : 06/05/21 A/c Regn. : VT-MPT / VT-MPR / VT-MPU
From : INDORE To : GWALIOR
Capt. : _____ Capt. : _____

S.No.	Name	Designation
1	<u>SKR</u>	
2		
3		
4		
5		
6		
7		

Total number of passengers : 01 (Authorised Signatory)

Figure 33: Passenger Manifest – Sector (Indore to Gwalior) on 06/05/2021

2.2.5 Preparation of Load & Trim Sheet

During the PIC's interview he clearly mentioned that the prevailing practice at DoA, GoMP, the "Final Trim" is only prepared after the flight is completed for the day. When the investigation team brought out that they have been given a copy of the "Load & Trim" for all the sectors for 6th May 2021, PIC mentioned that he was unaware of preparing such a "Load & Trim" sheet for the said flight, same would have been prepared by the DoA, GoMP staff and his signature would have been taken while he was in the hospital. This is not in line with the DGCA requirement.

The PIC in his interview, stated that in the current prevailing practice the "Load and Trim" is made using a "Mobile App" which does not have the necessary approval from the DGCA office. Post the flight, the flight crew would prepare the final load & trim. There was a similar "Finding" by DGCA in the year 2019/2020 during a surveillance for helicopter operations of DoA, GoMP. However, at the time of the accident the practice of using an unapproved Load and Trim software was still going on in the organization for fixed wing operations.

The above procedure followed by DoA, GoMP is not in compliance of DGCA CAR Section 2, Series X, Part II (Para 9.3 & 9.4).

- As per CFP, fuel required for the flight from Indore to Gwalior was 2000 lbs, however as per Load & Trim the fuel on board was 1800 lbs. 1800 lbs was adequate for the flight from Indore to Gwalior, taxi-out, a diversion to the furthest alternate (Jaipur), final reserve and taxi-in at the alternate. However, during the interview with the PIC he mentioned that there was 2500 lbs of fuel onboard.

Copy of the Computerised Flight Plan and Fuel Chit (**Refer Appendices D**).

2.2.6 Visual Approach

- The Flight Crew carried out a “**Visual Approach**” in the night-time for RWY 06R which was observed as non-adherence to the recommended company policy to avoid CFIT in operators Operations Manual (Para 6.17.4 {b}). The flight crew joined right base directly for the visual approach and then turned on to Final approach. The PIC mentioned that he carried out a visual approach in the night to save time as they were planned to fly two more sectors (Gwalior-Jabalpur-Bhopal) after landing at Gwalior.
- **Visual Illusion: Black Hole Approach Effect** – For the Approach into Gwalior for RWY 06R, the PIC (PF) could have been possibly affected by the visual illusion of a “Black Hole Approach Effect”, which is applicable for night- time visual segment of the approach. However, to mitigate the risk of the Pilot Flying getting affected by the said visual illusion, PAPI (Landing aid) was made available. However, the PIC (Pilot Flying) in his interview stated that he disregarded the PAPI indications and went below the visual PAPI profile knowingly.

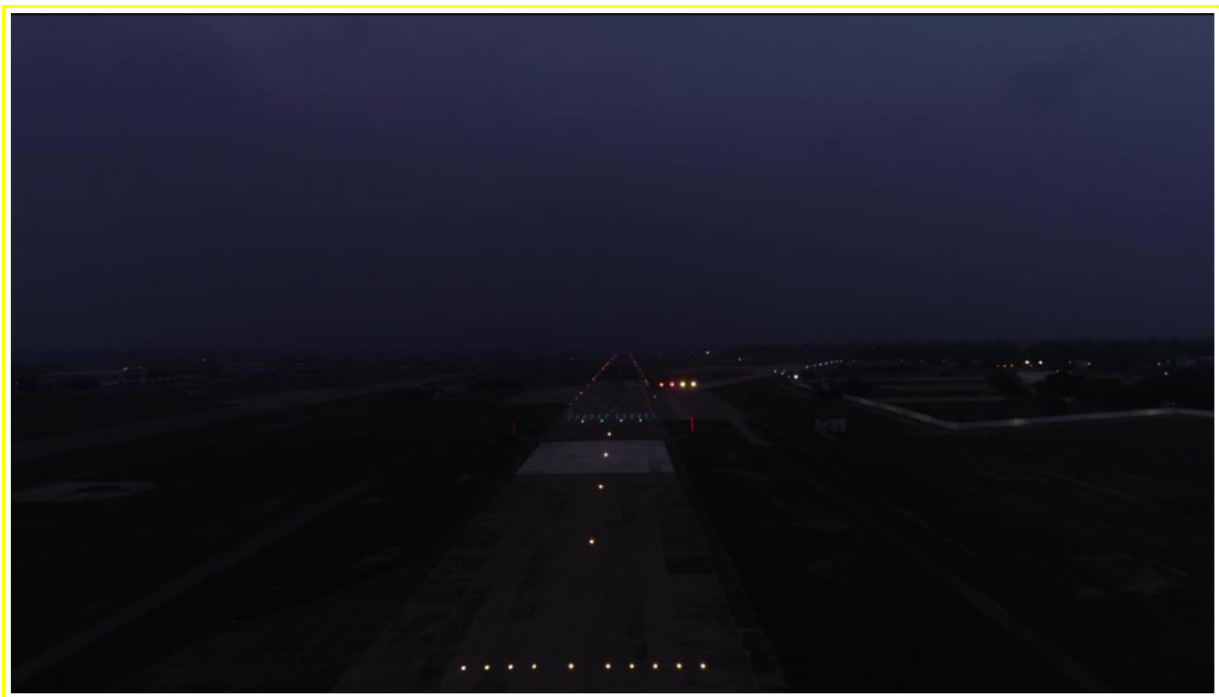


Figure 34: PAPI Indications and Displaced Threshold lights

2.2.7 Unstabilised Approach

- During the Co-pilot (PM) interview, the investigation team were informed that the selection of final landing flaps was delayed to below 500ft AGL, which does not meet the “**Stabilised Approach**” criteria as per DGCA Operations Circular 3 of 2017 and as specified in the DoA,GoMP Operations Manual Chapter 7. However, the PIC maintained that he had selected the Landing Gear at 5-6 NM, Landing Flap around 2-3 NM and the approach was stable and controlled. The CVR analysis indicates that the landing gear and flaps were selected as

mentioned by the PIC (PF) in his interview, however, the investigation team concluded that approach was considered as unstable as the PIC chose to deviate from the 3 degrees flight path profile and did not meet the company stabilised approach criteria.

- The aircraft was on profile till 300ft AGL as confirmed by the PIC and further the PIC (PF) confirmed that he deviated below the visual profile (PAPI profile) knowingly.
- During the Co-Pilot (PM) interview, he also confirmed that the aircraft started to deviate from the visual profile (PAPI profile) around 300 feet AGL and he mentioned that he did observe the PAPI indicating three Red's and One White (going below profile). However, no call was made by the PM in this regard to alert the PIC (PF).

2.2.8. iTAWS: Surface Management System (SMS) Alert

- **“Not a Runway” Aural Alerts**

The investigation team while analysing the contents of the CVR, observed a Aural Alert “Not a Runway” had come up in the previous sector (Ahmedabad to Indore) during taxi before departure. During the interview of PIC (PF), he mentioned that this aural alert was experienced on earlier occasions as well and he had brought this to the notice of the DoA,GoMP.

On Indore to Gwalior sector, the PIC (PF) was aware that the said aural alert would sound during the final approach. The aural alert did sound again as predicted, and the PIC (PF) commanded the Co-Pilot (PM) to inhibit the aural alert.

However, when the investigation team reviewed the “Journey Log Book” of VT-MPQ, no entry was found to have been made by the flight crew in this regard.

This is indicative of the fact that there was a prevalent culture within the organisation of not logging technical snags but verbally informing the Engineering / Safety Team. The investigation team reviewed the “Journey Log Book” and observed that only snags related to “Tyres” were logged.

- The flight crew received an aural alert “NOT A RUNWAY, NOT A RUNWAY” from the iTAWS (Surface Management System) which was inhibited by the Co-pilot (PM) on instructions from the PIC (PF).

2.2.9 General Observation about ducking under on short finals

- The investigation team opined that the PIC (PF) may have been aiming for the runway threshold of RWY 06R below 300 feet, probably due to the habit of flying this technique for landing on short runways not fitted with PAPI, where a touchdown is expected near the

threshold. This could be the reason the aircraft was maneuvered to go below the PAPI profile by the PIC (PF).

2.2.10 Instrument Approach Charts for Defence Airports:

Gwalior instrument approach charts were available on board. The PIC (PF) being the senior most pilot in the company and the Alternate Accountable Manager should have clarified to all flight crew in the organisation prior to the accident whether they are authorized to use the defence instrument approach charts or not. Raising this issue after the accident does not seem to justify PIC (PF) not carrying out an instrument approach chart at Gwalior. Further it does not justify carrying out a visual approach in the night time against the company recommendation.

2.2.11 Reporting of Aircraft Defects (Operations Manual Para 5.5.)

All pilots flying DoA, GoMP Aircraft should meticulously record the snags in the aircraft “Journey Log-Book” (JLB) as and when observed.

From the above company policy, it is evident that the flight crew did not follow the company SOP for reporting snags in JLB wrt to “iTAWS; Not A Runway” aural alert.

2.3 Human Factors Analysis and Classification System (HFACS)

The Human Factors Analysis and Classification System (HFACS) was developed by Dr. Scott Shappell and Dr. Doug Wiegmann. It is a broad human error framework that was originally used by the US Airforce to investigate and analyse human factors aspects of aviation. HFACS is broadly based upon James Reason’s Swiss Cheese Model (Reason 1990). The HFACS framework provides a tool to assist in the investigation process and target training and prevention efforts. Investigators are able to systematically identify active and latent failures within an organisation that culminated into an accident. The goal of HFACS is not to attribute blame; it is to understand the underlying causal factors that lead to an accident.

The HFACS framework describes human error at each of four levels of failure:

Within each level of HFACS, causal categories were developed that identify the active and latent failures that occur. In theory, at least one failure will occur at each level leading to an adverse event. If at any time leading up to adverse event, one of the failures is corrected, the adverse event will be prevented. (Diagram credit: Embry Riddle University)

The Human Factors Analysis and Classification System

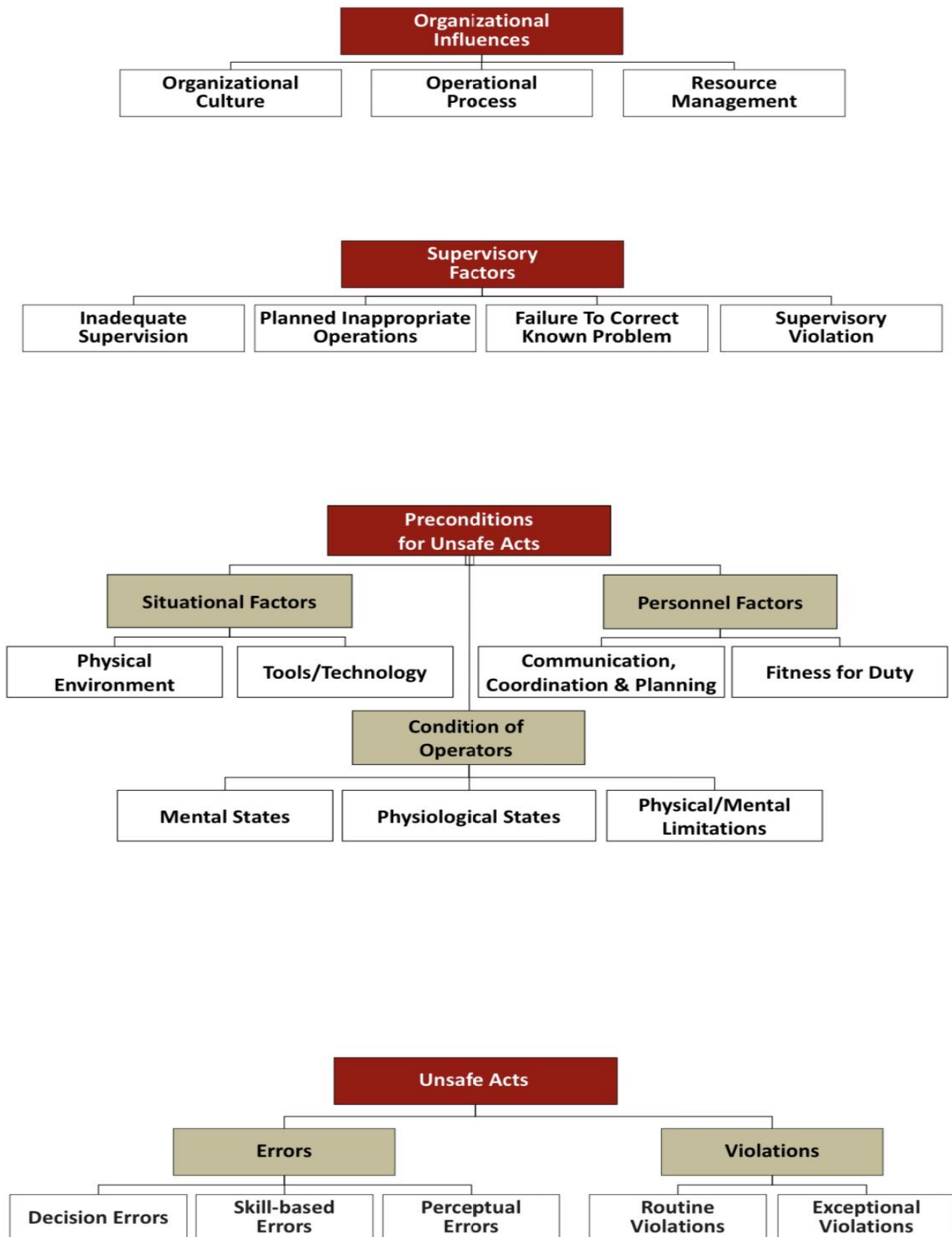
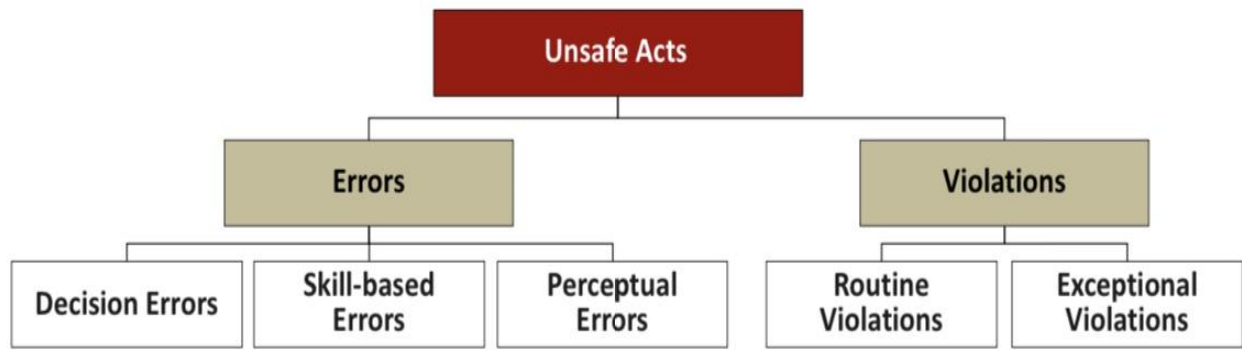


Figure 35: HFACS Flow chart

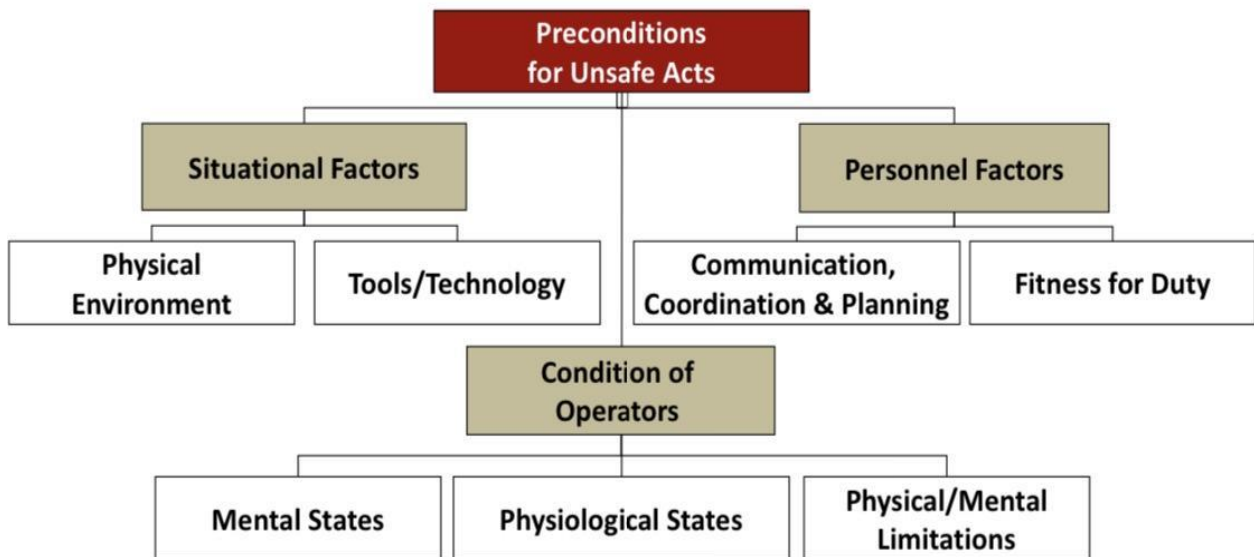
2.3.1 UNSAFE ACTS (ACTIVE FAILURES):



ERRORS			
	PIC	CO-PILOT	DATCO
DECISION ERROR	Flying a Visual Approach at Night while in violation of Company SOP Hurry up Syndrome Knowingly deviating from the Visual Flight Path (PAPI) Pointing to a Tower at a low height above ground / Deviating from the sterile cockpit requirement on final approach.	NIL	NIL
SKILL-BASED ERROR	NIL	NIL	Non-Adherence to Change of Runway Checklist
PERCEPTUAL ERROR	NIL	NIL	NIL

VIOLATIONS			
	PIC	CO-PILOT	DATCO
ROUTINE VIOLATIONS	Non-Compliance of SOP	Non-Compliance of SOP	NIL
EXCEPTIONAL VIOLATIONS	Carriage of Cargo in the Passenger cabin Distraction at a Low height above ground during final Approach	Distraction at a Low height above ground during final Approach	Non-Adherence to SOPs (Change of Runway Checklist not carried out)

2.3.2 PRECONDITIONS FOR UNSAFE ACTS (LATENT FAILURES):

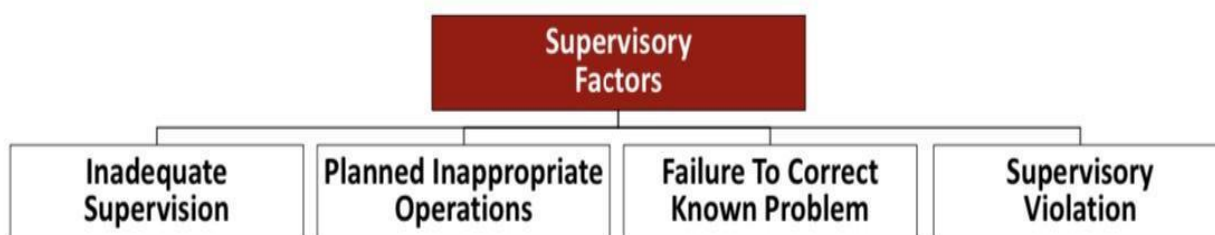


SITUATIONAL FACTORS			
	PIC	CO-PILOT	DATCO
PHYSICAL ENVIRONMENT	Night Flying	Night Flying	<p>Night time White LED lights on the Arrestor Barrier poles merging with the background lights.</p> <p>ATC design causing the vision of the Controller getting affected due to the pillars of the ATC building affecting the critical vision field of the "Approach of Runway 06R/24L"</p>
TOOLS/ TECHNOLOGY	<p>Not reporting and putting 'Off' ITAWS cautions and warning</p> <p>Not reporting ITAWS related technical issues in the "Tech Log"</p>	<p>Agreeing to switch the ITAWS warnings/cautions 'Off' on 'Command' of the PIC</p>	<p>Low intensity lighting inside the ATC at night time during (Approach for Landing, Take off and Landing.</p> <p>Arrestor Barrier Position Light unserviceable</p> <p>Arrestor Barrier Panel integral / background light unserviceable</p>

PERSONNEL FACTORS			
	PIC	CO-PILOT	DATCO
COMMUNICATION, COORDINATION AND PLANNING	Authoritarian (Subtle) type of Leadership	Non-Assertive behaviour	ATCO did not notify about the change of Runway from 24L to 06R to all concerned. Airman on Duty and Airman on Watch did not alert the DATCO of non-compliance to 'Change of Runway Checklist'
FITNESS FOR DUTY	Fit for Duty	Fit for Duty	Poor Management of Rest period by DATCO at a personal level.

CONDITION OF THE OPERATOR			
	PIC	CO-PILOT	DATCO
MENTAL STATES	Nil	Nil	Improper rest management by the DATCO leading to likelihood of Fatigue
PHYSIOLOGICAL STATES	Nil	Nil	Nil
PHYSICAL / MENTAL LIMITATIONS	Nil	Nil	Nil

2.3.3 SUPERVISORY FACTORS (LATENT FAILURES):



INADEQUATE SUPERVISION	<u>*DoA,GoMP</u> No systematic oversight mechanism to address known issues Lack of arranging regular simulator session for the PIC
PLANNED INAPPROPRIATE OPERATIONS	<u>*DoA,GoMP</u> Operator was authorised to carry out passenger operations by the DGCA but carried out cargo operations.

	<p>*Defence (IAF)</p> <p>1. With the 'Arrester Barrier Position Indicator' lights unserviceable, a robust alternate procedure was not in place but was left to only one individual (DATCO) to ensure the arrester barrier was down.</p> <p>2 Night time White LED lights on the Arrester Barrier poles against RED lights to indicate an obstacle as per requirement.</p>
FAILURE TO CORRECT KNOWN PROBLEM	<p>*DoA,GoMP</p> <p>PIC being a senior pilot did not assert himself to undergo simulator training on a regular basis as per the CAR requirement.</p> <p>PIC mentioned in his interview that they used to get regular "ITAWS" cautions/warnings, however, the same was not reported in the aircraft 'Tech-Log'.</p> <p>*Defence (IAF)</p> <p>Failure to fix the unserviceable 'Arrester Barrier Position Light' and the 'Integral Light on the Arrester Barrier Panel' in a timely manner.</p>
SUPERVISORY VIOLATION	<p>*DoA,GoMP</p> <p>Flight in violation of AIC (DGCA AIC 7/2021 dated 13th January 2021)</p>

2.3.4 ORGANIZATIONAL INFLUENCES:



	DoA,GoMP	DEFENCE (IAF)	REGULATOR
ORGANIZATIONAL CULTURE	Weak Safety Culture and reporting Culture	Reporting Culture	Inadequate Safety Oversight
OPERATIONAL PROCESS	Hierarchy driven processes	Hierarchy driven processes	Needs to be in line with the Best Practices
RESOURCE MANAGEMENT	No Limitations	No limitations	No Limitations

2.4 Cockpit Resource Management (CRM) Aspects with the flight crew

- **SOP:** Though the flight between Indore and Gwalior may be considered as normal however the PIC chose to carry out a visual approach in the night time against the company

recommended policy of carrying out an instrument approach. The Co-Pilot (PM) also did not raise any concerns regarding the same. Further, the deviation from the correct flight path of 3 degrees profile was flown knowingly by the PIC (PF) (as stated by him), and the Co-Pilot (PM) did not raise any concerns or made any amends regarding the same. This would not have happened if this was observed by the Co-pilot (PM) earlier, but he considered the same as normal as he was very new to the type of aircraft.

- **Communication:** The CVR was analysed for communication related issues. The investigation team observed that there were no communication related issues between the flight crew. All through the sector the communication was normal and relaxed. However, a steep seniority gradient prevented the Co-pilot (PM) to be assertive which affected his communication levels.
- **Decision Making:** The decision of PIC (PF) of flying a visual approach around 90 NM away is clearly indicative of the fact that the PIC (PF) was in a hurry and had made up his mind to conduct a visual approach to save time as there were two more sectors for them to operate after landing in Gwalior. The Co-Pilot (PM) also did not object to the PIC (PF) electing to carry out a visual approach or when the PIC (PF) deviated from the 3 degrees profile. Therefore, 'Decision Making' was observed as a factor in the outcome of the flight.
- **Trans-Cockpit Authority Gradient:** The communication levels between the flight crew were found to be normal and the PIC's (PF) tone was also right and did not indicate any anger, threat or aggressive behaviour. However, being a Senior Pilot with the company, Alternate Accountable Manager and a Designated Examiner, the Co-Pilot (PM) was a bit wary of the PIC and in his interview he did mention that the PIC (PF) would fly flat approaches (below 3 degrees profile) while carrying out a visual approach but he was in no position to question the PIC (PF) due to his seniority and authority in the Organisation. The statements of the Co-Pilot (PM) indicate that a subtle gradient existed between the flight crew which lead to non-adherence of SOP as laid down in their company Operations manual.
- **Assertiveness:** CVR analysis clearly indicated that the Co-Pilot (PM) was not assertive enough to question the decisions of the PIC (PF) and agreed with the decision of the PIC (PF) to carry out a visual approach 90 NM (approx.) away and did not bring to the notice of the PIC (PF) when he deviated from the 3 degrees visual profile.
- **Distraction Management:** The PIC (PF) was observed to not following the 'Sterile Cockpit' requirement and distracted the Co-Pilot (PM) to look towards a 'tower' close to the airport and finally both flight crew were engrossed in looking towards the tower at a low height above ground on approach which caused the delayed spotting of the arrestor barrier.

- **Situational Awareness:** The flight crew were situationally well aware during the flight till they commenced the visual approach. The PIC (PF) and the Co-Pilot (PM) had landed in Gwalior a number of times. The PIC (PF) by the virtue of flying a flat approach (below a 3 degrees profile) was not aware of the arrester barrier being in the raised position and ended up colliding with the arrester barrier. However, if the flight crew had followed the 3 degree visual profile as indicated by the PAPI to them, the aircraft would not have collided with the arrester barrier.
- **Workload Management:** Super King Air B200GT is certified for single pilot operations and all the SOP's are made for single pilot operations. Due to a regulatory and company requirement, the company has decided to have a Co-Pilot in DoA, GoMP B200GT aircraft. CVR analysis indicates that the workload was managed properly and the PIC (PF). However, the company has not clearly defined the "Pilot Monitoring Role".
- **Expectation Bias:** As the flight crew members had operated into Gwalior on multiple occasions and landed uneventfully. On the said day they were managing the flight like it was done on previous occasions and did not expect the Arrester Barrier to be in a raised position. Hence, did not in specific look out for the Arrester Barrier.

2.5 CIRCUMSTANCES LEADING TO THE ACCIDENT

The DATCO had joined duty around 1930 hrs IST on the 6th of May 2021 and was supported in the ATC by two other Air warriors (Air Men on Watch & Air Men on Lookout). In his handover briefing he was informed about the "Arrester Barrier Position Indicator Lights" not being serviceable in the ATC console panel.

Due to "Operational Readiness" the runway in use was 24L and the "Arrester Barrier" for 24L (240 feet beyond the end of runway 24L) was raised as per SOP's.

The DATCO relayed to the aircraft that runway in use was 24L but further went on to suggest to the flight crew that if they wanted to use runway 06R VOR approach. The PIC requested for a "visual approach" for runway 06R around 90 NM. Thereafter, the aircraft was cleared to descend from FL270 to 2700 feet. Subsequently the aircraft reported 15 NM and requested to call "Right Base" for runway 06R for a visual approach.

The staff manning the ATC had 18 mins time to complete the "Change of Runway Checklist" from the time the aircraft agreed to carry out a visual approach for runway 06R till the final landing clearance was given to the VT-MPQ flight crew. However, the DATCO did not carry out the "Change of Runway" checklist resulting in the "Arrester Barrier" remaining in the raised position.

In addition to the Arrestor Barrier Control Panel lights being unserviceable, the Arrestor Barrier poles also had “White LED” lights which merged into the background lights of the airport and prohibited the DATCO to visually see the raised arrestor barrier.

Flight crew carried out a visual approach and deviated from the visual flight path below 200-300 feet knowingly as guided by the PAPI and which was not brought to the notice of the PIC (PF) by the Pilot Monitoring (Co-Pilot).

The CVR analysis revealed both flight crew were busy looking at a tower which was constructed close to the airport boundary wall. However, the PIC (PF) elected to continue the approach below profile knowingly leading to collision with the raised Arrestor Barrier.

Had the flight crew maintained the PAPI profile (3 Degrees), the aircraft would have cleared the raised Arrestor Barrier and crossed the landing threshold around 50ft AGL.

3 CONCLUSION

3.1 FINDINGS

3.1.1 DoA,GoMP

- VT-MPQ was certified by the DGCA in the Normal Category Sub-Division Passenger Aircraft and was authorised to carry Passengers Only in the cabin and NOT Cargo as per their approved AOP. However, the aircraft was carrying Cargo in the Passenger compartment.
- DoA,GoMP did not seek an exemption from DGCA to operate a flight to carry Cargo in the passenger compartment in conformance with AIC 7/2021 , dated 15th Jan 2021.
- VT-MPQ aircraft was NOT insured at the time of the accident.
- VT-MPQ was installed with a Satellite Communication (SATCOM) but not a DFDR or any other data recording device.
- Both flight crew were endorsed on the aircraft and met all recency requirements and were medically fit to undertake flying duties.
- The Accountable Manager at DoA, GoMP does not have an Aviation background and was not familiar with Aviation Regulations as required by DGCA.
- Proper CAR compliance was not carried out by DoA,GoMP before submission to the DGCA for approval of the Operations Manual.

- There is no information or guidance for the Airports operated by DoA,GoMP in the operators Operations Manual.
- The Load And Trim Software being used on a Mobile App regularly by DoA,GoMP was not approved by the regulator.
- Knowingly deviating from the contents of DGCA AIC 7 of 2021, dated 15th Jan 2021.
- The DGCA approved Load & Trim sheets are prepared post the operation of a flight.
- Post removal of the aircraft seats, no DGCA approval was obtained for the revised Load and Trim.
- As per Computerised Flight Plan (CFP), fuel required for the flight from Indore to Gwalior was 2000 lbs, however as per Load & Trim the fuel on board was 1800 lbs. 1800 lbs was adequate for the flight from Indore to Gwalior, taxi-out, a diversion to the longest alternate (Jaipur), final reserve and taxi-in at the alternate.
- The CVR analysis do not suggest any aircraft system malfunction prior to the accident.
- During the CVR analysis it was observed that the flight crew were not wearing headsets while operating the flight as required by their company SOP.
- There was no evidence of a fire inflight or post impact.
- All damage to the aircraft was consequential to the accident.
- A detailed Approach Briefing as required by the company SOP was not carried out by the PIC (PF).
- Repeated iTAWS warnings and alerts not logged in the Journey Log Book (JLB) by PIC.
- As the PIC (PF) was aware of the nuisance iTAWS warning, the PIC (PF) commanded the Co-Pilot (PM) to switch OFF the iTAWS warning when the warning sounded on final approach.
- Recurrent Training of Flight Crew was not in compliance with DGCA CAR Section 7 Series B Part XVII.
- Incorrect CAR reference in the operators Operations Manual (Refer Training CAR).
- No information regarding the Arrestor Barrier in the operators Operations Manual.

- PIC has undergone Recurrent Simulator training only Twice in 19 years.
- Practical GPWS/EGPWS manoeuvres training and exercises not carried out during the IR/PPC check in the aircraft or in the simulator as required.
- PIC (PF) deciding to carryout a Visual Approach in the night time against company recommendation.
- The PIC knowingly deviated from the Flight Path below 300 ft AGL leading to the Approach becoming unstable.
- Lack of Assertiveness on the part of the Co-pilot in performing his role as Pilot Monitoring (PM).
- No specific procedures existed for the Pilot Monitoring (PM) despite having a Co-Pilot for all VIP flights.
- There were no Callouts for any deviations by the Co-Pilot (PM) on Approach.
- Distraction of the flight crew during the critical phase of flight (final approach for landing).
- Use of WiFi data on personal mobile phones during flight.
- The flight crew were not following the Sterile Cockpit rule.
- There were no Post Flight Blood, Urine tests carried out for the Flight Crew post the Accident.
- DoA,GoMP was unable to provide the investigation team with the video recording of the BA examination for Maintenance and ground staff as required.
- No proper system for managing Safety in the organization.
- Audit Findings remaining open at the time of the accident.
- Aircraft was serviceable and maintenance of the aircraft was in compliance with the DGCA laid down norms.

3.1.2 Indian Air Force (IAF)

- The DATCO was duly rated and certified for performing his duties as per IAF criteria.
- DATCO did not manage his personal rest period properly.

- DATCO not carrying out the “Change of Runway” checklist as per laid down SOP which led to Arrestor Barrier remaining in the raised position.
- Arrestor Barrier Position Indicator Lights were unserviceable at the time of the accident.
- Arrestor Barrier Panel Integral lights were unserviceable at the time of the accident.
- IAF internal process of audits did not capture the unserviceable items (Arrestor Barrier Position Indicator Lights and Arrestor Barrier Panel Integral Light) which directly affected safety during aircraft operations.
- The Arrestor Barrier poles were fitted with White LED lights.
- Unserviceable Arrestor Barrier Position Indicator Lights and Panel integral lights were not brought to the notice of SAS&IO.
- There is no video camera recording covering operations for Civil flights.
- There was no video camera recording for the Search and Rescue operations.

3.1.3 DGCA

- The AIC 07/2021, dated 15th Jan 2021 does not provide for the Emergency use of State Government aircraft for Carriage of Cargo in the passenger compartment.
- Proper CAR compliance was not carried out by the regulator before approval of the operators Operations Manual.
- The Accountable Manager at DoA,GoMP was approved without having an Aviation background.
- Permitting VT-MPQ to operate without the aircraft being insured.
- Permitting the Flight Crew (PIC) to carry passengers including VIPs despite of undergoing Recurrent Simulator Training ONLY twice in 19 years (in the year 2002 & 2009).
- DGCA oversight in not capturing and addressing GPWS/EGPWS manoeuvres training and exercises like wind-shear, electrical failure etc. while carrying out the IR/PPC in the aircraft when the training/ proficiency check is not carried in the simulator.
- Operator was using an unapproved software for carrying out Weight and Balance to prepare the Load and Trim on Fixed Wing aircraft and the same was not brought out during the DGCA Surveillance as pointed out for helicopter operations of DoA,GoMP.

- DGCA not conducting a Regulatory & Main Base Audit for Fixed Wing operations for DoA,GoMP.
- Review of DGCA Annual Surveillance Plan (ASP) for the last few years indicated that organisations providing Ground Training are not oversighted.

3.2 Probable cause of the Accident

- 1) The PIC (PF) carrying out a visual approach at night and knowingly deviated below the visual approach path profile (3 degrees) while disregarding the PAPI indications, thereby the aircraft collided with the raised Arrestor Barrier.
- 2) Lack of Assertiveness on the part of the Co-pilot (PM).

3.3 Contributory Factors

- 1) Non-Compliance to the SOP of “Change of Runway Checklist” by the ATC staff leading to the “Arrestor Barrier” remaining in a “Raised Position” while the aircraft (VT-MPQ) came in for landing on runway 06R.
- 2) Non-essential conversation by the flight crew during the final approach for landing causing distraction leading to a delayed sighting of the raised Arrestor Barrier.
- 3) Systemic failure at various levels at the Gwalior Air Force Base to ensure that the “Arrestor Barrier Position Indicator Lights and Integral Panel Lights” were not rectified in a stipulated time period.
- 4) A robust alternate procedure was not defined when the “Arrestor Barrier Position Indicator Lights and Integral Panel Lights” were unserviceable.
- 5) The Gwalior Airforce Base authorities did not install “Red Obstacle Lights” on the Arrestor Barrier Poles to indicate the position of the obstacle on the date of the accident as per the DGCA requirements (CAR Section 4, Series B, Part 1).

4 SAFETY RECOMMENDATIONS

4.1 DoA, GoMP

- i. DoA, GoMP may ensure compliance with DGCA requirements at all times and, for any deviation / exemption from the requirements, a specific DGCA permission must be obtained as per the laid down guidelines.

- ii. DoA GoMP/ other State Govt operators should ensure that all flight crew undergo recurrent simulator training as per the laid down norms of the DGCA.
- iii. The Flight Safety Officer in DoA, GoMP and all State Govt operators must implement a 'Safety Management System' in the right spirit and take proactive steps to address safety concerns rather than only trying to show compliance with the regulatory requirements.
- iv. All flight crew should be aware of the information provided in the Company's Operations Manual especially with reference to SOP etc.
- v. DoA,GoMP/ other State Govt operators may provide information regarding the airfields they operate into in their Company Operations Manual or any other document for their flight crew to refer to and special procedure if required for any airfield.
- vi. DoA, GoMP/ other State Govt operators should clarify if the flight crew are permitted to use Instrument Approach charts issued by the defence authorities.
- vii. DoA, GoMP should assign responsibility to ensure that the CCTV cameras are always functional while the staff members undergo a Breath Analyser examination as required by the DGCA CAR. Further DoA, GoMP may like to carry out the Breath Analyser examination for the flight crew under CCTV camera when operating out of base station while flying VIP's.

4.2 Indian Air Force

- i. IAF authorities may consider a video recording of all take-offs and landings of civil aircraft as laid down in the DGCA Air Safety Circular as carried out for IAF operations.
- ii. IAF authorities may consider video recording the ARFF (Search and Rescue) activities post an accident as per DGCA Air Safety Circulars.
- iii. IAF authorities may consider implementing an operational check of the CCTV cameras whenever there is a shift change of ATC staff to ensure all the take-offs and landings are recorded.
- iv. IAF authorities may like to review their internal processes to ensure important items which have a direct bearing on safety during aircraft operations are included in audits and may define specific timelines for rectification of critical components which have a direct bearing on safety of operations of aircraft.

- v. 'Safety Critical' items must be inspected by the SATCO as a part of his/her duty daily.
- vi. Post an aircraft accident all personnel providing Air Traffic Services, should be subjected to a Breath-Analyser examination, followed with blood and a Urine test to check for the presence of alcohol and drugs if prima facie the ATC has a role to play in the accident.
- vii. IAF authorities may like to educate staff involved in safety critical functions about the importance of managing their personal rest periods properly.
- viii. IAF authorities may like to introduce a training program for the ATC staff similar to CRM for flight crew which addresses issues like Communication, SOP's, Assertiveness, Fatigue, Workload Management etc.
- ix. IAF authorities should during their surveillance/ audits ensure compliance with relevant SOP including "Change of Runway Checklist".

4.3 DGCA

- i. DGCA may advise all State Governments operating fixed wing aircraft / helicopters to prepare an SOP as per AIC 7 of 2021 (revised to AIC 11 of 2021, dated 9th July 2021) for carriage of Cargo in passenger compartment at the earliest.
- ii. DGCA may consider including a provision in AIC 7 of 2021 (revised to AIC 11 of 2021, dated 9th July 2021) the Emergency use of the State Government aircraft for relief / humanitarian cargo operations at short notice till such time that their SOPs for carriage of Cargo in the passenger compartment are approved by the DGCA office.
- iii. DGCA may ensure that all State Government operators comply with the requirements of DGCA CAR Section 7 Series B Part XVII (Para 3.4) for Recurrent Training.
- iv. The DGCA office may relook into the issue of granting any exemptions to State Government operating flight crew {**DGCA CAR Section 7, Series B, Part XVII Para 3.4 (effective 01Oct 2016)**} in matters pertaining to simulator training wrt "Pilot Proficiency Checks" which has a direct impact on safety in operations. Particularly when they are involved in flying VIP's.

- v. DGCA may advise State Govt operators to carry out a Safety Risk Assessment (SRA) to all airfields they operate into and review the SRA every 3 years or if there is any major change demanding a review SRA as part of their Safety Management System.
- vi. DGCA may ensure all the 'document requirements' as per Section 2 Series X Part VII Issue 2 Rev 7 are met before an operator is given permission to fly an aircraft in Indian airspace.
- vii. DGCA may mandate camera recording of Breath Analyser Examination for all GA operator flight crew before commencing any flight duty from their base station.
- viii. DGCA may mandate installation of DFDR or any retrievable data recording device as per DGCA CAR for General Aviation including State Govt Aircraft carrying VIP's irrespective of the 'All Up Weight' of the aircraft like a Co-pilot is mandated even on aircraft less than 5700 kgs while carrying VIP's.
- ix. DGCA may like to carry out 'Regulatory Audit & Main Base Inspection' in addition to the 'Surveillance of specific areas' of State Govt operator's as they are involved in carrying VIP passengers like it is done for the 'Scheduled Operator's' to ensure major issues affecting safety are trapped early enough to avoid an occurrence. These audits may be in line with the International Best Practices.
- x. The DGCA may like to increase the frequency of Surveillance for General Aviation / State Government operators to ensure compliance with the contents of their Operations Manual in addition to the laid down DGCA requirements.
- xi. DGCA may like to enhance their oversight on Training Organizations which are imparting Ground training like Recurrent Annual Aircraft Technical, CRM, Human Factors etc. to General Aviation operators including State Government to ensure quality and standards.
- xii. GPWS Training DGCA OC 02 of 2017: DGCA may like to check how are the State Govt operators complying with the practical GPWS/EGPWS training requirements when the IR/PPC is being conducted in the aircraft.
- xiii. DGCA may cross-check in their surveillance/ audits that all General Aviation / State Govt operators provide information regarding the airfields they operate into in their Company Operations Manual or any other document including special procedure if required for any airfield.
- xiv. DGCA may apprise its Principal Operations Inspector (POI) to thoroughly scrutinize the organisation's Operations Manuals before approval is granted in order to ensure that the

requirements laid down in the manuals meet the requirement of DGCA in the category applicable to the operator.

- xv. DGCA may, while nominating an individual as an 'Accountable Manager' (AM), conduct an orientation course for the AM to know the requirements and understand their responsibilities rather than leaving it to the individual or the organization. Further DGCA may choose to create an E-Module in this regard.
- xvi. DGCA may like to formulate a methodology to apprise the Defense authorities on a periodic basis about all the DGCA requirements wrt to Aerodrome Standards, Videography of ARFF activity post an accident, Blood & Urine test of the surviving flight crew after the accident.
- xvii. The DGCA during Surveillance may like to cross check the process by which how all operators procure the current Defence Instrument Approach charts from the defence authorities, and ensure that the operators carry out a gap analysis to highlight the differences between the Defence approach charts and the regularly used instrument approach charts like Jeppesen etc. and further ensure the flight crew are competent to use the said charts.
- xviii. The DGCA may ensure that all instrument approach charts published by the Defence authorities are made available in AIP India to ensure that current charts are used by the flight crew.
- xix. The DGCA may issue guidelines to all operators including General Aviation/State Governments operators to clearly define the role of "Pilot Monitoring" for dual pilot operations. The contents of the Flight Safety Foundation "A Practical Guide to Improving Flight Path Monitoring" may be used as reference material.
- xx. Reference the DGCA Air Safety Report of 2020, wherein risk was identified in General Aviation/ State Government operations, DGCA may like to carryout a one time exercise to check how many "State Govt" flight crew undergo a Recurrent Training on Simulator as per the laid down guidelines of the DGCA CAR.

Interim Recommendation released by the Investigation Team during the course of the Investigation.

1. During the "Night" time, flight crew should preferably carry out an "Instrument approach" preferring the ILS and if ILS is not available a non-precision (CDFA) approach should be carried out. Visual approach should be given the last preference (except while conducting training flights to build proficiency in visual approach).
2. During night time in case the flight crew chooses to carry out a visual approach, then the approach should be carried out after coming overhead.
3. Flight crew should utilize all available landing aids (like ILS, Non-Precision approach profile) to support the approach or follow the guidance of PAPI/ VASI till crossing the runway threshold.

The above recommendation was released by the DGCA as a Safety Bulletin 1 of 2021 dated 15th June 2021.



Capt. Dhruv Rebbapragada
Investigator-In-Charge



Mr. Dinesh Kumar
Investigator

Dated: 24.01.2022

Place: New Delhi

APPENDICES

	<u>List of Appendices</u>
A	Certificate of Airworthiness / Operating Permit
B	Aircraft Station Licence
C	Meteorological Data for Flight (Flight Folder)
D	Computerised Flight Plan / Fuel Chit
E	MoU – DoA, GoMP and AWIEPL
F	ADS – B flight data
G	Duties and Responsibilities of Flight Safety Officer
H	Spectrum Analysis of CVR
I	Insurance Advertisement in Newspapers
J	ATC Tape Transcript
K	AIC 7 of 2021, Dated 15th Jan 2021
L	ASC 4 of 2013
M	ASC 5 of 2014

Appendix 'A' : Certificate of Airworthiness / Operating Permit

सं /No: 7362

ना.वि. 23 / C.A. 23



भारत / INDIA

नागर विमानन महानिदेशालय / DIRECTORATE GENERAL OF CIVIL AVIATION उड़न-योग्यता प्रमाण-पत्र / CERTIFICATE OF AIRWORTHINESS

राष्ट्रीयता तथा पंजीकरण चिह्न / Nationality and Registration Mark	विमान का निर्माता तथा विमान निर्माता द्वारा विमान को दिया गया नाम/ Manufacturer and Manufacturer's Designation of Aircraft	विमान क्रम सं / Aircraft Serial No
VT- MPQ	TEXTRON AVIATION INC. ONE CESSNA BOULEVARD WICHITA, KS 67215 SUPER KING AIR B200GT	BY-373
वर्ग/Category:	NORMAL	
उप-प्रभाग /Sub Division	PASSENGER	
आवश्यक न्यूनतम कर्मीदल / Minimum Crew Necessary:	ONE	
प्राधिकृत अधिकतम कुल भार / Maximum All-Up-Weight Authorized:	5670 KG	

इस विमान का परिचालन इस विमान के संबंध में जारी की गयी अनुमोदित उड़ान नियमावली तथा उसमें किये गये उत्तरवर्ती संशोधनों के अनुसार किया जायेगा। यह उड़ान नियमावली प्रमाण-पत्र का एक भाग समझा जायेगा तथा विमान में जायेगा।

This aircraft is to be operated in accordance with the approved Flight Manual and its subsequent amendments, issued in respect of this aircraft. The Flight Manual shall form a part of this Certificate of Airworthiness and shall be carried on board.

यह उड़न-योग्यता प्रमाणपत्र उपर्युक्त विमान जिसे पूर्वोक्त शर्तों एवं सम्बद्ध परिचालन परिसीमाओं के अनुरूप सांघारित और प्रचालित किये जाने पर उड़न-योग्य समझा जाता है, उसके लिए 7 दिसम्बर, 1944 के अन्तराष्ट्रीय नागर विमानन विषयक अभिसमय, तथा समय-समय पर यथा संशोधित विमान नियमावली, 1937, के अनुसार जारी किया जाता है।

This Certificate of Airworthiness is issued pursuant to the Convention on International Civil Aviation dated the 7th December, 1944, and the Aircraft Rules, 1937 as amended from time to time, in respect of the above mentioned aircraft which is considered to be airworthy when maintained and operated in accordance with the foregoing and the pertinent operating limitations.

यदि उपरोक्त अनिवार्य शर्तें पूरी कर दी गयी हैं तो, यह प्रमाण-पत्र उड़न-योग्यता पुनरावलोकन प्रमाण-पत्र की वैधता रहने तक वैध रहेगा बशर्ते कि इस प्रमाण पत्र को वापस नहीं ले लिया जाता अथवा निलम्बित नहीं कर दिया जाता।

This Certificate of Airworthiness shall remain valid, subjected to the above compulsory conditions being fulfilled along with valid Airworthiness Review Certificate, unless withdrawn, or suspended.



जारी करने की तारीख / Date of issue: 3rd November, 2020
नई दिल्ली / New Delhi

A. H. H.

हस्ताक्षर /Signature
नाम /Name (Sandhya Saxena)
पदनाम/मोहर/Designation/Seal (DDAW)

Mohit Jain
मोहित जैन
Mohit Jain
सहायक निदेशक (उड़नयोग्यता)
Assistant Director of Airworthiness
कार्यालय उपनिदेशक (उड़नयोग्यता)
O/o Deputy Director of Airworthiness
नागर विमानन विभाग, भारत सरकार
Civil Aviation Department, Govt. Of India
राजा भोज एयरपोर्ट/ Raja Bhoj Airport
भोपाल-462030 Bhopal-462030

OPERATING PERMIT

OP. No.07/2012

Government of Madhya Pradesh,
Raja Bhoj International Airport,
Bhopal-462030.

The following aircraft can be operated under the authority of this authorization.

Sl. No.	Aircraft Registration	Type of Aircraft	Sl. No. of Aircraft	Seating Capacity	Signature
1.	VT-MPR	EC155 B1	6938	06	
2.	VT-MPQ	Super King Air B200GT	BY-373	09	



Mohit Jain
Mohit Jain

मोहित जैन
Mohit Jain
सहायक निदेशक (उड़नयोग्यता)
Assistant Director of Airworthiness
कार्यालय उपनिदेशक (उड़नयोग्यता)
O/o Deputy Director of Airworthiness
नागर विमानन विभाग, भारत सरकार
Civil Aviation Department, Govt. Of India
राजा भोज एयरपोर्ट/ Raja Bhoj Airport
भोपाल - 462030/Bhopal-462030

Appendix 'B' : Aircraft Station Licence



भारत सरकार
Government of India

संचार एवं सूचना प्रौद्योगिकी मंत्रालय
Ministry of Communications

बेतार आयोजना एवं समन्वय स्कंध
Wireless Planning and Co-ordination Wing



वायुयान स्टेशन अनुज्ञप्ति
AIRCRAFT STATION LICENCE
LICENCE DE STATION D AERONEF
LICENCIA DE LA ASTACION DE AERONAVE

30-09-2025 तक विधिमान्य जब तक कि और आगे नवीनीकृत नहीं ।

Valid upto 30-09-2025 unless further renewed.

अनुसूची सं 002 अनुज्ञप्ति सं A-003/WRLO-20 से उपाबद्ध ।
Schedule No. 002 Annexed to License No. A-003/WRLO-20

1. अनुज्ञप्तिधारी का नाम और पता Name and address of licensee	Government of Madhya Pradesh Directorate of Aviation State Hangar Raja Bhoj International Airport Bhopal 462030
2. (i) संज्ञा चिन्ह या पहचान के अन्य चिन्ह Call sign or other identification (ii) सेलेक्टिव काल सं, यदि कोई हो Selective call No., if any.	VT-MPQ
3. किस प्रकार की सेवा की गई Nature of Service performed	Restricted Correspondence.

अरविन्द सरोज / ARVIND SAROJ
उड़ानयोग्यता अधिकारी / Airworthiness Officer
उपमहादेशीय नागर विमानन (प.क्ष.) वन कार्यालय
Sub-Continental Civil Aviation Authority

4. अनुज्ञापित उपकरण का वर्णन:

Description of licensed apparatus

क - रेडियो संचार प्रेषित्र

A - Radiocommunication Transmitters

	विनिर्माता Manufacturer	टाइप संख्या Type No.	निर्गम निर्धारण शक्ति Rated Output Power	आवृत्ति परिसर Frequency Range	उत्सर्जन Emission	आवृत्ति सहन Frequency Tolerance
मुख्य Main	Rockwell Collins	VHF - 4000 Qty: 1	18 W	118.00 to 136.99 MHz	A3E	± 0.0005%
आपाती Stand-by	Rockwell Collins	VHF - 4000 Qty: 1	18 W	118.00 to 136.99 MHz	A3E	± 0.0005%

ख - रेडियो संचार अभिग्रहित्र

B - Radiocommunication Receivers

	विनिर्माता Manufacture	टाइप संख्या Type No.	आवृत्ति परिसर Frequency Range
मुख्य Main	Rockwell Collins	VHF - 4000 Qty: 1	118.00 to 136.99 MHz
आपाती Stand-by	Rockwell Collins	VHF - 4000 Qty: 1	118.00 to 136.99 MHz


 25/10/2020
 अरविन्द सरोज / ARVIND SAROJ
 उड़नक्षमता अधिकारी, Airworthiness Officer
 उपमहानिदेशक नागर विमानन (प.क्षे.) का कार्यालय
 O/o Dy. Director General of Civil Aviation (WR)
 भारत सरकार / Govt. of India
 विले पार्ले (पूर्व), मुंबई / Vile Parle (E), Mumbai - 99



ग - रेडियो मार्ग निर्देशन संचित्र :

C – Radio Navigation Apparatus:

		विनिर्माता Manufacture	टाइप संख्या Type No.	आवृत्ति परिसर Frequency Range
1.	Automatic Direction Finder	Rockwell Collins	NAV-4000 Qty: 1	0.190 - 1.7995 MHz and 2.088 - 2.094 MHz
2.	ILS - Localizer Receiver	Rockwell Collins	NAV-4000 Qty: 1	108.10 - 111.950 MHz
3.	ILS - Localizer Receiver	Rockwell Collins	NAV-4500 Qty: 1	108.10 - 111.950 MHz
4.	ILS - Glide path Receiver	Rockwell Collins	NAV-4000 Qty: 1	329.15 - 335.00 MHz
5.	ILS - Glide path Receiver	Rockwell Collins	NAV-4500 Qty: 1	329.15 - 335.00 MHz
6.	ILS - Marker Receiver	Rockwell Collins	NAV-4000 Qty: 1	75 MHz
7.	ILS - Marker Receiver	Rockwell Collins	NAV-4500 Qty: 1	75 MHz
8.	VOR Receiver	Rockwell Collins	NAV-4000 Qty: 1	108.00 - 117.950 MHz
9.	VOR Receiver	Rockwell Collins	NAV-4500 Qty: 1	108.00 - 117.950 MHz
10.	Weather Radar	Rockwell Collins	TWR-850 Qty: 1	9343.85 ± 1.8 MHz
11.	DME Interrogator	Rockwell Collins	DME- 4000 Qty: 1	960 - 1215 MHz
12.	ATC Transponder	Rockwell Collins	TDR - 94D Qty: 2	Tx: 1090 ± 1.0 MHz Rx: 1030 ± 0.2 MHz
13.	Radio Altimeter	Rockwell Collins	ALT-4000 Qty: 1	4.2 - 4.4 GHz
14.	GPS Receiver	Rockwell Collins	GPS-4000S Qty: 1	1575.42 MHz
15.	Emergency Locator Transmitter	Artex	C406-N Qty: 1	121.5 MHz ± 6 kHz, 243 MHz ± 12 kHz and 406.028 MHz ± 1 kHz
16.	TCAS	Rockwell Collins	TTR - 4100 Qty: 1	Tx: 1030 MHz Rx: 1090 MHz
17.	SATCOM	COBHAM	AVIATOR 200 Qty: 1	Tx: 1626.5 - 1660.5 MHz Rx: 1525.0 - 1559.0 MHz

अरविन्द सरोज / ARVIND SAROUJ
 उड़नयोग्यता अधिकारी / Airworthiness Officer
 उपग्रहानिदेशक नागर विमानन (प.शे.) का कार्यालय
 O/o Dy. Director General of Civil Aviation (V)
 भारत सरकार / Govt. of India
 विले पार्ले (पूर्व), मुंबई / Vile Parle (E), Mumbai-400099

5. प्राधिकृत आवृत्ति कर्मीमंडल:-

Authorized Frequency Complement:

प्रचालन की आवृत्तियाँ, उत्सर्जन और घंटे वे होंगे जो समुचित सिविल विमानन प्राधिकारियों द्वारा समय-समय पर प्राधिकृत किये जाएँ।

Frequencies, emissions and hours of operation shall be as authorized from time to time by the appropriate Civil Aviation authorities.

6. प्रमाणित प्रचालक: Certified Operators:

वायुयान स्टेशन के प्रचालक की अर्हताएँ वे होंगी जो अन्तर्राष्ट्रीय संचार युनियन के अद्यतन रेडियो विनियम में उल्लेखित हैं।

The operator of the aircraft station shall possess the qualifications as prescribed in the Radio Regulation, in vogue, of the International Telecommunication Union.

भारतीय नागरिक से भिन्न कोई भी व्यक्ति भारत में रजिस्ट्रीकृत वायुयान पर रेडियो टेलिफोन/रेडियो टेलिग्राफी उपकरण का प्रचालन केन्द्रीय सरकार की पूर्व अनुज्ञा के बिना नहीं करेगा।

No person other than an Indian Citizen shall operate the Radio Telephony / Radio Telegraphy apparatus on board Indian Registered aircraft without the prior permission of the Central Govt.

7. स्टेशन निम्नलिखित कार्य करने के लिये अनुज्ञापित है:-

The station is licensed to :

(i) वैमानिक चल सेवा में स्थल और गश्ती स्टेशनों को संदेश भेजना और वहाँ से संदेश प्राप्त करना।
Transmit to and receive from land and mobile stations in the aeronautical mobile service.

(ii) वायु स्टेशनों के लिए सामान्य रूप से अभिग्रहण के लिए अभिप्रेत विशेष सेवा स्टेशनों और रेडियो यान निर्देशन स्टेशनों से भेजे गये संदेशों को प्राप्त करना।

Receive messages sent from special service stations and radio navigation stations meant for general reception for aircraft stations.

(iii) किसी स्टेशन से ऐसे प्रेषण प्राप्त करना जो एकल रूप से वायुयान से क्षेत्रपूर्ण निर्देशन के प्रयोजन के लिए हों।

Receive transmission from any station solely for the purpose of safe navigation of the aircraft.

(iv) ऐसी आपात स्थिति के दौरान जिसमें कामियों को या यान के संचालन में खतरा हो, ऐसे किसी अन्य स्टेशन को संदेश भेजना या वहाँ से संदेश प्राप्त करना, जिनके साथ संचार स्थापित करना वायुयान का कमाण्डर वांछनीय समझता हो।

Transmit to and receive messages during emergency involving danger to life of personal or to navigation from any other station with which the commander of the aircraft considers that communication is desirable.

8. स्टेशन को अन्तर्राष्ट्रीय संचार युनियन के अद्यतन रेडियो विनियम में उल्लेखित दस्तावेज उपलब्ध कराये जाएँ।
The station shall be provided the documents specified in the Radio Regulations, in vogue, of the International Telecommunication Union.

संचार एवं सूचना प्रौद्योगिकी मंत्रालय, भारत सरकार द्वारा निकाली गई।
Issued by the Ministry of Communications, Government of India.

दिनांक: 01-10-2020

Date: 01-10-2020

अरविन्द सरोज / ARVIND SAROJ
उड़नयोग्यता अधिकारी / Airworthiness Officer
उपमहादेशिक नागर विमानन (प.क्ष.) का कार्यालय
O/o Dy. Director General of Civil Aviation (WR)
भारत सरकार / Govt. of India
विले पार्ले (पूर्व), मुंबई / Vile Parle (E), Mumbai - 99

C. Gupta
(Gaurav D. Gupta)

Deputy Wireless Adviser
उप द्वातार सल्लाहकार
Deputy Wireless Adviser
संचार मंत्रालय
Ministry of Communication
क्षेत्रीय अनुज्ञापित कार्यालय, मुंबई
Regional Licensing Office Mumbai

Appendix 'C': MET Folder



INDIA METEOROLOGICAL DEPARTMENT FLIGHT FOLDER

METEOROLOGICAL DATA FOR FLIGHT VTMPQ VAID-VIGR DOF 06 MAY 2021

Departure VAID (DEVI AHILYABAI HOLKAR)
Destination VIGR (GWALIOR)
Date Thu May 6 14:06:02 2021Z
ETD 1400Z
ETE 0100
Username gmrgroup

Weather Codes and Symbols

QUALIFIER		WEATHER PHENOMENA		
Intensity	Descriptor	Precipitation	Obscuration	Other
- Light (no indicator) Moderate + Heavy VC - In the vicinity	MI - Shallow BC - Patches DR - Low drifting BL - Blowing SH - Shower(s) TS - Thunderstorm FZ - Freezing PR - Partial	DZ - Drizzle RA - Rain SN - Snow SG - Snow grains IC - Ice crystals PL - Ice Pellets GR - Hail GS - Small hail and/or snow pellets	BR - Mist FG - Fog FU - Smoke VA - Volcanic ash DU - Dust (widespread) SA - Sand HZ - Haze	PO - Dust/sand whirls SQ - Squalls FC - Funnel cloud(s) (tornado or waterspout) SS - Sandstorm DS - Duststorm

SIGNIFICANT WEATHER SYMBOLS

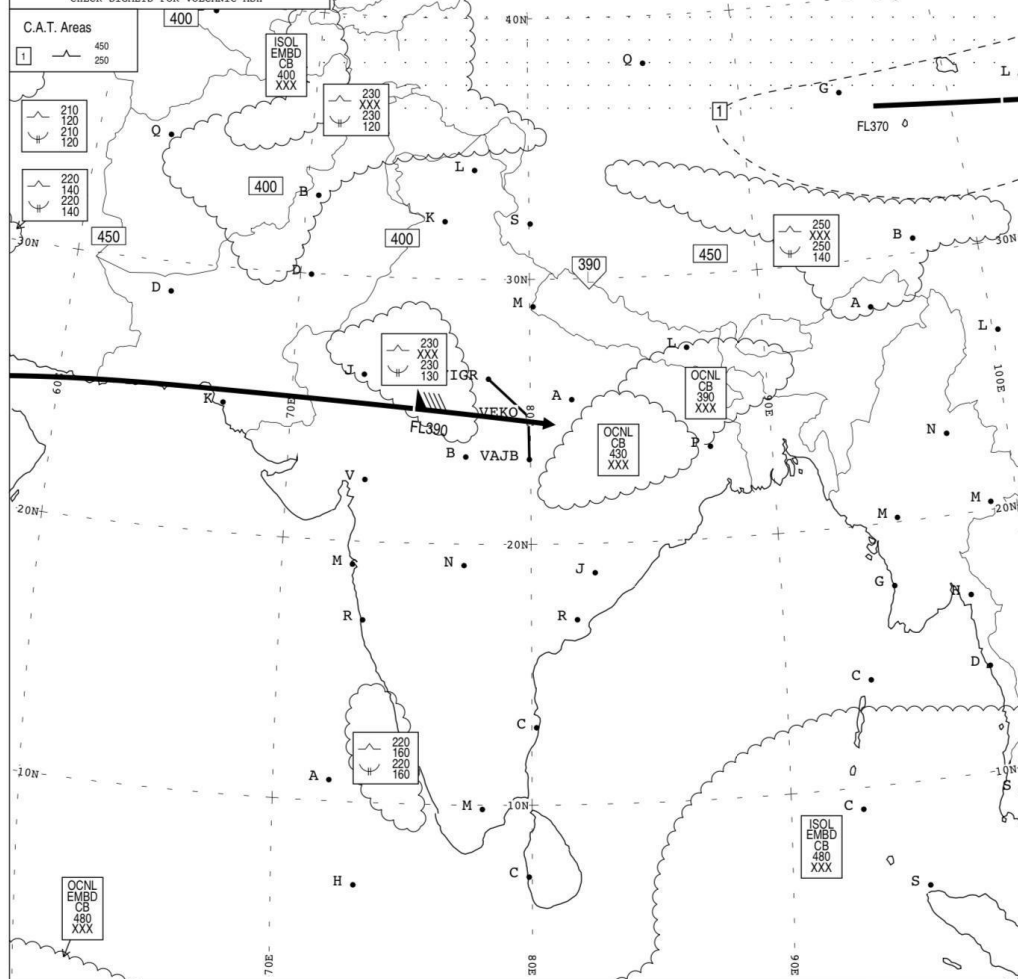
	Severe Icing		Moderate Icing		Severe Turbulence		Moderate turbulence
	Tropical Cyclone		Volcano				
	Tropopause Low		Tropopause Height		Tropopause High		
	FL370	The double bar denotes changes of Level by 3000 or less and/or wind speeds by 37Km/h (20Kt)					
	Short feather - 5 knots Long feather - 10 knots Triangle - 50 knots						

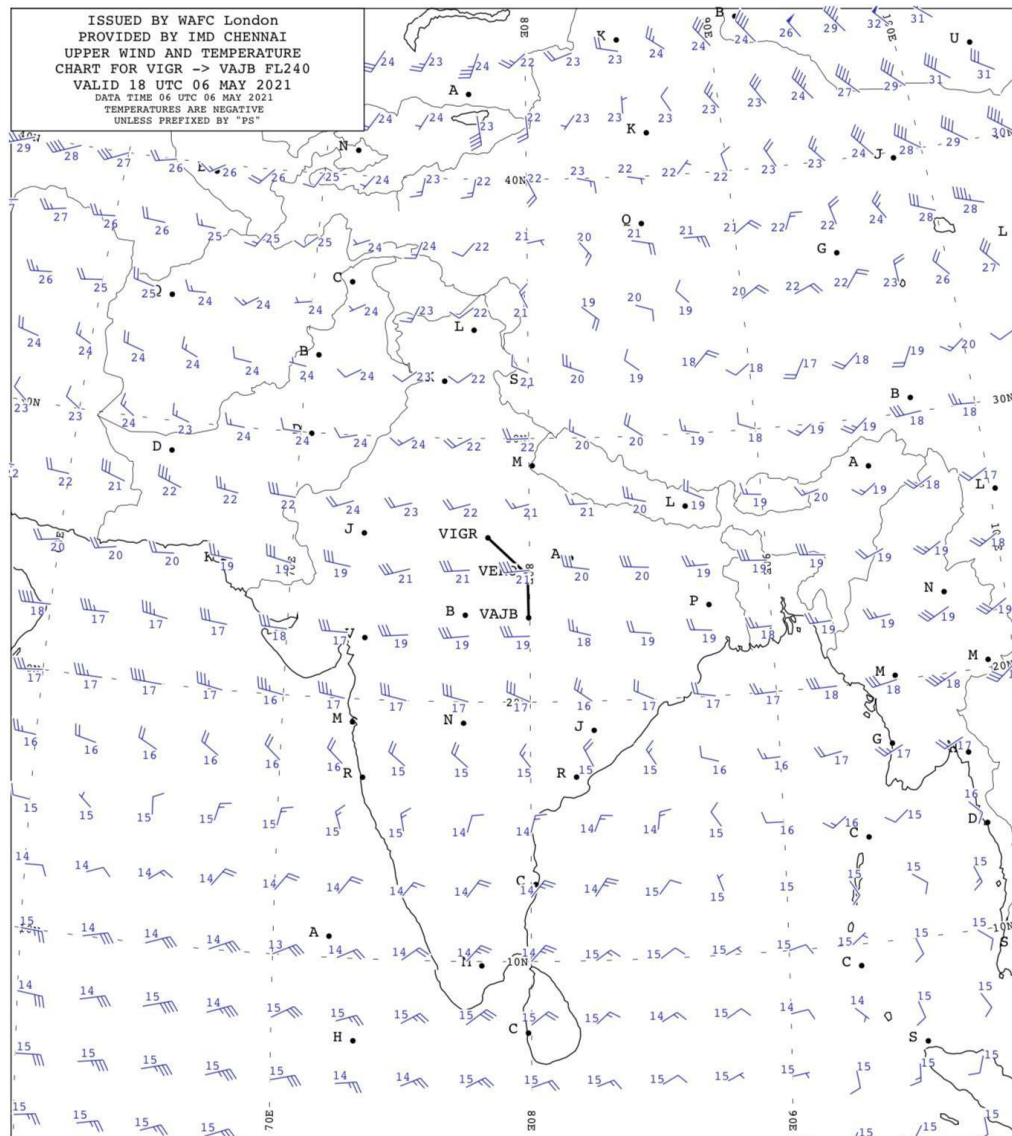
Aerodrome Meteorological Office Delhi
 IGI Airport
 Tel: + 91 11 2560168, + 91 11 25652398
 Fax: + 91 11 25652398
 E-mail: amss20042000@yao.co.in

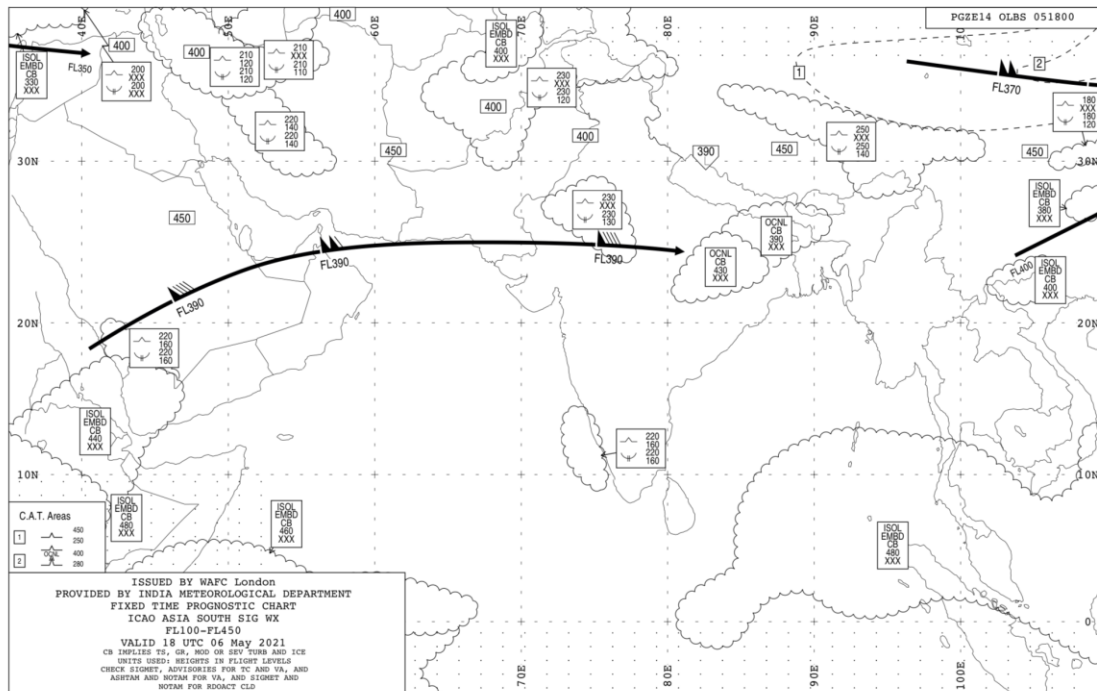
Aerodrome Meteorological Office Chennai
 Chennai Airport
 Tel: + 91 44 22560168
 Fax: + 91 44 22560790
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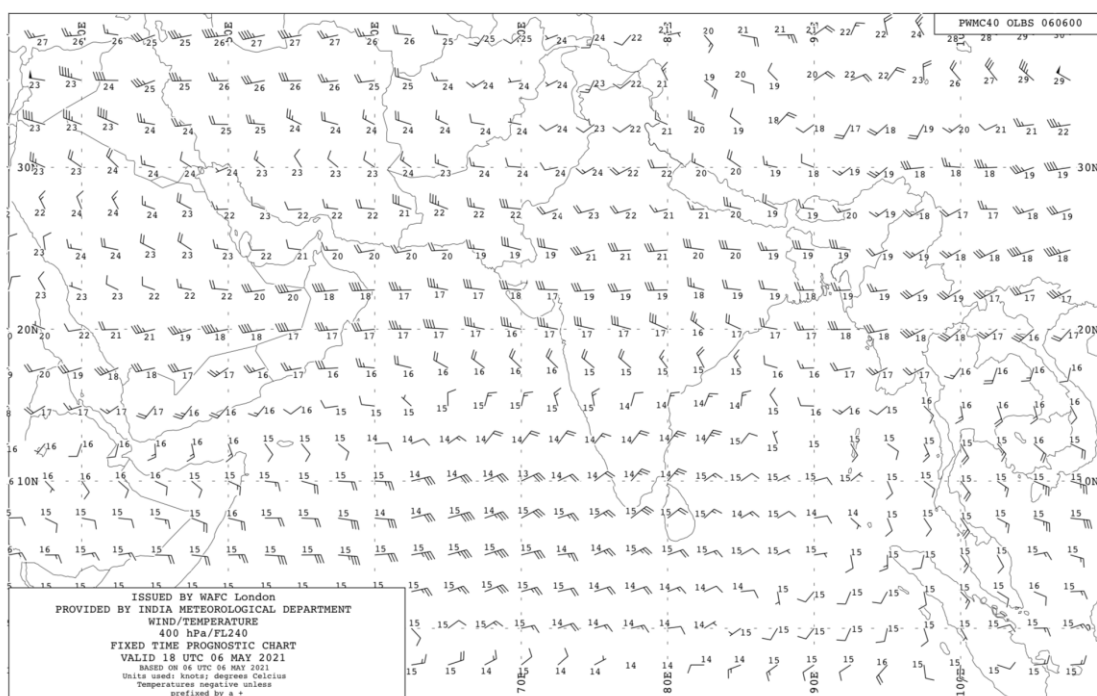
RAW DATA FROM WAFc London
 FIXED TIME FORECAST CHART
 ROUTE VIGR -> VAJB SIG WX
 FL100-FL450
 VALID 18 UTC 06 May 2021
 CB IMPLIES MOD OR SEV TURBULENCE,
 ICE or RAIL
 HEIGHT INDICATIONS IN FLIGHT LEVELS
 ALL SPEEDS IN KNOTS
 CHECK SIGMETS FOR VOLCANIC ASH







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Appendix 'D': CFP and Fuel Chit

VAID - VIGR VTMPQ

----- VTMPQ (BE20) 06MAY21 NAV LOG/ OPS FPL FOR ETD 1400Z (ETA 1459Z) -----

DEP : VAID - INDORE DIST : 281NM TRACK : 277 DEG
 DEST : VIGR - GWALIOR CRUISE : IFR MAX CRUISE POWER 1800 RPM @ PAX : 0
 FL270

MAIN ROUTE : FL270 IID W10N GWA

PIC : SM AKHTAR

FO : SHIV JAISWAL

COMPUTED FUEL : 2000 LBS BLOCK FUEL : 871 LBS
 MIN. TRIP FUEL : 1110 LBS TAKE OFF FUEL : 1910 LBS
 MAX. TRIP FUEL : 3672 LBS LANDING FUEL : 1129 LBS
 TOP CLIMB TEMP : FL 270 (ISA: -38°C) WIND : 14KT TAIL (277°/052)

----- PLAN TIME & FUEL ----- PLAN WT (in LBS) -----

TAXI : 90 LBS	BASIC WT : 8618 LBS
TRIP : 781 LBS	LOAD : -
CONTINGENCY 5% : 39 LBS	ZERO FUEL : 8618 LBS
FIRST ALTN FUEL : 562 LBS	T.OFF WT : 10528 LBS
SECOND ALTN FUEL : 552 LBS	LAND WT : 9837 LBS
FINAL RESERVE FUEL : 200 LBS	ALTN : 139NM MIN DIVERT FUEL: 762 LBS
ADDITIONAL / HOLD : 890 LBS	FIRST ALTN ROUTE : GWA AVLEL VEGLU JJP
	SECOND ALTN ROUTE : GWA OMKOP PAKSI LKN
TOTAL : 2000 LBS	

----- DIFFERENT LEVEL CALCULATION ----- ACTUALS -----

FL	WC	TIME	TRIP	CHOCKS ON : _____	LANDING : _____
FL 230	T11		732 LBS	CHOCKS OFF : _____	AIRBORNE : _____
FL 250	T13	0H59M	661 LBS	BLOCK TIME : _____	FLT TIME : _____
FL 270	T14		691 LBS	BLOCK FUEL : _____	FIC-ADC : _____
FL 290	T15	0H59M	671 LBS		
FL 310	T15		657 LBS		

ATC CLEARANCE :

DEP ATIS :

ARR ATIS :

DEST ALTN ATIS :

V1: _____ VR: _____ V2: _____ VFTO: _____ VREF: _____

I certify that all my licenses, ratings etc are current / valid and I am legally/ medically fit for operating flight. I meet the qualification requirements to operate to concerned airfields as per category/routes indicated per OM D. I have read and understood the operations manual, OPS supplements, emails, NOTAMS and required compliance. (cars, circulars, aips, etc).BA test complied as per car section 5 series F part 3.

(PILOT/COPILOT SIGNATURE)

VAID - VIGR VTMPQ

					WIND			SPD KT		DIST NM		FUEL LB		TIME			
WAYPOINT	AIRWAY	HDG	CRS	ALT	CMP	DIR/SPD	ISA	TAS	GS	LEG	REM	USED	REM	LEG	ETE	ETA ATA	ACTUAL FUEL
VAID		-	-	1854	-	-	+24	0	0	-	281	90	1910	-	0:59		
IID INDORE 116.7	DCT	244	242	3200	H11	275/013	+24	163	152	1	280	100	1900	0:00	0:59		
MUBDO	W10N	067	068	FL161	T13	260/013	+17	172	185	18	262	191	1809	0:06	0:53		
-TOC-	W10N	063	068	FL270	T28	276/031	+13	197	225	24	238	267	1733	0:06	0:47		
OSEPU	W10N	063	068	FL270	T47	276/054	+13	294	340	30	208	321	1679	0:06	0:41		
BPL BHOPAL 117.1	W10N	063	068	FL270	T46	276/054	+13	294	341	21	187	359	1641	0:03	0:38		
100-BILAN	W10N	006	016	FL270	T4	276/053	+13	294	299	6	181	372	1628	0:02	0:36		
-TOD-	W10N	005	014	FL270	T2	278/049	+12	295	297	95	86	566	1434	0:19	0:17		
BILAN	W10N	008	016	FL254	T13	276/038	+12	284	297	5	81	576	1424	0:01	0:16		
GWA GWALIOR 112.8	W10N	012	014	700	T4	257/013	+15	287	291	81	-	780	1220	0:16	0:00		
VIGR	DCT	160	163	617	H1	080/012	+19	284	283	0	-	781	1219	0:00	-		
Alternate route for VIGR,VIJP Route GWA AVLEL VEGLU JJP																	
GWA GWALIOR 112.8	DCT	347	343	800	T1	079/012	+19	166	167	1	138	92	1127	0:00	0:33		
-TOC-	DCT	298	299	FL120	H2	234/003	+19	176	174	13	125	171	1048	0:05	0:28		
AVLEL	DCT	295	298	FL120	H14	248/020	+14	273	259	51	74	325	894	0:12	0:16		
VEGLU	DCT	268	269	FL120	H18	245/020	+14	272	254	37	37	440	779	0:09	0:07		
-TOD-	DCT	267	270	FL120	H8	207/018	+14	272	264	3	34	448	771	0:00	0:07		
JJP JAIPUR 112.9	DCT	271	270	1700	H7	325/008	+17	284	277	32	2	555	664	0:07	0:00		
VIJP	DCT	270	266	1268	H2	351/021	+19	277	275	2	-	562	657	0:00	-		
Alternate route for VIGR,VILK Route GWA OMKOP PAKSI LKN																	
GWA GWALIOR 112.8	DCT	347	343	800	T1	079/012	+19	166	167	1	152	92	1127	0:00	0:32		
-TOC-	DCT	057	057	FL130	T6	239/005	+18	175	181	15	137	177	1042	0:05	0:27		
OMKOP	DCT	056	057	FL130	T20	249/021	+13	276	296	39	98	280	939	0:08	0:19		

VAID - VIGR VTMPQ																	
					WIND			SPD KT		DIST NM		FUEL LB		TIME			
WAYPOINT	AIRWAY	HDG	CRS	ALT	CMP	DIR/SPD	ISA	TAS	GS	LEG	REM	USED	REM	LEG	ETE	ETA ATA	ACTUAL FUEL
-TOD-	DCT	090	090	FL130	T20	274/020	+13	275	295	54	44	420	799	0:11	0:08		
PAKSI	DCT	091	090	FL120	T20	268/021	+13	295	315	3	41	428	791	0:00	0:08		
LKN LUCKNOW 117.4	DCT	090	090	400	T21	266/010	+17	284	306	40	1	549	670	0:08	0:00		
VILK	DCT	288	288	406	T3	071/004	+17	245	249	1	-	552	667	0:00	-		

AIRPORT INFO

	Airport	ETA	ATIS	TWR/CTAF	CLR	GND	ELEV	LONGEST RWY	
DEP	VAID	-	127.6	122.8	N/A	N/A	1854	25	9035 ft
DEST	VIGR	1459Z	N/A	122.7	N/A	N/A	617	24	8971 ft

VAID - VIGR VTMPQ																	
					WIND			SPD KT		DIST NM		FUEL LB		TIME			
WAYPOINT	AIRWAY	HDG	CRS	ALT	CMP	DIR/SPD	ISA	TAS	GS	LEG	REM	USED	REM	LEG	ETE	ETA ATA	ACTUAL FUEL
-TOD-	DCT	090	090	FL130	T20	274/020	+13	275	295	54	44	420	799	0:11	0:08		
PAKSI	DCT	091	090	FL120	T20	268/021	+13	295	315	3	41	428	791	0:00	0:08		
LKN LUCKNOW 117.4	DCT	090	090	400	T21	266/010	+17	284	306	40	1	549	670	0:08	0:00		
VILK	DCT	288	288	406	T3	071/004	+17	245	249	1	-	552	667	0:00	-		

AIRPORT INFO

	Airport	ETA	ATIS	TWR/CTAF	CLR	GND	ELEV	LONGEST RWY	
DEP	VAID	-	127.6	122.8	N/A	N/A	1854	25	9035 ft
DEST	VIGR	1459Z	N/A	122.7	N/A	N/A	617	24	8971 ft

ATC FLIGHT PLAN VIGR to VILK

.....

(FPL-VTMPQ-IG

-BE25/L-SDFH/S

-VAID1400

-N0280F270 IID W10N GWA

-VIGR0100 VJIP VILK

-DOF/210506 REG/VTMPQ

EET/VIDF0040 OPR/GOVT OF MP

RMK/MEDICAL RELIEF FLIGHT CREDIT FACILITY AVAILABLE WITH AAI PIC S M AKHTAR MOB 9425008042 ALL INDIANS ON

BOARD ENDURANCE 0300)

ENROUTE WINDS

IDENT	FL 230 W/V	TMP	FL 250 W/V	TMP	FL 270 W/V	TMP	FL 290 W/V	TMP	FL 310 W/V	TMP
IID	274/035	+13	275/043	+13	276/054	+13	280/057	+13	282/060	+12
MUBDO	274/035	+13	275/043	+13	276/054	+13	280/057	+13	282/060	+12
-TOC-	274/035	+13	275/043	+13	276/054	+13	281/057	+13	282/060	+12
OSEPU	276/034	+13	276/042	+13	276/054	+13	279/056	+13	280/058	+12
BPL	276/034	+13	276/042	+13	276/053	+13	279/056	+13	280/058	+12
100-BILAN	276/034	+13	276/042	+13	276/053	+13	279/056	+13	280/058	+12
-TOD-	271/026	+12	274/033	+12	277/040	+11	274/054	+12	275/064	+11
BILAN	271/026	+12	273/033	+12	277/040	+11	274/054	+12	275/064	+11
GWA	271/024	+12	278/026	+12	286/027	+11	285/034	+10	281/045	+9
GWA	246/013	+19	249/018	+17	251/020	+15	247/021	+12	246/021	+11
-TOC-	246/013	+19	249/018	+17	251/020	+15	247/021	+12	246/021	+11
AVLEL	257/004	+17	255/011	+15	245/020	+14	241/019	+13	245/018	+12
VEGLU	299/006	+17	228/010	+15	207/018	+14	205/021	+12	212/023	+11
-TOD-	298/006	+17	228/010	+15	208/018	+14	205/021	+12	212/023	+11
JJP	296/006	+17	227/010	+15	208/018	+14	206/021	+12	213/023	+11
GWA	247/017	+18	250/019	+16	249/021	+13	246/022	+11	246/020	+11
-TOC-	247/016	+18	250/019	+16	249/021	+13	246/022	+11	246/020	+11
OMKOP	292/011	+16	287/018	+15	280/020	+13	267/018	+12	256/016	+12
-TOD-	257/017	+16	265/020	+14	268/021	+13	267/021	+12	267/018	+11
PAKSI	257/017	+16	265/020	+14	268/021	+13	267/021	+12	267/018	+11
LKN	263/019	+15	263/021	+14	265/020	+12	270/014	+12	261/013	+12

***** END OF THE REPORT *****

COMPUTED DATE : 06-05-2021

TIME : 10:48:13 UTC

एवी-7 / AV-7

इंडियन ऑयल कॉर्पोरेशन लिमिटेड (डीजीसीए अनुमोदित) Indian Oil Corporation Ltd. (DGCA APPROVED) फ्यूल डिलीवरी वाउचर FUEL DELIVERY VOUCHER		एफडीवी सं. FDV No. 877645	दिनांक DATE 06	माह MONTH 05	वर्ष YEAR 2024
एयरफील्ड AIRFIELD		लोकेशन का नाम LOCATION NAME	सैप कोड SAP CODE	आयएटा कोड IATA CODE	
कस्टमर का नाम CUSTOMER NAME GOVT OF MP					
बिल करें BILL TO 1000408			आपूर्ति कर्ता / SUPPLIER VT-MPL		
डिफ्यूलिंग रसीद DEFUELLING RECEIPT	<input type="checkbox"/> फ्लाइट सं. FLIGHT NO. NS	एयरक्राफ्ट रजि. सं. AIRCRAFT REG. No. VT-MPL			
घरेलू DOMESTIC	<input type="checkbox"/> से आगमन ARRIVED FROM	एयरक्राफ्ट प्रकार AIRCRAFT TYPE			
एक्सपोर्ट EXPORT- ड्यूटी पेड DUTY PAID- बॉन्डेड BONDED	<input type="checkbox"/> जहाँ जाना है PROCEEDING TO	एमटीओडब्ल्यू <40टी सहित निर्धारित एअरलाइन एअरक्राफ्ट Scheduled Airline's aircraft with MTOW <40T हाँ Yes <input type="checkbox"/> नहीं No <input type="checkbox"/>			
बे. सं. BAY NO.	कारनेट सं. CARNET NO.	समय-घंटे:मिनट (भारतीय मानक समय) Time-HH:mm(IST)			
हाइड्रंट पीट सं. HYDRANT PIT NO.	को समाप्त EXPIRES ON.	सामान रखा गया EQUIP. POSITIONED			
फ्यूल प्राधिकृत संदर्भ संख्या (एन/शेड्यूल फ्लाइट्स) FUEL AUTHORISATION REF. NO. (for N/SCH. FLIGHTS)		फ्यूलिंग शुरू हुई / FUELLING STARTED			
नगद CASH <input type="checkbox"/> क्रेडिट CREDIT <input type="checkbox"/>		फ्यूलिंग समाप्त हुई / FUELLING COMPLETED			
		अंतिम मंजूरा / FINAL CLEARANCE			
फ्यूल ग्रेड / GRADE: JET A-1/JP-5/AVGAS 100LL					
उपकरण सं. / आईडी EQUIPMENT NO. / ID	क्लोसिंग मीटर रीडिंग CLOSING METER READING				
ओपनिंग मीटर रीडिंग OPENING METER READING	अंतर (लीटर) DIFFERENCE (LITRES)				
की गई आपूर्ति की कुल मात्रा (लीटर) TOTAL QUANTITY DELIVERED (LITRES)	आंकड़ों में IN FIGURES शब्दों में IN WORDS				
फ्यूल नमूने की जांच FUEL SAMPLE CHECK	फ्यूल बैच सं. FUEL BATCH NO.:				
रिफ्यूलिंग से पहले BEFORE REFUELLING	आपूर्ति किया गया फ्यूल संबंधी आईएस एवं डेफस्टान विनिर्देशों के नवीनतम अंक को पूर्ण करता है। THE FUEL SUPPLIED MEETS LATEST ISSUE OF RELEVANT BIS & DEFSTAN SPECIFICATIONS.				
(केवल डिस्पेंसर के लिए FOR DISPENSER ONLY • (लगभग 1000 लीटर रिफ्यूलिंग के बाद AFTER APPROX. 1000 LTRS OF REFUELLING • रिफ्यूलिंग के बाद AFTER REFUELLING	ग्राहक टिप्पणी CUSTOMER COMMENT	घनत्व DENSITY:	के.जी/मी ³ kg/m ³	तापमान TEMP:	से Deg C
फ्यूल नमूना साफ, उजला और दृश्य रूप से कठोर पदार्थ अघुलनशील पानी से मुक्त। एअरलाइन प्रतिनिधि द्वारा पानी पता लगाने के उपकरण से जांच गई। FUEL SAMPLE CLEAR, BRIGHT AND VISUAL FREE FROM SOLID MATTER & UNDISSOLVED WATER, CHECKED WITH WATER DETECTING DEVICE BY AIRLINE REPRESENTATIVE.					
डिलीवरीकर्ता DELIVERED BY:			प्राप्तकर्ता RECEIVED BY:		
नाम (बड़े अक्षरों में) NAME (IN BLOCK LETTERS):			नाम (बड़े अक्षरों में) NAME (IN BLOCK LETTERS):		
हस्ताक्षर SIGNATURE			हस्ताक्षर SIGNATURE		

Appendix 'E': Relevant Extract of the MoU between DoA.GoMP & AirWorks India (Engineering) Private Limited:

3. CUSTOMER's Responsibilities and Obligations

During the Term of this Agreement, the CUSTOMER undertakes to:

- 3.1 Use the Aircraft in accordance with the technical limitations/Specification as specified on the Airworthiness Certificate and according to all legal prescriptions and regulations as well as to OEM's operating, flight and loading manuals.
- 3.2 Observe the schedules for the maintenance on the Aircraft, either by the limitation of flying hours or the calendar time according to the OEM's recommendations.
- 3.3 Ensure that if the maintenance is carried out by a Service Center other than AWIEPL, such Service Center would be duly approved by the OEM and the Aircraft's equipment's are repaired only by duly authorized repair agencies approved under CAR-145 Regulations.
- 3.4 Follow-up on the requirement for the application of any mandatory SB's or AD's issued by the DGCA, the OEM, or the relevant authority of the country of manufacture of the parts, components and equipment.
- 3.5 Confirm in writing to AWIEPL, the work scopes to be performed on the Aircraft together with planned input dates for the Aircraft inspection.
- 3.6 Maintain Flight Report Book up-dated so that Aircraft and engine log books are accurately up-to-date and record in particular all occurrences during the operation of the Aircraft as well as all maintenance or modification works performed, and be responsible for the accuracy of the information recorded.
- 3.7 Provide AWIEPL with complete updated documentation relative to the Aircraft and its engines each time the Aircraft is brought for scheduled and/or unscheduled inspections performed at AWIEPL's facility.
- 3.8 Obtain and maintain Comprehensive Insurance Coverage under the Aviation Insurance policy and Aircraft Liability Insurance according to applicable air law regulations, conditions of carriage, etc. which would cover all risks and perils including – hull, air accidents and mishaps, third party liability, baggage loss, death/injury of passengers and crew, property damage, etc.
- 3.9 The Aircraft is presented to AWIEPL in a timely manner for the accomplishment of the prescribed tasks and de-briefing meeting is held to address any defects.
- 3.10 The Customer shall respond with its decision on all matters referred to it by AWIEPL within such time as AWIEPL shall reasonably specify so as not to delay the provision of the Services. In the event of non receipt of consent from the Customer within a reasonable time, AWIEPL shall not be liable and responsible for delay in delivery of Aircraft and/or any delay in defect rectification, claims arising due to non-performance of matters for which the Customer has not consented.



Contract No. – AWI/MPQ/AMC/AUGUST2020

- 3.11 The Customer shall provide, prior to any Aircraft delivery access to the Airworthiness Data in respect of such Aircraft in accordance with the Customer's approved maintenance planning document.

4. AWIEPL's Responsibilities and Obligations

During the Term of this Agreement, AWIEPL undertakes to:

- 4.1 Carry out Services under this Agreement in accordance with OEM's Maintenance Manual and under CAR-145 Approval No. Q-3 AWI / 2999.
- 4.2 Provide written work report showing the details of the works performed on the Aircraft.
- 4.3 Be responsible for the technical services and the technical administration of the Aircraft when serviced by AWIEPL.
- 4.4 AWIEPL shall maintain activity records for the relevant documents and information concerning the computerized maintenance program, if applicable, and ensure transmission of applicable data to the OEM.
- 4.5 Ensure that licenses and authorizations of AWIEPL's specialized personnel performing services for the CUSTOMER are valid and up to date.
- 4.6 AWIEPL shall not assign this Agreement or parts thereof to a third party without express sanction of the CUSTOMER.
- 4.7 AWIEPL shall provide authorized person at normal operating base to complete arrival/departure formalities.
- 4.8 AWIEPL shall provide the maintenance personnel from the pool of its engineers and technicians to work on Customer Aircraft.
- 4.9 AWIEPL shall comply with the maintenance requirement as prescribed by the manufacturer of aircraft.
- 4.10 AWIEPL shall ensure following:
 - (a) The AIRCRAFT is maintained in an airworthy condition.
 - (b) Any operational and emergency equipment fitted is correctly installed and serviceable or clearly identified as unserviceable.
 - (c) The airworthiness certificate remains valid, and
 - (d) The maintenance of the AIRCRAFT is performed in accordance with the Customers approved maintenance program.

Appendix ‘F’: ADS-B Flight Data

In the absence of “Flight Recorder” on VT-MPQ, the investigation team reviewed the available flight data from the ADS-B which was captured by the software “Flight Radar 24”. The Flight data from ADS-B was available from (14:17:32 Z) 8950 feet during climb up to FL270 and descent from FL270 to (15:05:19 Z) 10475 feet only.

The investigation team also cross-checked the ADS-B data feed from Delhi, Nagpur and Lucknow however no data was available below 18000 feet. Gwalior radar was “off” due as no Defence flying was in progress. The Captured ADS-D data is given below.

Timestamp	UTC	Callsign	Position	Altitude	Speed	Direction
1620310663	2021-05-06T14:17:43Z	VTMPQ	22.812784,75.886536	8950	180	40
1620310675	2021-05-06T14:17:55Z	VTMPQ	22.820435,75.893456	9325	181	39
1620310687	2021-05-06T14:18:07Z	VTMPQ	22.828812,75.900848	9675	182	39
1620310706	2021-05-06T14:18:26Z	VTMPQ	22.841042,75.911659	10275	184	39
1620310719	2021-05-06T14:18:39Z	VTMPQ	22.849421,75.918983	10700	184	39
1620310731	2021-05-06T14:18:51Z	VTMPQ	22.857475,75.926155	11100	183	39
1620310746	2021-05-06T14:19:06Z	VTMPQ	22.867716,75.935158	11575	184	38
1620310759	2021-05-06T14:19:19Z	VTMPQ	22.876099,75.942497	11950	186	39
1620310771	2021-05-06T14:19:31Z	VTMPQ	22.88443,75.949783	12250	191	38
1620310802	2021-05-06T14:20:02Z	VTMPQ	22.906174,75.96891	13125	195	38
1620310836	2021-05-06T14:20:36Z	VTMPQ	22.930143,75.989891	14150	197	38
1620310867	2021-05-06T14:21:07Z	VTMPQ	22.952581,76.009575	15025	203	39
1620310897	2021-05-06T14:21:37Z	VTMPQ	22.975346,76.029564	15850	206	39
1620310928	2021-05-06T14:22:08Z	VTMPQ	22.998001,76.049461	16725	203	39
1620310961	2021-05-06T14:22:41Z	VTMPQ	23.021713,76.070282	17575	201	39
1620310993	2021-05-06T14:23:13Z	VTMPQ	23.045334,76.091011	18300	204	39
1620311059	2021-05-06T14:24:19Z	VTMPQ	23.095505,76.134354	19725	212	38
1620311119	2021-05-06T14:25:19Z	VTMPQ	23.14312,76.176399	20800	225	39
1620311182	2021-05-06T14:26:22Z	VTMPQ	23.194748,76.221947	22075	227	39
1620311245	2021-05-06T14:27:25Z	VTMPQ	23.245514,76.266541	23300	228	39
1620311307	2021-05-06T14:28:27Z	VTMPQ	23.297346,76.312508	24425	231	39
1620311368	2021-05-06T14:29:28Z	VTMPQ	23.348831,76.357925	25325	241	38
1620311429	2021-05-06T14:30:29Z	VTMPQ	23.402462,76.405281	26250	247	39
1620311490	2021-05-06T14:31:30Z	VTMPQ	23.457367,76.453758	26825	255	39
1620311551	2021-05-06T14:32:31Z	VTMPQ	23.516048,76.50589	27025	277	39
1620311612	2021-05-06T14:33:32Z	VTMPQ	23.579132,76.561836	27000	293	39
1620311674	2021-05-06T14:34:34Z	VTMPQ	23.644684,76.61972	27000	299	39
1620311734	2021-05-06T14:35:34Z	VTMPQ	23.710777,76.678406	27000	303	39
1620311795	2021-05-06T14:36:35Z	VTMPQ	23.777252,76.737518	27000	307	39
1620311857	2021-05-06T14:37:37Z	VTMPQ	23.845276,76.798302	27000	307	39
1620311917	2021-05-06T14:38:37Z	VTMPQ	23.91188,76.857704	27000	307	39
1620311979	2021-05-06T14:39:39Z	VTMPQ	23.980036,76.918655	27000	307	39
1620312041	2021-05-06T14:40:41Z	VTMPQ	24.048048,76.979645	27025	306	39
1620312103	2021-05-06T14:41:43Z	VTMPQ	24.11673,77.041016	27000	305	39
1620312165	2021-05-06T14:42:45Z	VTMPQ	24.183748,77.101173	27000	304	39
1620312226	2021-05-06T14:43:46Z	VTMPQ	24.249851,77.160561	27000	301	39
1620312289	2021-05-06T14:44:49Z	VTMPQ	24.317959,77.221916	27000	300	39
1620312350	2021-05-06T14:45:50Z	VTMPQ	24.382944,77.280472	27000	297	39
1620312412	2021-05-06T14:46:52Z	VTMPQ	24.449249,77.340294	27000	295	39
1620312473	2021-05-06T14:47:53Z	VTMPQ	24.513748,77.398628	27000	296	39
1620312535	2021-05-06T14:48:55Z	VTMPQ	24.579023,77.457603	27000	296	39
1620312598	2021-05-06T14:49:58Z	VTMPQ	24.645721,77.518059	27000	295	39
1620312659	2021-05-06T14:50:59Z	VTMPQ	24.710161,77.576485	27000	294	39
1620312722	2021-05-06T14:52:02Z	VTMPQ	24.776031,77.636444	27000	291	39
1620312785	2021-05-06T14:53:05Z	VTMPQ	24.841671,77.696037	27000	293	39
1620312846	2021-05-06T14:54:06Z	VTMPQ	24.905457,77.754211	27025	295	39
1620312906	2021-05-06T14:55:06Z	VTMPQ	24.968805,77.812019	27000	293	39
1620312935	2021-05-06T14:55:35Z	VTMPQ	25.000181,77.837097	26625	299	28
1620312936	2021-05-06T14:55:36Z	VTMPQ	25.001438,77.837769	26600	299	26
1620312938	2021-05-06T14:55:38Z	VTMPQ	25.004883,77.839508	26525	301	25
1620312942	2021-05-06T14:55:42Z	VTMPQ	25.009119,77.841454	26450	302	22
1620312944	2021-05-06T14:55:44Z	VTMPQ	25.011612,77.842506	26375	299	27
1620312945	2021-05-06T14:55:45Z	VTMPQ	25.013634,77.843262	26350	303	19
1620312948	2021-05-06T14:55:48Z	VTMPQ	25.016968,77.844444	26275	304	17
1620312950	2021-05-06T14:55:50Z	VTMPQ	25.020767,77.845665	26200	304	15

Appendix 'G': DoA, GoMP Operations Manual

Chapter 2 - Duties and Responsibilities

2.6.4 Flight Safety Officer. The Flight Safety Officer reports to the Accountable Manager on flight safety matters.

(a) The Flight Safety Officer shall be responsible for implementation of the policies and procedures for compliance of safety requirements in the Flight Safety Manual.

(b) The DoA, GoMP has adequately qualified persons to analyse incidents, defects, carry out internal safety audits and monitor flight operations quality assurance by downloading flight data recorder information. The head of safety division is approved in accordance with CAR Section 5, Series F, Part I dated 28th June 1996 Rev 2, 17th March 2009.

(c) He has authorization from the DDAS to perform inspections in any area of the operation which, in his sole opinion, have an impact on flight safety. All personnel in the DoA shall be enjoined to give the Flight Safety Officer such assistance in his functioning as Flight Safety Officer may deem necessary.

(d) He is responsible to analyze incidents, defects, carry out internal safety audits and monitor flight operations quality assurance by downloading flight data recorder information.

(e) In case of any violations, he shall promptly take effective corrective action including punitive action as necessary to prevent similar occurrence in future. A record of such actions shall be maintained.

(f) He may make recommendations on any and all activities related to aviation safety within all sections of the organization. Among his responsibilities are:

(i) Implementation of the DoA, GoMP Safety Management System (SMS);

(ii) liaise with the Flight Operations Officer to ensure that flight planning is done proactively to preclude breach of the FDTL regulations;

(iii) report BA positive cases to the DGCA HQ and Regional Office within 24 hours;

(iv) manage the Flight Safety Programme of the DoA;

(v) determine standards and methods for use in trend analysis suitable for use in the Flight Safety Programme in coordination with the Accountable Manager/ Chief Pilot;

(vi) assist the Accountable Manager by making those inputs as necessary in his function of performing risk management in flight operations;

(vii) monitor adherence to established safety standards and identify undesired trends with regard to operational/technical areas with regards to flight safety and to report any such findings to the Accountable Manager;

(viii) inspect and examine as necessary, any area of the operations which may have an impact on flight safety and to report any deviations from safe practices to the Accountable Manager;

(ix) shall take corrective action immediately on the deficiencies observed during the audit;

(x) monitor procedures for the handling of any reports having an impact on flight safety (such as Flight Safety Reports, Accident Reports, Dangerous Goods/ Incident Reports etc.;

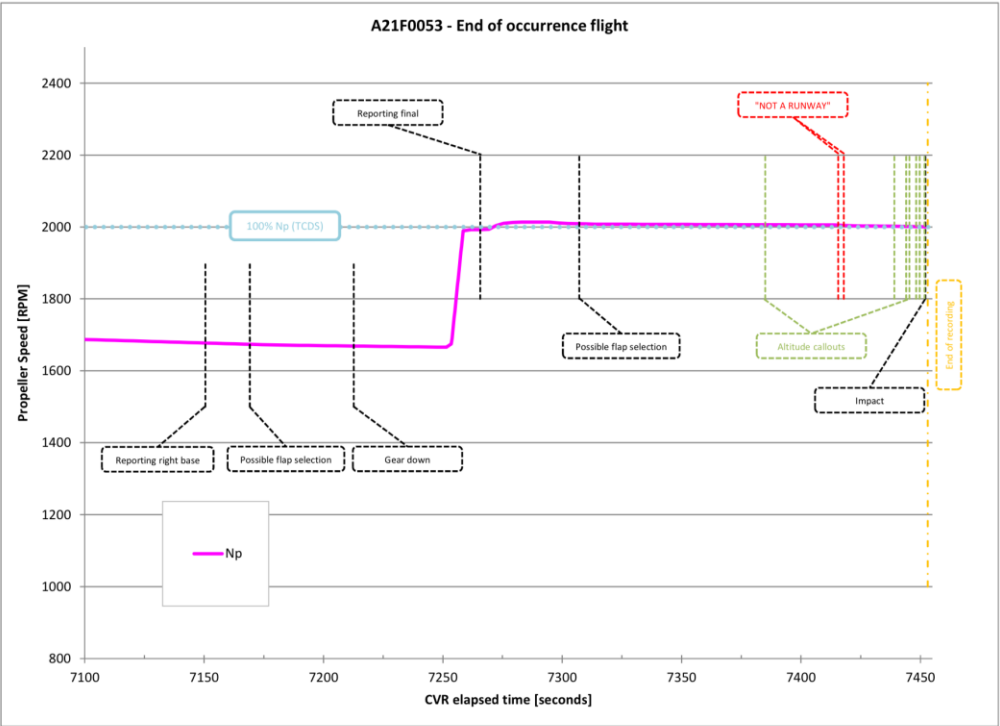
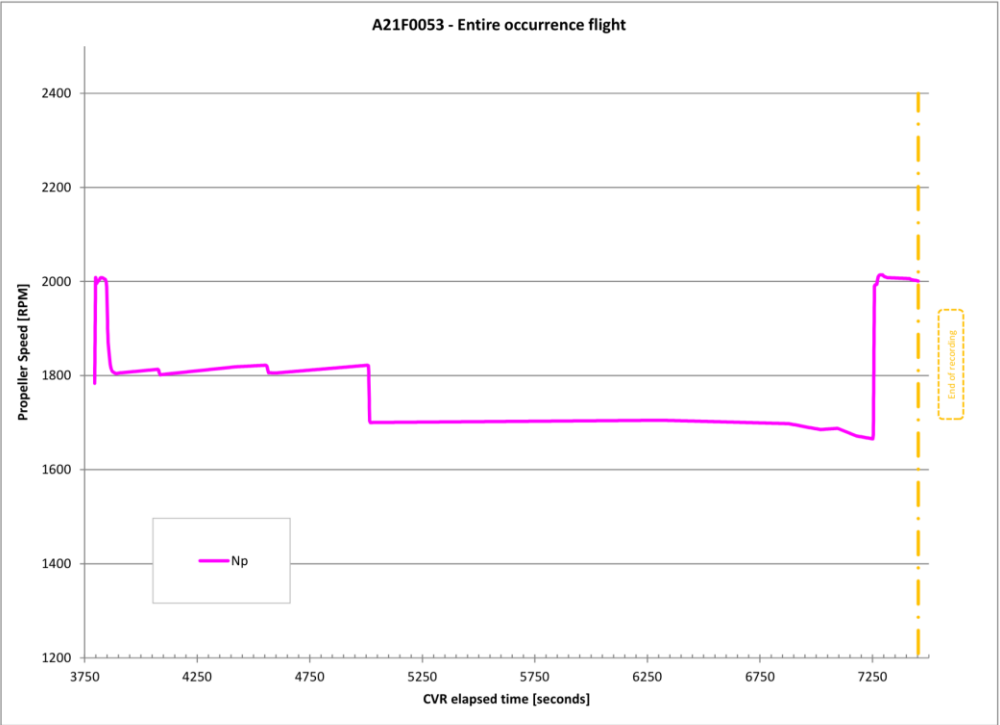
(xi) Shall provide support for effective implementation and running of the Safety Management System;

(xii) In addition to other information, extensive use of the data recorded on the flight recorders (CVR) should be made by the Flight Operations Officer for performance monitoring the flight crew, for early detection of safety hazards and the initiation of appropriate accident prevention measures;

(xiii) Planning and training of manpower for fire safety;

(xiv) Shall provide support for effective implementation of Safety Management.

Appendix ‘H’ Spectrum Analysis of CVR



**'Historic victory in Kerala
will reinvigorate Left'**

[illegible][illegible]

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Appendix 'J' : RT TRANSCRIPTION CHANNEL 05 ON 06 MAY 2021

<u>TIME</u>	<u>CALLER</u>	<u>DETAILS OF CALL</u>	<u>REMARKS</u>
20:19:18	PILOT	GWL VTMPQ	
	TOWER	VPQ GW'L VPQ GWL	
20:20:13	PILOT	SIR VPQ INDORE TO GWL MAINTAINING FLT LEVEL 270, SQUACK 1410 ESTIMATING YOUR FIELD 1512	
	TOWER	VPQ REPORT RELEASED FROM AREA	
20:21:05	PILOT	ROGER, CALL YOU RELEASED BY DELHI VPQ. VPQ RELEASED BY DELHI	
	TOWER	MONITORED, SIR ATI IS 112.8	
20:21:11	PILOT	SIR UNABLE TO READ YOU.	
	TOWER	VPQ MONITOR ATIS ON VOR FREQ 112.8	
	PILOT	SAY AGAIN FREQUENCY PLEASE QNH	
	TOWER	VPQ MONITOR ATIS 112.8	
20:23:12	PILOT	MONITORED SIR AND REQUEST RUNWAY IN USE	
	TOWER	RUNWAY 24L SURFACE WIND 08006 KTS	
	TOWER	CONFIRM WISH TO CARRY OUT VOR 06R	
	PILOT	AFFIRMATIVE, REQUESTING 06R VISUAL	
	TOWER	ROGER VISUAL 06R APPROVED REPORT WHEN AIR FIELD VISUAL AND READY TO DESCEND	
20:23:20	PILOT	CALL YOU FOR DESCENT AND –VE TRAFFIC WITH DELHI	
	TOWER	ROGER. INFORMATION FOXTROT QNH 1006	
20:23:22	PILOT	VPQ REQUESTING DESCEND	
	TOWER	ROGER, VPQ DESCEND TO 2700 FEET. QNH 1007, TRANSITION LEVEL 55	
	PILOT	DESCEND 2700 FEET TRANSITION LEVEL 55 COPIED	
20:35:56	TOWER	VPQ REPEAT DISTANCE IN BOUND	
	PILOT	25 DME IN BOUND SIR	
	TOWER	ROGER	
20:36:56	PILOT	APPROACH VPQ WE HAVE FIELD IN SIGHT MAY I CALL RUNWAY RIGHT BASE 06R	
	TOWER	AFFIRMATIVE VPQ CLEAR VISUAL APPROACH. DESCEND TO CIRCUIT ALTITUDE REPORT RIGHT BASE 06R	
	PILOT	CLEARED TO DESCEND CIRCUIT ALTITUDE AT BASE	

	PILOT	CALL RIGHT BASE 06R VPQ	
20:39:15	PILOT	TURNING RIGHT BASE FOR 06R VPQ.	
	TOWER	VPQ REPORT FINAL, SURFACE WIND 080/05 KNOT	
	PILOT	CALL YOU FINALS SURFACE WINDS MONITORED	
20:41:10	PILOT??????	
	TOWER	VPQ CONFIRM RUNWAY VISUAL	
20:41:16	PILOT	AFFIRM RUNWAY VISUAL	
	TOWER	VPQ RUNWAY 06R CLEARED TO LAND	
	PILOT	CLEARED TO LAND VPQ	
20:42:12	PILOT	CONFIRM CLEAR TO LAND VPQ	
	TOWER	VPQ CLEAR TO LAND 06R	
	PILOT	CLEAR TO LAND 06R	
	TOWER	VPQ VISUAL FROM TOWER	
	PILOT	THANK YOU SIR	
20:44:39	TOWER	VPQ TOWER	
20:44:51	TOWER	VPQ TOWER	
20:56:56	TOWER	VPQ TOWER	

Telephone No. : 24627830 Aeronautical : VIDDYAYX Email Id: dgoffice.dgca@nic.in Fax : 91-11-24652760	GOVERNMENT OF INDIA AERONAUTICAL INFORMATION SERVICES DIRECTOR GENERAL OF CIVIL AVIATION OPPOSITE SAFDARJUNG AIRPORT NEW DELHI – 110003	AIC Sl. No. 7/2021 15 th January 2021
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File No. DGCA-25012(07)/2/2020-AW

The Order No. DGCA-25012(07)/1/2020-AW dated 15th January 2021 is reproduced below for information, guidance and compliance.



(ARUN KUMAR)
Director General of Civil Aviation

File No. DGCA-25012(07)/2/2020-AW
Dated 15th January 2021

ORDER

In exercise of the powers conferred by Section 5A of the Aircraft Act, 1934 (XXII of 1934), the Director General of Civil Aviation hereby directs scheduled operators desirous to carry cargo in the passenger compartment of the aircraft, to demonstrate compliance of the following and obtain permission, prior to commencing such operations:

1. The type of cargo to be carried shall be as per Government directives and limited to transportation of products such as medical supplies, PPE and other cargo which is vital and essential for the functioning of sensitive supply chains affected by the COVID-19 pandemic.
2. Operator shall not transport dangerous goods {as specified by the ICAO (Doc. 9284) in the Technical Instructions for the Safe Transport of Dangerous Goods by Air} in the passenger compartment.
3. In case of carriage of Covid19 vaccine packed in dry ice in passenger compartment, compliance with DGCA Circular issued vide F. No. 4/1/2020-IR dated 8.1.2021 (available on DGCA Website) shall be strictly adhered to.
4. Operator shall only carry persons essentially required on board during such operations.
5. Carriage of mix passengers and cargo in the passenger compartment at the same time is not allowed. Further, Operators shall ensure that such operations do not affect/ disrupt their approved schedule.

6. Operator shall deactivate any automatic activation of the passenger oxygen system on the aircraft, prior to such operation.
7. Operator shall disable or deactivate passenger convenience and other cabin systems not necessary for safety or normal operations (e.g., in-flight entertainment systems installed in seats, in-seat power, galley systems, and any other heat generating systems) on aircraft, prior to such operation.
8. Operator shall not load cargo in any stowage compartment (including stowage compartments with internal dividers) containing portable oxygen bottles, protective breathing equipment, or equipment containing lithium batteries. The Operator shall identify or lock each such compartment prior to cargo loading. Operator shall not install portable oxygen, or any equipment containing a lithium battery, on any exposed wall surface.
9. Cargo loaded on a seat shall not exceed 22.5 kg. per seat place or 50 kg. in a single package per triple seat, and shall not extend above the seatback height.
10. Cargo stowed under seats shall not exceed 9 kg. per seat place.
11. Operator shall restrain all cargo loaded on each seat, using the primary load path of the seat so that each cargo installation is restrained to the load factors specified by the manufacturer (TC/STC holder) and complies with all other applicable structural retention requirements. Primary load path elements include:
 - a. The seat belt;
 - b. Seat beams (cross tubes); and
 - c. Seat legs.
12. Operator shall load all cargo in a manner that allows sufficient access to the cargo to allow effective firefighting. In case of twin aisle aircraft, the Operator shall load the cargo in the passenger compartment in a manner such that, in each section of the passenger compartment, there is a means to cross from one aisle to the other aisle at approximately equal distance from the existing cross-aisles (An empty seat row provides sufficient access from one aisle to the other).
13. Operator shall not load or restrain cargo in any manner that obstructs decompression vents or airflow when the vents are activated.
14. Cargo shall not be stowed where it will prevent or impede access to emergency equipment or interfere with emergency evacuation.
15. Operator shall provide each person, occupying the passenger compartment of the aircraft at the time of operation, with portable oxygen equipment.
16. Operator shall ensure that each person whose duties on board the airplane include fire detection and firefighting in the passenger compartment carry the equipment provided under para 15, during their inspections required by para 21.

17. Operator shall make available the following fire extinguishers in the passenger compartment:
- a) Two Underwriters Laboratories (UL) 2A (9.5 litres) rated water portable fire extinguishers, or an equivalent amount of water carried in no more than 5 containers;
 - b) At least two fire extinguishers with a minimum UL 4A-80B: C-rating or equivalent (Four UL 2A-10B: C extinguishers is equivalent to two fire extinguishers with a minimum UL 4A-80B: C-rating);
 - c) The quantity and type of fire extinguishers identified in the Operator's safety risk assessment required by Para 28 in addition to the number required by Paras 17a) and 17b).
18. Operator shall locate fire extinguishers required next to the seats occupied by persons required to be on board. Operator may provide additional fire extinguishers identified in Para 17 at locations that the operator determines would be effective in providing fire protection.
19. Operator shall configure the Environmental Control System (ECS) settings of the aircraft, prior to such operations, to minimize the likelihood of smoke that would enter the flight deck, and to maximize the ability of a crewmember to detect a fire/smoke, including:
- a. Adapt the ECS setting as per the number of occupants.
 - b. If configured with Gasper outlets, turn them to closed/off position for all phases of flight.
20. The minimum number of persons required to perform the duties specified in Para 16 shall be: at least two persons whose duties are to detect and fight a fire and relay information to the flight crew; and any additional persons identified by the Operator through a safety risk assessment that considered, at a minimum, the type/size of the aircraft, the length of flight, and the availability of alternate airports.
21. Persons assigned to inflight fire-fighting duties must make a visual inspection of the cargo on a regular basis, not exceeding 30 minute intervals including prior to taxi, take-off, and landing.
22. Operator shall prepare Standard Operating Procedures (SOP) covering at least the following requirements:
- a. Identify the minimum number of additional persons required in the passenger compartment under Para 20 during such an operation;
 - b. Include procedures for persons assigned to inflight fire-fighting duties to make a visual inspection of the cargo on a regular basis, not exceeding 30 minute intervals including prior to taxi, take-off, and landing;
 - c. Include procedures for persons who must carry portable oxygen equipment, or equivalent, when making the inspection under Para 21 above.
 - d. Include procedures for the flight crewmembers to notify persons in the passenger compartment in case of a decompression;
 - e. Identify such seats that must be occupied during take-off and landing and in emergency situations, such as turbulence or decompression,

- unless each such seat is individually placarded;
- f. Include a passenger compartment fire emergency procedure based on manual firefighting; and
- g. Update any additional existing procedures (including emergency procedures) that result from Paras 20 and 21.

Note: The SOP shall form part of the Operator's Operation Manual and will be approved by DGCA.

23. Operator shall provide training to each person who will perform duties during such operations which includes:

- a. For currently qualified pilots serving as flight crew, training must include the following:
 - i. Instruction in the new or revised emergency assignments and procedures for such operations, including coordination among crewmembers; and
 - ii. Instruction in the configuration of aircraft systems for such operations.
- b. For currently qualified crewmembers who will perform the fire detection and firefighting duties, training must include at least the following:
 - i. Instruction in the new or revised emergency assignments and procedures for such operations, including coordination among crewmembers;
 - ii. Instruction in the location, function, and operation of fire extinguishers;
 - iii. Instruction in the handling of a cargo fire in the passenger compartment, including assessing and evaluating hidden fires and removing cargo restraints; and
 - iv. Hands-on emergency drill using the fire extinguisher, including removing the extinguisher from the storage location and moving it to the furthest point in the passenger compartment where a fire could occur.
- c. For other persons who will perform the fire detection and firefighting duties, training must include at least the following:
 - i. Instruction in the emergency assignments and procedures for such operations, including coordination among crewmembers;
 - ii. Instruction in the location, function, and operation of fire extinguishers and the portable oxygen equipment.
 - iii. Instruction in the handling of a cargo fire in the cabin, including assessing and evaluating hidden fires and removing cargo restraints.
 - iv. Hands-on emergency drill using the portable oxygen equipment.
 - v. Hands-on emergency drill using the fire extinguisher, including removing the extinguisher from the storage location and moving it to the furthest point in the passenger compartment where a fire could occur.

24. Hands-on emergency drills shall be conducted by using actual aircraft equipment or training equipment duly approved.
25. Operator shall provide any occupant in passenger compartment, other than a person assigned to duty during flight, with a briefing regarding the use of all emergency equipment, including portable oxygen systems, and on the operation of emergency exits and evacuation procedures.
26. Operator shall comply with any additional guidelines issued by the manufacturer in this regard.
27. Operator shall ensure that the aircraft is loaded in accordance with the limitations and recommendations provided in the Weight and Balance Manual and Load and Trim prepared accordingly prior to every flight.
28. Operators intending to carry cargo in passenger compartment shall apply to DGCA at least 10 days prior to the proposed commencement of operations along with the following:
- a) Statement of Intent for carrying cargo in the passenger compartment of the aircraft specifying the type of the aircraft;
 - b) Standard Operating Procedures (SOP) as per para 22.
 - c) Verification that the Operator has completed a safety risk assessment to determine the type and quantity of additional fire extinguishers necessary in the passenger compartment. The safety risk assessment must include statement indicating whether additional fire extinguishers of a particular type need to be installed in the passenger compartment in addition to the fire extinguishers identified in Paras 17a) and 17b).
 - d) Verification that the Operator has completed a safety risk assessment to determine whether any additional persons are required during such operation. The safety risk assessment should include statement indicating whether more than two persons are required for the operation, in accordance with Para 20.
 - e) An outline of the curricula that the Operator will use to conduct the training required by para 23.
29. The Operator shall carry a copy of the permission and the approved SOP on board the aircraft while conducting such operations.
30. Operators other than Scheduled Operators shall be required to comply with all the above requirements and obtain permission prior to commencement of such operation.
31. Operator shall maintain a record of cargo carried under the permission granted under this Order and the same shall be made available to DGCA as and when required.
32. The permissions granted under this Order shall be restricted to 10th July 2021 or earlier.

(Arun Kumar)
Director General of Civil Aviation



GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

File No. AV.15011/2/2013-AS

Dated 30th May 2013

Air Safety Circular No. 4 of 2013

Subject: Role of Aerodrome operator in preservation of Evidence following an Accident/Incident

1. Introduction:

The Aerodrome operator, local fire department and the police are the first authorities to arrive at an aircraft accident site. It is therefore important to enlist the cooperation of these authorities in order to ensure security and control of accident sites, initial documentation of the evidences and cooperation during investigations. It is essential that vital evidence is not lost through interference with the aircraft wreckage in the early phases of an investigation. Also the fire department and the police authorities should be aware of what is expected from them in the event of an aircraft accident.

2. Nomination of Safety Investigation Coordinator:

To ensure that initial action is carried out at the accident site in coordinated manner and the evidences are not destroyed, the airport operators shall nominate a post holder at each airport called "Safety Investigation Coordinator (SIC)".

He will be the single point of contact in case of an aircraft accident/Incident.

Name, designation and contact details of Safety Investigation Coordinator shall be intimated to DGCA within seven days of issue of this circular and also put on the website of the airport operator. The details shall be updated as and when there is change in the personnel.

3. Action by SIC:

SIC shall initiate immediate actions required to facilitate investigation, till the arrival of Investigator nominated by the DGCA/AAIB, while the search and rescue operations are still under-way. The actions would include:

3.1 Securing of the Recording Devices:

To ensure immediate sealing of the ATC/RADAR/Video recording devices pertinent to the accident/incident in accordance with Air Safety Circular 3 of 2013.

3.2 Photography/Videography:

Recording of all immediate actions while the rescue operations are underway. The initial actions will include video recording of the fire fighting operation; rescue operation; wreckage; steps in removing, opening or cutting apart components; photograph of damage to any electric pole/cables or other like structure due to aircraft impact before they are restored, etc.

3.3 Coordination with the Police and District Authorities:

SIC shall coordinate with the police authorities and district authorities to ensure compliance of Air Safety Circular 06 of 2010 and guarding of the wreckage so as to;

- a) Protect the public from the hazards in the wreckage.
- b) Prevent disturbance of the wreckage (including bodies and contents of the aircraft.
- c) Protect property.
- d) Permitting only authorized persons in coordination with the Investigator.
- e) Protect and preserve any ground marks of the aircraft.
- f) Record the names and addresses of all the eye witnesses and others who may have firsthand knowledge of the accident and supply such a list to the Investigator on his arrival for the purpose of investigation and facilitate production of such witnesses before him.
- g) Stop the movement of ambulances and fire vehicles along the wreckage trail,
once the survivors have been rescued and the fire risk has been eliminated as far as practicable.
- h) Liaise with the local population, particularly with regard to locating outlying pieces of wreckage.

3.4 Recording of the evidences:

- a) Whilst rescuing the injured crew members [Pilot and the Copilot(s)], their identification and location in or around the aircraft must be carefully observed and recorded.
- b) In the event of Pilot and / or the Copilot(s) being found dead, the necessary photographs must be taken in situ prior to the removal. The removal action should be such as to cause minimum of disturbance to the aircraft wreckage/parts and any such disturbance should be fully recorded.
- c) The location of the passengers alive or dead should be recorded immediately during rescue/removal operation. However, removal of the injured to the nearest hospital must not be delayed for want of formalities with regard to the recording as stated above.
- d) Any movement of the controls/cutting of wires, cables, component parts etc. must be made note of for submission to the investigator.

3.5 Medical Examination:

In the event of an accident at Airport or in its vicinity, samples of blood, urine etc. should be taken at the Airport medical centre. In cases where medical centers are not available at the airports or when the condition of crew members requires immediate hospitalization, SIC shall ensure that the samples of blood, urine etc. are taken at the nearest hospital. These checks should be expeditiously carried out without any loss of time. The sample should be suitably preserved and handed over to the Investigator Accidents for detailed laboratory examination.

3.6 Training and Awareness:

SIC shall interact with the fire and rescue personnel and police authority to brief them about their role in preservation and documentation of the wreckage on routine basis and also during the practice of airport emergency exercises.

A checklist for the initial onsite actions at accident/incident site is attached at Appendix A for ready reference.

Sd/-
(Lalit Gupta)
Deputy Director General
For Director General of Civil Aviation

To:

- (1) All Aircraft Operators/ Aerodromes Operators/Airports Authority of India
- (2) Internal distribution as per list.

Appendix-A

CHECK LIST FOR THE ACTIONS IMMEDIATELY FOLLOWING THE MISHAP:

SNO	ACTION	STATUS/DETAILS
1	Fire fighting (Video)	
2	Rescue operations (Video)	
3	Photos and video of : Steps in removing, opening or cutting apart components	
4	Photos of ground marks made by the aircraft	
5	Photos of damage to - structure - electric cables - Poles - Trees	
6.	In situ Photographs of the Dead Crew	
6	Securing of Radar, ATC (Recordings) and other recording media pertinent to accident	
7	Weather (forecast and actual conditions)	
8	Coordination with the Police and District Authorities	
9.	Record of Eye witness	
10	Recording of Evidences	
11	Medical Examination of the Crew	



**GOVERNMENT OF INDIA
OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION**

AIR SAFETY CIRCULAR 05/2014

File No. AV.15011/ASC/2/2014-AS

Dated: 05/06/2014

Subject: Preservation and Replaying of ANS and Aerodrome related Recording Media for Investigation of Accidents/Incidents/Occurrences.

1. Introduction:

Ground based recorders provide significant information in investigation of accident/incidents/ occurrences. To ensure that relevant information is available for investigation, it is essential that recording media is promptly sealed (wherever feasible) and preserved after the occurrences.

2. Relevant Recording Media

For the purpose of this Circular, the recording media refers to the following:

- a) Air Traffic Control (ATC) voice communication/Radar data,
- b) Close Circuit Television (CCTV) footage,
- c) Surface Movement Radar (SMR) data/Advanced Surface Movement Guidance & Control System (ASMGCS) data,
- d) Automatic telecommunication logs,
- e) Airport Operational Control (AOCC) System/Apron Control data,
- f) Hot lines and land lines,
- g) Video recorders installed at airports,
- h) ADS-B and ADS-C data.

3. Instances Requiring Replay of Recording Media

The recording media may be required to be replayed in following instances:

- a) Accident
- b) Serious incident

- c) Airprox
- d) Incident
- e) Recording function and quality check
- f) Proficiency check of air traffic controllers.
- g) Search and rescue operations.
- h) ATC violations
- i) RT violations
- j) Any complaint received by DGCA wherein it is prudent to conduct investigation.
- k) Any other event as per the discretion of DGCA

4. Applicability

All Airport Operators and Air Navigation Service Providers (ANSP) in India where the recording media as indicated in Para 2 of this Circular is available.

5. Guidelines for Sealing, Replay and Preserving of Recording Media

5.1 The relevant recording media shall be removed or extracted from normal storage and sealed. In case of a memory chip where sealing is not feasible, true copy of recording shall be made and placed in a separate and secure area pending further instructions.

5.2 Records of the sealing/replay/preservation of the media shall be maintained by the airport operator/ANSP indicating the reasons for the same.

5.3 In case of an accident/serious incident, ATS/CNS in-charge/in-charge of the recording facility (wherever applicable) shall handover the same to Safety Investigation Coordinator (SIC) (Refer Air Safety Circular 04 of 2013) for safe custody who in turn shall forward the same to the Director of Air Safety, DGCA Hqrs, Court of Enquiry/Committee of Inquiry/Inquiry Officer appointed by MoCA/AAIB/DGCA or any other officer so authorised. Upon being handed over the recording media, the AAIB/ DGCA shall be responsible for its preservation as per record retention procedure.

5.4 In case of an incident or any other occurrence, as indicated in Para 3 of this Circular, ATS/CNS in-charge/in-charge of the facility shall maintain the data in accordance with the provisions of Para 5.1 of this Circular.

5.5 The readout/transcript of the recorded media shall be prepared by a team of officers authorised by the DGCA who will have access to the recording media.

5.6 Replay of the recording media shall be carried out within 15 days from the date of the occurrence.

5.7 The recording media shall be kept in the custody of incharge of the recording facility/ DGCA/ SIC till finalization of the investigation.

5.8 The recording media shall be released for re-use only after obtaining a written permission from the Director of Air Safety, DGCA Hqrs.

5.9 No person involved in sealing/replay/preserving of the recording media shall give any information pertaining to the recorded data in public without explicit approval of the DGCA.

6. Serviceability and Functional Check of Equipment

A daily check of the equipment shall be carried out to ensure serviceability and recording function without interrupting the recording of any active communications. The results of such daily checks shall be recorded in a logbook.

7. Time period for Preservation of Records

<i>Recording media</i>	<i>Minimum back up period</i>	<i>Maximum back up in Accident/Incident/ Occurrences</i>
Systems at AOCC	30 days	Three years or as instructed by AAIB/ DGCA, whichever is earlier.
ATC Tape (VHF/HF)	30 days	
Radar Replay	30 days	
CCTV	30 days	
Airline Operations Data	30 days	
Base (AODB) Data	30 days	
Phones and Hotline	30 days	

8. This Circular supersedes all previous instructions issued in this regard including Air Safety Circular 01 of 1984.

(Lalit Gupta)
Joint Director General of Civil Aviation