



सत्यमेव जयते

**FINAL INVESTIGATION REPORT**  
**ON ACCIDENT TO**  
**M/s INDIRA GANDHI RASHTRIYA URAN**  
**ACADEMY**  
**TB20 AIRCRAFT VT-IGE**  
**AT AZAMGARH, U.P ON 21<sup>st</sup> SEPTEMBER 2020.**

**AIRCRAFT ACCIDENT INVESTIGATION BUREAU, INDIA**

**K. Ramachandran**  
**Investigator -In- charge**

**Amit Kumar**  
**Investigator**

## **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/serious incident shall be the prevention of accidents and incidents and not to apportion blame or liability. The investigation conducted in accordance with the provisions of the 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, opinion obtained from the experts and laboratory examination of various components. Consequently, the use of this report for any purpose other than for the prevention of future accidents or incidents could lead to erroneous interpretations.*

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## GLOSSARY

AAIB	Aircraft Accident Investigation Bureau, India
AMSL	Above Mean Sea Level
ARC	Airworthiness Review Certificate
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
AUW	All Up Weight
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CAR	Civil Aviation Requirements
SPL	Student Pilot License
CVR	Cockpit Voice Recorder
DFDR	Digital Flight data Recorder
DGCA	Directorate General of Civil Aviation
FTO	Flight Training Organisation
hrs	Hours
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
LLZ	Localizer
MEL	Minimum Equipment List
MLG	Main Landing Gear
NDB	Non-Directional Beacon
NLG	Nose Landing Gear
NM	Nautical Miles
PA	Passenger Address
PIC	Pilot in Command
QRH	Quick Reference Handbook
RA	Radio Altitude
RESA	Runway End Safety Area
SB	Service Bulletin
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOR	VHF Omnidirectional Range
UTC	Coordinated Universal Time

**FINAL INVESTIGATION REPORT ON ACCIDENT TO**  
**M/s INDIRA GANDHI RASHTRIYA URAN ACADEMY, TRINIDAD TB20 AIRCRAFT,**  
**VT-IGE IN AZAMGARH DISTRICT, U.P ON 21<sup>ST</sup> SEPTEMBER 2020**

1.	Aircraft	Type	TRINIDAD TB20
		Nationality	Indian
		Registration	VT-IGE
2.	Owner and Operator	Indira Gandhi Rashtriya Uran Academy	
3.	Pilot – in –Command	Trainee Pilot	
4.	Extent of injuries	Fatal	
5.	Date & Time of Accident	21.09.2020; 0540 UTC.	
6.	Place of Accident	Azamgarh, U.P.	
7.	Last point of Departure	Fursatganj Airport	
8.	Intended landing place	Fursatganj Airport	
9.	No. of persons on board	01 (Trainee Pilot)	
10.	Type of Operation	Training flight (Solo cross country)	
11.	Phase of Operation	En-route	
12.	Type of Accident	Uncontrolled flight into terrain (Aircraft encountered bad weather)	
13.	Damage to the Aircraft	Destroyed	

(All the timings in the report are in UTC unless otherwise specified)

## **SYNOPSIS**

On 21<sup>st</sup> September 2020, TB20 aircraft VT-IGE belonging to M/s Indira Gandhi Rashtriya Uran Academy (IGRUA) was involved in a fatal accident at Azamgarh district, U.P while operating a training flight. The aircraft was under the command of a student pilot holding a valid student pilot license. The trainee pilot was detailed for “solo cross country” flying from Fursatganj to Fursatganj overflying Mau.

The Trainee Pilot took-off for a solo cross-country exercise from runway 09 of Fursatganj airport after obtaining take-off clearance from Fursatganj ATC. The weather at Fursatganj at the time of take-off was fine. The aircraft after take-off was changed over and came in contact with ATC Lucknow. Initially, the aircraft was cleared to and maintained 3500 ft. Thereafter, the trainee pilot requested for climb to 5500 ft to ATC, Lucknow. The trainee pilot then informed ATC, Lucknow the estimate of MAU as 05:31 UTC and Furstaganj as 06:31 UTC. ATC Lucknow then instructed the aircraft to further climb in co-ordination with Fursatganj & Varanasi ATC. The aircraft came in contact with ATC Varanasi and in co-ordination with Furstaganj ATC was cleared for climb to 5500 feet.

It was observed on RADAR display that the aircraft had climbed to 6000 ft and then descended to 5200 ft. The weather at that time became very bad. After some time when the aircraft was around 36 NM North of BBN (Varanasi), the Radar and VHF contact were lost and a synthetic radar position symbol appeared. The controller gave many calls to the aircraft including calls on emergency frequency, through other IGRUA aircraft and airlines aircraft operating under the jurisdiction of ATC Varanasi, however, there was no response. Later it was found that, the aircraft had crashed in an agricultural field in Nizamabad village in Azamgarh district. The aircraft was destroyed during the accident and the wreckage was scattered. The trainee pilot received fatal injury.

Sh. K Ramachandran, Assistant Director, AAIB was appointed as Investigator – In – Charge & Sh. Amit Kumar, Safety Investigation Officer as Investigator to investigate into the probable cause(s) of the accident, vide Order No. INV.11011/7/2020-AAIB dated 25th September 2020 under Rule 11 (1) of Aircraft (Investigation of Accidents and Incidents), Rules 2017.

## **1. FACTUAL INFORMATION**

### **1.1 History of Flight**

For the purposes of imparting training in the organization, flying schedule is prepared in the evening for the next day and accordingly flight plans are filed. The Dy.CFI/ CFI of the organization use to inform trainee pilots about the flying schedule for the next day. Accordingly, the trainee pilots reported in the morning on 21.09.2020 for their respective flying training exercise.

On the day of accident, the CFI was on leave and all flying training operations were authorized by Dy.CFI. At around 0145 UTC, the Dy.CFI conducted morning briefing to the trainee pilots and after ensuring that the weather is fit (for local as well as enroute for cross country) started flying training operations as per the scheduled programme for the day.

The trainee pilot reported for flying training exercise in the morning as per the programme. Trainee pilot was authorized for “solo cross country” long navigational exercise from Fursatganj to Fursatganj over flying Mau by the Dy.CFI. The trainee pilot then reported to one of the AFI at around 0300 UTC. The AFI after ascertaining the local and enroute weather conditions detailed the trainee pilot for solo cross country navigational exercise on VT-IGE from Fursatganj to Fursatganj over flying Mau.

The aircraft was released for training flight after the AME qualified on type carried out the first pre-flight inspection of the day and issued CRS for the aircraft. There was no abnormality observed on the aircraft. The AFI accepted the aircraft and carried out pre-flight inspection himself. He also did not observe any abnormality in the aircraft.

The aircraft was then handed over to the trainee pilot. The trainee pilot after obtaining the necessary clearances from the ATC, Fursatganj took off from runway 09 at around 0450 UTC. The weather at the time of take-off at Fursatganj was visibility 5000 meters with winds VRB/02 Kts (variable direction with speed 2 knots). The aircraft was then changed over to ATC, Lucknow. The aircraft came in contact with ATC, Lucknow at 0457 UTC and requested for climb to FL55 and squawk. The trainee pilot then informed ATC, Lucknow the estimate of MAU as 0531 UTC and Furstaganj as 0631 UTC.

The ATC, Lucknow instructed the trainee pilot to climb in co-ordination with Varanasi & Fursatganj and obtain departure squawk with Varanasi. The trainee pilot then came in contact with ATC, Varanasi at around 0507 UTC and informed that the aircraft is maintaining altitude 3500 feet and requested for climb to 5500 feet. The ATC, Varanasi informed the radar squawk and instructed to climb in co-ordination with Fursatganj and to report when released by them. At 0510 UTC the trainee pilot again came in contact with ATC, Varanasi and informed that ATC, Fursatganj has cleared for FL55. The ATC, Varanasi also cleared the aircraft to climb to FL55 for which the trainee pilot replied "Sir leaving 3500 for flight level 55" this was the last transmission made by the trainee pilot. The aircraft then climbed to and was maintaining designated altitude of 5500 feet.

It was observed on RADAR display that the aircraft had climbed to altitude of 6000 ft and then descended to 5200 ft. The weather at that time became very bad. After some time when the aircraft was around 36 NM North of BBN (Varanasi) at a radial of 30°, the Radar and VHF contact were lost and a synthetic radar position symbol appeared. The controller gave many calls to the aircraft including calls on emergency frequency, through other IGRUA aircraft and airlines aircraft operating under the jurisdiction of ATC Varanasi, however, there was no response. Another trainee pilot of the organisation was also detailed for cross country long navigational flight on the same route (Furstaganj – Mau- Fursatganj) on aircraft VT-FGF who was behind the deceased trainee pilot. As per the statement of another trainee pilot, the ATC, Varanasi asked him to contact VT-IGE and check its position. He tried calling VT-IGE two to three times on Varanasi frequency but there was no response. He also tried contacting VT-IGE on Gorakhpur frequency but there was no response. He accordingly informed ATC, Varanasi about the same. He further stated that at around 55 NM outbound from Fursatganj, he observed weather (vertically developed clouds) in front and decided to set course back. After taking necessary clearances from ATC, Varanasi and subsequent ATCs landed back safely at Fursatganj. Another trainee pilot was also authorized for solo cross country flight on aircraft VT-FGK for route Fursatganj – Ghazipur-Fursatganj which departed before VT-IGE. The trainee pilot also stated he too observed



developing weather near Varanasi and set course back to Fursatganj after taking necessary clearances from ATCs.

Based on the last observed position of the aircraft the WSO, Varanasi called District Magistrate (DM), Azamgarh. Later DM, Azamgarh confirmed the finding of aircraft wreckage in a village called Seruddin Pur Usaha in Azamgarh district.

As per the eye witnesses, they heard a loud bang sound soon after a thunderstorm and came out of their house. They observed that the aircraft was losing height and then crashed in an agricultural field. Soon after the accident it started raining in that area. The aircraft was destroyed during the accident and the wreckage was found scattered. There was no fire.

## **1.2 Injuries to Persons**

The trainee pilot who was the only occupant on board the aircraft received fatal injury.

## **1.3 Damage to Aircraft**

The aircraft was destroyed during the accident.

## **1.4 Other Damages**

Nil

## **1.5 Personnel Information**

### **1.5.1 Trainee Pilot**

Nationality	Indian
Age	25 years
Date of Joining Organization	26.09.2017
License	Student Pilot License (SPL)
Date of Issue	14.08.2018
Valid up to	13.08.2023
Category	Aeroplane
Date of Class I Med. Exam.	13.11.2019
Class I Medical Valid up to	12.11.2020
Date of issue FRTOL License	20.10.2018
FRTO License valid up to	19.10.2028
Endorsements as PIC (on SPL)	TRINIDAD TB-20
Total flying experience	125:00 Hrs

Total flying experience on type	125:00 Hrs
Last Flown on type	15.09.2020, TRINIDAD TB-20
Total flying experience during last 1 year	80:10 Hrs
Total flying experience during last 6 Months	53:40 Hrs
Total flying experience during last 30 days	10:05 Hrs
Total flying experience during last 07 Days	02:35 Hrs
Total flying experience during last 24 Hours	Nil
Rest period before flight	12 hrs before the flight
Whether involved in Accident/Incident earlier	No
Date of latest Flight Checks and Ground Classes	- 18.06.2020 Navigation Check with CFI. - 10.06.2018 Completion of ground classes.

The student pilot started flying training in February 2019. He was released for first solo flying on 6<sup>th</sup> June 2019 after obtaining flying experience of about 22:10 hours. The trainee pilot was released for first solo cross country long navigational flight (Fursatganj – Rewa - Fursatganj) on 14<sup>th</sup> July 2021 after almost 100 hours of flying training experience. The trainee pilot had carried out 09 solo cross country long navigational flight before the accidental flight including 02 flights on the same route (Fursatganj – Mau - Fursatganj). All his flying training had been carried out on TB20 aircraft.

#### 1.6 Aircraft Information

Aircraft Model	TRINIDAD TB-20
Aircraft S. No.	1883
Year of Manufacturer	1999
Name of Owner	Indira Gandhi Uran Akademi (IGRUA)
C of R	Valid
C of A	Valid
Category	Normal

A R C issued on	17.08.2020
ARC valid up to	02.07.2021
Aircraft Empty Weight	897.50 Kgs
Maximum Take-off weight	1400 Kgs
Date of aircraft weighment	14.02.2019
Max Usable Fuel	236.35 Kgs
Max Payload with full fuel	181.15 Kgs
Empty Weight C.G	1.001 m aft of Datum
Next Weighing due	14.02.2024
Total Aircraft Hours	8968:07 hrs
Last major inspection	100 Hrs/ 06 months app Inspection
List of Repairs carried out after last major inspection till date of accident	NIL
Engine Type	LYC.IO540C4D5D
Date of Manufacture	03.12.1992
Engine Sl. No.	L-24159-48A
Last major inspection	100 Hrs/ 06 months app Inspection schedule
List of Repairs carried out after last major inspection till date of accident	NIL
Total Engine Hours/Cycles	TSN-10305:20 Hrs-802:53 Hrs
Aero mobile License	Valid upto 31.12.2021
AD, SB, Modification complied	As applicable. AD, SB modification are complied with

The aircraft was used for flying training purposes under Flying Training Organisation approval No. 01/1999 which was last issued on 18<sup>th</sup> March 2020 and valid upto 26<sup>th</sup> March 2022. The accidented flight was the first flight of the day on the aircraft.

All concerned Airworthiness Directives, mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine had been complied with as on date of accident.

Scrutiny of the Pilot Defect Register (PDR) revealed that, there was no snag pending on the aircraft prior to the accident flight.

“Load and Trim” sheet of accident flight was prepared and center of gravity was found within limit.

### 1.7 Meteorological Information

The local weather for flying is taken from MET office situated at Fursatganj Airport. Following METARs for Fursatganj airport were issued between 0400 UTC to 0600 UTC.

Time (UTC)	Winds (°/Knots)	Visibility (Meters)	Weather	Clouds	QNH (HPa)	Temp/ DP (°C)
0400	VRB/02	5000	Haze (HZ)	FEW 2000 FT	1000	35/26
0500	VRB/02	5000	Haze (HZ)	FEW 2000 FT	1000	35/27
0600	070/02	5000	Haze (HZ)	FEW 2000 FT SCT 2500 FT	1015	31/27

The aircraft was under the jurisdiction of Varanasi Airport at the time of accident. The weather (METAR) MET Report for Varanasi Airport from 0500 UTC to 0700 UTC.

Time in UTC	Wind Dir	Wind Speed (KT)	Vis (m)	Clouds	Temp/ Dew Point (°C)	QNH hPa	TREND
0500	170	06	3500	FEW 2000 FT FEW CB 3000FT SCT 10000 FT	32/26	1000	TEMPO 1500 IN HVY TSRA
0506	120	15	---	SCT 2000FT FEW CB 3000FT OVC 8000 FT	30/26	1001	NOSIG CB over head
0530	060	07	2500	SCT 2000FT FEW CB 3000FT OVC 9000 FT	31/26	1000	BECMG 3000 IN TSRA

0600	230	03	3000	SCT 2000FT FEW CB 3000FT BKN 10000 FT	28/27	1000	NOSIG
0630	360	04	3500	SCT 2000FT FEW CB 3000FT BKN 10000 FT	28/27	1000	NOSIG
0700	VRB	02	4000	SCT 2000FT FEW CB 3000FT OVH BKN 8000	28/25	999	TEMPO 3000 RA

### 1.8 Aids to Navigation

The aircraft was fitted with ILS, DME, VOR DME, RNAV transponder and GPS. There was no defect reported and all navigational equipment were in serviceable condition.

### 1.9 Communication

There was always two-way communication between the aircraft and ATC. The recording of the communication between the aircraft and ATC was mostly clear except when the aircraft was in contact with ATC, Lucknow. It was informed that the reception from the aircraft departing from Fursatganj towards Mau, Azamgarh, Gazipur, etc. are generally very poor due to low altitude maintained by the training aircraft and VHF coverage.

At the time of accident, the aircraft was on Varanasi Approach Control Frequency. The last communication made by the trainee pilot was "Sir leaving 3500 for flight level 55" when the trainee pilot was reading back the approval given by Controller to the request made by him for climb to 5500 ft. The trainee pilot did not report any operational difficulty at any stage of the flight.

It was observed that when the aircraft was under the control of Area Surveillance Control, Lucknow all communication/RT call outs with the aircraft was given by the planning controller.

### 1.10 Aerodrome Information

Not relevant. The accident occurred while the aircraft was enroute.

### **1.11 Flight Recorders**

Cockpit Voice Recorder (CVR) and Digital Flight Data Recorder (DFDR) were neither fitted nor required on this aircraft as per existing Civil Aviation Requirements.

### **1.12 Wreckage & Impact Information**

The aircraft was destroyed during the accident. The aircraft wreckage was scattered in an area of radius of about 5 Kms from the point where the main aircraft wreckage (Forward portion of cockpit along with wings and engine) was found. The wings were found attached to the forward portion of the fuselage. The main wreckage impacted the paddy field (soft ground) in nose down attitude which was evident from the fact that the engine (which was intact with the structure) along with front instrument panel were found buried approximately 3 feet under soft ground.

When the investigation team reached the accident site, the local police authorities informed that other aircraft wreckage parts fell in different areas of the village. The villagers took these aircraft parts to their home which were later recovered by the local police authorities. The investigation team with the help of local police authorities interacted with the villagers/eyewitnesses to identify the approximate position of each aircraft part from where it was picked up by the villagers.

Following information was revealed from the interaction with villagers & eyewitnesses: -

- The aircraft empennage along with rear seat were found approximately 5 Kms (In another village) away from the main wreckage on a terrace of a house.
- The rear fuselage portion was found 500 meters away from the main wreckage.
- The cockpit door along with attached frame was found on top of a tree, however, the exact location of the tree could not be ascertained.
- The body of the deceased trainee pilot was found approximately 300 meters away from the main wreckage. As per the eyewitnesses the trainee pilot fell from the aircraft main wreckage before it impacted the paddy field.

From the interaction with villagers/eyewitnesses and analyzing the wreckage distribution pattern it is quite evident that the aircraft got disintegrated in flight. The main wreckage along with parts recovered from the villagers were later shifted to IGRUA hangar at Fursatganj. The aircraft wreckage was re-constructed and it was found that most of the parts were recovered. The wreckage was destroyed to an extent that some of the small parts could not be recovered.

### **1.13 Medical & Pathological Information**

The trainee pilot did not undergo pre-flight Breath Analyzer (BA) test before the flight. As per order No. DGCA-15031/4/2020 issued by DGCA, for all domestic operations only 10% random pre-flight BA examination is to be done. Therefore, on the day of accident three trainees carried out BA test randomly, which didn't include the deceased trainee pilot.

The trainee pilot received fatal injuries.

### **1.14 Fire**

There was no fire.

### **1.15 Survival Aspects**

The accident was not survivable.

### **1.16 Test and Research**

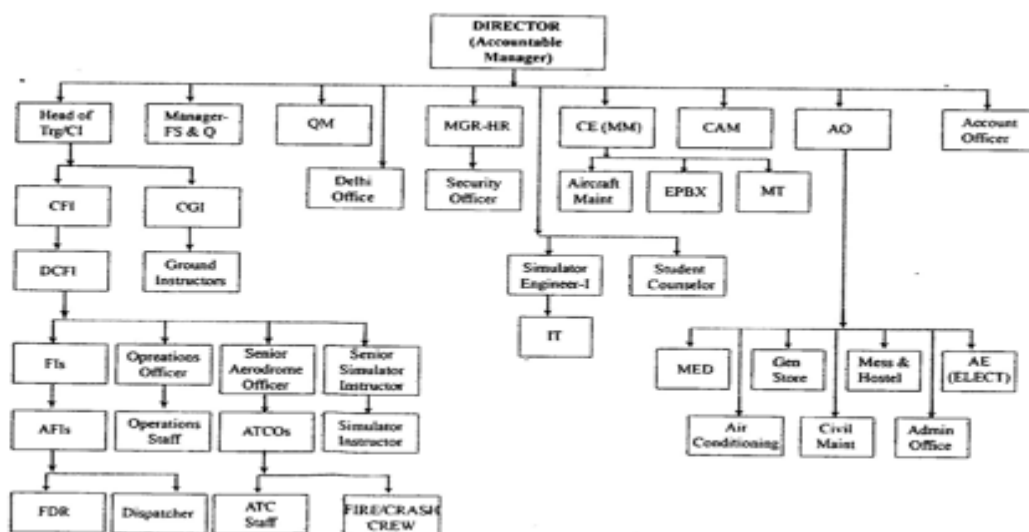
Nil

### **1.17 Organizational & Management Information**

#### **1.17.1 Indira Gandhi Rashtriya Uran Akademi (IGRUA)**

Indira Gandhi Rashtriya Uran Akademi (IGRUA) is a flying training Organization located at Fursatganj, Dist. Raebareli U.P. It was set up in 1985 as an autonomous body under the Ministry of Civil Aviation. The chief executive of the organization is the Director who is the Accountable Manager having both the administrative and financial control in the organization. The flying training operations at IGRUA commenced in Oct 1986. As per the Certificate of Approval of FTO, the organization has approval for conducting flying training courses for CPL, PPL, SPL, IR, FIR(A) training, etc. The FTO has fleet of Trinidad TB-20, Zlin 242L, Diamond DA-40 and Diamond DA-42 aircraft.

The Organisation Chart as per the Manual of the FTO is as shown below:



**FIG. 1 - ORGANIZATION CHART**

As on the day of accident, the flying training academy had one CFI, two Dy.CFI, three FI and 06 AFI for imparting training to the student pilots. The FTO has in-house maintenance setup as per CAR 145 which is approved by DGCA and was valid on the day of accident.

## 1.17.2 Training and Procedure Manual (TPM) of the Organization

### 1.17.2.1 Duties & Responsibilities of CFI

The salient portion of duties & responsibilities of CFI as mentioned in the TPM is reproduced below.

**D) Chief Flying Instructor (CFI)**  
 Chief Flying Instructor is responsible for overall conduct of Flying Training, which may include following:

- Authorize all training flights
- Conduct of SPL & FRTOL (R)
- Patter Training for issue of AFIR(A) & FIR (A)
- Skill Tests for issue/renewal of Pilot Licenses
- Authenticate the entries in Pilot's Logbook
- Standardization Checks for all Flying Instructors

**Qualifications:**

- As per CAR Section 7 Series I Part V

**Succession of Command:** During the temporary absence of CFI, any other CFI /Senior Most Deputy Chief Flying Instructor (DCFI) will take over the responsibilities of Chief Flying Instructor.

**FIG.2 - SALIENT PORTION OF DUTIES & RESPONSIBILITIES OF CFI**



### **1.17.2.2 Procedure regarding Weather**

The investigation team perused the TPM of the organisation approved by DGCA and it was observed that there was no specific procedure laid down in the TPM for weather such as from where the weather/Forecast will be taken, how the current weather and forecast will be informed to the trainees/instructors for imparting flying training, who is responsible for obtaining weather and maintaining weather watch all the time during flying training exercise, etc. Also, there is no specific requirement/guidelines by DGCA in this regard for FTOs.

However, it was informed to the investigation team that there is a settled practice wherein the instructors conduct three briefings in a day for flying training in batches. This also includes following Met Briefings: -

- Latest METARs of Fursatganj, Lucknow, Prayagraj and Varanasi.
- Current Weather Conditions: Satellite images and radar images are displayed along with any weather warnings or cautions.
- Weather forecast Local & Neighboring Airfields: Max/Min temperature of the day for base, chances of precipitation and winds at different altitudes.

Post briefing the trainees report to their individual flying instructor for their planned exercise briefing. Thereafter, the respective flying instructor briefs the solo trainee as per their planned profile for navigation profile briefing consists of Nav log briefing, route briefing, VFR Map briefing, fuel planning, Local & Enroute weather briefing and few contingencies are discussed.

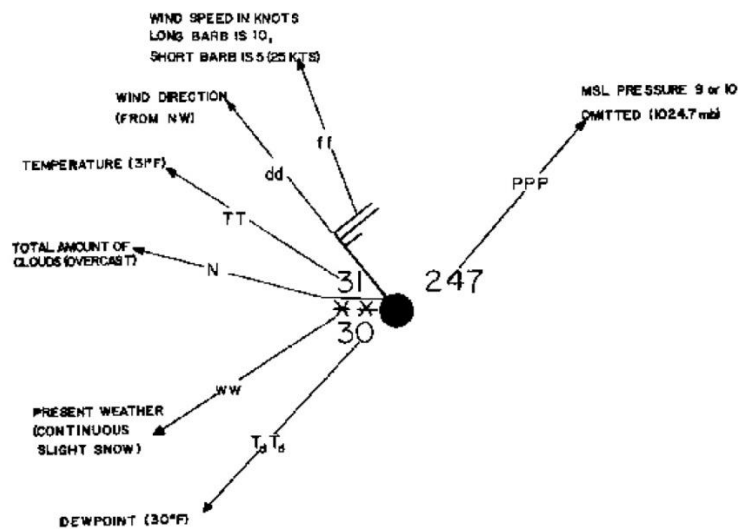
On the day of accident, the morning briefing was conducted at around 07:15 IST by one of the Dy.CFI as the CFI was on leave. As per the Dy.CFI, he authorized the flying training exercise after ensuring that the current weather and the weather forecast shown till 09:30 IST was fine for local & enroute (for cross country). The deceased trainee pilot was briefed by one of the AFI who stated that local & enroute weather was fine for solo navigation.

## 1.18 Additional Information

### 1.18.1 Wind Shear

Wind shear is a rapid change in wind speed or direction over a relatively short distance in the atmosphere. This shear can be both either vertical or horizontal. Vertical wind shear is a change in wind speed or direction with change in altitude. Horizontal wind shear is a change in wind speed with change in lateral position for a given altitude.



















Wind shear conditions can occur at low as well as high altitudes. Horizontal wind shear is most frequently experienced when crossing fronts or flying in the vicinity of mountainous areas. Vertical wind shear can be experienced anywhere from the surface to upper Flight Levels (FLs) – particularly it is associated to thunderstorm conditions. The most dangerous conditions are when flying at lower levels.



**FIG. 3 - WIND SHEAR REPRESENTATION**

Wind shear codes for speed, direction, temperature clouds, dew point etc. are shown in the above figure. Wind shear measured in knots, is either positive or negative. Increment in wind shear value are positive numbers, while decrement is noted as negative values. When operating in the upper atmosphere, wind shear value is almost always positive. Closer to the ground, one may experience negative wind shear values.

Symbols used for the quantum of wind shear are shown below.

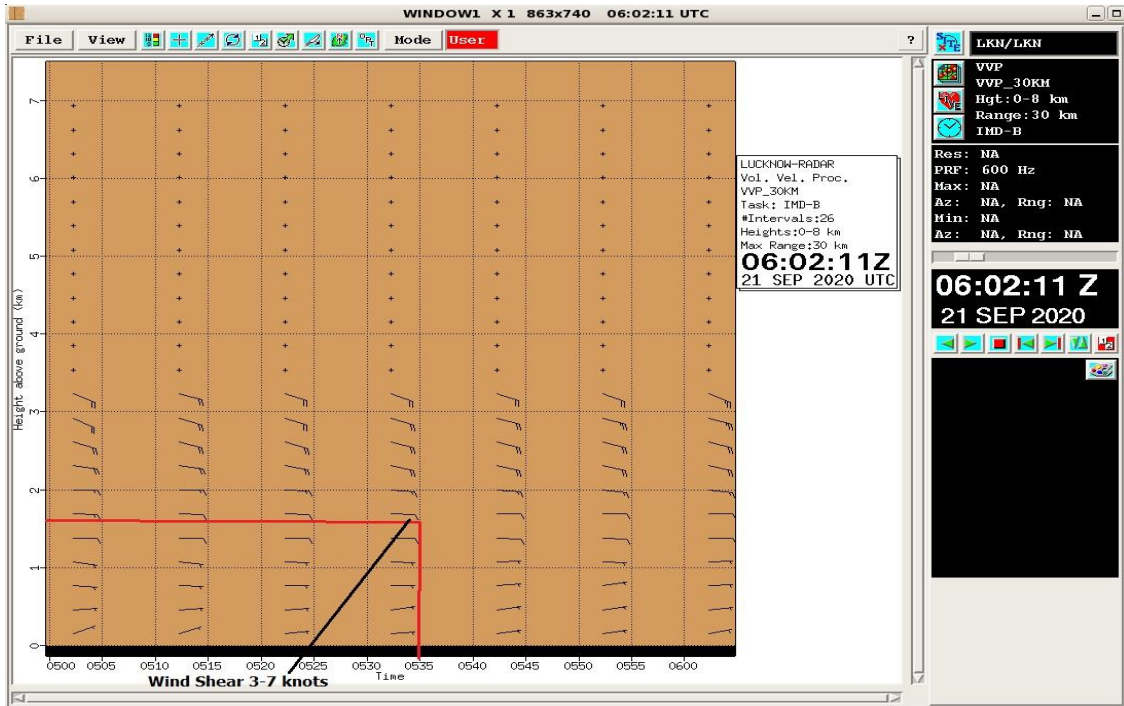
<b>SYMBOL</b>	<b>Knots</b>
	Calm
	1- 2
	3- 7
	8- 12
	13- 17
	18- 22
	23- 27
	28- 32
	33- 37
	38- 42
	43- 47
	48- 52
	53- 57
	58- 62
	63- 67
	68- 72
	73- 77
	103-107

**FIG. 4 - WIND SHEAR CODES**

Wind shear has significant affects on control of an aircraft. It causes rapid change in lift, and thus the altitude, of the aircraft. Strong outflow from thunderstorms causes rapid changes in the three-dimensional wind velocity just above ground level. Initially, this outflow causes a headwind that increases airspeed, which normally causes a pilot to reduce engine power if they are unaware of the wind shear.

### **1.18.2 Weather Trend from MET Office, Lucknow**

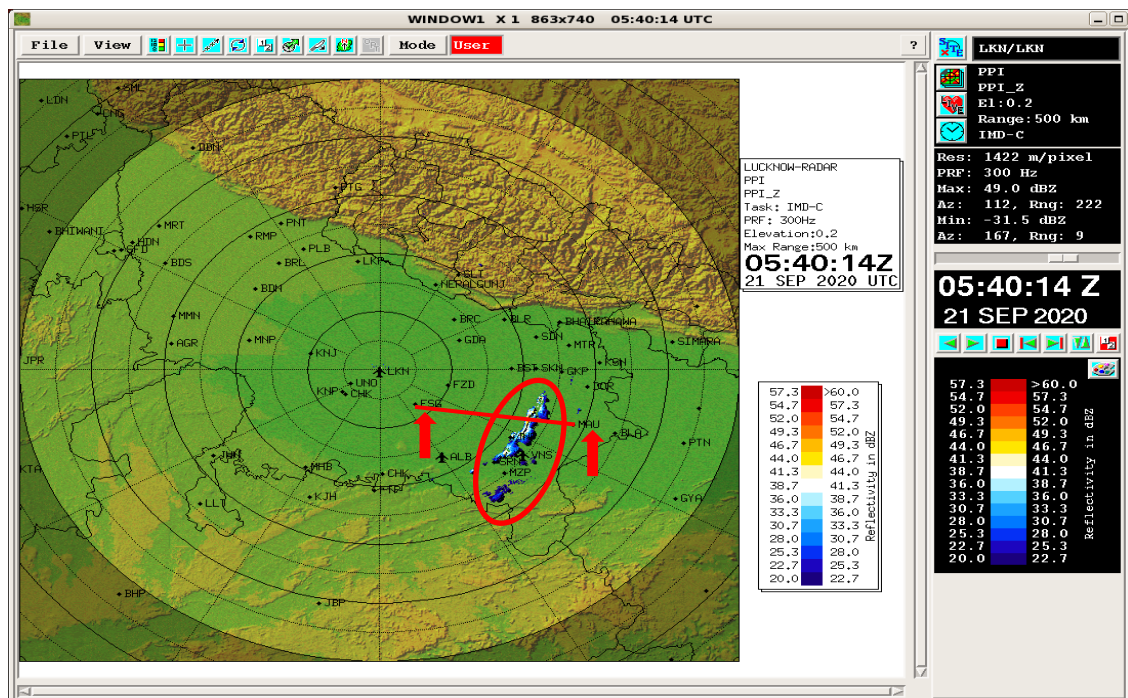
In addition to the general MET information provided by IMD (Refer Para 1.7), weather trend with respect to change in altitude from time 0530 UTC to 0635 UTC was obtained from MET office, Lucknow to study the prevailing weather conditions in the area which the aircraft could have encountered during flight. The weather trend provided by IMD (reflectivity Index v/s height) is as given below:



**FIG. 5 - REFLECTIVITY INDEX WITH HEIGHT FROM TIME 0500 UTC TO 0600 UTC**

The above graph shows reflectivity index (in dBZ) viz-a-viz height (altitude in Kms) from time 0500 to 0600 UTC.

The aircraft was maintaining altitude of approximately 5500 feet (1676 meters) when it disappeared from the radar. At that time as per the above graph there was no precipitation. The wind shear symbol was indicating wind shear of 3-7 knots just prior to accident.



**FIG. 6 - WEATHER RADAR IN AND AROUND LUCKNOW (UPTO 500 KM) AT 05:40:14 UTC**

Areas of heavy precipitation (with big raindrops or snowflakes) return a lot of power to the radar and appear as brighter colors in reflectivity images. In this reflectivity image, the heaviest precipitation is in red, while lighter precipitation is in blue and green. The colours - yellow, orange and white shows moderate precipitation.

It is evident from the Radar image (Refer image above) that the weather was building up in the area between Fursatganj (FSG) and Mau (MAU) i.e., enroute the flight path followed by the trainee pilot where the accident occurred.

### **1.18.3 Recent occurrences of similar nature involving flying training aircraft**

There have been similar occurrences in the recent past wherein the trainee aircraft had encountered weather enroute during the cross-country flight. Circumstances of one such occurrence is discussed below: -

- Accident to M/s Wings Aviation Pvt. Ltd. Cessna 172 aircraft VT-RGF at Sultanpur Village, Telangana on 06.10.2019.

In the above occurrence also, the aircraft was operating solo cross country flight when it encountered sudden adverse weather. At that time the precipitation was moderate with downward wind shear of 3-7 knots. This was further confirmed when, the trainee pilot requested ATC for descent due to heavy rain and return to base. The request was approved by ATC. The aircraft during descent encountered wind shear, during which the speed of the aircraft got reduced. There was sudden increase in its sink rate due to sudden reduction in lift. As the aircraft was low, there was no time/ height available for the trainee pilot to affect a recovery, and the aircraft impacted the ground at high vertical speed resulting into aircraft disintegrating into pieces and leading to the accident.

### **1.19 Useful and Effective Techniques**

NIL

## **2. ANALYSIS**

### **2.1 Serviceability of aircraft**

The aircraft was manufactured in the year 1999. It was having a valid Certificate of Registration (C of R) at the time of accident and holding a valid Indian Certificate of Airworthiness (C of A) under Normal category and Passenger Sub-Division. Airworthiness Review Certificate (ARC) was valid at the time of accident. There was no snag reported before the accidented flight.

All concerned Airworthiness Directives, mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine were complied with as on the date of accident. The CG of the aircraft was within limits.

### **2.2 Weather**

The weather reported at and around Fursatganj airport at the time of accident was visibility 5000 meters, with winds VRB/02 knots. Weather as per this information and observations made by Dy. CFI in the morning was found suitable for carrying out the cross-country flight. At the time of accident, the aircraft was under Varanasi control and the weather in and around Varanasi just before the accident was HVY TSRA with cloud SCT 2000 FT, FEW CB 3000 FT, OVC 8000 FT, winds changing from 170/06 kt to 120/15 kt and visibility dropping to 2500 meters from 3500 meters.

During investigation, weather trend (variation) with altitude was obtained from MET Office, Lucknow, which revealed that at the time of accident at an altitude of 5500 feet (1676 meters) there was a wind shear of 3 to 7 knots with no precipitation. The same was also corroborated from the radar image (Refer FIG. 6 above) that the weather was building up in the area between Fursatganj (FSG) and Mau (MAU) i.e., enroute the flight path followed by the trainee pilot where the accident occurred.

It was also evident from the extent of damage to the aircraft and scatter of the wreckage which confirmed that the aircraft encountered very bad weather such that it disintegrated in air. The eyewitnesses (Villagers) also confirmed that they heard a bang noise just after thunderstorm when they saw the damaged aircraft which was losing height.

In view of the above it can be concluded that the aircraft had encountered sudden adverse weather with severe wind shear which gave no time for the trainee pilot to take any corrective action to avoid the same.

## **2.3 Organizational Aspect**

### **2.3.1 Weather monitoring in the organisation**

The investigation team perused the TPM of the organisation approved by DGCA and it was observed that there was no specific procedure laid down in the TPM for weather monitoring. Also, there is no specific requirement/guidelines by DGCA in this regard for FTOs. However, it was informed to the investigation team that there is a settled practice in the organisation where they conduct mass briefing to the trainee pilots three times a day during which they cover weather briefings also. On the day of accident, the mass briefing was conducted in the morning at around 07:15 IST by one of the Dy.CFI in the absence of the CFI who was on leave that day. As per the Dy.CFI, he authorized the flying training exercise after ensuring that the current weather and the weather forecast shown till 09:30 IST was fine for local & enroute (for cross country). The deceased trainee pilot was briefed by one of the AFI who stated that local & enroute weather was fine for solo navigation.

The deceased trainee pilot was enroute to MAU when the aircraft encountered sudden severe adverse weather which led to the accident. There were other trainee pilots who were also authorized for cross country flight on aircraft VT-FGK & VT-FGF. VT-FGF was authorized for the same route after the departure of VT-IGE and VT-FGK was authorized for Fursatganj – Ghazipur-Fursatganj which departed before VT-IGE. Both these trainee pilots were en-route (near Varanasi) when they observed developing weather ahead in their respective path. Both the trainee pilots decided to set course back to Fursatganj after taking necessary approval from ATC, Varanasi.

It is, therefore, quite evident that even though the weather in the morning was fine for local and cross-country exercise, the weather started deteriorating afterwards at around 0500 UTC when these aircraft were enroute in their respective flight path.

This was quite obvious as the accident occurred during monsoon. Monsoon season activities/period in India begins from starting June and continues till mid-October. Monsoon period /season is mostly a four-month period, when a massive convective thunderstorm dominates India's weather. The weather tends to change suddenly during monsoon.

This was also the case in a similar occurrence which was discussed earlier (refer para 1.18.3) wherein the trainee aircraft encountered sudden severe weather enroute the flight path which led to the accident.

These accidents could have been avoided if there was proper monitoring of current and weather trends which seems to be lacking during the conduct of flying training exercises. Although there are certain existing practices like MET register and scheduled briefings, etc. but these are not sufficient and not monitored continuously as most of the instructors are busy imparting flying training during which it is not possible to monitor weather continuously. Had the enroute weather/weather trend been monitored continuously these cross-country exercises could have been cancelled or the trainee pilots could have been asked to come back.

This may be achieved by dedicated weather monitoring system and a procedure in this regard should be developed wherein the current and weather trends are monitored continuously during the time of flying training exercise especially monitoring of en-route weather for cross country flights. This will help in conducting safe flying training exercise where the trainee pilots and instructors will be provided with latest weather and can plan the flying training exercises accordingly.

#### **2.4 Circumstances Leading to the Accident**

On the day of accident after the mass briefing the trainee pilot was detailed for "solo cross country" exercise by one of the AFI as the local & enroute weather was fine at that time for solo navigation.

The AFI carried out pre-flight inspection and did not find any abnormality in the aircraft. The weather at the time of take-off from Fursatganj was visibility 5000 meters with winds VRB/02 kts. After take-off, the aircraft was handed over to ATC, Lucknow and thereafter to ATC, Varanasi. The aircraft was cleared for



climb to 5500 ft (outbound operating altitude for cross country as per flight plan) and was maintaining 5500 ft. Thereafter it was observed on the radar that while enroute the aircraft, was observed to have climbed to 6000 ft followed by a descent to 5200 ft. This implies that the aircraft had encountered inclement weather. At that time there was wind shear of 3-7 knots at altitude of 5500 feet. This was further confirmed from the radar images that the weather was building up in the area between Fursatganj (FSG) and Mau (MAU) i.e., enroute the flight path followed by the trainee pilot. When the aircraft was around 36 NM North of BBN (Varanasi) at a radial of 30°, the Radar and VHF contact were lost and a synthetic radar position symbol appeared. The controller gave many calls to the aircraft including calls on emergency frequency, through other IGRUA aircraft and airlines aircraft operating under the jurisdiction of ATC Varanasi, however, there was no response. The aircraft could have encountered sudden adverse weather (Thunderstorm) with severe wind shear which gave no time for the trainee pilot to take any corrective action during which the aircraft disintegrated in air and lost control. The aircraft structural parts such as empennage, fuselage section was found in different areas which were around 5 km away from the final resting position of the main wreckage (Forward cabin with wings & engine).

### **3. CONCLUSION**

#### **3.1 Findings**

- 3.1.1** The aircraft was having valid C of R, C of A & ARC on the day of accident.
- 3.1.2** The aircraft and its engine were being maintained as per continuous maintenance programme approved by DGCA.
- 3.1.3** No inspection/Maintenance action was due on the aircraft & its engine as on date of accident.
- 3.1.4** All concerned Airworthiness Directives, mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine had been complied with as on date of event.
- 3.1.5** Scrutiny of the Flight Release Book (FRB) revealed that, there was no snag pending on the aircraft prior to the accidented flight.

- 3.1.6** The deceased trainee pilot was having a valid student pilot license and was certified & qualified for the flight.
- 3.1.7** On the day of accident, the flying training exercises were authorized by one of the Dy. CFI in the absence of CFI who was on leave.
- 3.1.8** The AFI who briefed the deceased trainee pilot for solo cross country navigational exercise carried out the pre-flight inspection of the aircraft and did not find any abnormality.
- 3.1.9** The weather at the time of take-off at Fursatganj was fine with visibility 5000 meters with winds VRB/02 kts. After take-off, the aircraft was handed over to ATC, Lucknow and thereafter to ATC, Varanasi.
- 3.1.10** The RT call outs during that time at Lucknow Area Control were given by planning controller which is in contravention to the relevant SOPs.
- 3.1.11** The trainee pilot was cleared and was maintaining altitude of 5500 feet as per plan for outbound leg.
- 3.1.12** After some time, it was observed on RADAR that the aircraft climbed to 6000 ft and then descended to 5200 ft indicative of aircraft encountering severe adverse weather.
- 3.1.13** At that time there was wind shear of 3-7 knots at altitude of 5500 feet. This was further confirmed from the radar images that the weather was building up in the area between Fursatganj (FSG) and Mau (MAU) i.e., enroute the flight path followed by the trainee pilot.
- 3.1.14** When the aircraft was around 36 NM North of BBN (Varanasi) at a radial of 30°, the Radar and VHF contact were lost and a synthetic radar position symbol appeared.
- 3.1.15** The controller gave many calls to the aircraft including calls on emergency frequency, through other IGRUA aircraft and airlines aircraft operating under the jurisdiction of ATC Varanasi, however, there was no response. The trainee pilot did not give any call out for emergency.

- 3.1.16** The aircraft could have encountered sudden adverse weather (Thunderstorm) with severe wind shear which gave no time for the trainee pilot to take any corrective action during which the aircraft disintegrated in air and lost control.
- 3.1.17** The aircraft wreckage was scattered in an area of radius of about 5 Kms from the point where the main aircraft wreckage (Forward portion of cockpit along with wings and engine) was found.
- 3.1.18** The TPM of the organisation approved by DGCA did not have any specific procedure laid down for weather monitoring. Also, there is no specific requirements/guidelines by DGCA in this regard for FTOs.
- 3.1.19** It was informed to the investigation team that there is a settled practice in the organisation where they conduct mass briefing to the trainee pilots three times a day during which they cover weather briefings also.
- 3.1.20** On the day of accident, the mass briefing was conducted in the morning at around 07:15 IST by one of the Dy.CFI. As per the Dy.CFI, he authorized the flying training exercise after ensuring that the current weather and the weather forecast shown till 09:30 IST was fine for local & enroute (for cross country).
- 3.1.21** There was other two trainee pilots of the organisation who were also authorized for solo cross-country flight during that time. Both these trainee pilots set course back to Fursatganj when they observed developing weather ahead in their respective path.
- 3.1.22** The weather in the morning was fine for local and cross-country exercise, when the weather started deteriorating afterwards. The weather around Varanasi at the time of accident was HVY TSRA with cloud SCT 2000 FT, FEW CB 3000 FT, OVC 8000 FT, winds changing from 170/06 kt to 120/15 kt and visibility dropping to 2500 meters from 3500 meters.
- 3.1.23** The present accident and accidents of similar nature in pasts could have been avoided if there was proper monitoring of current weather and weather trends which seems to be lacking in most of the FTOs during the conduct of flying training exercises.

**3.1.24** Although there are certain existing practices like MET register and scheduled briefings, etc. but these are not sufficient and not monitored continuously as most of the instructors are busy imparting flying training during which it is not possible to monitor weather continuously.

### **3.2 Probable Cause of the Accident**

The accident occurred as the aircraft encountered sudden inclement weather (Thunderstorm) with wind shear during which it disintegrated in air and lost control wherein trainee pilot had no time to take corrective action.

In-adequate weather monitoring was a contributory factor to the accident.

## **4 Safety Recommendations**

- 4.1 It is recommended that DGCA may formulate requirements/guidelines regarding weather monitoring such that the current weather and weather trends are being monitored continuously by FTOs and same is communicated to instructors & trainee pilots during flying training exercise especially in case of development of any adverse weather. The compliance of the same may be ensured during audits/surveillance of FTOs.
- 4.2 It is recommended that DGCA may advise all flying training organizations to develop a full proof system of 100% supervision of the training sorties by CFI or Dy.CFI as stipulated in the DGCA CAR on the subject.
- 4.3 It is recommended that AAI may advise all controllers to strictly adhere to the laid down SOPs to ensure that the RT calls are made by the responsible controller only.

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Place: New Delhi