



**FINAL INVESTIGATION REPORT ON ACCIDENT INVOLVING
TECNAM P2008JC AIRCRAFT, VT-BRP
OPERATED BY M/S NMIMS, ACADEMY OF AVIATION
ON 16 JULY 2021 NEAR VILLAGE VARDI, SHIRPUR**

AIRCRAFT ACCIDENT INVESTIGATION BUREAU

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.

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GLOSSARY

AAIB	Aircraft Accident Investigation Bureau
AD	Airworthiness Directives
AMSL	Above Mean Sea Level
ARC	Airworthiness Review Certificate
ATC	Air Traffic Control
AUW	All Up Weight
C of A	Certificate of Airworthiness
CAR	Civil Aviation Requirements
CPL	Commercial Pilot Licence
DGCA	Directorate General of Civil Aviation
ELT	Emergency Locator Transmitter
FDTL	Flight Duty Time Limitation
Hrs	Hours
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
Kt	Knots
MEL	Minimum Equipment List
MLG	Main Landing Gear
MTOW	Maximum Take Off Weight
NLG	Nose Landing Gear
Nm	Nautical Miles
NOSIG	Not Significant
NTSB	National Transportation Safety Board
PIC	Pilot in Command
RTR	Radio Telephony Restricted
SB	Service Bulletin
SCT	Scattered
VHF	Very High Frequency
VRB	Variable
UTC	Universal Time Coordinated

Aircraft and Accident details of Tecnam P2008JC Aircraft VT-BRP on 16 July 2021			
1.	Aircraft	Type	Tecnam P2008JC
		Nationality	Indian
		Registration	VT-BRP
2.	Owner		M/s Shri Vile Parle Kelvani Mandal
3.	Operator		Academy of Aviation
4.	Country of Manufacture		Italy
5.	No. of Persons on board		02 (1 Instructor, 1 Student Pilot)
6.	Date & Time of Accident		16 July 2021 at 0958 UTC
7.	Place of Accident		Satpura Jungle, Near Vardi Village
8.	Co-ordinates of Accident Site		Lat: 21° 17'37.9" N Long: 075° 24' 48.5" E
9.	Last point of Departure		Shirpur
10.	Intended landing place		Shirpur
11.	Type of Operation		Cross Country Training Flight
12.	Phase of operation		Cruise
13.	Type of Occurrence		Controlled flight Into Terrain (CFIT)
14.	Extent of Injuries		Instructor: Fatal injury
			Student pilot: Serious Injury

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

SYNOPSIS

On 16 July 2021, M/s Academy of Aviation Tecnam P2008JC aircraft VT-BRP while operating a training flight met with an accident in Satpura Jungle range near village Vardi, Taluka Chopda, Maharashtra. The student pilot sustained serious injuries whereas onboard instructor received fatal injuries and the aircraft was destroyed.

The training flight was scheduled for a dual cross country training flight and the sector planned was Shirpur to Shirpur overflying Shegaon. Before operating the flight, the trainee pilot had carried out the preflight inspection of the aircraft. The aircraft after obtaining necessary clearances from ATC was lined up on runway 09. ATC cleared the aircraft and it took off from Shirpur at 0930 UTC.

The crew were reporting the aircraft position to ATC on RT after every 10-15 minutes (every 10 Nm) as per the laid down SOP. While the aircraft was at around 18 Nm out bound Shirpur, the crew received a RT call from the CFI who was on another training flight on aircraft VT-MRP advised them to set course back to Shirpur. Crew acknowledged and executed an air turn back while the aircraft was at around 20 Nm from Shirpur. There was no further communication from the crew. After some time, the ELT of the aircraft got activated.

The aircraft crashed into a hill at a distance of 26 Nm away from Shirpur and 8.4 Nm off the intended flight track. The aircraft was destroyed during the accident. However, there was no fire. Thereafter, information about aircraft crash was received in the organisation and search & rescue was activated.

The occurrence was classified as Accident as per the Aircraft (Investigation of Accidents and Incidents) Rules, 2017. DG-AAIB vide Order INV- 11011/06/2021-AAIB dated 20.07.2021 appointed Mr. K. Ramachandran as IIC and Mr. Dinesh Kumar, Assistant Director as an Investigator. Initial notification of the occurrence was sent to concerned states along with ICAO as per requirement of ICAO Annex 13 and state(s) appointed Accredited Representative to participate in the investigation.

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 Flight

On 16 July 2021, as per roster, the first flight planned on the aircraft VT-BRP was a solo sortie of 01:15 hrs for another student pilot. The second sortie scheduled was a dual sortie of 02:30 hrs to impart a cross country training flight to the involved student pilot.

Before the aircraft was released for first flight of the day, as per procedure, daily inspection checks were performed by company AME at 0410 UTC and later aircraft was handed over to operations department with 80 litres of fuel and 03 litres of engine oil onboard. Thereafter, aircraft did a local sortie and as per the trainee, no abnormality was observed in the aircraft during the sortie. As the aircraft was next scheduled for a cross-country training flight, 20 liters of fuel was added and aircraft was released with a total fuel of 80 liters before it was handed over to the crew.

The Student Pilot reported at Shirpur airfield and at that time flying was already in progress. The Student Pilot underwent Breath Analyzer test at 0406 UTC. As per the flying training roster for the day, the Student Pilot was rostered for a Dual Sortie on a cross country training flight under the supervision of a flying instructor that was scheduled for 0930 UTC.

The local weather at Shirpur was above the minima required for carrying out training flight. The *en route* weather was also checked from the IMD website and was found conducive to undertake a cross country flight Shirpur – O/F Shegaon - Shirpur.

As per the Student Pilot, pre-flight inspection was carried out at around 0915 UTC and thereafter, the Flying Instructor had joined the Student Pilot for the flight. Start-up clearance was obtained from the Shirpur Tower. After completion of 'Before Taxi checklist' crew requested for Taxi permission and subsequently, SQUAWK CODE and level clearance was asked.

ATC then gave level clearance to the aircraft as per the procedure and instructed after departure from runway "climb to runway heading 1600 feet then turn Right intercept Radial 108 and start Climb to FL90 and call intercepted". After read back by the crew, aircraft was cleared for take-off from runway 09.

Aircraft took off from runway 09 at around 0930 UTC. After acknowledgement from crew "Radial intercepted", ATC requested for Estimates and ETA. As per ATC Shirpur, estimates along with ETA was communicated to the Tower by the crew.

As per laid down procedures, ATC advised crew to report their position after every 10 Nm. Accordingly, the crew reported the position when the aircraft was at 10 Nm outbound Shirpur. Crew further informed climbing passing 3500 for flight level 90. Subsequently, crew were advised by ATC to report next position at 20 Nm.

During this time, CFI was in check flight in another aircraft VT-MRP scheduled for local sortie at Shirpur. As per CFI statement, at around 0955 UTC, before VT-BRP reached position of 20 Nm outbound Shirpur, the CFI advised the aircraft VT-BRP to set course back from 20 Nm which was acknowledged by the instructor. Thereafter, CFI continued his sortie.

Approximately 20 minutes later, CFI observed that the ATC was trying to establish contact with aircraft VT-BRP. Since there was no communication from the aircraft VT-BRP to the calls made by ATC, CFI also tried to make contact with VT-BRP on company frequency. However, no reply was received from VT-BRP. As per CFI, weather at that time was good, there were few patches of cloud with blue sky and visibility was above 6000 m around Shirpur. However, during investigation, CFI could not provide any reason for asking the aircraft to turn back from 20 Nm despite the fact that *en route* weather was not adverse and no such communication was made by the crew either.

According to the Student Pilot, the CFI's directions were followed and a 180 degree turn was made to join the inbound leg while the aircraft was approximately 20 Nm outbound. The Student Pilot stated that prior to setting the course back, the instructor took over the controls, which remained with the instructor during rest of the flight. The aircraft deviated from the intended flight path and headed toward the hilly region north of the flight path. While flying in that hilly region near Satpura mountain range the aircraft collided with the trees over the hill before impacting a big tree at high speed. During this process, the flying instructor was thrown out of the aircraft and the Student Pilot lost consciousness. After regaining consciousness, the student pilot found that the aircraft was lying on the hill between the trees and the flying Instructor was on ground in unconscious condition beside the aircraft wreckage. The student pilot was not able to move due to injury.

Due to heavy impact a loud bang was heard in the jungle. After hearing the sound, some villagers arrived at the crash site and rescued the student pilot after cutting the seat harness. The villagers then moved the student pilot from the accident site (on hill) to ground on a temporary stretcher made by them.

An ambulance was ready at ground and the Student Pilot was immediately taken to the nearest hospital which was in Village Chopada. After the first aid provided at the local hospital, student pilot was shifted to Mumbai for further treatment where the student pilot was treated for serious injuries.

ATC, Shirpur did not receive any call out from VT-BRP after the instructor gave call out of "Wilco Sir" in response to call out given by CFI to return to Shirpur. The aircraft was expected to report its position after reaching 20 Nm outbound Shirpur or report ATC about turning back to Shirpur. No such call was made by the aircraft. It did not make any distress call either. Thereafter, ATC made numerous attempts to establish a positive contact with the aircraft VT-BRP. Meanwhile, VT-MRP also gave 3-4 calls but could not make a contact. After some time, one technical staff of the organization informed ATC that ELT of the aircraft got activated. Again, attempts were made by ATC to establish the contact on RT, but soon the organization received a call informing that one of their aircraft has met with an accident near village

Chopada. CFI was also informed about the accident when he reached dispersal area after completing the sortie.

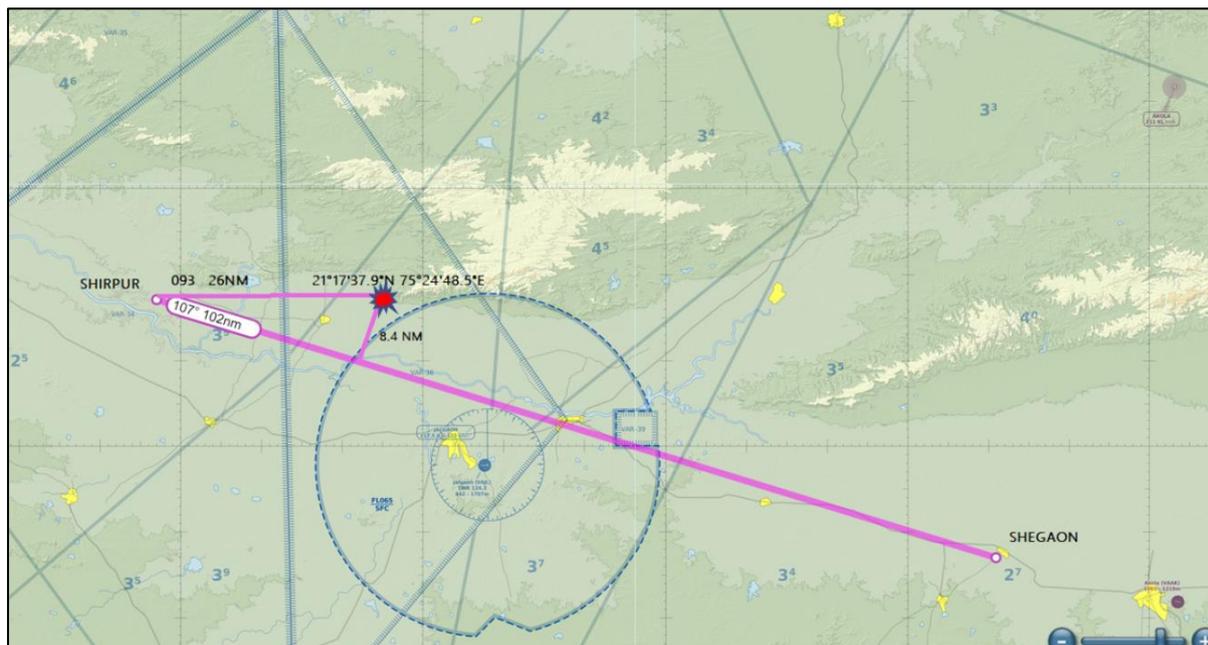


Fig 1: Geographical location of Accident Site (26 NM east of Shirpur Airport & 8.4 NM North from the assigned route)

1.2 Injuries to persons

Injuries	Crew	Passenger	Others
Fatal	01 (Instructor)	Nil	Nil
Serious	01 (Student Pilot)	Nil	Nil
Minor/ None	Nil	Nil	Nil

1.3 Damage to Aircraft

The aircraft was destroyed during the accident. Details of aircraft damage is provided in Para 1.12.2.

1.4 Other damage

Nil

1.5 Personnel Information

1.5.1 Crew Information – Instructor

Nationality	Indian
Age	27
License	CPL
Date of License Issued	26 May 2014
License valid up to	25 May 2024
Category	Aeroplane
Class	Single Engine Land
Endorsements as PIC	Cessna-172, TECNAM P-2008JC

Date of Joining Company	26 Nov 2020
Date of FRTOL issue	26 May 2019
FRTOL validity	25 May 2024
Date of Medical Exam	02 Feb 2021
Medical Exam validity	09 Feb 2022
Date of Last Proficiency Check	25/05/2021
Total flying experience	514:05 Hrs.
Total Experience on type	100:30 Hrs.
Total Experience as PIC on type	96:00 Hrs.
Last flown on type	15 July 2021
Total flying experience during last 01 Year	273:00 Hrs.
Total flying experience during last 180 days	211:45 Hrs.
Total flying experience during last 90 days	84:50 Hrs.
Total flying experience during last 30 days	40:00 Hrs.
Total flying experience during last 07 Days	15:15 Hrs.
Total flying experience during last 24 Hours	03:00 Hrs.
Rest period before the flight	24 hours 50 mins

The instructor joined the company as AFI and was not involved in any accident or incident earlier.

1.5.2 Student Pilot

Nationality	Indian
Age	19
License	SPL
Date of License Issue	23 July 2020
License valid up to	22 July 2025
Category	Aeroplane
Class	Single Engine Land
Endorsements as PIC	NA
Date of FRTOL issue	28 Jan 2021
FRTOL validity	27 July 2031
Date of Medical Exam	10 Nov 2020
Medical Exam validity	15 Nov 2022
Date of Last Proficiency Check	01 July 2021
Total flying experience	113:45 Hrs.
Total Experience on type	99:55 Hrs.
Last flown on type	13 July 2021
Total flying experience during last 01 Year	113:45 Hrs.
Total flying experience during last 180 days	113:45 Hrs.
Total flying experience during last 90 days	96:50 Hrs.

Total flying experience during last 30 days	18:30 Hrs.
Total flying experience during last 07 Days	07:30 Hrs.
Total flying experience during last 24 Hours	00:00 Hrs.
Rest period before the flight	3 Days

Both Instructor and Student Pilot had adequate rest prior to operating the accident flight. Both were familiar with the route Shirpur-Shegaon-Shirpur, as they had flown in this sector earlier also.

1.6 Aircraft Information

1.6.1 General Information: Tecnam P2008JC

Tecnam P2008 JC is a single-engine two-seat aircraft with a strut braced high wing and fixed landing gear. The aircraft is powered by one Bombardier-Rotax GmbH Piston Engine with GT fixed pitch propeller.

Aircraft fuselage is mainly made by carbon fibres composite materials. The fuselage is made by two main shells that are later assembled bonding the two main bodies and the floor (composite) and adding aluminum stiffeners that allow the connection of the main landing gear, seats, wing and instrument panel.

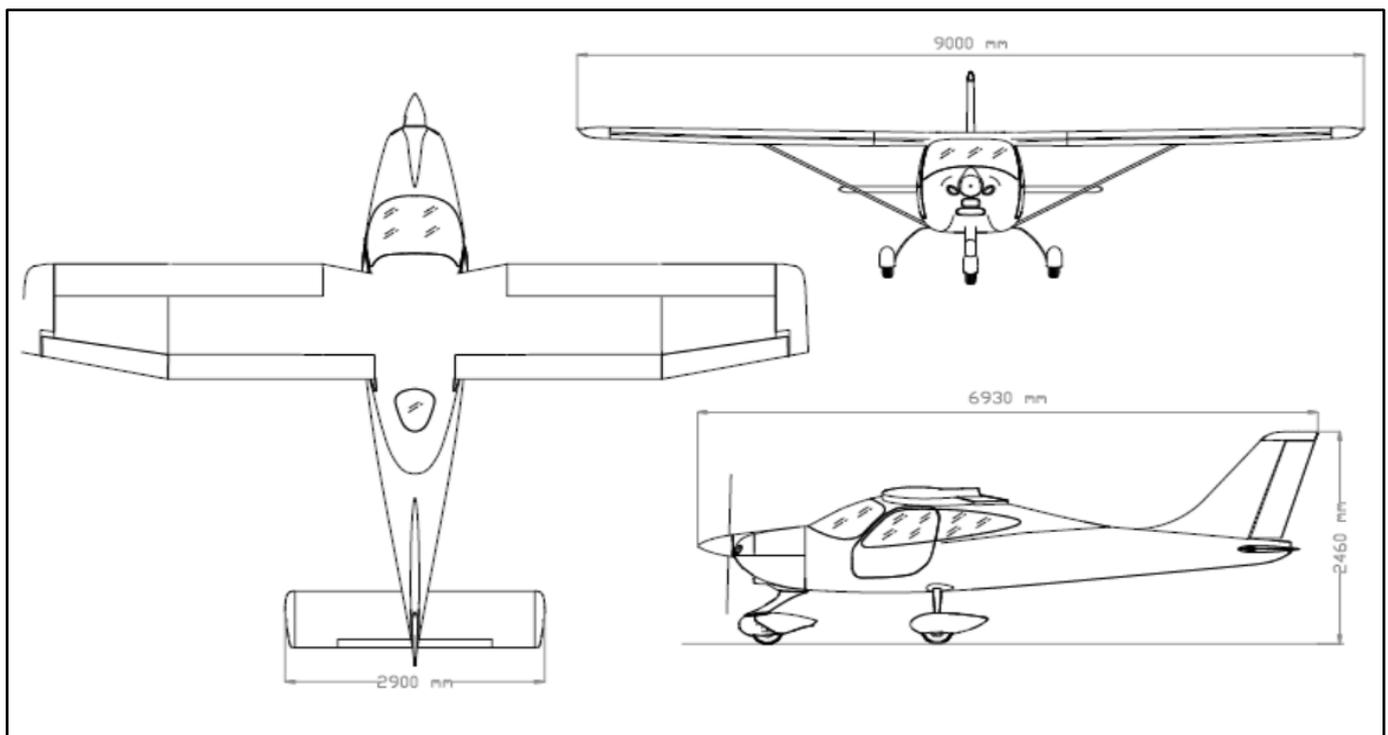


Fig 2: Aircraft Dimensions

Aircraft flight controls are operated through conventional stick and rudder pedals. Longitudinal control acts through a system of push-rods and is equipped with a trim tab. The aircraft is certified in Normal Category in accordance with EASA CS-VLA regulation applying to aeroplanes intended for non-aerobatic operation only. Non aerobatic operation includes:

- Any manoeuvre pertaining to “normal” flight
- Stalls (except whip stalls)
- Lazy eights
- Chandelles
- Steep turns in which the angle of bank is not more than 60°

Aircraft systems or components/parts are described below which have relevance with this accident:

1.6.1.1 Avionics

This aircraft has a glass cockpit. The left area holds primary (analogue) and pilot’s situational awareness (G3X LH display) flight instruments, a chronometer, and the pitch trim indicator. The right area holds engine and moving map indicator (G3X RH display), an analogue backup CHT indicator and breaker panel.

The avionic system installed in the aircraft features four analogue indicators, an airspeed indicator, an altimeter, a magnetic compass and a slip indicator, which provide primary flight information.

The suite provides primary engine information, except fuel quantity information which is provided by two dedicated analogue indicators located in the bottom central instrument panel. G3X also embodies a GPS WAAS receiver whose information, intended for situational awareness only, are presented on RH display moving map.

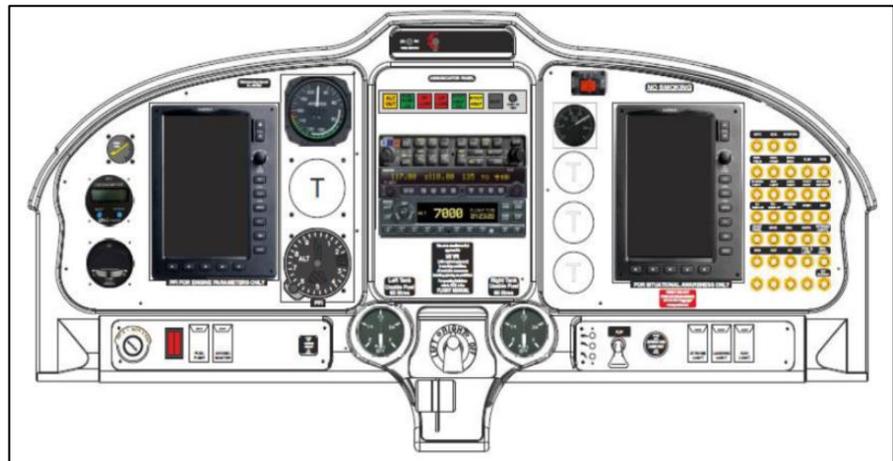


Fig 3: Instrument panel

Stand-alone external

COM/NAV and transponder sources are also installed. Garmin SL 30 Navigation information is presented on the display (course and direction) along with the information related to active/standby frequency. This information is supplemented by an HSI indicator on G3X LH display.

GTX 3XX transponder provides SSR (Secondary Surveillance Radar) responses; this unit is capable of both mode “S” and mode “C”. An external altitude encoder (ACK A-30) allows altitude reporting, this information is also presented on GTX 3XX display.

An automatic reversion mode is integrated within the system in order to continue providing the pilot with the flight and engine information in the event of a LH or RH display failure.

1.6.1.2 Seats and Safety harness

Seats are built with light alloy tube structure and synthetic material cushioning. A lever located on the right lower side of each seat allows for seat adjustment according to pilot size.

Aircraft features three fitting point for safety belts equipped with waist and shoulder harnesses adjustable *via* sliding metal buckle.

1.6.2 Aircraft's Maneuvering Limitations

As per the AFM, following are the airspeed limits which are significant for normal operations:

	FLAPS	650kg
Rotation Speed (V_R)	T/O	50 KIAS
Flap Retraction Speed (V_{OBS})	TO	61 KIAS
Best Angle-of-Climb Speed (V_X)	0°	63 KIAS
Best Rate-of-Climb speed (V_Y)	0°	67 KIAS
Approach speed	T/O	61 KIAS
Final Approach Speed	FULL	55 KIAS
Optimal Touch Down Speed	FULL	55 KIAS
Balked Landing Speed	FULL	61 KIAS
Manoeuvring speed (V_A)	0°	98 KIAS
Never Exceed Speed (V_{NE})	0°	143 KIAS

As per the above chart, the maximum permissible manoeuvring speed is 98 KIAS. Further, as per AFM, recommended entry speeds for each approved manoeuvre are as follows:

Manoeuvre	Speed [KIAS]
Lazy eight	99
Chandelle	113
Steep turn (max 60°)	99
Stall	Slow deceleration (1 kts/s)

In the AFM, to make aware of the aircraft limitations, following WARNINGS are provided:

“Acrobatic manoeuvres, including spins and turns with angle of bank of more than 60°, are not approved”.

“Limit load factor could be exceeded by moving abruptly flight controls at their end run at a speed above V_A (Manoeuvring Speed: 98 KIAS)”.

1.6.3 Aircraft Specific Information (VT-BRP)

The aircraft is registered under category ‘Normal’ with sub category ‘Passenger’ and the minimum number of crew specified to operate this aircraft is ‘ONE’ as per its C of A.

1.6.3.1 Aircraft Information

Aircraft Model	TECNAM P2008JC
Aircraft S. No.	1126
Year of Manufacture	2019
Name of Owner	SHREE VILLE PARLE KELVANI MANDAL
C of R / validity	5093, issued on 20.05.2019 & valid
C of A / validity	7196, subject to validity of ARC.
Category	"A"
ARC issued on	17 Aug 2020
ARC valid up to	16 Aug 2021
Aircraft Empty Weight	433:20 kg
Maximum Take-off weight	650:00 kg
Date of Aircraft weighment	04 Feb 2019
Max Usable Fuel	120:00 kg
Max Pay load with full fuel	44:40 kg
Empty Weight CG	1.875 Meter Art of Datum
Next Weighing due	N/A
Total Aircraft Hours	416:00 hrs
Last major inspection	200 Hrs inspection carried out on 09.07.2021
List of repairs carried out after last major inspection till date of accident.	Nil
Engine Type	Rotax 9125
Date of Manufacture	24 Oct 2018
Engine Sl. No.	9564932
Last major inspection	200 Hrs inspection carried out on 09.07.2021
List of repairs carried out after last major inspection till date of accident	Nil
Total Engine Hours	416:00 Hrs.
Aero mobile License	valid up to 31 Dec 2022
AD, SB, Modification complied	Complied
Aircraft flying under any MEL invoked	No

Aircraft was re-assembled as per Approved Schedule/Procedure Sheet at organization's facility located at Shirpur airfield on 11.11.2019. After re-assembly of the aircraft, flight and engine controls rigging were carried out at 00:50 hrs. Thereafter, Engine run was performed and all parameters were found within limits. An independent inspection was carried out by a DGCA approved AME and during inspection, operational limits were again found satisfactory. Aircraft remained on ground, till the first 12 months/100 hrs scheduled inspection was carried out on 10.02.2020, as approval from DGCA was still awaited. On 02.03.2020, a first test flight of 01 hour was carried out for the issue of initial CoA & ARC and it was completed successfully. Thereafter, on 13.04.2020, aircraft along with its engine was preserved to follow the

guidelines issued by DGCA during lockdown imposed due to COVID -19 pandemic. Later, in accordance with the approved procedure sheet, de-preservation of the aircraft was carried out on 24.06.2020 at 01:50 hrs. After getting all the relevant approvals from DGCA, finally aircraft made the first flight on 19.02.2021. Thereafter, aircraft was maintained as per the approved schedules and last major inspection (200 hrs) was performed on 09.07.2021 at 395:30 hrs.

No entry of pending defect/MEL was found in aircraft logbook and engine logbook. All concerned Airworthiness Directives and Mandatory Service Bulletins, DGCA Mandatory Modifications on the aircraft and its engine were complied with as on date of accident.

1.16.4 SD card use and databases

The aircraft is equipped with Garmin G3X system. On Garmin G3X system, two SD card slots are provided on each display unit for capturing of aircraft parameters. The location of these slots are depicted in Figure 4.

As per Garmin G3X Touch Pilot's Guide, it is recommended to maintain three SD cards for the G3X system. One SD card should be used exclusively for loading software, another SD card should be used exclusively for loading databases, and a third card should be used exclusively for flight purposes.

The G3X Touch uses an SD Card for software updates, database updates, Map Source data, checklist files, Chart view, Flight Data Logging, exporting Track Logs/User Waypoints, importing/exporting Flight Plans, and user-downloaded vehicles. Garmin Guide also contains the guidelines for installation and removal of SD cards from the slots. After reaching the crash site, the SD cards installed in both the units were removed and it was found that only dummy cards were installed in SD card slot on both display units.

The investigation team decided to remove both Garmin GDU 460 (M/N: O3ANGT00) bearing Serial Numbers 350003815 & 350003187 from the aircraft wreckage. After retrieval of the units, NTSB was contacted and their assistance was sought to milk out the data and analyse. Thereafter, both units were shipped to USA at NTSB facility.

Later, during the course of investigation, Operator's Engineering team informed that aircraft was without SD Card/ Memory Card, when it was received from OEM. As per the operator, at the time of aircraft delivery, a loader card (Software update Card) which is used for aircraft's software updation, was initially supplied by the OEM. Consequent upon induction into the fleet, loader card was never used for updating the software and thereon, the aircraft was



Fig 4: Garmin G3X system

flying with the pre-installed software till it met with the accident. The Engineering Head of the organization stated that their Engineering team was unaware about the utility of these slots, hence, SD Cards were never installed on the device.

1.7 Meteorological Information

Shirpur aerodrome is an uncontrolled aerodrome and does not have any MET facility at airport. Hence, before the commencement of the first flight of the day, local weather information was collected from IMD website. In addition to this, *en route* weather for Shegaon was also checked on the website and was found conducive to take the cross-country flight. Indore is the nearest airport to Shirpur. However, as per their defined SOP, weather forecast and trends from different stations (including Indore) were also gathered before commencement of training flights on the day of accident i.e., 16 July 2021 as given below:

Station	Time (UTC)	Winds (°/Kts)	Visibility	Clouds	Temp (°C)	QNH	Forecast
VAOZ	0430	130/04	6000 m	FEW 020 SCT 030	27	1008	NOSIG
VAAH	0430	210/03	6000 m	FEW 018 SCT 025 BKN080	27	1007	NOSIG
VABO	0430	180/05	5000 m (Hz)	FEW 025 SCT 020 BKN 080	30	1002	NOSIG
VABB	0430	240/11	3000 m (Hz)	SCT 012 SCT 025 FEW 030 CB	27	1004	TEMPO 1500
VASU	0430	130/03	6000 m	FEW 018 SCT 080 SCT 045	29	1002	NOSIG
VAID	0430	120/08	6000 m	FEW 020 SCT 100	26	1006	NOSIG
VAID	0900	140/09	6000 m	FEW 020 SCT 030	30	1006	NOSIG
VAID	1000	180/06	6000 m	FEW 020 SCT 030	31	1005	NOSIG
Shirpur	0430	100/05	6000 m	FEW 030 SCT 040	29	1007	NOSIG
Shirpur	0830	120/05	6000 m	FEW 025 SCT 045	34	1005	NOSIG
Shirpur	0930	130/05	6000 m	FEW 025 SCT 045	34	1005	NOSIG

Shirpur Airfield updates METAR with the help of IMD website. However, on the day of accident, no significant weather change was reported by any other station except Mumbai (VABB).

1.8 Aids to Navigation

The aircraft was equipped with GPS to assist in navigation. Shirpur Aerodrome is not equipped with any navigational aid other than a wind sock.

1.9 Communication

Aircraft was fitted with a VHF radio set to cater for communication while flying. The communication is being done through the help of RT. As per the statement of person manning the tower, there was always positive two-way communication between the ATC and the aircraft on local frequency 122.75 MHz. However, the aircraft did not make any distress call or call for turning back to Shirpur. The last call made by the aircraft was when the instructor responded to the call made by the CFI advising them to turn back to Shirpur.

As Shirpur is an uncontrolled airfield, the tower has no mechanism in place to record and retrieve the communication held between tower and the operating aircraft.

1.10 Aerodrome Information

Shirpur Airfield is an uncontrolled airfield privately owned by SVKM's NMIMS M/s Academy of Aviation, Shirpur. It has one runway with orientation 09/27 having a total length of 3936 feet and a width of 75 feet. The geographical co-ordinates of the ARP are 21° 19' 26" N & 74° 57' 25" E and its elevation is 183 m (AMSL).

M/s Academy of Aviation has set up a local ATC, operating with allotted frequency 122.75 MHz, and which is manned by a qualified personal from the Academy.

Except one wind sock installed at north of runway and visible from both ends, no other navigational aids were available at the airfield.

1.11 Flight Recorders

No flight recorder (CVR/DFDR) was installed on the aircraft. DGCA's Civil Aviation Regulations does not mandate the same as per CAR Section 2 Series I Part V.

1.11.1 Data retrieved from Garmin Units

On Garmin G3X system installed in the aircraft, two SD card slots are provided on each display unit for capturing of aircraft parameters. While the cards in the two slots were dummy cards, the data stored in the Garmin Units were retrieved with the help of NTSB, USA. The data retrieved was for the flights operated by the aircraft starting from 11 July 2021 till the accident flight on 16 July 2021.

1.11.1.1 Flight Data of accident flight

Flight data of the accident flight like speed, attitude, etc. was analysed. The graph between relevant aircraft parameters against time (UTC) was plotted to understand the maneuvering of aircraft by the crew. Two graphs have been plotted, first between 0948 UTC till end of recording i.e., the time of accident (Refer fig 5) and second concentrating the last phase of the flight from 0957 UTC till accident (Refer fig 6). The units were also recording terrain

awareness and warning information prior to the accident, including alerts and warnings. The alerts/warnings generated during the flight are also plotted against the time (Refer fig 5 & 6).

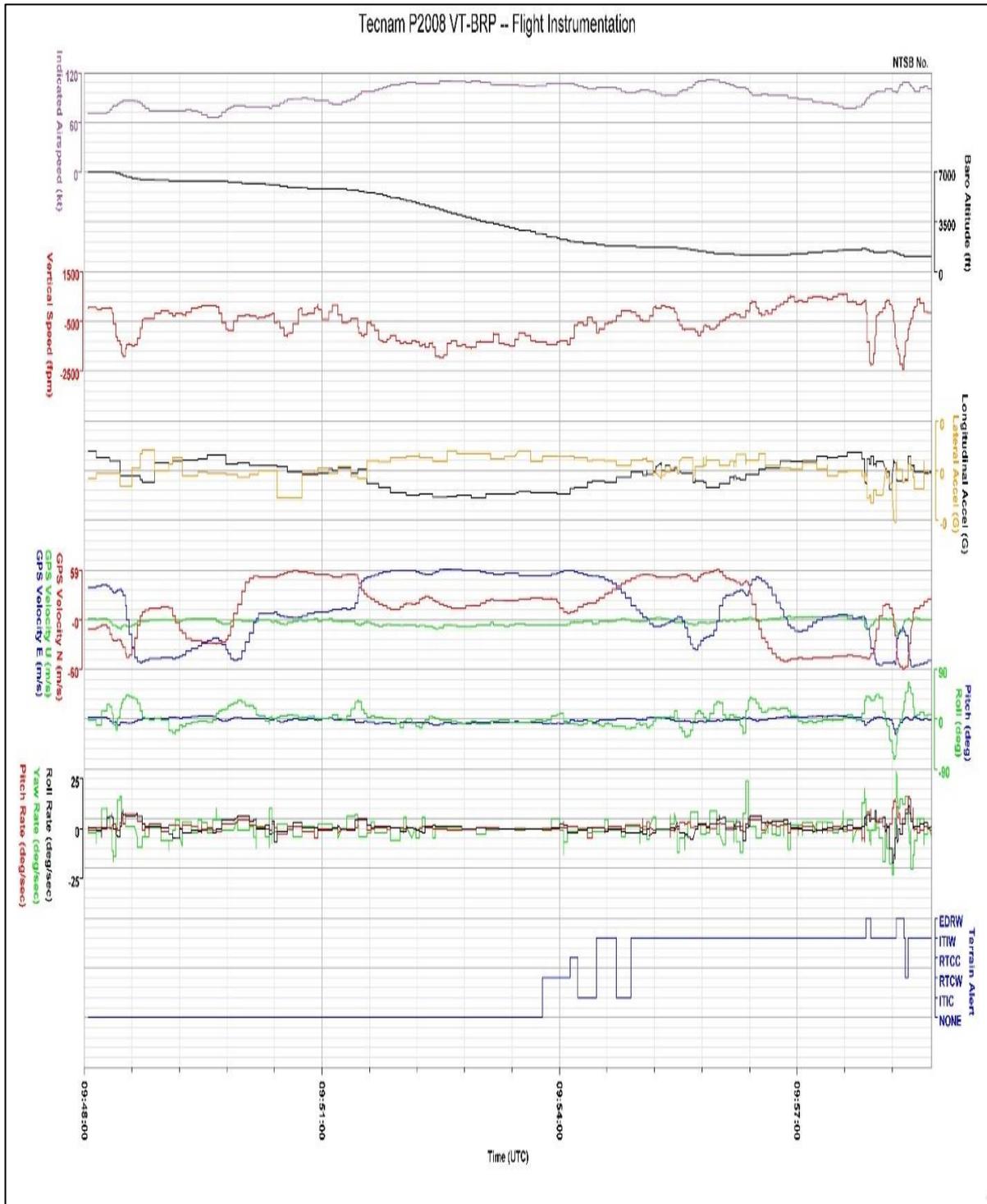


Fig 5: Graph of relevant parameters (including alerts/warnings) vs time (0948 UTC till accident)

The last recorded data was TAS-105 Knots, heading 301.3°, pitch 0.36° and roll 7.08°.

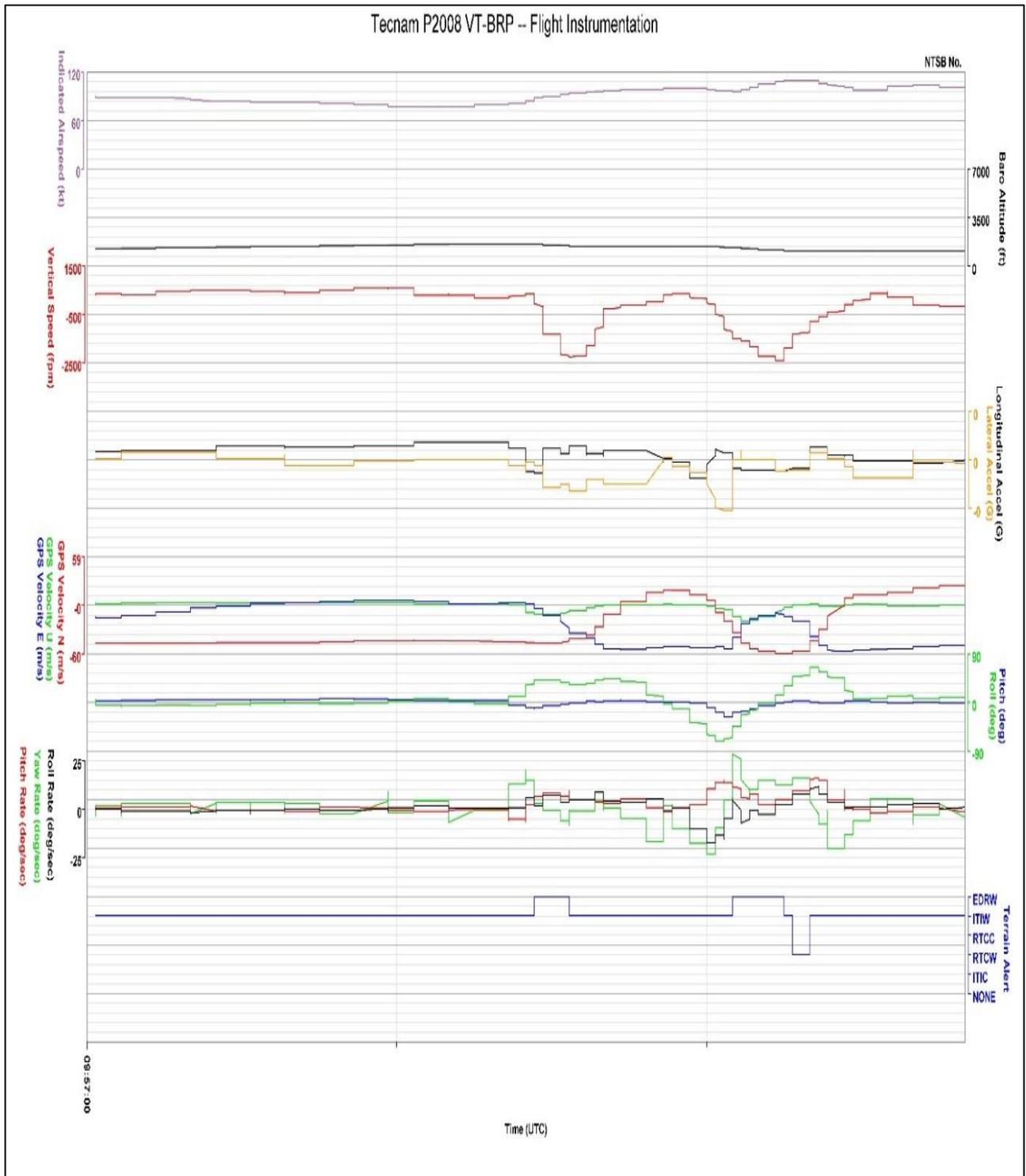


Fig 6: Graph of relevant parameters vs time for final phase of flight (0957 UTC till accident)

1.11.1.2 Routes followed by the Aircraft as per flight data

The data retrieved in total was analysed and the routes followed by the aircraft were plotted on google map (Refer Figure 7) to ascertain whether the standard routes as laid down in the TPM were followed, as the accident site was about 8 Nm north of the assigned flight path and 26 Nm away from intended landing place i.e., Shirpur.

The plot corroborates with the statement of CFI and others that the aircraft was advised to turn back while it was on a cross country flight overhead Shegoan. As per the track plotted on google map, the aircraft performed air turn back while it was near Gorgawale Bk which is 23 Nm outbound Shirpur. Later, while the aircraft was on backtrack course to Shirpur, it deviated from the designated flight track when the aircraft was near Chopada which is 21.6 Nm from Shirpur. The aircraft started deviating north of the intended flight path towards the Satpura mountain ranges (marked as 2 in the above figure). It is clear from the route projections on map that the aircraft did not follow the designated track. The aircraft path can be seen ending at the Satpura hills where the accident occurred.

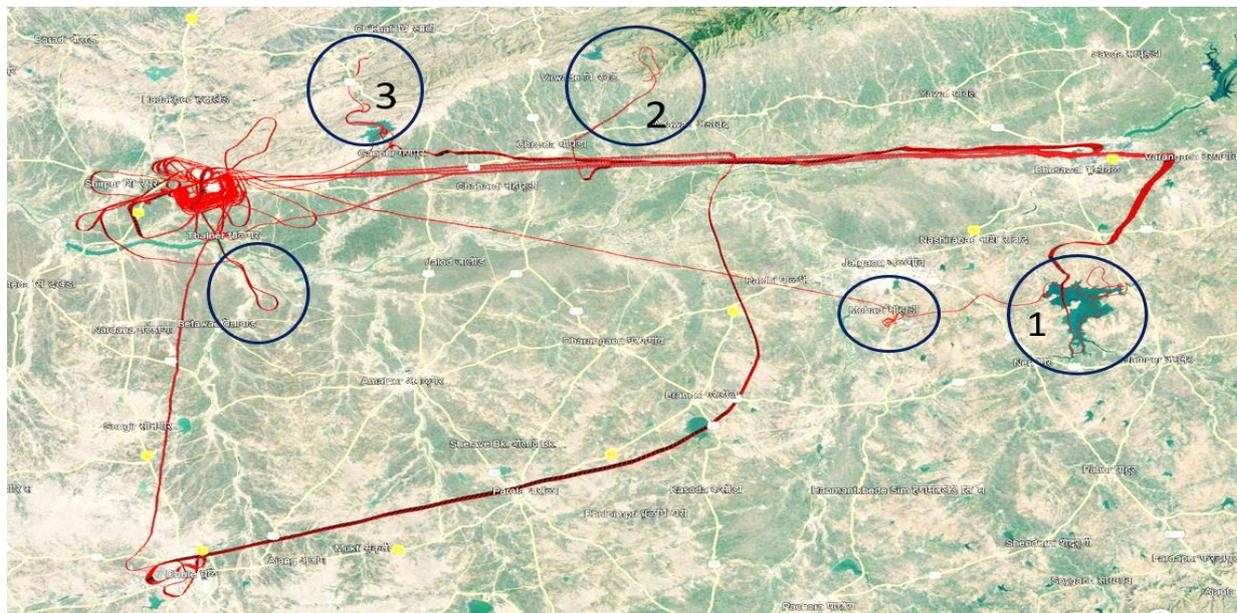


Fig 7: Routes followed by aircraft from 11 July 2021 to accident flight showing deviations from the flight path (1-Water Body, 2-Mountain Ranges, 3-River Stream)

Apart from the accident flight, there were many instances earlier also (as it can be seen from the figure 7 above) when the aircraft had deviated from the intended/assigned path. During one of its preceding flights, path followed by the aircraft clearly depicts that it had left the set assigned course when it was flying overhead Varangaon and deviated towards a water body located at south of the intended route (marked as 1 in the figure). After flying over the water body, aircraft path can be seen to have set the course for other unintended/unassigned location, Mohadi which was also not a standard route as per company assigned routes. Aircraft followed some irregular flight tracks there before it set course back for Shirpur Airport. Similarly, there have been deviation from the flight track towards some mountain ranges, river, etc. which are clearly depicted in Fig 7.

1.12 Wreckage and Impact Information

1.12.1 Impact Information

As per the analysis of data retrieved from the Garmin unit, the aircraft was maintaining a speed of about 105 knots before it impacted the trees over the hill. The aircraft was probably moving in downhill direction when it hit trees at a very high speed. The aircraft hit a number of trees before it impacted with a big tree on the right side. The impact was such that the aircraft pivoted to the right at the point of impact during which the right wing along with door and part of cockpit structure got separated from the fuselage. In the process, the instructor who was occupying the right seat was thrown out of the aircraft. As per the eyewitness, the Instructor was lying unconscious on the right side of the final resting position of the aircraft. The aircraft after pivoting to the right turned almost 180 degree and slid downhill slightly before coming to the final rest position. The left wing also impacted with many trees which is evident from many dents it suffered at the leading edge. During the process, the nose section and cabin was completely crushed. The engine got separated from the structure. Some of the wreckage photographs are provided at the 'Appendix A' of the report.

The damage details are provided in the following paragraph.

1.12.2 Aircraft Damage

Aircraft was completely damaged up to cabin baggage compartment, engine was completely detached from the structure and engine mounts were found broken. Nose landing gear sheared off from its attachment due to impact. Right wing detached from its mounting and moved away from the aircraft. Right wing leading edge severely damaged and wing tip teared off. Left wing leading edge damaged and tip sheared off completely. Cabin collapsed completely. Both doors detached from its mounting and crushed. The main landing gear were intact with the aircraft tail section. Details of damage caused to the aircraft are as follows:

a. Left Wing

- Found to be attached with the aircraft.
- Leading edge collapsed at multiple places with teared skin.
- Tip teared off at navigation lights.
- Wing lower and upper skin found teared off at many places.
- Wing strut detached from its mounting.
- Flap and aileron damaged, deformed. Aileron detached from its mounting and crushed, flap intact but bent and damaged at center.
- Approx. 2ft- Leading edge skin detached from wing tip.

b. Right wing

- Detached from aircraft and its mounting broken.
- Wing tip damaged from leading edge approx. 07 inches.
- Leading edge broken at multiple places.
- Upper and lower skin damaged and deformed at several places.
- Root side completely crushed and damaged.
- Flap separated from wing and damaged.

- Aileron damaged.
 - Flap bent from center and crushed.
 - Aileron attached to wing but damaged at trailing edge.
- c. Nose section and cabin**
- Nose Section and cabin completely crushed.
 - Cowling broken in small pieces.
 - Engine Mounts completely damaged.
 - Engine detached from the Engine Mounts.
 - Firewall crushed and detached.
 - Nose landing gear damaged and detached.
 - Oil tank crushed.
 - Dash board and instrument panel completely damaged and crushed.
 - LRU's installed in the cabin displaced and detached (e.g., display unit, GEA, MD-302).
 - Both seats got detached from rail.
 - Both door detached and right side door glass broken.
 - Main landing gear intact to aircraft fuselage.
 - Control column damaged, detached and bent.
 - Rudder paddle crushed and broken.
- d. Engine & Propeller**
- Engine completely detached from mounts.
 - Starter & alternator detached and broken.
 - Oil tank crushed.
 - Cowling damaged completely
 - Propeller broken, A piece of 6'' only left with propeller mounting.
 - Spinner broken into pieces and detached.
 - Carburetor broken and detached.
 - One CDI detached and broken and another displaced
 - Fuel pump broken and displaced
 - Intake and exhaust manifold completely damaged and sheared off.
- e. Fuselage**
- Tail section after baggage (C6 Aft cabin bulkhead) is intact.
 - COM 1 antenna found broken/ damaged.
 - Right Stabilizer leading edge tip side approx. 24 inches collapsed, bent, and Left Stabilizer trailing edge approx. 12 inch bent.
 - Stabilizer trim bent at center.
- f. Landing Gear**
- Nose landing gear broken and damaged, nose wheel detached and was missing.
 - Main landing gear intact with fuselage with no visual damage.
- g. Missing aircraft parts**
- Nose Wheel
 - Part of wooden propeller after propeller hub.
 - Right side wing strut

1.13 Medical and Pathological Information

Both student Pilot and Instructor were subjected to Breath Analyzer test and found negative before they were authorized for training flight. Post-accident, condition of the Student Pilot was critical and therefore, blood and urine samples were not collected by hospital authority. After providing first aid treatment, Student Pilot was released from the hospital and shifted to a private hospital in Mumbai, where the Student Pilot underwent multiple surgeries during hospitalization of more than one month.

1.14 Fire

There was no pre or post impact fire.

1.15 Survival Aspects

The aircraft was maintaining a very high speed, when it hit the mountain which led to a very high impact on the aircraft structure. Safety harness of the right seat which was occupied by the Flying Instructor could not sustain the impact and broke. The instructor was thrown out of the aircraft and could not survive the injuries. The safety harness of student pilot occupying the left seat was intact. However, due to heavy impact the left seat got distorted and the nose section was crushed such that the student pilot was not able to move. The student pilot was later rescued out of the aircraft by the local villagers and was immediately taken to nearby hospital. The Flying Instructor received fatal injuries while the Student Pilot sustained serious injuries in the accident. The operator initiated emergency operation after the information of aircraft crash was received, however, by the time they reached the accident site the student pilot was already rescued by the villagers.

1.16 Tests and Research

Nil

1.17 Organizational and Management Information

1.17.1 Academy of Aviation (NMIMS)

M/s Academy of Aviation (AOA), NMIMS is a Flying Training Organization situated at Shirpur, Maharashtra. The approval of Flying Training Organization (FTO) was renewed by DGCA on 27.08.2020 and was valid up to 26.08.2022. Flying Academy is imparting integrated flying and ground training to trainee students for following license and ratings:

- i. Issue/Renewal of Student Pilot License
- ii. Issue/Renewal of Flight Radio Telephony Operator's License(R)
- iii. Issue/Renewal of Private Pilot License
- iv. Issue/Renewal of Commercial Pilot License Issue and Renewal
- v. Issue/Renewal of Instrument Rating
- vi. Issue/Renewal of AFI/FI Rating
- vii. Issue/Renewal Extension of Aircraft Rating & conversion

The organizational chart of the flying club is shown in the figure below.

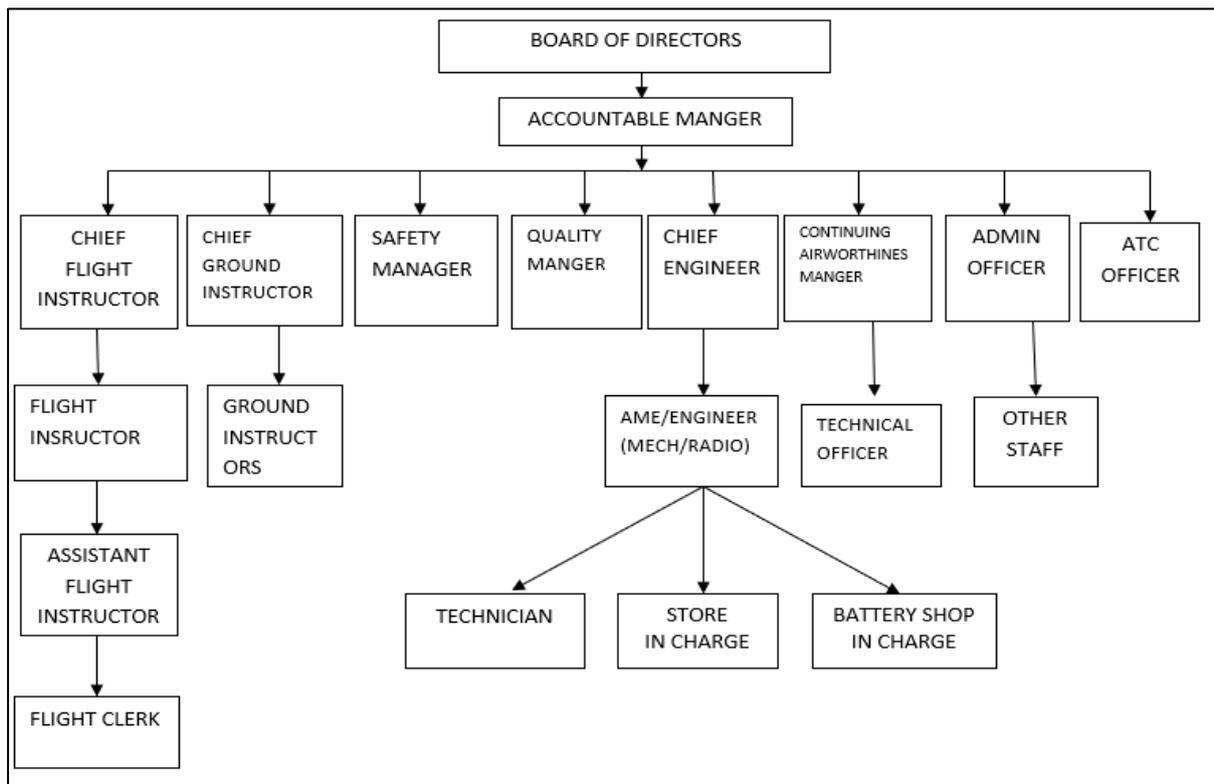


Figure 8: Organisation Chart (AoA)

Chief Flight Instructor (CFI) is responsible to coordinate the activities of all departments. The Chief Flight Instructor directly reports to the Accountable Manager who is the head of the organization and all departments have their respective heads.

M/s Academy of Aviation has a mixed fleet containing Cessna 172R aircraft, Tecnam P2008 JC (Single Engine) & Tecnam P2006T(Multi Engine) to impart flying training, as per details given below:

Aircraft	1st	2nd	3rd	4th
Type of a/c	Cessna 172R	Cessna 172R	Tecnam (P2008JC)	Tecnam (P2006T)
Registration No	VT-RCP	VT-MRP	VT- BRP	VT- MSP
Category of registration	A	A	A	A
Date of manufacture	2008	2008	2018	2018

1.17.1.1 Training & Procedure Manual (TPM) of the Organisation

The Company's Training and Procedure Manual Issue 01 Rev 02 was issued on 15 Sep 2020 after approval of DGCA.

1.17.1.1.1 Duties & Responsibility of Accountable Manager & Chief Flight Instructor

Accountable Manager

- a) Ensuring that all relevant requirements and regulations of DGCA are complied with.
- b) Organize, manage and supervise all activities including quality monitoring, within the organization.
- c) Direct proper quality control setup to ensure and enable maintenance in accordance with the organizations, manufacturers and relevant DGCA requirements.
- d) Provide premises and ensure that office accommodation appropriate to the management of the work is available.
- e) Ensure that appropriate instructions are developed, maintained, documented and followed for compliance with the requirements including payment of any charges.
- f) Provide adequate and updated literature for the work to be performed which includes all necessary airworthiness data from the applicable Aviation Authorities and the aircraft manufacturer as appropriate.
- g) Provide staff and ensure that all personnel are appropriately trained and qualified to accomplish the work.
- h) Ensure that all maintenance work is suitably recorded as per the requirements.
- i) Provide suitable facilities (workshops and equipment) to enable the organization to work as per the scope of approval granted.
- j) Provide necessary material (components, spare parts etc.) and ensure proper control over purchases, receipt, storage, safekeeping and dispatch of spares and material to support maintenance in the most efficient, economical and timely manner.
- k) Provide direction and control for the following engineering sections, as applicable:
 - i. Production engineering (Maintenance and workshops)
 - ii. Quality Control
 - iii. Stores
 - iv. Technical Planning Cost Control Ensure safety, health and welfare of all personnel pertaining to the daily work. Provide suitable working environment to all.
 - v. Establish an effective cost control system.
 - vi. To ensure that the work is carried out in legal, safe and commercially viable manner.
 - vii. Disciplinary action against erring personnel.
 - viii. Provide necessary finance for ensuring compliance with the above.

In absence of Accountable Manager, CFI will take over responsibilities.

Chief Flight Instructor

- a) CFI will be the overall in-charge of all flying training activities and other flight operations at AOA.
- b) Manage the flying training activity in order to achieve the targets set by the Management of AOA.

- c) Ensure all students are properly briefed and de-briefed by the flying instructors before and after each flight.
- d) Ensure SOPs and flying training standards are laid down and followed by all flying instructors and students.
- e) Monitor progress of all students on a regular basis and take appropriate remedial measures for weak students.
- f) Give counseling and if necessary, recommend review board action to the AM for students who are weak, do not come up to the required standards, have poor discipline or are unlikely to graduate within the laid down time frame due to any reason.
- g) Conduct flight briefings for Dy. CFI/ FIs / AFIs and students as necessary.
- h) Coordinate with QM/CE to ensure maximum serviceability and utilization of aircraft.
- i) Authorize and ensure all flights of the Club are conducted within the laid down rules and regulations.
- j) Ensure maximum flight safety.
- k) Ensure safe-keeping and updating of all documents and records.
- l) Conduct Student Pilot's License (SPL) and Flight Radio Telephone Operator's License (Restricted) (FRTOL-R) as per DGCA rules.
- m) To impart flying training to trainee pilots for the issue of Civil Flying Licenses, Patter Training for the issue of Assistant Flight Instructors Rating (Aero plane) AFIR (A), Flying Instructor FIR (A) and to carry out periodical standardization checks of all flying instructors.
- n) To authenticate the entries in the pilot's log book.

In absence of CFI, Dy CFI will take over responsibilities.

1.17.1.1.2 Chapter 5 of TPM

Para 5.11 contains guidelines on 'Maps and Charts'. As per this section of TPM, during flight planning, it must be ensured that all maps and charts are carried onboard and following procedures are required to be adhered by student pilots:

- *All pilots should ensure that they are carrying current and suitable maps and charts for every flight.*
- *All pilots planning for a cross-country shall carry a chart covering a radius of 150Nms for the departure/destination and alternate aerodrome.*
- *All maps/charts carried on board should be clear.*
- *All pilots should have adequate knowledge on map reading and en route charts.*
- *Instructors should ensure that trainee should be briefed on map reading for a new route.*
- *Other than normal navigation map in the aircraft a standby should be available.*
- *Pilots should carry both Jeppesen Approach Plates and topographical charts for the cross country.*

Note: When uncertain of position or lost, read from ground to map until position is established.

Para 5.17 contains the procedures to be followed for obtaining and record keeping of Met information for the airport and *en route* before undertaking any training flight.

- *Weather information should be taken by pilot before each flight (local and cross-country).*
- *For cross country flights Met requisition should be given to concern Met Office before 24 hours of the ETD. The en-route forecast should be received from concern MET station 02 hours prior to ETD.*
- *The recorded MET briefing should be read and understood and discussed with an instructor prior to a training flight.*
- *The met information collected after every flight should be filed in a file located in dispatch room.*

1.17.1.1.3 Chapter 7 of TPM

Para 7.5 lays down the procedures to be followed during flight preparation as given below:

Meteorological Briefing

Meteorological briefing involves determining forecast and actual weather conditions for the route planned and for selected airfields along the route. En route weather comprises forecast winds and temperatures at cruising levels along the route together with forecasts of en route weather conditions, especially cloud conditions and any associated turbulence and/or icing. This information is depicted on special charts. Airfield weather reports may be either actual reports (METAR) or forecast conditions (TAF). METARs are issued at regular intervals; when a significant change to conditions occurs before the next METAR is due, a special report (SPECI) is issued.

Route Selection

When choosing the route for a flight, the following considerations must be taken into account where applicable:

- *Obtaining ADC and FIC for flights.*
- *Flights to be conducted wholly or partly within controlled airspace must follow the provisions of the appropriate national authorities.*
- *Flights must avoid airspace restrictions including danger, prohibited and restricted areas, and other flight restrictions (e.g. VIP flights).*
- *Where possible, the route should avoid areas of forecast extreme weather conditions, e.g., severe turbulence, or moderate or severe icing.*
- *Weather conditions at the departure, destination and alternate airfields must be better than the specified minima.*

Mode of Navigation

Navigation equipment in the aircraft must be adequate for safe operation

- *Where visual navigation is to be employed, the route should avoid areas of low cloud or where visibility is forecast to be poor;*
- *Where navigation is to be by use of radio navigation aids, the route may be designed to follow tracks between radio beacons or radials or bearings from radio beacons.*

Chart Preparation

Charts used must be marked with all relevant airspace restrictions, i.e. controlled airspace, danger, prohibited and restricted areas.

- *Charts printed with aeronautical information must be checked to ensure the currency of depicted information.*
- *Temporary airspace restrictions notified in NOTAMs or AICs must be marked on charts.*
- *The route to be flown should be marked on charts, including, where appropriate, topographical charts. Where appropriate, important bearings or ranges from navigational beacons (e.g., those which define a turning point or entry into controlled airspace) should be marked on the chart.*

Flight Plan Preparation

- *Where required by procedures, VFR flight plan should be prepared for submission to ATC authorities. The ATC flight plan must be submitted in good time, as specified in the national AIP.*
- *Whether or not an ATC flight plan is required, a navigation flight plan should be prepared for the route, showing planned levels, minimum safe flight levels, tracks, distances, times, ETAs and fuel requirements and any other information specified by the operator.*

Flying Restrictions

No aircraft shall be cleared for flying in case of actual weather is bad or under the period of any weather warnings. No solo shall be undertaken by the trainee student in case of weather is below VFR/VMC conditions. Not more than three aircraft shall operate on circuit flying at one time. In case of poor weather, the number of aircraft may be reduced as per the actual weather conditions prevailing over the airfield or in the vicinity of the airfield.

Para 7.6 clearly defines the role and responsibilities of an instructor onboard. *As per TPM, "If trainee is flying the aircraft, then the trainee is considered as PIC of the aircraft and if instructor is on board, then instructor is considered as PIC of the aircraft".*

As per the TPM, other than teaching students how to fly an aircraft, Flying Instructor is also held responsible to impart training on safe practices and accident prevention.

1.17.1.1.4 Chapter 9 of the TPM

Para 9.2 is reproduced below:

- The procedure for calculating minimum safe altitude is taught to the students and pilots in Navigation classes as well explained by their flying instructors. The sector safety*

altitude is always recommended to be maintained as far as practical in the cross-country flights. However, a route safety altitude is also permitted to be maintained on all cross country flights. The VOR, NDB and GPS are to be used in cross country flights or as and when required for homing on to the aerodrome of operations or destination or en route aerodromes.

- b. A route is a description of the path followed by an aircraft when flying between airports. Route selection is given importance so that a student selects a route and can identify the waypoints along the route. The basic principles of air navigation are identical to general navigation, which includes the process of planning, recording, and controlling the movement of a craft from one place to another.*
- c. Successful air navigation involves piloting an aircraft from place to place without getting lost, breaking the laws applying to aircraft, or endangering the safety of those on board or on the ground. Air navigation differs from the navigation of surface craft in several ways: Aircraft travel at relatively high speeds, leaving less time to calculate their position on route.*
- d. In the VFR case, a pilot will largely navigate using "dead-reckoning or "dead reckoning" combined with visual observations (known as pilot age), with reference to appropriate maps. This may be supplemented using radio navigation aids. The pilot will choose a route, taking care to avoid controlled airspace that is not permitted for the flight, restricted areas, danger areas and so on. The chosen route is plotted on the map, and the lines drawn are called the track.*
- e. The aim of all subsequent navigation is to follow the chosen track as accurately as possible. Occasionally, the pilot may elect on one leg to follow a clearly visible feature on the ground such as a railway track, river, highway, or coast. Once in flight, the pilot must take pains to stick to plan, otherwise getting lost is all too easy. This is especially true if flying in the dark or over featureless terrain. This means that the pilot must stick to the calculated headings, heights and speeds as accurately as possible, unless flying under visual flight rules.*
- f. The visual pilot must regularly compare the ground with the map, (pilot age) to ensure that the track is being followed although adjustments are generally calculated and planned. Usually, the pilot will fly for some time as planned to a point where features on the ground are easily recognized. If the wind is different from that expected, the pilot must adjust heading accordingly, but this is not done by guesswork, but by mental calculation - often using the 1 in 60 rule. For example a two degree error at the halfway stage can be corrected by adjusting heading by four degrees the other way to arrive in position at the end of the leg. This is also a point to reassess the estimated time for the leg. A good pilot will become adept at applying a variety of techniques to stay on track.*
- g. While the compass is the primary instrument used to determine one's heading, pilots will usually refer instead to the Direction Indicator (DI), a gyroscopically driven device which is much more stable than a compass. The compass reading will be used to correct for any drift (precession) of the DI periodically. The compass itself will only show a steady reading when the aircraft has been in straight and level flight long enough to allow it to settle.*

1.17.1.2 SMS Manual of the Organization

The organisation has framed an SMS Manual which is approved by DGCA. The manual was perused and it was observed that references of Rules 68 to 77 of Aircraft Rules, 1937 which had become obsolete are mentioned in the manual. Relevant parts of the Manual referring the same are given below:

Chapter 5 Para 5.1 of the SMS Manual on 'Accident/incident investigation' is reproduced below:

5.1.1 Notification and Investigation of aircraft accidents and serious incidents is covered in DGCA CAR Section-5- Air Safety Series C Part-I dated 13th Oct 2006. Aircraft Rules 1937 Part X & X-A cover the procedure for Investigation of Accidents and Incidents respectively. The procedures enumerated in these documents are to be followed strictly with no deviation. Safety Manager is to maintain complete documentation in such an eventuality.

5.1.2 In an eventuality of any accident/incident, while the data for notification to DGCA is being prepared, in parallel, preliminary information is to be given by the Accountable Manager.

5.1.3 Detailed procedure for Accident/Incident reporting and Investigation is placed at Appendix 'D'. Notification of any accident is to be sent to Director General DGCA, New Delhi with a copy to Director of Air Safety, Civil Aviation Department, Mumbai Airport, Mumbai (Tele:....., Fax:). Notification of any incident is to be sent to Director of Air Safety, Civil Aviation Department, and Mumbai with a copy to Director Air Safety, DGCA, New Delhi.

5.1.4 Director General, HQ DGCA, will order investigation for any Accident. In case of incidents, the Regional Director Air Safety would decide whether AOA Investigating Officer can conduct the investigation and forward the report or an Investigating officer would be sent by DGCA.

Content of the **Appendix 'D' "Accident/Incident Reporting and Investigation"** from the SMS manual of the operator is also reproduced below:

Accident Reporting Procedure - Notification of an accident (Aircraft Rules 1937-Part X refers)

The notice and information of an accident shall be sent as defined under **Rule 68 Para 4 of the Aircraft Rules 1937.**

(1) An accident in which an aircraft is involved shall be notified in accordance with the provisions of sub-rules (3), (4) and (5) of this rule, if between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked:

(a) Any person suffers death or serious injury as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto, or

(b) The aircraft receives substantial damage.

(3) Where an accident occurs which has to be notified under sub-rule (1), the person-in-command of the aircraft or, if he be killed or incapacitated, the owner, the operator, the hirer or other person on whose behalf he was in command of the aircraft, as the case may be, shall-

(a) Send notice thereof to the Director General, and

(b) Give information to the District Magistrate and the Officer-in-charge of the nearest Police Station.

1.17.1.2.1 Voluntary Reporting System

The operator, in its SMS Manual Chapter 2 Para 2.6 and 2.7, has defined about the procedure on hazard reporting and handling safety reports respectively. The contents of the Para 2.6 and Para 2.7 are reproduced below:

Para 2.6 Reporting of hazards

“ICAO and DGCA require each airport/flying establishment to establish a hazard/incident reporting system to facilitate the collection of information on actual or potential safety deficiencies. AOA management is committed to the following Safety Policy in this regard:

(a) Open sharing of information on all safety issues.

(b) All employees must be encouraged to report significant safety hazard or concerns.

(c) No disciplinary action will be taken against any employee for report on safety hazard, concern or incident. A sample of reporting form for hazards is attached at Appendix ‘D’.

These report forms can be either dropped in the safety suggestion boxes placed at various points in the institutes or handed over to the Quality Manager or forwarded to the Safety Manager.”

Para 2.7 Handling Safety Reports

“At AOA, confidentiality of the report is guaranteed. This will be achieved by de-identification i.e. by not recording any identifying information of the occurrence. The identity of the reporter will never be disclosed, even if known to any Manager/Executive. Every report is to be investigated, analysed and entered in the AOA database. A trend projection and cause-effect analysis is to be carried out and feedback provided to management of AOA Based on the above analysis, the need to review or reassess any safety measure will be evaluated, documented and acted upon accordingly.”

During investigation, all the records pertaining to voluntary reporting were sought from the operator to ensure whether the organization has a well-defined system to encourage voluntary reporting of issues which have a bearing on safety of operations. A register, which is maintained by the operator and contains complaints, hazards, or grievances, was handed over to the investigation team. During scrutiny it was noted that only three reports were raised during the past 07 years, which were generic in nature. Not a single report relevant to aircraft operations or maintenance was found in the register. Out of those three, two hazards were reported in the year 2015 and last one was reported in the year 2018.

During interview, the student pilot stated that they were not aware about any system for voluntary reporting of events or hazards.

1.18 Additional Information

1.18.1 Video clip of another aircraft of the organisation

After the accident, a video clip captured on a mobile phone was in circulation on social media wherein an aircraft was seen flying at a very low altitude while following a river stream. Initially, it was claimed that the clip was that of the accident aircraft VT-BRP captured before it met with the accident. However, when the clip was observed carefully, it revealed, that the aircraft in the video was not VT-BRP, but it was some other aircraft VT-MRP belonging to the organisation.

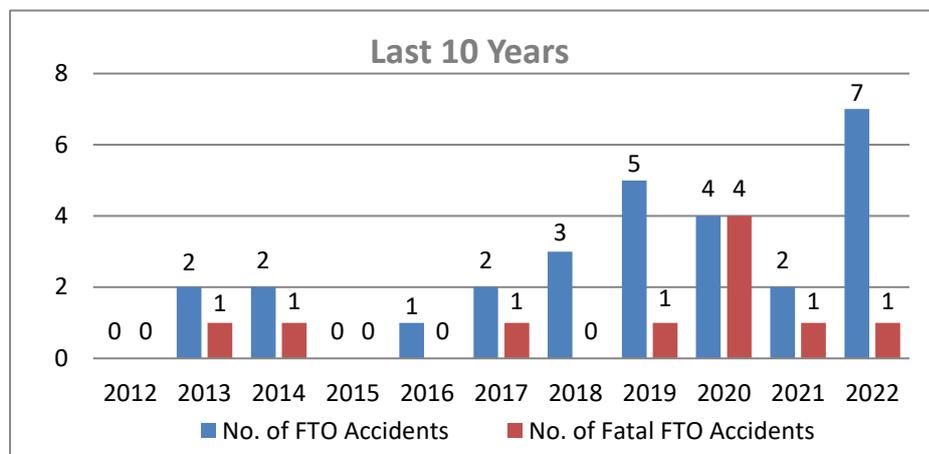


Figure 9: Snapshots from the video clip of another aircraft VT-MRP belonging to NMIMS flying low over a river

A few snapshots from the video clip are shown below (Refer fig. 9) wherein it can be seen that the aircraft is flying very low while flying overhead the river and doing acrobatic manoeuvring. The organization was not aware of this video clip.

1.18.2 Accidents pertaining to Flying Training Organizations

In the recent past there have been number of aircraft accidents involving Flying Training Organizations in the country.



The investigation team analysed the accident data of last ten years i.e., July 2012 to December 2022. It was observed that there has been a total of 28 accidents involving Flying Training Organizations

Fig 10: Number of FTO accidents from year 2012 (July) to 2022

during this period. Out of these 28 accidents, 10 accidents were fatal. There was no accident in 2012 (July onwards) involving FTO. From the period 2013 to 2016 there were only 05 accidents involving FTO. However, the cases started to increase gradually from the year 2017 onwards and reached up to five in the year 2019 and 07 in the year 2022. In 2020, even though, lockdown was imposed and flying activities was put on hold for few months across all the FTOs, four aircraft belonging to different Flying Training Organizations met with accident. All these accidents were fatal.

The investigation team analyzed the following aspects in these accidents:

- Accidents (Fatal & Non-Fatal) involving solo training flights and experience of the involved student pilots.
- Accidents (Fatal & Non-Fatal) involving dual training flights.
- Probable cause/Contributory factor(s) of solo and dual flying accidents.

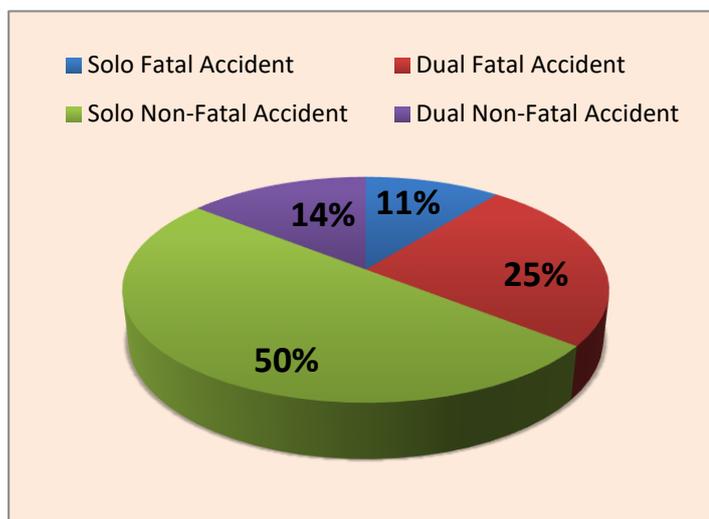


Fig 11: Fatal/Non-Fatal accidents involving Solo/Dual flying

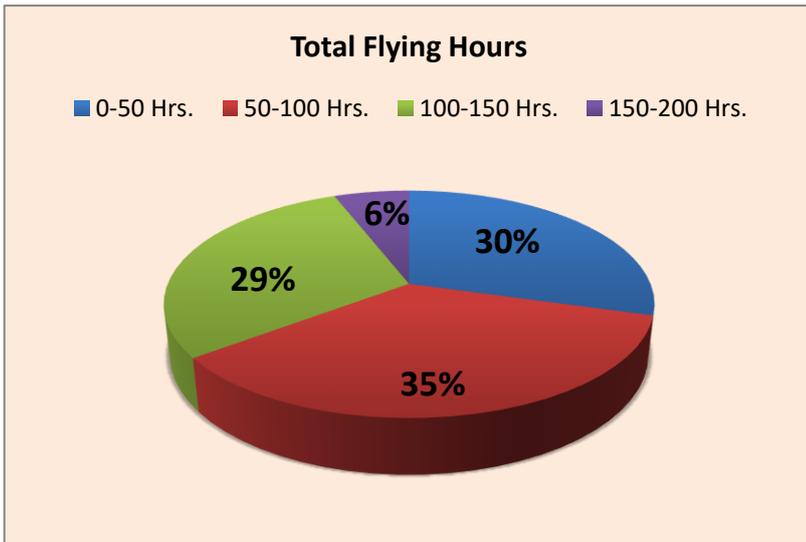


Fig 12: Total flying hours experience of student pilots involved in Solo flying accidents.

Out of the total 28 accidents, 61% of accidents were during solo flying training. Most of the solo flying accidents were non-fatal in nature and only 11% of solo flying accidents were fatal. The analysis of flying experience of student pilots involved in solo flying accidents revealed that student pilots with flying experience between 50-150 hrs were more prone to accidents (64%) than other student pilots having lesser flying hours experience (0 to 50 hrs) (30%).

The analysis of the data further revealed that out of the total 28 accidents, about 61% accidents occurred during solo flying training exercise and 39% accidents occurred during dual flying training exercise. However, while analyzing the data of fatal accidents, it was observed that 70% of the fatal accidents occurred during dual flying exercise i.e., while student pilots were flying under the supervision of an instructor on board.

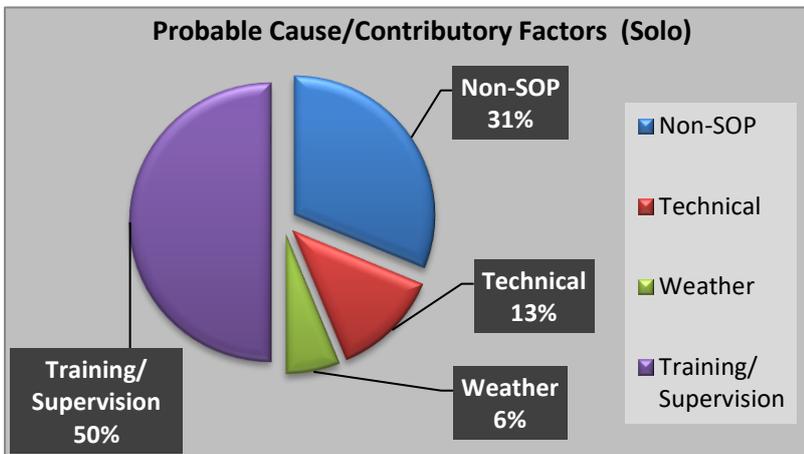


Fig 13: Probable Cause/Contributory Factors of Solo flying training exercise accidents

Probable cause/contributory factor(s) of these accidents were analyzed for both involving dual flying exercise and solo flying exercise separately to understand the nature of these accidents. It was observed that for solo flying training exercise, 50% of the accidents occurred due to lack of training/ supervision (Refer Fig. 13). However, for dual flying training exercise

80% of the accidents occurred due to non-adherence to SOP (Refer Fig. 14).

The investigation team further analyzed the probable cause/contributory factors of fatal accidents involving dual flying training exercise which revealed that all these accidents occurred due to non-adherence of SOP, wherein the aircraft was involved in unauthorized activities such as low flying, deviating from authorized flight path, acrobatic manoeuvres, carrying out flying training in low visibility below VMC, not performing the correct pattern for landing/take-off, etc. Most of these accidents occurred in an uncontrolled airfield/region.

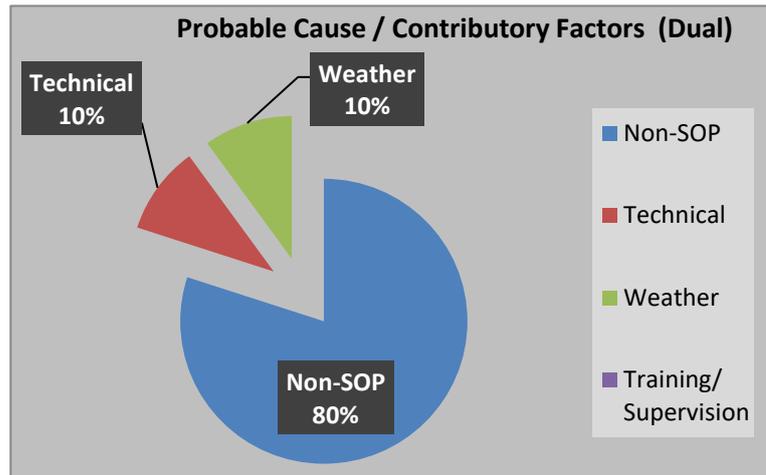


Fig 14: Probable Cause/Contributory Factors of Dual flying training exercise accidents

1.18.3 DGCA Flying Training Circular 01 of 2022

DGCA recently has issued a flying training circular 01 of 2022 dated 22 November 2022 regarding “Monitoring of training in Flying Training Organization” with the objective to enhance DGCA oversight over flying training and ground training activities of Flying Training Organization for improving the safety of operations and quality of training. It is also mentioned that this would also facilitate instructors in analyzing the performance of the trainee pilots and investigations by DGCA.

The circular covers following aspects for monitoring of flying training:

- Installation of Camera
- Flight data monitoring in aircraft

The circular is provided in **Appendix B** of this report.

1.19 Useful or effective Investigation Techniques

Nil

2. ANALYSIS

2.1 Serviceability of Aircraft

The aircraft had a valid C of A and ARC as on date of accident. Scrutiny of Log books revealed that as on 16 July 2021, both aircraft and its engine had completed 416:00 hrs (TSN) each. The last major inspection of 200 hrs inspection was carried out at 395:30 hrs on 09.07.2021. Thereafter, aircraft had flown 20:30 hrs, before it met with an accident. However, all lower inspections (Pre-flight checks, Service Checks, Weekly Checks) were carried out as and when due.

Scrutiny of the aircraft records revealed that ADs, SBs and all mandatory modifications were complied at the time of accident. Further, scrutiny of snag register also revealed that there was no pending snag reported on the aircraft prior to the accident flight and it was not operating under any MEL.

From the above, it is concluded that serviceability of the aircraft was not a contributory factor to the accident.

2.2 Weather

On the day of accident, other than Shirpur, weather for Shegaon and enroute weather was also checked on the IMD website before the aircraft was released for cross country flight. Local & enroute weather was found conducive for training flight and accordingly the aircraft was released for cross country flying by the CFI.

The Metrological report issued by IMD at 0930 UTC for Shirpur station indicated visibility of about 6000m which is well above approved minima and winds as 130°/05 knots with few scattered clouds were reported at FL025 & FL045 respectively. However, no significant weather was reported by IMD. Further, the statements of the witnesses and CFI also confirmed that the weather was fine and conducive for cross country flight. The aircraft also did not report any adverse weather at any point during the entire flight.

Hence, from the above, it is concluded that weather was not a contributory factor to the accident.

2.3 Crew Aspect

2.3.1 Crew Flying Experience and Qualification

The instructor on board had a valid instructor rating as on date of accident. His license was valid and all his required training/medical for operating the flight were valid as on date of accident. The instructor was a CPL holder qualified on type and had a total flying experience of about 514 hours including about 100 hours on type. The instructor was qualified to operate the flight and to impart training to the student pilot. The instructor has earlier flown the sector Shirpur-Shegaon-Shirpur and was quite familiar with this route.

The trainee pilot was qualified to operate the flight. All the requirements including medical, licenses were current as on date of accident for conduct of this training flight. The trainee pilot had about 113 hrs of total flying experience and about 100 hrs on type which indicates that most of the flying training exercise was carried out on Tecnam P2006C aircraft.

2.3.2 Crew handling of aircraft and non-adherence to SOP.

The aircraft was *en route* on the outbound leg from Shirpur to Shegaon. The weather was fine and conducive for conducting the flight. The student pilot was flying the aircraft. When the aircraft was about 18 Nm outbound Shirpur, the CFI on RT asked the instructor to turn back to Shirpur for which the instructor responded "Wilco Sir". Accordingly, the instructor took over the controls from student pilot and set course back to Shirpur. This was also

corroborated by the data retrieved from the Garmin units wherein it was observed that the aircraft made a 180 degree turn and started heading towards Shirpur on radial 280.

2.3.2.1 Non-adherence to TPM and assigned routes

After the aircraft was set on course back to Shirpur, and at about 21.6 Nm from Shirpur, the aircraft started deviating from the intended flight path and started heading towards north of the intended flight

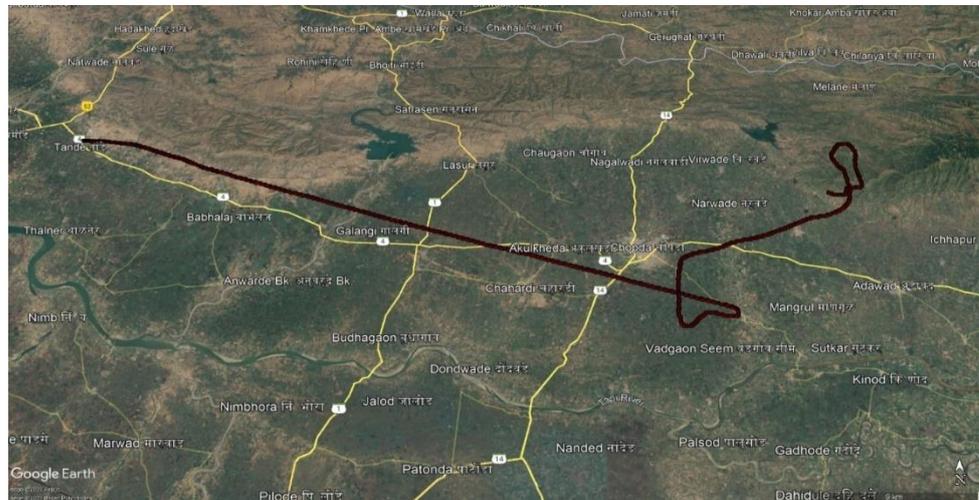


Fig 15: Path followed by VT-BRP during the accident flight

path on radial 350. The aircraft was heading towards the hilly region where the accident occurred which was about 26 Nm from Shirpur and 8 Nm away from the intended flight path. This deviation from the intended flight path was non-adherence to the SOP laid down in the company TPM. Further, the crew did not communicate their intention of turn back to Shirpur to ATC nor they communicated their position, which again was non-adherence to SOP.

2.3.2.2 Non-adherence to AFM

When the aircraft was flying over the hills, the speed was observed to have increased to 110 KIAS. During the final stages before the aircraft met with the accident it was also observed that the aircraft attitude such as the change in roll rate, yaw rate and pitch rate were very sudden and substantial. The roll degree at one point of time increased up to 68.5. The change of values from extreme positive to extreme negative indicated that the aircraft attitude was changed very abruptly. This was again non-adherence to the laid down SOP in TPM and also to the Aircraft Flight Manual, wherein it is clearly laid down that the allowable speed limit for this aircraft during manoeuvre is 98 knots IAS and this aircraft is not certified for the acrobatic maneuvers.

Apart from unauthorized deviation from the flight path and flying the aircraft beyond the operational limitations stipulated in AFM, the aircraft was flown close to the terrain without ensuring the operational safety. Even the terrain warning/alerts generated in the cockpit were ignored and the safety of the aircraft operations were compromised. This non-adherence to the SOP and unauthorized flying of the aircraft lead to the accident.

2.3.3 Chief Flight Instructor (CFI)

The CFI asked the aircraft to turn back when it was only about 18 Nm outbound Shirpur. During interview with CFI, it was asked to furnish the reason behind the same. The CFI stated

that it was just a hunch and no exact reason was provided by CFI for calling the aircraft back. Further, during the interview, the CFI stated that they were not aware of any unauthorized deviation from the flight path during flying training in the past.

2.4 Organisation Aspect

2.4.1 Flying Training and its supervision

The organisation is imparting flying training for various licenses and ratings including issuance and renewal of CPL. On the day of accident, the organisation was having 04 instructors including 01 CFI, 01 FI & 02 AFI. The Accountable Manager is entrusted with the responsibility to ensure that all relevant requirements and regulations of DGCA are complied with and to organize, manage and supervise all activities including quality monitoring, within the organization. CFI is entrusted with the responsibility to ensure SOPs and flying training standards are laid down and followed by all flying instructors and students. During the investigation, it was observed that there were many flights which deviated from the intended/assigned flight path and were involved in unauthorized flying as in this case. This was confirmed from the analysis of data retrieved from the Garmin units. The data pertaining to the involved aircraft VT-BRP covered data for the period from 11th July 2021 to 16th July 2021 (day of accident) including that of accident flight. A number of flights out of these were found to have deviated from the assigned route and were flown in an unauthorized area and at a very low height close to the terrain. This indicates that the accident flight was not a stand-alone case. Some other flights of which the data has been captured were also involved in such unauthorized activity. This indicates that there may be unauthorized flying in a number of other aircraft also by the Instructors/Student pilots of the organisation. This act of unauthorized flying was further evident from one of the video clips which was circulating in the social media after the accident capturing an aircraft of the organisation with registration VT-MRP which was seen flying very low over a river with abrupt maneuvering (Refer Para 1.18.2). The organization was not aware of such video clip.

From the above, it is inferred that unauthorized flying practices are being followed in the organisation frequently and the accident flight was not an exception. The fact that the organisation management including Accountable Manager/CFI were not able to identify and control such unauthorized flying practices indicates lack of supervision on their part and also poor safety culture in the organisation. This accident could have been averted if the organisation management including Accountable Manager/CFI had identified such wrong practices and taken corrective action to stop the same.

2.4.2 Voluntary Reporting System

The operator has formulated a SMS Manual wherein procedure of Hazard reporting is defined. There are procedures defined in the manual for hazard/incident reporting to facilitate the collection of information on actual or potential safety deficiencies. The manual also mentions that the management is committed to the following Safety Policy in this regard:

- Open sharing of information on all safety issues.

- All employees must be encouraged to report significant safety hazard or concerns.
- No disciplinary action will be taken against any employee for report on safety hazard, concern or incident.....

However, during investigation, all the records pertaining to voluntary reporting provided by the organisation was perused. Scrutiny of last 07 years data revealed that only three reports were raised during this period and all these were generic in nature. There was not a single report pertaining to aircraft operations or maintenance. Out of the three reports, two hazards were reported in the year 2015 and last one was reported in the year 2018.

During interview, the student pilot stated that they were not aware about any system for voluntary reporting of events or hazards.

With so many unauthorized flying activities being carried out in the organisation and the fact that no hazard reporting has been done in this regard by anyone in the organisation again reflects lack of safety culture in the organisation. The fact that most of the personnel including student pilots are unaware of such system and anyone who is aware of the system are not encouraged to make use of such system further implicates that the procedure lies only in papers and they are not complied by the organisation in true letter and spirit.

2.4.3 Use of Garmin G3x System

The Tecnam P2008C aircraft is equipped with Garmin G3X system which is provided with two SD card slots on each display unit for capturing of aircraft parameters.

As per Garmin G3X Touch Pilot's Guide, it is recommended to maintain three SD cards for the G3X system. One SD card should be used exclusively for loading software, another SD card should be used exclusively for loading databases, and a third card should be used exclusively for flight purposes. After reaching the crash site, it was found that only dummy cards were installed on both display units. Later, during the course of investigation, Operator's Engineering team informed that aircraft was without SD Card/ Memory Card installed when it was received from OEM. As per the operator, at the time of aircraft delivery, a loader card (Software update Card) which is used for aircraft's software updation, was initially supplied by the OEM. Consequent upon induction into the fleet, loader card was never used for updating the software and thereon, it was flying with the pre-installed software till aircraft met with an accident.

The Engineering Head for the organization also stated that as their Engineering team was unaware about the utility of these slots, therefore SD Cards were never installed on the device. At the time of accident, there was no requirement laid down by DGCA for recording of data through this medium.

From the above it is inferred that, while the recording of flight data was not mandatory as per requirements laid down by DGCA, the organization did not utilize the available medium of data cards to capture and record flight data. By pro-actively using these data cards to record flight data and its monitoring, the management could have tracked and monitored unauthorized flying being carried out by the Instructors and trainees. This reflects lack of

safety culture in the organization, wherein the organization is not making use of the available resources for safe conduct of flying training operations.

2.4.4 SMS Manual of Organisation

Scrutiny of SMS Manual of the Organisation approved by DGCA revealed that in many places in these documents, references of previously existing Rules of Aircraft Rules, 1937 i.e., Rule 68 to 77 are mentioned which have been omitted and superseded by the Aircraft (Investigation of Accidents & Incidents) Rules, 2012 and subsequently by the Aircraft (Investigation of Accidents & Incidents) Rules, 2017. The Rules mentioned in these documents are not updated as per the prevailing regulation at the time of approval of the manual.

While the above observations had no bearing on the accident, however there is a need to address these issues so that the operators/organizations are aware of the current regulations in place. This will help them to act as per the regulation in place and to understand what actions are required to be carried out by them in case of accidents/serious incidents/incidents without any ambiguity.

2.5 Accidents involving Flying Training Organisation Aircraft

The investigation team analysed the accident data of last 10 years i.e., from July 2012 to December 2022 involving aircraft of Flying Training Organisation and it was observed that there has been sharp increase in accident rates in the past few years. A total of 28 accidents occurred during this period involving Flying Training Organisation. Out of these 28 accidents there have been 10 accidents wherein fatalities were involved. Looking at the trend, it is observed that the number of fatal accidents are more in case of dual flying training exercise wherein the aircraft has been under the command of flying training instructor as compared to solo flying training exercise carried out by student pilots themselves. The instructors are entrusted with the responsibility to impart training and safe conduct of flight to ensure that students follow correct procedure while performing different flying training exercises. However, looking at the trend of probable cause of most of the fatal accidents wherein instructors are involved, that is not the case. The analysis of the probable cause of these fatal accidents revealed that in most cases standard procedures were not followed and there was clear deviation from the laid down operating procedures wherein the aircraft was involved in unauthorized activities such as low flying, deviating from authorized flight path, acrobatic manoeuvres, carrying out flying training in low visibility below VMC, not performing the correct pattern for landing/take-off, etc. There is lack of supervision and more importantly lack of safety culture in most of these organizations which is majorly contributing to these accidents. Most of these flying trainings are being carried out from the uncontrolled airfields where it is difficult to have a control or oversight by the DGCA in the absence of any recording media such as ATC tape, Surveillance Radar, etc. Moreover, these flying training exercises are carried out on basic training aircraft with no flight data recording medium like CVR, DFDR, etc. However, in this case, a medium for recording of flight data was available in the aircraft but the organisation did not make use of this medium sighting that it was not required as there was no laid down requirement by DGCA in this regard. Various safety recommendations have

been issued by AAIB through investigations to prevent re-occurrence of these type of occurrences which included installation of CCTV cameras in uncontrolled airfields, recording of flight data with suitable means, recording of VHF communication between tower and aircraft, etc.

DGCA recently has issued a flying training circular 01 of 2022 dated 22 November 2022 regarding “Monitoring of training in Flying Training Organization” with the objective to enhance DGCA oversight over flying training and ground training activities of Flying Training Organization for improving the safety of operations and quality of training. It is also mentioned that this would also facilitate instructors in analyzing the performance of the trainee pilots and investigations by DGCA. The circular covers some of the aspects required for enhancing the safety oversight by DGCA and also for improving safety of flying training organizations as they will have more resources to supervise the flying training exercises.

However, the fact that most of these flying training activities are carried out from uncontrolled airfields, the communication between the ATC (on ground) and the crew becomes that much important. A recording medium for recording the conversation between the ATC and the flight crew will further enhance the safety of training operations and its oversight. This aspect is not covered in the said circular issued by DGCA.

Further, the safety culture in the flying training organizations needs to be improved. The student pilots and instructors should be made aware of safety standards so that they ensure compliance with the safety standards. Regular briefing can be provided to students and instructors wherein they are made aware of repercussions of not following the standard procedures. This can be achieved by sighting examples of these accidents and also incidents during mass briefings and discuss the factors which led to these accidents/incidents.

2.6 Circumstances leading to the Accident

The weather was fine with visibility more than the required minima and no significant change. The aircraft was enroute on the outbound leg from Shirpur to Shegaon and was about 18 Nm outbound Shirpur, when the CFI on RT asked the instructor to turn back to Shirpur. The instructor on board confirmed the same and decided to turn back to Shirpur. The instructor took over the controls from student pilot and set course back to Shirpur. After setting course back to Shirpur, the aircraft was deviated from the assigned flight path and it headed towards the hilly region which was on the north of the intended flight path on radial 350. They did not report their intent of turning back to Shirpur and their position after setting course back. The crew did not adhere to the SOP as laid down in the TPM. No distress call was made during the entire flight. When the aircraft was flying over the hills, the speed was observed to have increased to 110 knots IAS. The aircraft was flown at a very high speed with abrupt maneouvere. This again was non-adherence to the laid down SOP in TPM and AFM.

Apart from unauthorized deviation from the assigned flight path and flying the aircraft beyond the operational limitations, the aircraft was flown close to the terrain without ensuring the

operational safety. Even the terrain warning/alerts generated in the cockpit were ignored and the safety of the aircraft operations were compromised. During this process the aircraft hit the trees over the hill and subsequently lost control. Thereafter, it impacted a big tree at high speed which resulted into the accident.

During the investigation, it was revealed that the accident flight was not the stand-alone case and unauthorized flying has been practiced in the organisation earlier also. Lack of supervision on part of concerned personnel and lack of safety culture in the organisation contributed immensely to this accident.

3. CONCLUSION

3.1 Findings

- 3.1.1 The Certificate of Airworthiness, Certificate of Registration and Airworthiness Review Certificate of the aircraft were valid on the day of accident.
- 3.1.2 The aircraft and its engine were being maintained as per continuous maintenance programme approved by the DGCA. All other laid down requirements pertaining to serviceability of aircraft were complied with, hence, serviceability of the aircraft did not contribute to the accident.
- 3.1.3 The weather around Shirpur and enroute was conducive to carry out flying training exercise and hence did not contribute to the accident.
- 3.1.4 The Flight Instructor was holding a valid license and was qualified for operating the training flight.
- 3.1.5 The training flight was authorized by CFI, who asked the aircraft to turn back to Shirpur while the aircraft was enroute during outbound leg. However, CFI did not provide the reason for asking the aircraft to set course back.
- 3.1.6 No distress or emergency call was given by the crew during the entire flight. The last call made by the crew on RT was when the instructor on board replied to the call out given by the CFI to set course back.
- 3.1.7 The instructor took over the controls from student pilot and set course back to Shirpur. The crew did not report the intention of setting course back and their position on RT, thereby, not adhering to the SOP laid down in TPM.
- 3.1.8 The aircraft was deviated from the assigned flight path and was flown at a very high speed with abrupt maneuver beyond the limitations stipulated in AFM. This again was non-adherence to the laid down SOP.
- 3.1.9 Apart from unauthorized deviation from the assigned flight path and flying the aircraft beyond the operational limitations, the aircraft was flown close to the terrain without ensuring the operational safety. The terrain warning/alerts generated in the cockpit were ignored and the safety of the aircraft operations was compromised which subsequently resulted into the accident.
- 3.1.10 The ATC and thereafter the CFI tried to establish the contact on RT assigned frequency, however, no response was received from the aircraft.

- 3.1.11 ELT of the aircraft was activated after the accident and the organisation received message from local authorities regarding the accident.
- 3.1.12 Aircraft was fitted with GDU 460 units, but no SD card was installed on the device to capture the aircraft parameters. However, two dummy cards were found in the slot. The organisation did not make use of this medium to record the flight data and monitor the flying activities.
- 3.1.13 Data was retrieved from the GDU 460 units' limited internal memory. Analysis of these flight data revealed that unauthorized flying practices are being followed in the organisation frequently and the accident flight was not an exception.
- 3.1.14 The investigation revealed lack of supervision on the part of Accountable Manager/CFI who were not able to identify and control such unauthorized flying practices being carried out in the organisation. This also reflects poor safety culture in the organisation. This accident could have been averted if the organisation management including Accountable Manager/CFI had identified such wrong practices and taken corrective action to stop the same.
- 3.1.15 Lack of safety culture in the organisation was further evident from the records of voluntary reporting. The procedures only exist on paper and were not complied in true letter and spirit. Further, there is no awareness in the organisation regarding voluntary reporting of events and hazards.
- 3.1.16 Analysis of accidents pertaining to FTOs during last ten years revealed that:
- Most of the accidents in case of solo flying training exercise occurred due to lack of training/supervision.
 - Most of the accidents in case of dual flying training exercise occurred due to non-adherence to SOP by the Instructor/Students.
 - Most of the fatal accidents occurred during dual flying training exercise as compared to solo flying training exercise wherein standard procedures were not followed and unauthorized activities such as low flying, deviating from authorized flight path, acrobatic manoeuvres, carrying out flying training in low visibility below VMC, not performing the correct pattern for landing/take-off, etc were carried out.
 - Most of these flying trainings are being carried out from the uncontrolled airfields and on basic training aircraft where there are no means such as ATC tape, Surveillance radar, flight data recorders, etc to record flying training activities.
 - There is lack of supervision and more importantly lack of safety culture in most of these Flying Training Organizations which is contributing to these accidents.
- 3.1.17 Flying Training Circular dated 22 November 2022 issued by DGCA covers most of the aspects required for enhancing the safety oversight by DGCA. However, it does not contain any directions for developing means to record conversation between ATC and aircraft flying in uncontrolled airfield/region which will further enhance the safety oversight.
- 3.1.18 Rules mentioned in Organization's documents such as SMS Manual and TPM are not updated as per the prevailing regulations.

3.2 Probable cause of the accident

The accident occurred as the aircraft was maneuvered abruptly at a high-speed close to the terrain, during which it impacted the trees over the hill, as a result of

- Non-adherence to the SOP, wherein the aircraft was deviated from the assigned flight path.
- Lack of supervision of training flights being conducted in the organization.
- Lack of safety culture in the organization.
- Non-use of available resources such as Garmin G3X SYSTEM installed in the aircraft for data collection, monitoring, and training.

4. SAFETY RECOMMENDATIONS

It is recommended that

- 4.1** DGCA may advise all Flying Training Organizations to put a mechanism in place for 100% supervision and monitoring of the training sorties by the instructors as per the laid down procedures. The compliance of the same may be checked and verified during audits/surveillance of FTOs.
- 4.2** DGCA may analyze feasibility of issuing instructions to all FTOs for installing means to record VHF communications between aircraft and tower in the uncontrolled airfields to enhance the oversight of flying training exercise.
- 4.3** DGCA may issue instructions/directions as deemed fit to all Flying Training Organizations to develop means
 - to enhance safety culture in their organization wherein it is ensured that every individual involved in flying training operations follow the laid down procedures/guidelines in true letter and spirit.
 - to ensure that every personnel in the organisation is aware of voluntary reporting system procedures and are encouraged to report any event/hazard.
- 4.4** DGCA may verify the manuals submitted by operators to ensure that these are in line with the existing regulations.
- 4.5** DGCA during their surveillance/audit of the FTOs may check compliance of instructions given to FTOs (vide Flying Training Circular 01 of 2022) to ensure that all aircraft are equipped with means to capture & record flight data and are effectively used for flying training and monitoring.



(Dinesh Kumar)
Investigator

Date: 15 June 2023

Place: New Delhi



(K Ramachandran)
Investigator-in-Charge

APPENDIX A - PHOTOGRAPHS OF AIRCRAFT WRECKAGE AND SURROUNDINGS



Fig 16. First impact on trees (View from aircraft wreckage)



Fig 17. Front view of the aircraft with damaged cockpit and sheared RH wing



Fig 18. Impact marks on Left wing (all along leading edge)



Fig 19. Detached Right Wing and Right Side Cockpit Door



GOVERNMENT OF INDIA
OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION
TECHNICAL CENTRE, OPP. SAFDURJUNG AIRPORT, NEW DELHI

FLYING TRAINING CIRCULAR 1 OF 2022

E-File No. DGCA-16034(11)/9/2020-DFT
Dated: 22nd November, 2022

Subject: Monitoring of training in Flying Training Organization (FTO).

1. Introduction:

The Flying Training Organizations operate from various controlled and uncontrolled airfields. Inspection/surveillance/audit of these flying training organization are carried out by DGCA as per CAR Section 7 Series D Part 1.

The objective of this circular is to enhance DGCA oversight over flying training and ground training activities of Flying Training Organization for improving the safety of operations and quality of training. This would also facilitate instructors in analyzing the performance of the trainee pilots and investigations by DGCA.

2. Applicability:

This circular is applicable to all Flying Training Organizations (FTO).

3. Methods of monitoring:

(i) Installation of Camera

a) All the FTOs shall install cameras of high resolution in FTO premises to ensure proper visibility of flying training activities. The cameras should be installed to cover the following view :

- Apron area
- Hangar
- Taxiway and runway
- Classrooms
- Examination Room
- Area where the flights are authorized in Flight Authorization register

- b) The cameras should be installed and made operational within 90days from the date of issue of this circular.
- c) SPL and FRTOL(R) exams shall be carried out under camera with live feed to Directorate of Flying Training (DFT) of DGCA which shall be intimated 03 days prior.

(ii) Flight data monitoring in Aircraft:

Many aircrafts available for flying training are equipped with glass cockpit (Garmin G1000/ G3X etc.) which has a provision of recording flight data and/or fitted with ADS (B) which can also monitor the path followed by the aircraft. This provides opportunity for enhancement of training, improve training quality and objective surveillance. FTO shall ensure the following:

- a) FTOs operating with aircraft equipped with glass cockpit or ADS (B) shall monitor, analyze and maintain the data from the date of issue of this circular.
- b) FTOs operating with aircraft not pre-equipped with glass cockpit or ADS (B) shall devise a method within 90 days for recording and monitoring of the flights to check if flight path flown by their trainee pilots and instructors are as per flight authorization. FTO shall install/carry an equipment which automatically records at least following parameters:
 - i) Engine start/stop time- as feasible
 - ii) Flight path followed
 - iii) Height and Speed of aircraft at all times

The above data is to be maintained by all FTOs and Safety manager shall carry out flight data analysis of at least 25% flights of the FTO on daily basis and maintain record of analysis.

4. Monitoring:

- a) The FTO shall ensure that the surveillance cameras are functional (during flying activities) and the camera feed must be displayed in the CFI, Dy. CFI and Flying Instructor room.
- b) The FTO shall ensure that the recording of glass cockpit, ADS (B) or any other monitoring device is functional during flying activities.
- c) In case the cameras/ADS (B) or any other monitoring device is nonfunctional then FTO should intimate DFT immediately via email and take action to make it functional within 15 days.
- d) CFI/Dy. CFI/Safety Manager of the FTO shall preserve the recording of camera for at least 30 days and the flight data of all the devices for at least 06 months.

In case a violation of the circular is observed or the record is not available as required in this circular or tampered, appropriate action as per the enforcement/ penal provisions contained in CAR Section-7, Series-I, Part-V, CAR Section-7, Series-D, Part-1 and The Aircraft Rules 1937 will be taken.

This supersedes FLYING TRAINING ADVISORY CIRCULAR No. 1 of 2013.

This issues with the approval of competent authority.

Sd/-
(Maneesh Kumar)
Joint Director General