

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/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.

Contents		
S. No.	Table of Contents	Page No.
	GLOSSARY	4
	SYNOPSIS	8
1	FACTUAL INFORMATION	8
1.1	History of the flight	8
1.2	Injuries to persons	9
1.3	Damage to Aircraft	9
1.4	Other damage	9
1.5	Personnel Information	9
1.5.1	Flight Instructor	9
1.5.2	Student Pilot	10
1.6	Aircraft Information	11
1.6.1	Aircraft General Description	11
1.6.2	Aircraft VT-AMU Specific Information	12
1.7	Meteorological Information	13
1.8	Aids to Navigation	15
1.9	Communications	15
1.10	Aerodrome Information	15
1.11	Flight Recorders	15
1.12	Wreckage and impact information	16
1.13	Medical and Pathological Information	19
1.14	Fire	19
1.15	Survival aspects	19
1.16	Tests and Research	19
1.17	Organizational and Management Information	19
1.17.1	Training Procedure Manual	20
1.17.2	SOP for Night Cross Country Flight	20
1.18	Additional Information	22
1.18.1	VFR criteria as per DGCA Civil Aviation Requirements	22
1.18.2	Flying Grants Advisory Circular 02 of 2005	22
1.19	Useful or Effective Investigation Techniques	23
2	ANALYSIS	23
2.1	Serviceability of Aircraft	23
2.2	Operations	24
2.2.1	Crew Qualifications for the Flight	24
2.2.2	Operational Factors	24
2.2.3	Weather	28
2.2.4	Aerodrome	29
2.2.4.1	Air Traffic Control	29
2.2.4.2	Communication	29

2.2.4.3	NAV Aids	29
2.2.4.4	Aerodrome Information	30
2.2.5	Circumstances leading to Accident	30
2.3	Human Factors	30
2.4	Survivability	31
3	CONCLUSION	31
3.1	Findings	31
3.2	Probable cause of accident	32
4	SAFETY RECOMMENDATIONS	33

GLOSSARY

AAIB	Aircraft Accident Investigation Bureau, India
ASC	Air Safety Circulars
AFI	Assistant Flying Instructor
AFIR	Assistant Flight Instructor Rating
AGL	Above Ground Level
AIP	Aeronautical Information Publication
ALT	Altitude
AMSL	Above Mean Sea Level
ARC	Airworthiness Review Certificate
ARP	Airport Reference Point / Aerodrome Reference Point
ATC	Air Traffic Control
ATS	Air Traffic Services
BR	Mist
C of A	Certificate of Airworthiness
CAR	Civil Aviation Requirements
CFI	Chief Flight Instructor
CPL	Commercial Pilot License
CRS	Certificate of Release to Service
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DGCA	Directorate General of Civil Aviation
ELT	Emergency Location Transmitter
ETA	Estimated Time of Arrival
FI	Flight Instructor
FII	Flight Instructor Instrument
FOB	Flying Order Book
ft	Feet
FRP	Fiber Reinforced Polymers
FRTOL	Flight Radio Telephone Operators License
FTO	Flying Training Organization
GND	Ground
HDG	Heading
Hrs	Hours
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organization
INMCC	Indian Mission Control Center
IMD	India Meteorological Department
IST	Indian Standard Time
Kg	Kilogram
Km	Kilo meter
LAT	Latitude
Load	Load Lever Position
LONG	Longitude
m	Meters
MAP	Manifold Air Pressure
MSL	Mean Sea Level
NLG	Nose Landing Gear

NM	Nautical Miles
PIC	Pilot In Command
PFAPL	Pioneer Flying Academy Private Limited
PPL	Private Pilot License
QFI	Qualified Flying Instructor
RA	Radio Altitude
Revs	Engine Speed
rpm	Revolutions per minute
SB	Service Bulletin
SOP	Standard Operating Procedure

Aircraft and Accident details of Cessna 172 S VT-AMU on 21st January 2022

1.	Aircraft	Type	Cessna 172 S
		Nationality	Indian
		Registration	VT-AMU
2.	Owner		M/s Pioneer Flying Academy Pvt. Ltd.
3.	Operator		M/s Pioneer Flying Academy Pvt. Ltd.
4.	Country of Manufacture		USA
5.	Pilot in Command		CPL Holder
6.	No. of Persons on board		02 (PIC & Student Pilot)
7.	Date & Time of Accident		21 Jan 2022, 14:46 UTC
8.	Place of Accident		Agricultural field Near Aligarh Aerodrome
9.	Co-ordinates of Accident Site		Lat : 27° 52'5" N Long : 78° 8'34" E
10.	Last point of Departure		Aligarh Aerodrome
11.	Intended landing place		Aligarh Aerodrome
12.	Type of Operation		Night Cross Country Training Flight
13.	Phase of operation		Landing
14.	Type of Occurrence		Accident (Crash Landing)
15.	Extent of Injuries		Minor For Both Crew

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

SYNOPSIS

On 21 Jan 2022, Cessna 172 S aircraft VT-AMU operated by M/s Pioneer Flying Academy Pvt. Ltd met with an accident near Aligarh Aerodrome, Uttar Pradesh while carrying out a cross country night flying training on route Aligarh-Ramnagar-Aligarh. The training flight was under supervision of a Flying Instructor holding valid ratings with more than 2400 hrs of flying experience. Trainee Pilot had 177:50 hrs of flying experience.

Aircraft took off from Aligarh Aerodrome (Uncontrolled Airport) at about 1305 UTC in visibility of around 3.5 km as estimated by CFI of M/s Pioneer Flying Academy Pvt. Ltd. As per the crew statements, they could spot all the check points for circuit pattern and turned for finals for Runway 29 with all the ground references being visible. As the aircraft was aligned with Runway 29 for final approach, the crew encountered thick layer of smoke at around 400 ft altitude. At this juncture, the crew decided to descend past the smoke layer and sight the runway for landing. At around 300 ft altitude, the crew experienced dense smoke and decided to go around. The crew added full power to initiate “go around procedure”, and at this point of time, crew could not see through the layer of dense smoke and got disoriented during the go around and felt impacting on the ground. The aircraft met with an accident approximately 02 miles from Aligarh Aerodrome while attempting a go around on a missed approach for landing. The aircraft sustained substantial damage and minor injuries were reported to the crew.

Director General, AAIB appointed Gp Capt R P Singh VSM (Retd), Senior Consultant, AAIB as Investigator In Charge with Gp Capt K U S Phani (Retd), Consultant, AAIB and Capt Rakesh Anand Operational Expert as Investigators to investigate into the probable cause(s) of the accident, vide Order No. INV.11011/1/2022-AAIB dated 25 Jan 2022 under Rule 11 (1) of Aircraft (Investigation of Accidents and Incidents), Rules 2017.

Unless otherwise indicated, recommendations in this report are addressed to the regulatory authorities of the State having the responsibility for the matters with which the recommendation is concerned. It is for those authorities to decide what action is taken.

1. FACTUAL INFORMATION

1.1 History of the flight

On 21 January 2022, routine flying training exercises were being carried out at Aligarh Aerodrome by M/s Pioneer Flying Academy Pvt. Ltd. A total of 03 Night Cross Country training flights were authorized as per the record available in the Flight Authorization Book and flying commenced at 1255 UTC (1825 IST).

Cessna 172-S aircraft with registration VT-AMU was the last of the three flights to operate Night cross country flights on 21 Jan 22 and was released for flight after satisfactory pre-flight inspection by an authorized AME. The three aircraft took off with an interval of 05 minutes between them. As per flight plans, first two aircraft were to fly Cross Country Flight for 120NM with route 'Aligarh-Moradabad-Aligarh'. The last aircraft VT-AMU filed flight plan for 'Aligarh-DCT 29 40N 079 12E-DCT-Aligarh' though the route was not mentioned/recorded in the flight authorization book.

The Aligarh aerodrome is an uncontrolled airfield. There is no ATC manning and no meteorological support. M/s Pioneer Flying Academy Pvt. Ltd. had made a visibility chart with land marks to determine the visibility. On the day of the accident, CFI of the FTO assessed the visibility as 3.5 kms based on the visibility chart and authorized Deputy CFI as Pilot in Command (PIC) with a Trainee pilot for flying on VT-AMU aircraft, who was on the verge of completing the flying syllabus/training. The flight plan filed & approved for VT-AMU was under Instrument Flight Rules. 120 NM Night Flying cross country, is a requirement for issue of CPL as per the Aircraft Rules 1937, Schedule II, Section J Para 1 (e) & (h). However, Civil Aviation Requirements Section 9, Series C, Part 1 Para 4 stipulates local flights and training flights of flying club aircraft may be cleared by Air Traffic Control and operated during night in Visual Meteorological conditions (VMC).

The first aircraft took off at 1255 UTC (1825 IST) for cross country flying, second aircraft took off at 1300 UTC (1830 IST). The last aircraft VT-AMU took off for 120 NM Night Cross Country Flight at 1305 UTC.

As narrated by the crew of VT-AMU aircraft in their statements, the take-off and *enroute* cross country flight was uneventful as they could spot all the check points *enroute* as per the flight plan. The crew also stated that they experienced good visibility throughout the route. As per crew statement, on the return leg of the cross country flight, the crew approached dead side of Runway 29 and crossed takeoff path and joined left down wind. The crew stated that all the check points for circuit pattern were visible and they turned for finals for Runway 29 with all the ground references visible. As the aircraft was aligned with Runway 29 for final approach, the crew encountered thick layer of smoke at around 400 ft altitude. At this juncture, crew decided to descend past the smoke layer and see if the runway was visible. At around 300 ft altitude, as perceived by the pilots, the crew experienced dense smoke hence decided to go around and added full power to initiate 'go around procedure'. At this point of time, crew could not see through the dense smoke/ fog and got disoriented (Somatogravic Disorientation) in the process of ascertaining their position with respect to runway by looking for outside visual references and

not focusing on instruments as per instrument flying procedure. The crew felt impacting on the ground. However, the aircraft crash landed on agriculture field in Aligarh which was approx. 1340 Mtrs from runway 29 end. The crew sustained minor injuries due to impact with the ground and overturning of the aircraft before coming to halt in paddy field. The crew de energized the aircraft before coming out. Both the crew came out from the crashed aircraft by opening the left window. The student pilot came out first followed by instructor. After coming out the PIC himself informed the CFI on mobile about the crash of VT-AMU and then started walking towards the Aligarh airfield. The off base accident plan as per chapter 4 para 4.8.3.1 of TPM was not activated by the FTO on being informed by the crew of VT-AMU about the accident. The Crew were picked up by the Pioneer Flying Academy Pvt. Ltd personnel's enroute. The crew of the preceding two aircraft of Pioneer Flying Academy on cross country also encountered weather at Aligarh, however the crew could land the aircraft safely at Aligarh. The gap between landing of first aircraft, second aircraft and the third aircraft (VT-AMU) was approx. 05 and 06 minutes.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	NIL	NIL	NIL
Serious	NIL	NIL	NIL
Minor/ None	02	NIL	NIL

1.3 Damage to Aircraft

The aircraft sustained substantial damage. The nose section of the aircraft was severely damaged. Both upper and lower firewalls were found crumbled and ripped at several pieces. The Nose gear was found bent from the attachment. The engine was found to be detached from its attachment points connected to aircraft through pipe lines and other connections. Engine cowling was found ripped off from the right side and had separated from the aircraft. The propeller was found bent inwards indicating that the engine was on power during impact.

1.4 Other damage

The aircraft crash landed into a mustard field, chopping off the mustard plants before coming to rest in a paddy field.

1.5 Personnel Information

1.5.1 Flight Instructor

Nationality	Indian
Age	30 years
License	CPL
Date of Issue	19.01.2018
Valid up to	18.01.2023
Date of Class I Med. Exam.	14.09.2021
Class I Medical valid up to	15.09.2022

Date of issue FRTOL License	19.01.2018
FRTOL valid up to	18.01.2023
Endorsements on the License	Cessna 152, Cessna 172S
Total flying experience	2475:20 Hrs
Total flying experience on type	1209.10 Hrs
Total flying experience during last 1 year	599:55 Hrs
Total flying experience during last 6 Months	314:15 Hrs
Total flying experience during last 30 days	58:10 Hrs
Total flying experience during last 07 Days	09:35 Hrs
Total flying experience during last 24 Hours	Nil
Rest period before starting flying on 21 Jan 2022	49 Hrs
Whether involved in Accident/Incident earlier	NO
Date of latest flight checks, ground Classes & Refresher	Date of last flight check- 11.09.2021, Ground classes & refresher- 03.06.2021,

1.5.2 Student Pilot

Nationality	Indian
Age	30 years
Date of joining organisation	05.04.2021
License	SPL
Date of Issue	05.04.2021
Valid up to	04.04.2026
Date of Class I Med. Exam.	26.02.2021
Validity of Class I Medical	25.02.2022
Date of issue FRTOL	23.06.2021
Validity of FRTOL	22.06.2031
Total flying experience	186:05 Hrs.
Total flying experience on type	177:50 Hrs.
Last flown on type	14.01.22
Total flying experience during last 1 year	87:35 Hrs.
Total flying experience during last 6 Months	47:10 Hrs.
Total flying experience during last 30 days	11:05 Hrs.
Total flying experience during last 07 Days	09:15 Hrs.
Total flying experience during last 24 Hours	01:00 Hrs. (on 21.01.2022)
Rest period before starting flight on 21 Jan 2022	78:25 Hrs.
Whether involved in Accident/Incident earlier	NO
Date of latest flight checks, ground Classes & Refresher	14.01.2022, 250 NM, Cross- country Flight

On scrutiny of Student Pilot's Log Book, it was observed that the trainee had 06:15 Hrs. of night flying experience at Aligarh since 21 Dec 2021. In his recent flying, preceding accident, he had carried out three solo night flying sorties on 11, 12 and 13 Jan 2022.

1.6 Aircraft Information

1.6.1 Aircraft General Description

Cessna 172S is a sub 2250 Kg aircraft with high wing, nose mounted single engine tricycle landing gear and all metal construction. Aircraft is designed for general flying and training purposes. Three views (plan, elevation and side view) and dimensions of the aircraft as per the POH are shown below:

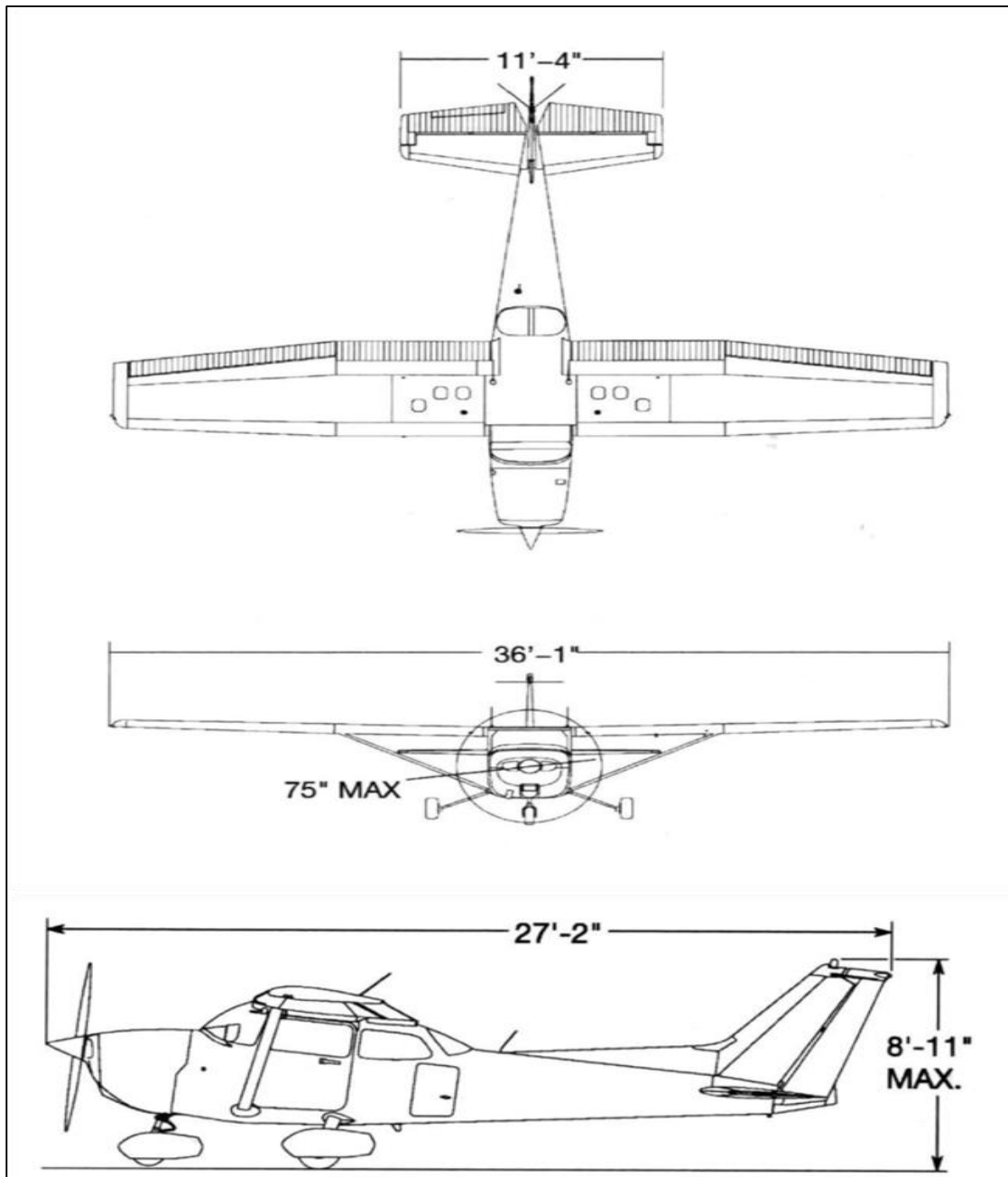


Figure 1: Three dimensional views of Aircraft

The Aircraft was fitted with Bendix King KLN 94 GPS system in which the pilots can feed the daily navigation routes with way points. However, this system does not retain any flight information for analysis. The aircraft was also installed with an auto pilot system; however, the operator had disabled the system, as it is not a mandatory requirement for imparting flying training.

Aircraft is fitted with Lycoming IO-360 L2 A Engine Serial No L-34022-51E manufactured by Lycoming Engines, USA. The engine is a fuel injected, naturally aspirated, horizontally opposed, four cylinder, four stroke, spark ignited, air-cooled, wet sump engine incorporating provisions for front and rear mounted accessories. Engine provides Take-off and maximum continuous power of 119 kW (160 HP) at 2400 rpm and has a displacement of 5.916 dm³ (361 cu. in). The engine is equipped with the mechanical 'Precision Air Motive' fuel injection system RSA-5.

1.6.2 Aircraft VT-AMU Specific Information

Aircraft Model	Cessna 172 S
Aircraft S. No.	172S9492
Year of Manufacturer	2003
Name of Owner	Pioneer Flying Academy Pvt. Ltd
C of R	Certificate No. 3824 valid on date
C of A	Certificate No. 5033/2 valid subject to validity of ARC
C of A Validity	Subject to validity of ARC
A R C issued on	14.06.2021
ARC valid up to	13.06.2022
Aircraft Empty Weight & Empty weight CG	760 Kg, 1.01 meters (40.01 inch) aft of datum. CG = 23.99% MAC
Maximum Take-off weight	1159 Kg
Date of Aircraft weighment	08 Jul 2016
Max Usable Fuel	200.60 Kg
Max Payload with full fuel	169.57 Kg
Next Weighing due	N/A(CAR Series 'X', Part II, Section 2 Airworthiness)
Total Aircraft hours	9816.45 Hrs.
Last major inspection	400 Hrs./yearly servicing on 26.10.2021
List of Repairs carried out after last major inspection till date of incidence	Nil
Engine Type	Lycoming IO-360 L2A
Date of Overhaul	06 Nov 2020 (OH)
Engine Sl. No.	L-34022-51E
Date of Manufacture	Not available in records
Last major Inspection	Oil Change and Oil filter replacement at 9780:25 airframe Hrs. on 10.01.2022.
List of Repairs carried out after last major inspection till date of incidence	Nil
Total Engine Hours	1332:30 Hrs. since last overhaul
Aero mobile Licence	A-052/002-RLO (NR)
Propeller Type	McCauley
Propeller Sl. No	XA23014
Date of Manufacture	16.12.2013
Total Propeller Hours	1703:25 Hrs.

All concerned Airworthiness Directives, mandatory Service Bulletins and DGCA Mandatory Modifications on this aircraft and its engines were complied with as on date of event. The Last DGCA Mandatory Modification complied as per log book entry was DGCA/NEW MISC/13, at 9599:30 Hrs. on 23 Nov 2021.

Scrutiny of the Technical Log Book and Pilot Defect Report (PDR) register revealed no pending snag or no deferred maintenance on the aircraft prior to the accident flight. The last entry made in PDR register was of 04 Oct 2021. The corresponding rectification was done on 06 Oct 2021.

1.7 Meteorological Information

There is no Airport Meteorological Station or Airport Meteorological Office of Indian Meteorological Department at Aligarh Airport. Aerodrome has an ATC tower, but it is not manned. The weather is obtained from IMD website and the same is recorded in the weather register kept in Crew Complex. As per the procedure mentioned in the Para 7.5, Chapter 7 of the Training and Procedure Manual, the METARs and weather for neighboring airports has to be obtained from www.olbs.amss.delhi.gov.in. At the FTO, a register is maintained to physically record the weather so obtained. On 21 Jan 2022, weather obtained for Aligarh and Delhi at 0630 UTC i.e., 1200 local time (IST) was recorded and there was no further recording of weather for the day. Also, there was no record of weather of primary and *enroute* diversionary airfields namely Agra and Bareilly respectively.

The weather recorded at Aligarh is based on a visual assessment chart and determined by the CFI. On 21 Jan 2022, the CFI assessed the weather at 0630 UTC (1200 IST) and the same was found recorded in the weather register with the following details:

Weather assessed by CFI of M/s Pioneer Flying Academy Pvt. Ltd on 21 January 2022						
Location	Time	Wind	Visibility (m)	Weather	Temp (° C)	QNH
Aligarh	0630 UTC (1200 IST)	0°/0 kts	3500	Sky Clear Becoming 5000		
Delhi	0630 UTC (1200 IST)	260°/03kts	1100 Runway 28/2000 Runway 29/1800	Mist	15°	1014

Synoptic observations recorded at Aligarh (Part time Observatory, Aligarh) were also obtained from IMD New Delhi by the investigation team. The observations logged for Aligarh are tabulated below:

Actual Weather at Aligarh as recorded at Part Time Observatory, Aligarh for 21 January 2022			
Date & Time	Wind	Visibility (m)	Weather
21 Jan 22 0300 UTC	320/02 kts	Code 90 (00-49 m)	Generally cloudy sky, Rain / thundershowers likely at few places
21 Jan 22 1200 UTC	320/02 kts	Code 94 (1000 < 2000 m)	Generally cloudy sky, Rain / thundershowers likely at few places
22 Jan 22 0300 UTC	140/04 kts	Code 93 (500-999 m)	--

The forecast for west UP on 21 Jan 2022 was rain / thundershowers very likely at isolated places with a warning, dense fog very likely at isolated places and cold day conditions to prevail at isolated places.

The METAR obtained from IMD New Delhi for VIDP (**Palam**) and VILK (**Lucknow**) are placed below.

Actual Weather as recorded at IMD Delhi for 21 January 2022					
Time	Wind Direction	Visibility (m)	Weather	Temp (° C)	QNH
Location: VIDP (Palam)					
1100 UTC	170/04 kts	1200	BR FEW	18/14	1011
1130 UTC	130 / 05 kts	1200	BR FEW	17/13	1011
1200 UTC	130 / 05 kts	1200	BR FEW	17/13	1011
1230 UTC	200 / 04 kts	1200	BR FEW	16/13	1011
1300 UTC	150/ 02 kts	1200	BR FEW	15/14	1011
1330 UTC	240/03 kts	1500	BR FEW	15/14	1011
1400 UTC	240/03 kts	1200	BR FEW	15/14	1011
1430 UTC	000/00 kts	1500	BR FEW	14/13	1011
1300 UTC	000/00 kts	1500	BR FEW	14/13	1011
Location: VILK (Lucknow)					
0900 UTC	VRB 02 kts	1200	HZ NSC	20/13	1011
1000 UTC	VRB 02 kts	1500	HZ NSC	20/13	1011
1100 UTC	VRB 02 kts	1600	HZ NSC	19/14	1011
1200 UTC	240/03 kts	1600	HZ NSC	18/14	1011
1300 UTC	240/03 kts	1600	BR NSC	16/14	1011
1400 UTC	000/00 kts	1500	BR NSC	15/13	1011
1500 UTC	000/00 kts	1500	BR NSC	15/13	1011

The Synoptic observations obtained from IMD New Delhi were as follows:

Location	Time	Wind	Visibility (m)
VIAG (Agra)	0900 UTC	NNE/01 kts	1000-2000
	1200 UTC	CALM	1000-2000
Bareilly	0900 UTC	SE/01 kts	2000-4000
	1200 UTC	CALM	2000-4000

The FTO obtained weather at 0630 UTC (1200 IST). However, the aircraft took off after six and half hours, at 1305 UTC (1835 IST) for the Cross Country flight.

The weather obtained from IMD Delhi for Aligarh City on 21 Jan 22 at 1200 UTC (1730 IST) indicates visibility to be between 1000-2000 meters with surface wind 320/02 kt. The forecast for Aligarh city on 21 Jan 2022 was 'generally cloudy sky Rain/ thunder showers very likely at few places over area'. The general forecast for the State, all over western UP, was forecast with 'Rain / thundershowers very likely at isolated places with a warning dense fog very likely at isolated places and cold day conditions very likely at isolated places.'

The actual visibility as per the reported METARs from all neighboring airfields viz. Agra, Delhi, Bareilly, Allahabad, Gwalior and Lucknow at 1300 UTC (1830 IST) i.e. 05 minutes before the takeoff of the aircraft VT AMU was as follows:

Location	Visibility
Agra	0500 m Fog
Delhi	1500 m Mist
Bareilly	3000 m Mist
Allahabad	2500 m Mist
Gwalior	0500 m Fog
Lucknow	1600 m Mist

1.8 Aids to Navigation

There are no approach aids at Aligarh Airport. The Airfield has an off base VOR and PAPI installation is under progress. The aircraft was fitted with Bendix King KLN 94 GPS system in which the pilots can feed the daily navigation routes with way points. However, this system does not retain any flight information for further analysis. An Auto pilot system was also installed in the aircraft; however, the operator had disabled the system as it is not a mandatory requirement for imparting flying training. All Navigational equipment available on aircraft were serviceable and VOR at Aligarh was serviceable and available.

1.9 Communications

There is a VHF RT set available at the FTO, however, there are no laid down procedures (SOP) for maintaining two way RT communications between aircraft and ground. On the day of the accident no two-way RT communication was being maintained between aircraft and ground during cross country flight.

1.10 Aerodrome Information

There is an ATC tower available at Aligarh airport. A representative from AAI is also available; however, the ATC is not operational. Aligarh Airport is an un-controlled airfield with no ILS, PAPI, Met and ATC facilities. The Airport is having a beacon, Wind sock and Signaling Square. M/s Pioneer Flying Academy along with Ambition Flying Club and Chetak Flying Academy are conducting training operations from the airport. The Runway is operational from both ends i.e. Runway 29 and Runway 11. The Runway is 4000 ft. in length and its coordinates are Lat: 27° 52'5" N, Long: 78° 8'34" E.

1.11 Flight Recorders

As per the prevailing DGCA Civil Aviation Requirements, VT-AMU was not required to be fitted with Cockpit Voice Recorder (CVR) or Digital Flight Data Recorder (DFDR) and therefore, none was installed on the aircraft. However, Bendix King KLN 94 GPS system was fitted on the aircraft had navigation feature. The system can be fed with way points as per the flight plan. However, the system does not record any parameter related to the navigation route. The SD data card facilitates the local area maps.

1.12 Wreckage and impact information

The aircraft sustained following damages due to accident

- Right and left wing tip fully damaged
- Vertical stabilizer and rudder damaged
- Engine mount damaged
- Propeller damaged
- Firewall damaged
- Nose landing gear damaged
- Front plexi-glass cracked
- Right wing Centre section damaged
- LH and RH windows damaged
- Nose portion severely



Figure 2 (left to right): a-Damaged Aircraft upside Down; b-Damaged Nose Portion; c-Bent Starboard wing; d-Bent Ventral Fin due to weight; e-Aircraft Left Flap extended position; f-Aircraft Right Flap extended position g-Flap Selector Switch in 100 Position; h-Throttle in Full Power Position

The aircraft was resting in upside down condition with the ventral fin taking the load during the somersault. The right wing took impact during the somersault resulting in slight bending inwards. The engine cowling was completely damaged and separated from the engine.

The nose undercarriage strut took the impact while passing over the wedge during the controlled descent and bent inwards before toppling of the aircraft. The flaps were in extended position on both the wings. The leading edge of the port wing housing, the anti-collision lights were found impacted and damaged. The starboard wing was found with an inward bent.

The Flap selector switch was in 100 position corresponding to the extended flap position. The throttle was fully in and in full power position corroborating with the PIC's statement that a "go-around" maneuver was attempted on impact with the ground.

Impact information

The aircraft crash landed at a distance of 649 meters away from Runway 11 end and 1340 meters away from Runway 29 end in a paddy field. The exact crash location of the aircraft was 27°52'07.0"N, 78°08'36.0"E. The aircraft was in toppled condition (Inverted position).

At the crash site it was observed that the aircraft created an inclined furrow over the mustard



Figure 3: Aircraft Crash Site with distances marked (Pic Courtesy: Google Earth)



Figure 4: Aircraft Crash Site with distances marked

field, chopping of the plants with a gradient in a gradual manner. The width of the furrow created by the aircraft was 36 ft. which is akin to the wing span of the aircraft. The height of the mustard plants at the entry point of the field was 05 ft. approximately and the minimum height of the plants cut by the aircraft was 02 ft. The main wheels and the engine propeller created tracks on the field up to a distance of 160 feet. The tell-tale signs of chopping of the mustard plants of 05 ft. height to 02 ft. height over a distance of 33 ft. created by the aircraft indicates that the aircraft had descended in a shallow attitude, touched down on the field and rolled approximately 160 ft.

before coming to a halt after somersaulting as the nose wheel getting obstructed over a wedge on the ground. The whole wreckage was found in an inverted position at a distance of approximately 198 ft. from the point of entry into the mustard field.

1.13 Medical and Pathological Information

The Flight Instructor had undergone breath analyzer (BA) test at 0726 UTC, 05:39 hours before operating the first flight at 1305 UTC. The Student Pilot underwent BA test at 0740 UTC before proceeding for the Night cross-country flight at 1305 UTC. The gap between BA test and flying was 5:25hrs. The gap between BA test and Flying was too large for both the crew. BA test results of both the crew were negative. However, the post-accident BA test and Medical Examination of both the crew was not carried out.

1.14 Fire

There were no signs of fire on the aircraft wreckage.

1.15 Survival aspects

The crash site was in the vicinity of airport and information about the aircraft crash was received from the crew of the aircraft through mobile call after they came out of the crashed aircraft. Both Pilots were able to come out of the aircraft without any injuries.

ELT was also activated as a result of impact during the accident. ELT was detected by INMCC at 14:13 UTC and the same was transmitted under reference 'INMCC 83616' at 14:35 UTC on 21 Jan 2022 to all concerned agencies.

1.16 Tests and Research

The fuel and oil samples were collected by the investigation team. The samples of fuel and oil were sent to DGCA lab at New Delhi to determine the samples specification. As per Lab Test Report, the fuel sample passed the specification test.

1.17 Organizational and Management Information

M/s Pioneer Flying Academy Pvt. Ltd is a DGCA approved flying training organization (FTO) situated at Aligarh, Uttar Pradesh. The Flying Club has been operational since 2008 with approval from DGCA. The FTO approval was re-validated by DGCA vide approval no 05/2016 on 14 Mar 2016 and was valid till 18 Feb 2021. The FTO approval was last renewed on 19 Feb 2021 before the accident and was valid up to 18 Feb 2023. The organization is permitted to provide training services for issue of PPL, CPL, IR, AFIR, FIR and extension of single engine, RPAS training on Airplanes as per scope of approval. It has a fleet of Cessna 172S, Cessna 152 aircraft (Total 05 aircraft) for carrying out its day-to-day training operations.

Accountable Manager has been nominated by the FTO as per DGCA requirements. He reports to the Board of Directors and is responsible for management and operation of organization related activities. He is assisted by a team of professionals. Safety & Quality Manager, Head of Training and Aircraft Maintenance Manager extend their support to the Accountable Manager. Aircraft

Maintenance Manager is being assisted by Continuous Airworthiness Manager and Maintenance Manager.

M/s Pioneer Flying Academy Pvt. Ltd operates from Aligarh Airport, an un-controlled airfield with no ILS, PAPI, Met and ATC facilities. The TPM approved by DGCA is available with Pioneer Flying Academy Pvt. Ltd which is being used for conduct of flying training.

No CCTV have been installed in the tarmac area to monitor the ongoing activities of FTO. CCTV will be of great help from the safety and security point of view and will aid in getting real time information in the time of need.

1.17.1 Training Procedure Manual

Para 9.4 Chapter 9 of *ibid* TPM stipulates the weather minima i.e. different minimum visibility criterion for local flying and cross country flying for instructors as follows:

Flight Activity	Visibility	Clouds (FT)	Winds (Knots)	Cross wind Component (knots)	Tail Wind (knots)
VFR Single Engine Local	5000M	1500FT	25	10-15	5
VFR Single Engine Cross Country	3000M	1000FT	20	10-15	20

Para 7.5 of Chapter 7 of the TPM refers to Flying Grants Circular 02/2005 for **Flying under special VFR and low visibility** and lays down the following criteria for undertaking flying operations in visibility less than 5 Km.

*“When the **visibility is less than 05 km**, following criteria shall be followed for conducting flying training operations by flying clubs at **controlled /uncontrolled air fields in coordination with ATC authorities available at the airports where the flying club is situated:***

- (a) One aircraft – When the visibility is not less than 1.5 Km with qualified flight instructor/AFI on board holding instrument rating.*
- (b) Two aircraft – when the visibility is not less than 3.5 Km, only one solo aircraft in circuit may be authorized by CFI/Dy. CFI only, the other aircraft shall be flown with QFI/AFI holding valid IR.*
- (c) All Aircraft - when the visibility is 05 Km or more for all dual/solo flying.*

Met report for visibility and cloud cover have to be obtained from www.olbs.amss.delhi.gov.in. Minima for VFR are 05 Km visibility, 1000 ft. vertical and 1500 m Horizontal from the clouds.

1.17.2 SOP for Night Cross Country Flight

In Jul 2015, the Academy requested DGCA for permission to carry out Night Flying at Aligarh. DGCA examined the proposal and after carrying out inspection of facilities available at Aligarh airport, granted permission to carry out Night Flying at Aligarh airport¹ under same terms & conditions (SOP) as stipulated to Ambition Flying Club Pvt. Ltd².

¹ vide its letter AV 22011/19/2006-FG dated 07 September 2015

² vide letter AV.22011/11/2007-FG dated 20 May 2015

The terms and conditions stipulated in *ibid* letter of approval for night flying are as follows:

- (i) The approval of flying training institute remains valid in terms of the provision of CAR Sections 7, Series D, Part 1.
- (ii) The night flying training shall be carried out as per the standard operating procedure submitted to this office.
- (iii) The goose neck flares to be used by the flying training institute in place of fixed light fitting at your flying training institutes for runway, taxi way and apron lighting as laid down in CAR Section 4, Series B, Part 1.
- (iv) All observation around the vicinity of aerodrome should be lighted as per the provision of CAR Section 4, Series B, Part 1.
- (v) Wind sock and signal square should be lighted as per the provision of CAR Section 4 Series B Part 1.
- (vi) Aerodrome beacon should be available and serviceable.
- (vii) Nearest ATC shall be informed before the commencement and after the termination of night flying training activities.
- (viii) The flying training institute shall ensure provision of adequate safety service such as firefighting equipment medical aids etc.
- (ix) Night flying operations shall be strictly carried out in the presence and direct supervision of Chief Flight Instructor/ Pilot Instructor In charge.
- (x) Before release of trainee pilot for night solo, the trainee shall have undertaken a minimum one hour or more night flying training to the satisfaction of CFI.
- (xi) Adequate watch ward arrangement shall be deployed to keep the operations are clear of stray animal/unauthorized persons.
- (xii) Signaling lamp should be available when night flying training is under progress.
- (xiii) Positive two-way communication between aircraft and ground station shall be made available.
- (xiv) Local fire service provider shall be intimated before commencement of night flying training.
- (xv) SOP may be reviewed accordingly.

DGCA also directed M/s Pioneer Flying Academy Pvt. Ltd to update SOPs on night flying in Training & Procedures Manual for approval during re-certification. However, the FTO did not take action as per directions of DGCA.

1.18 Additional Information

1.18.1 VFR criteria as per DGCA Civil Aviation Requirements

As per DGCA CAR Section 9, Series C, Part 1 Para 4, except when a clearance is obtained from an Air Traffic Control unit, VFR flights shall not take off or land at an aerodrome within a control zone or enter the aerodrome traffic zone or traffic pattern when

- (i) the cloud ceiling is less than 450 M (1500 ft.) or
- (ii) the ground visibility is less than 5 KM

VFR flights shall not be operated between 20 min after sunset to 20 min before sunrise, except when exempted by air traffic control. Local flights and training flights of flying club aircraft may be cleared by air traffic control and operated during night in Visual Meteorological conditions. Here it is very clearly mentioned that local flight is a flight wholly conducted in the immediate vicinity of an aerodrome³.

Para 4 of CAR Section 9, Series C, Part 1 lays down provisions of Visual Flight Rules and does not mention anything about Local Flights or Training Flights. Note 3 of Para 2.2.1 of CAR allows for Local Flights and Training Flights of Flying Clubs to be operated in night during Visual Meteorological Conditions with clearance from ATC and states that:

“Local flights as may be exempted by Air Traffic Control and such training flights of Flying Club aircraft as may be cleared by Air Traffic Control may be operated during night in Visual Meteorological Conditions.”

1.18.2 Flying Grants Advisory Circular 02 of 2005 and DGCA Flying Training Circular 04/2020

DGCA’s Flying Grants Advisory Circular 02 of 2005⁴ for “Flying under Special VFR by Flying Clubs/Training Institutes when Visibility is less than 5 Km” stipulates that:

Keeping in view the flying training operations carried out by Flying Clubs/Training Institutes approved by DGCA, it has been decided that when the visibility is less than 5 Km, the following criteria shall be followed for conducting flying training operations by Flying Clubs/Training institutes at controlled / uncontrolled air fields in co-ordination with ATC authorities available at the Airports where the Flying clubs/Training Institute is situated:

(a)	One Aircraft	<i>When visibility is not less than 1.5 km, with a Qualified Flight instructor/Assistant Flight Instructor on board holding valid Instrument Rating.</i>
(b)	Two Aircraft	<i>When visibility is not less than 3.5 km, only one solo aircraft in circuit may be authorised by CFI/FI only and the other aircraft shall be flown with a QFI /AFI holding valid Instrument Rating.</i>
(c)	All Aircraft	<i>When the visibility is 5 Km or more for all Dual / Solo flying.</i>

³ Aircraft Manual (India) Volume I page 113, Schedule IV, Rules of Air

⁴ Issued Vide AV22031/2/2005-FG dated 12 April 2005

The circular also mentions that *the above criteria shall be applicable for all Day Flying training operations conducted by Flying clubs/Training Institutes at the discretion of CFI/FII who should be physically present during all such flying operations.*

DGCA had since long been referring to the Flying Grants Circular 02/2005 to approve Flying Operations below 05 Km visibility undertaken by FTOs. AAIB in its Investigation Report of an earlier accident that happened in 2017 had recommended that Flying Grants Circular 02/2005 be revised so as to remove ambiguity in requirements contained in the said circular vis-à-vis requirements contained in other DGCA CARs. DGCA in its response to the recommendation had communicated to AAIB vide e-mail dated 04.06.2021 that the Flying Grant Circular was not valid and has been cancelled. However, references to the Flying Grants Circular 02/2005, continue to be in place in the TPMs approved by DGCA not only for M/s Pioneer Flying Academy Pvt. Ltd, but also other FTOs whose TPMs were studied during various AAIB Investigations.

Further, as per Para 5(E) of DGCA Circular 04/2020 dated 31 Dec 2020 for Conduct of Cross-Country flights by Flying Training Organization for issue of CPL '*during the entire cross-country, two-way radio contact must be maintained with the base of origin or other en route Air Traffic Services available along the route.*'

1.19 Useful or Effective Investigation Techniques

Nil

2. ANALYSIS

2.1 Serviceability of Aircraft

The aircraft had current and valid Certificate of Registration, Certificate of Airworthiness and Aero Mobile License as per applicable regulation on the day of accident. The aircraft was weighed on 02/07/2016 and duly approved by DGCA.

Aircraft had logged 9816:45 Hrs. till the date of accident. Last scheduled inspection carried out on the aircraft was Inspection Operation 5 (400 Hrs./01 year) at 9504:20 airframe hours on 26 Oct 2021 as per approved Aircraft Maintenance Schedule and the aircraft had logged 36:20 Hrs. since the last CRS (scheduled inspection) was issued. The aircraft engine had logged 1332:30 Hrs. since last overhaul. Last scheduled inspection carried out on the engine was Oil Change and Oil filter replacement at 9780:25 Hrs. airframe hours on 10 January 2022. The propeller installed on the aircraft had logged 1703:25 Hrs. as on date of accident.

No snag or defect was reported in any of the flights preceding the accident flight on the day of accident. The crew did not reveal any technical problem with the aircraft in their disposition or transmitted any distress signal to any ATC during any time of the flight.

Serviceability of the aircraft was not a causative or contributory factor to the accident.

2.2 Operations

2.2.1 Conditions for undertaking the flight

The flight was operated to conduct 120 NM VFR Night Cross Country Test for the Trainee Pilot as per DGCA laid down requirements and Aircraft Rules 1937. The prevailing visibility at the time of 'take off' was well below the required VFR criteria of 5 KM. This was a Night Cross Country Navigation Test to be flown by the Trainee Pilot in VMC/VFR conditions. The visibility determined by the CFI as per their visibility chart itself was 3.5 KM, whereas the actual visibility reported by various meteorological agencies *en route* was much below. *Thus, the conditions were not suitable for undertaking the flight. Though the Pilot in Command is qualified with Instrument Rating and QFI qualifications, the objective of the flight was to test the trainee pilot for Night Cross country and he was not supposed to undertake the flight for the Trainee Pilot by Night in the prevailing visibility conditions.*

2.2.2 Operational Factors

i. Night Flying SOP

While granting approval to undertake Night Flying Cross Country, DGCA had instructed M/s Pioneer Flying Academy Pvt. Ltd to incorporate NF SOP in its TPM. The organisation failed to produce the Night Flying SOP to the investigation team. The Deputy CFI & Trainee Pilot were also not familiar with Night Flying SOP. The PIC stated that Night Flying SOP had not been incorporated in the TPM. *This was a clear non-compliance of instructions issued by DGCA.*

ii. Filing of Flight Plan

The Night Flying Cross Country Flight Plan was filed for a daytime departure of 1205 UTC, whereas the actual plan was to get airborne by night at 1305 UTC. The information that this cross-country flight is actually to be undertaken by night was not correctly shared with the approving authority. *The FTO employed the same methodology to obtain clearance for the two other NF cross country flights of VT-NNN & VT-IGH.*

Frequent & adhoc changes in Flight Plan

The route indicated in the flight plan is Aligarh- 2940N/07912E- Aligarh. This route is not amongst the ten routes listed in the DGCA approved TPM (Chapter 9, para 9.6). As verified from ADC, at 1123 UTC time, the route was changed to Aligarh-Moradabad-Aligarh by the FTO telephonically. At 1223 UTC, it was again changed to 2940N/07912E and one minute later at 1224 UTC, it was further changed to Aligarh-Ram Nagar-Aligarh, by the FTO for which ADC was issued at 1227 UTC. The route co-ordinates 2940N/07912E, as plotted on a half million map correspond to a point about 10 nm on radial 280 (West) of Ranikhet. Incidentally, Ranikhet is in the hills with an elevation of 1913m (6276 ft) and the filed flight plan altitude was for FL 40. *This indicated lack of planning to cater for minimum safety altitude. Frequent changes in flight plan just before taking off reflected poor planning and afforded no preparation time to the crew.*

iii. Flight Rules

The flight plan filed and approved for VT-AMU was under IFR Flight rules. DGCA Civil Aviation Requirements Section 9, Series C, Part 1 Para 4 stipulates local flights and training flights of flying club aircraft may be cleared by air traffic control and operated during night in Visual Meteorological conditions (VMC). However, in this instance, the flight plan was approved to be flown under IFR. Though the aircraft was having elementary navigation equipment onboard, the Aligarh aerodrome was not having any navigational aids for landing the aircraft at the airfield in IFR. *DGCA's Circular 02/2005 for conduct of Night cross country flights (now stands withdrawn), was ambiguous and allowed discretionary interpretation by the individual operators/FTO.*

iv. Validity of Air Defence Clearance

For ease of operations, AAI had requested⁵ IAF for a change in validity of ADC timings. The post ETD validity was thus enhanced from 45 minutes to 03 hrs⁶. Therefore, the ADC clearance granted for a 1200 UTC for VT-AMU was valid till 1500 UTC. However, during this period, the environment changed from Day to Night and flight conditions from VFR to IFR. The FTO took advantage of this flexibility granted for ease of operations, compromising flight safety.

v. Different Minimum Visibility Criteria

Para 9.4 Chapter 9 of TPM of M/s Pioneer Flying Academy Pvt. Ltd stipulates different minimum visibility criterion for local flying and cross country flying. During Cross Country flying, when the aircraft lands back at parent base, minimum visibility has been relaxed from 05 KM to 03 KM, which is not justified. Circuit approach and landing during local flying or on return after a cross country flight would pose the same challenges for recovery of the aircraft. Moreover, during cross country, due to longer flight duration and flight distances, the crew fatigue levels would be higher and also the aircraft is not readily contactable and is at considerable distance from the airfield. Therefore, the minimum visibility requirements should at least be the same, if not more stringent. It is pertinent to note that due to absence of an operational ATC and communication aids, it would be near impossible to inform or recall an aircraft on cross country navigation flight once the weather deteriorates.

vi. DGCA Flying Training Circular 04/2020

As per Para 5(E) of DGCA Circular 04/2020 dated 31 Dec 2020 for Conduct of Cross-Country flights by Flying Training Organization for issue of CPL 'during the entire cross-country, two-way radio contact must be maintained with the base of origin or other en route Air Traffic Services available along the route.' *However, VT-AMU was neither in RT contact with base nor with any en route ATC. Hence the flight was not in compliance with the stipulations of DGCA circular.*

vii. Diversions Airfields

Agra is the primary diversion for Aligarh and the ATC, Agra was informed about Night Flying. The CFI stated that Agra Visibility was 2.5 km while the Deputy CFI stated that it was 1.5 km. However, as per Agra METAR of 1300 UTC visibility was only 500 meters in Fog, well below the

⁵ vide letter No AAI/ATM/OPS/ 30-212-2014 dated 14 Aug 2021

⁶ vide Air HQ/S16192/1/OPSADCR(ADII) BM-II(PC-I) dated 17 Sep 2021

required minima. Thus, Agra was not available as a diversion due to poor visibility. The FTO decided to treat Bareilly as a diversionary airfield. However, Bareilly watch hours are only from sunrise to sunset and on as required basis, but the CFI did not inform COO/ATC Bareilly to be available as a diversionary airfield for Aligarh. *Therefore, practically, three aircraft got airborne for NF cross country with no diversion plan available for any contingencies.*

viii. Radar Cover

As per Chapter 9 Para 9.2 of TPM, 'FTO aircraft shall always be under Radar Control Unit'. VT-AMU was equipped with a Bendix KT 76 C Mode A&C transponder, which would display aircraft identification, altitude and ground speed on the controlling Radar's screen. The Investigation Team requested various agencies to check if VT-AMU was being tracked on any civil or military radar on 21 Jan 22 night. While none of the civil radars in the vicinity reported any information about its track, VT-AMU was tracked on radar through IFF (Secondary Radar) by IAF for only initial 18 minutes after take-off from Aligarh from 1256 UTC to 1314 UTC before the signal faded out. This could be either due to flying at low altitude or less power output of the transponder. *Therefore, VT-AMU was not in R/T contact with any Ground Agency, which was required as per SOP in TPM.*

ix. Instrument Flying Procedure

Both Pilots stated that on finals when they entered a thick layer of smoke/fog & lost visual references, instead of focusing on the instruments crew tried to acquire the runway visually. In all probability, this resulted in getting disoriented. *The crew did not switch over to instruments while flying in IMC conditions as per standard flying practice.*

x. Missed Approach Procedure & Go Around Actions

In actual conditions, on initiating a go around & applying full thrust, instead of focusing on instruments & following the missed approach procedure, the PIC continuously tried to look for the runway instead of following the GA procedure and was totally focused on trying to acquire the runway lights. *The PIC of the aircraft did not carry out the Go-around & Missed Approach procedure as given in SOPs/TPM.*

xi. Physiological Factors: Disorientation

Based on the statements given by both the crew, they got disoriented during the go around. It seems that they suffered from Somatogravic⁷ illusion. On initiating a go around, sudden linear acceleration due to rapid increase of thrust, will result in a climbing, head tilting back, nose up sensation. Lack of visual cues at night and/or in actual conditions, will aggravate this illusion and would lead to automatic physiological somatic reaction to push the controls forward and start a descent. However, a fast large reaction of control input will further increase the climbing sensation leading to the illusion of tumbling backwards. This would tempt the pilot to further lower the nose thus aggravating the situation and resulting in a rapid descent towards the ground.

Somatogravic illusion is a form of disorientation which stems from the combination and interaction between the posterior & anterior canals to detect the sensation of pitch.

xii. CFIT

Based on the statements given by the crew, the Go Around was initiated in actual weather conditions at about 200 to 300 feet AGL. *There is a high possibility of Somatogravic disorientation coupled with inadvertent banking to the right while being engrossed in looking for the runway lights, thus leading to total loss of situational awareness.* The aircraft lost direction in an unplanned turn to the right by about 104 degrees, from the approach RW heading of 290 to crash landing course of 034. On descending through the thick layer of fog & acquiring visual cues due to ambient lighting or other sources viz. lighted objects, the crew apparently, regained his orientation. He thus managed to roll wings level; eased back on the control column & raised the nose. However, by this time, they had already lost height & entered the mustard field in a nose up tail down attitude leading to impact with the ground.

xiii. Post-Accident Breath Analyzer

As per DGCA CAR Section 5, Series F, Part III, para10 post-accident medical is mandatory. *The FTO, failed to ensure that a post-accident medical examination was carried out for both crew.*

xiv. Applicability of DGCA Circular 02/2005

AAIB in its Investigation Report of an earlier accident that happened in 2017 had recommended that Flying Grants Circular 02/2005 be revised so as to remove ambiguity in requirements contained in the said circular vis-à-vis requirements contained in other DGCA CARs. DGCA vide their email dated 04.06.2021 had stated that the said circular was not valid and has been cancelled. The Investigation team however, observed references to this circular not only in TPM of M/s Pioneer Flying Academy Pvt. Ltd, but also in various other FTOs. A Public Notice to delete the said circular has finally been issued by DGCA in May 2023.

The wrong reference to a deleted circular escaping scrutiny by DGCA during approvals and subsequent renewals on multiple occasions involving multiple operators indicates that thorough scrutiny of manuals is not being carried out. The error has escaped detection since no standard template for a model TPM has been issued by DGCA for guidance to operators or its inspectors.

Notwithstanding the above, TPMs of various FTOs including M/s Pioneer Flying Academy Pvt. Ltd continue to be in place having references from the above mentioned DGCA Circular. Investigation Team observed that

- Special VFR is applicable to controlled aerodromes; however, DGCA Circular allowed flying below VFR conditions at uncontrolled airfields in coordination with ATC. *The ambiguity in instructions has allowed FTO to undertake special VFR operations by night at an uncontrolled Airfield in visibility conditions below 5 km at Aligarh.*
- DGCA Circular allowed relaxation for training flying in visibility conditions below 5 KM by day.; however, the TPM of M/s Pioneer Flying Academy Pvt. Ltd approved by DGCA, quoted the conditions laid down without including the condition regarding day flying, thereby using the same for night flying. *Thus, a TPM not aligned with the DGCA Circular was approved by DGCA and also used by the FTO wrongly for night flying.*

- The circular further states that if the visibility is between 3.5 to 5.0 KM not more than two aircraft may fly. In the instant case, VT-AMU was the third aircraft to take off as two aircraft were already in the air. *Thus, the third aircraft took off in violation to the stipulated provisions.*

The references to Flying Grants Circular 02/2005 has existed in the TPMs since long time and Investigation team made enquiries to DGCA to understand as to when and why this circular was deleted or if these requirements have been incorporated in any other regulations, however, information was not provided despite repeated enquiries by Investigation Team. Absence of a valid circular or regulation providing guidelines for flying operations by FTOs below VFR creates a grey area in the regulations which puts in question the validity of approval granted by DGCA to TPMs of FTO.

2.2.3 Weather

i. SOP as per TPM

As per the procedure mentioned in the Para 7.5, Chapter 7 of the Training and Procedure Manual, the FTO is required to obtain weather from www.olbs.amss.delhi.gov.in and record the same in the weather register. On 21 Jan 2022, *this procedure was not followed*. Only 0600 UTC weather for Agra & Delhi was recorded in the register. Thereafter, there was no record of any weather report till the commencement of Night Flying at 1300 UTC or even thereafter. *Hence, this is a non-adherence to the SOP stipulated in the TPM.*

ii. DGCA FTC 04 of 2020

Para 5.2 sub-para 4 of DGCA issued Flying Training Circular (FTC) 04 of 2020 dated 31 Dec 2020 states the following:

“Consideration of prevailing weather conditions *en route*, to the extent that such information is available from local or other sources, to be evaluated taking into account a combination of the following information:

- (i) Local and enroute observations;
- (ii) Regional weather information (e.g. significant weather charts); and
- (iii) Terminal area forecast (TAF)/meteorological aerodrome report (METAR) of the nearest aerodromes; and”

However, the FTO did not check or record the actual weather & prevailing weather trend of reducing visibility as stipulated above by DGCA FTC 04 of 2020.

At 1300 UTC, the time of commencement of night flying, the CFI of FTO visually assessed local visibility as about 3.5 KM. He stated that he had checked Agra & Bareilly weather and the visibility was 2.5 KM & 04 KM respectively. However, it is pertinent to note that as per Agra METAR of the same time, Agra visibility was only 500 meters in Fog with reducing visibility trend. Similarly, Bareilly 1330 UTC METAR reported 3 km & at 1400 reported visibility reduced to 02 KM. Further, neither the visual assessment nor the weather reports of Agra and Bareilly were recorded in the Weather Register maintained at FTO.

On return from the Night Cross Country Flight, both the pilots reported that on final approach they lost visual contact with the Runway because of a layer of smoke. They decided to continue with the approach. On entering the thick layer, the visibility reduced to more or less zero. As per the trainee it was pitch dark & he could not see anything. It is thus, very likely that at the time of approach to land the actual visibility was very poor. It was low enough for the runway not to be visible from about 200 ft.

iii. Winter Weather Pattern

The expected weather pattern for Aligarh & surrounding area in the month of January is generally poor visibility conditions with prevalence of fog, mist or smoke haze in late evening/night hours. On the night of 21 January 2022, visibility conditions were not good as is evident from the METARs of all neighboring airfields & the statement of both pilots of VT-AMU.

iv. Visibility Assessment for Night Flying by other FTOs at Aligarh

It is pertinent to note that on 21 Jan 2022 evening, Chetak FTO assessed local visibility as 1.5 KM and called off Night Flying. Similarly, Ambition FTO assessed same visibility with reducing trend & called off Night Flying.

However, M/s Pioneer Flying Academy Pvt. Ltd continued with night flying despite adverse weather conditions. The FTO did not appreciate the consequences of getting airborne in poor visibility conditions, which was well below the authorized minima. *The very tangible threat and consequences of poor visibility due to fog were ignored, which led to this accident.*

2.2.4 Aerodrome

2.2.4.1 Air Traffic Control

Aligarh Airfield has an ATC building and associated infrastructure. *However, it is not manned and ATC is not operational.* There are 34 Flying Training Organisation as on date (as per DGCA website), around 19 Flying Academies are operating from uncontrolled airports. The manning of ATC would ensure availability of controlled environment for flying at the aerodrome.

2.2.4.2 Communication

As there is no operational ATC, there is no communication. The aircraft have a VHF RT set, which is used for communication with each other. *The FTO has a ground installed VHF RT Set for monitoring purpose, but there is no SOP for manning this RT Set to ensure two-way communication with airborne aircraft.* The detailed procedure for manning of RT set with clear cut duties and responsibilities of persons manning RT set is required to be formulated by FTO to rule out any ambiguity /confusion during RT handling.

2.2.4.3 NAV Aids

There are no navigation or approach aids on the airfield. Airfield is on Radial 320 and 2.2 NM from VOR Aligarh. The VOR was functional on the day of accident.

2.2.4.4 Aerodrome Information

Aligarh Aerodrome is an un-controlled airfield with no ILS, PAPI, Met and ATC facilities. The Airport has a Beacon, Wind Sock and Signal Square. M/s Pioneer Flying Academy, Ambition Flying Club and Chetak Flying Academy conduct flying training operations from this airfield. The 4000 feet long runway is operational from both ends RW 29 & RW 11. There is no instrument aid or any other laid down approach procedure. All the available aids at the aerodrome were serviceable.

2.2.5 Circumstances leading to Accident

Aligarh normally experiences moderate weather pattern typical of Indian climatology and Flying activities are frequently affected by poor visibility due to fog in winters. On 21 Jan 2022, flying activity started at Aligarh in the morning at 0710 UTC when the first flight took off.

During the day time seven flights were undertaken uneventfully, however, as the day progressed, the visibility started dropping below VMC. The visibility conditions were not good as is evident from the METAR of all neighboring airfields. In spite of visibility reducing below VMC conditions, the FTO planned three cross country flights by night. VT-AMU was the third aircraft to take off for NF Cross Country to be flown by the trainee pilot.

As per the records available with Investigation Team, the weather at time 1300 UTC was conducive to setting of Fog and visibility was well below the VFR minima. The Crew started engines around 1255 UTC & the aircraft took off for NF cross country at about 1305 UTC. After crossing Moradabad, as they were unable to make RT contact with AF Station Hindan, they discontinued the Navigation and flew back to Aligarh. Though the crew had stated that they could spot all check points *en route*, the visibility was less than 2000 m due to which the other two co-located flying academies cancelled their Night Flying. As per the filed flight plan, the cross country flight was supposed to be for 03 hrs duration, however, the crew returned to base around 1430 UTC, and were overhead runway 29 at around 1440 UTC which was about 01:35 hrs of flying.

On return they established visual contact with the RW 29 & turned downwind for a circuit. On finals, due to a layer of smoke/cloud/fog, they lost visual contact with runway, but decided to continue approach. On entering this layer, at about 300 ft., they realized that it was pitch dark with visibility close to zero; hence they initiated a Go Around. In the process, both pilots got disoriented & within a matter of seconds the aircraft crashed.

2.3 Human Factors

M/s Pioneer Flying Academy Pvt. Ltd does not have any scientific resources to determine the visibility. The CFI had assessed the visibility at 3.5 km and expected to be improving to 5 Km based on the local visibility chart. However, the weather from nearby primary and secondary diversionary airfields was not checked, which indicated lack of planning and co-ordination.

The crew took off for the Night cross country flight in marginal weather conditions under pressure to complete the flying syllabus for the trainee pilot. During the flight the crew could not identify the impending weather conditions and failed to focus on instruments rather than

looking for visual cues / runway aids for landing. The crew got disoriented due to lack of situational awareness and failed to go around on missed approach. The crew attempted landing based on visual cues and crashed.

2.4 Survivability

Since, both pilots involved in the accident survived with minor injury, the accident was survivable. However, the off base accident plan was not implemented by the FTO. The PIC himself made contact with the FTO for initiating rescue operations.

3. CONCLUSION

On the night of 21 Jan 2022, in VT-AMU, the Deputy CFI of M/s Pioneer Flying Academy Pvt. Ltd. with the student pilot onboard got airborne for a Night Cross Country Flight. The flight was operated to conduct 120 NM VFR Night Cross Country Test for the Trainee Pilot as a part of his CPL training requirements. This was a Night Cross Country Navigation Test to be flown by the Trainee Pilot in VFR conditions. However, the prevailing visibility at the time of takeoff was well below the required VFR minimum criteria of 5 KM.

On return, during the circuit to land, on finals at about 300 ft, the aircraft entered a thick layer of fog and the pilots lost visibility of the runway. While initiating a go round at night, in actual weather conditions with no visual references, both pilots got disorientated. This resulted in a climbing, head tilting back, aircraft nose up sensation. As an automatic reaction, the controls were pushed forward and the aircraft started descending. Inadvertent bank to the right further complicated the issue. In fog, at low altitudes, this was a fatally dangerous situation as the reaction time after regaining orientation was very limited and as a result the aircraft crashed into the ground.

Somatogravic Disorientation followed by complete loss of situational awareness led to Controlled Flight into Terrain (CFIT), which was the immediate cause of the accident. Non-adherence of DGCA laid down rules, non-adherence to TPM procedures and SOPs and lack of supervision were contributory factors.

3.1 Findings

1. The aircraft was fully serviceable and airworthy to undertake the intended flight.
2. The Pilot in Command was trained and competent to undertake the Night cross country training flight.
3. The prevailing weather conditions were not suitable for undertaking the flight by the Trainee Pilot.
4. M/s Pioneer Flying Academy Pvt. Ltd has not incorporated the Night Flying SOP in its TPM as instructed by DGCA.

5. M/s Pioneer Flying Academy Pvt. Ltd filed the Flight Plan for day, whereas the intended flight was to be flown by night. The controlling agency approved clearance for day cross country which was actually planned to be flown by night.
6. While special VFR is applicable to controlled aerodromes, DGCA Circular allowed flying below VFR conditions at uncontrolled airfields in coordination with ATC. The ambiguity in instructions has allowed FTO to undertake special VFR operations by night at an uncontrolled Airfield in visibility conditions below 5 km at Aligarh.
7. The flight was an infringement of Para 5.2(4) & Para 5.3 (E) of DGCA FTC 04 of 2020 for conduct of Cross Country Flying training, as:
 - (a) The crew failed to check and record the actual weather and weather trends of reducing visibility in the area of operations.
 - (b) During the entire cross-country, VT-AMU was neither in RT contact with base nor with any *en route* ATC.
8. Three aircraft got airborne for NF from Aligarh without any diversionary airfields being available for any contingencies; which was not in accordance to the approved SOP for conduct of flying operations on the airfield.
9. VT-AMU was neither in RT contact with base nor with any en route ATC and the flight was not in compliance with the stipulations of DGCA's circular.
10. The crew did not switch over to instruments on entering actual weather conditions.
11. The crew did not adhere to the go around & missed approach SOPs.
12. M/s Pioneer Flying Academy Pvt. Ltd did not ensure that a post-accident medical examination of both pilots is undertaken.
13. There was no CCTV camera installed anywhere on the FTO premises to record any ongoing activities.
14. Frequent changes were made in the flight plan by the crew.
15. No SOP was made by M/s Pioneer Flying Academy Pvt. Ltd for maintaining two way RT communication between ground and the flying aircraft.
16. The crew did not undergo medical examination post-accident.

3.2 Probable cause of accident

Somatogravic Disorientation followed by a complete loss of situational awareness leading to a controlled flight into terrain (CFIT) was the direct cause of this accident.

Attempting to land in poor visibility conditions well below the authorized minima is considered to be the major cause of this accident.

The supervisory lapses, omissions of DGCA laid down rules, non-adherence to TPM procedures and SOPs, pushing for completion of flying training syllabus, regardless of rules, safety and prevailing weather conditions vis-à-vis skill sets of trainees were the contributory factors for the accident.

4. SAFETY RECOMMENDATIONS

It is recommended that

- (i) DGCA should issue instructions to back approvals being given by it to FTOs in their TPMs for flying below VMC. This should remove any ambiguity with existing requirements and leave no room for misinterpretation.
- (ii) As a pro-active preventive measure, DGCA should undertake fresh review of TPMs of all FTOs to ensure that they are in consonance with DGCA regulations.
- (iii) DGCA should issue model TPM templates that are in compliance of all existing DGCA regulations and contain best practices for safe Flying Operations by the FTOs. These template will provide a model for FTOs to follow and prepare a TPM document, which will be less prone to errors. The process of scrutiny by DGCA inspectors will also become simplified.
- (iv) DGCA may issue instructions for rationalization of minimum visibility criteria for local flying training viz. cross-country flying training, with planned recovery at the parent base itself.
- (v) DGCA may consider issuing instructions for commissioning of ATCs at uncontrolled Airports where ATC towers are available, to facilitate a safe flying training environment and better control of flying activities at FTOs.
- (vi) DGCA may issue instructions to all FTOs to ensure compliance of DGCA circular on the subject related to installation of CCTV cameras covering Apron, Runway etc for safety, security of aircraft and better monitoring of ongoing activities on the aircraft and operational area.

Date: 11.10.2023

Place: New Delhi