



**Government of India**  
**Directorate General of Civil Aviation**

**Investigation Report on Gear-Up landing incident to  
M/s Patiala Aviation Club aircraft VT-PBD at Patiala on**

**12.02.2020**

## **FOREWORD**

In accordance with Annex 13 to the International Civil Aviation Organisation Convention and the Aircraft (Investigation of Accidents & Incidents) Rules 2017, the sole objective of this investigation is to prevent aviation incidents/ accidents in the future. It is not the purpose of the investigation to apportion blame or liability.

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

## **GLOSSARY**

1.	AED	Aircraft Engineering Directorate, DGCA
2.	AGL	Above Ground Level
3.	AME	Aircraft Maintenance Engineer
4.	ARC	Abnormal Runway Contact
5.	ATC	Air Traffic Control
6.	CPL	Commercial Pilot License
7.	CVR	Cockpit Voice Recorder
8.	DE	Designated Examiner
9.	DGCA	Directorate General of Civil Aviation
10.	DI	Daily Inspection
11.	DME	Distance Measuring Equipment
12.	FDR	Flight Data Recorder
13.	FRTOL	Flight Radio Telephone Operator's Licence
14.	FWD	Forward
15.	IFR	Instrument Flight Rules
16.	IR	Instrument Rating
17.	LG	Landing Gear
18.	LH	Left Hand
19.	MKR	Marker
20.	MLG	Main Landing Gear
21.	MTOW	Maximum Take-off Weight
22.	PIC	Pilot In-Command

23.	RH	Right Hand
24.	RWY	Runway
25.	SE	Single Engine
26.	SOP	Standard Operating Procedure
27.	TPM	Training and Procedures Manual
28.	UTC	Coordinated Universal Time
29.	V <sub>APP</sub>	Approach Speed
30.	V <sub>FE</sub>	Maximum Flap Extended Speed
31.	V <sub>LO</sub>	Maximum Landing Gear Operating Speed
32.	VFR	Visual Flight Rules
33.	VHF	Very High Frequency
34.	VOR	Very High Frequency Omni Range

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**Investigation Report on Gear-Up landing incident to M/s Patiala Aviation Club aircraft VT-PBD at Patiala on 12.02.2020.**

1. Aircraft

Type : TECNAM P2006T  
Nationality : INDIAN  
Registration : VT-PBD

2. Owner/Operator : Patiala Aviation Club

3. Pilot-in-Command : CPL Holder  
Extent of injuries : NIL

Co-Pilot : CPL Holder- Designated Examiner  
Extent of injuries : NIL

4. Date of incident : 12.02.2020

Time of incident : 07:50 UTC (approx.)

5. Place of incident : Patiala Aerodrome, Punjab

6. Co-ordinates of incident site : 30° 18' 48"N ; 76° 21' 51"E

7. Last point of Departure : Patiala Aerodrome

8. Intended place of Landing : Patiala Aerodrome

9. No. of passengers on board : NIL

10. Type of operation : Familiarisation Flying Training

11. Phase of operation : Landing

12. Type of Incident : ARC (Abnormal Runway Contact)

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

## **Synopsis**

Patiala Aviation Club aircraft VT-PBD was engaged in familiarisation flying training of a CPL holder (with period of absence in flying exceeding 12 months) under supervision of a Designated Examiner on 12.02.2020. Three Circuit and landing exercises at Patiala were planned as part of the familiarisation flying training and 02 circuit and landing exercises were completed successfully. During the third approach to Patiala RWY33, the crew did-not extend the landing gear and the aircraft landed with the landing gear in retracted condition at 07:50UTC (approx.).

DGCA-India, vide Order No DGCA-15018(19)/1/2020-DAS dated 26.02.2020 instituted investigation of the incident under Rule 13 (1) of Aircraft (Investigation of Accidents and Incidents), Rules 2017 and appointed an Investigator-In-Charge.

The aircraft landed with the landing gear in retracted condition, due to non-adherence to procedures and checklist(s) by both the operating crew during final approach.

Contributory factors to the incident are:-

- a) Execution of a short circuit which was not discussed during briefing of the familiarization flying training exercises.
- b) Inadequate monitoring by the Examiner over the actions being performed by the CPL holder (LH seat occupant) undergoing familiarization flying training.

## **1. Factual information**

### **1.1. History of flight:**

Patiala Aviation Club, TECNAM P2006T aircraft VT-PBD was engaged in a familiarization flying training on 12.02.2020 at Patiala (Circuit and landing exercise). The aircraft departed from Patiala for the first circuit w.r.t CPL holder undergoing familiarization flying training at 07:10UTC. Three Circuit and landing exercises were planned for the CPL holder with the Designated Examiner (who is also the CFI of Patiala Aviation Club) followed by IR check on 12.02.2020. At the time of incident the cockpit was manned by the Designated Examiner (RH cockpit seat) and the CPL holder (LH cockpit seat).

The CPL holder (LH cockpit occupant) undergoing familiarisation training had exercised the privileges of his CPL license last on 10.08.2018 and because of the absence in flying of more than 12 months, he had to undergo ‘Ground Refresher on Technical/Performance’, ‘Familiarization Flying Training’, ‘Skill test’ and ‘IR check’. After obtaining the training slot for 12.02.2020, he reported to Patiala Aviation Club by 04:15UTC (approx.) and updated himself of the aircraft checklists and procedures. During the period (Flight plan filing time 06:30UTC) he also filed the flight plan for the planned flight to Ambala(VIAM) with a planned departure time of 08:00UTC.

The Designated Examiner reported for duty by 04:20UTC (approx.) on 12.02.2020 at Patiala Aviation Club. The Examiner met the CPL holder (who had an absence in flying exceeding 12 months) in his office, where as per the Examiner the Ground Refresher was also conducted for duration of 30 minutes, prior to the flying training. The Designated Examiner performed the breath analyser test for alcohol at 05:24UTC. The result of the breath analyser test for alcohol was ‘negative’. The Designated Examiner after reporting for duty has informed that, he performed flight authorisation for flying, aircraft inspection and pilot acceptance of aircraft. He then accompanied another flying student for Instrument flying training from 05:30UTC (11:00IST) to 07:00UTC (12:30IST).

The CPL holder(LH seat occupant), who was undergoing the familiarization flying training with the Examiner, was performing circuit and landing exercise in-order to complete the 0:45 minutes flying duration as required by DGCA Operations Circular 02 of 2004. Three circuit and landing exercises were planned and 02 circuit and landings were completed uneventfully.

After take-off for the third circuit from RWY 33, during climb before 500ft the Examiner gave a command to turn left, join downwind leg for RWY33 and announced that this would be a short circuit. Being a familiarization flight the Examiner was assisting the CPL holder (LH seat occupant) to perform the flight. Since a short circuit was not planned to be performed, the CPL holder (LH seat occupant) undergoing familiarisation training could not follow the instructions from the Examiner to turn left upon take-off. The checklists were not followed effectively during the third circuit due to change in the circuit plan.

The winds at the time of approach to RWY33 were about 07kts cross from 290°. The Examiner informed that bird activity in the vicinity of operation was observed near Patiala Aerodrome. Examiner mentioned that, a call-out was made for landing gear down, but he did not check the Landing gear switch selection or the gear down indications prior to landing and continued with the approach. The crew did-not operate the landing gear during the approach and the aircraft landed on RWY33 with the landing gear in retracted condition. Both the operating crew members reported that, they did not get any warning/aural alerts w.r.t landing gear in retracted condition during approach. The incident occurred during day time at 07:50UTC (approx.).

There was no fire as a result of the incident and no injury has been reported to either of the occupants.

### **1.2 Injuries to persons:**

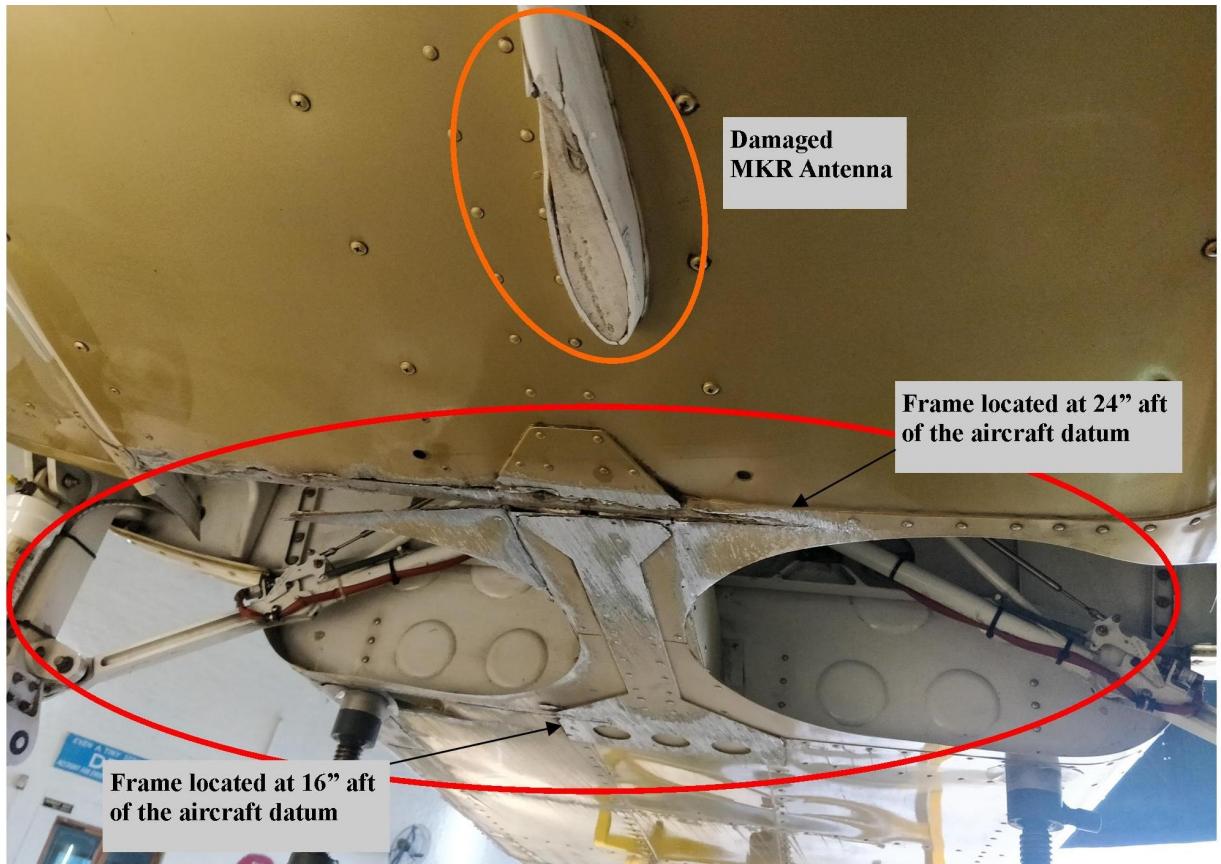
Injuries	Crew	Passengers	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor/None	Nil/02	Nil	

### **1.3 Damage to aircraft:**

The various aircraft parts (fuselage skin, structural frame, wheels, antenna and components on the lower fuselage) were damaged. Landing gears LH & RH forward and Aft beams found scuffed from the lower side, the skin scuffing was also observed especially from the LH lower side. Tail cone fairing impact observed. All the Antennas installed on the belly got damaged i.e. VHF-COM 2, DME, Marker Beacon and transponder.



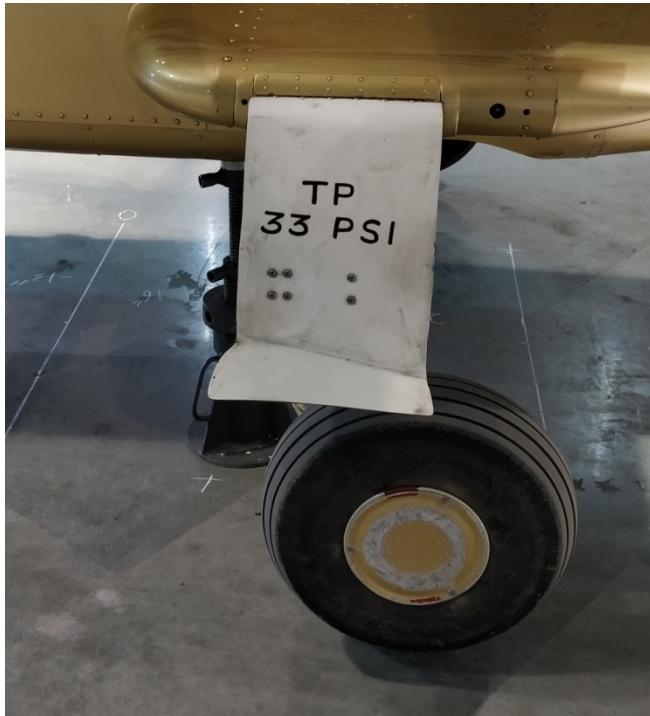
**Damage to aircraft skin on the frame on LH side (13" FWD of aircraft datum) –  
Photograph taken from FWD looking AFT**



**Damaged aircraft antenna, aircraft skin and frames –  
Photograph taken from AFT looking FWD**



**Damage to aircraft skin on the frame on LH side (23" FWD of aircraft datum) –  
Photograph taken from aircraft LH looking towards RH side**

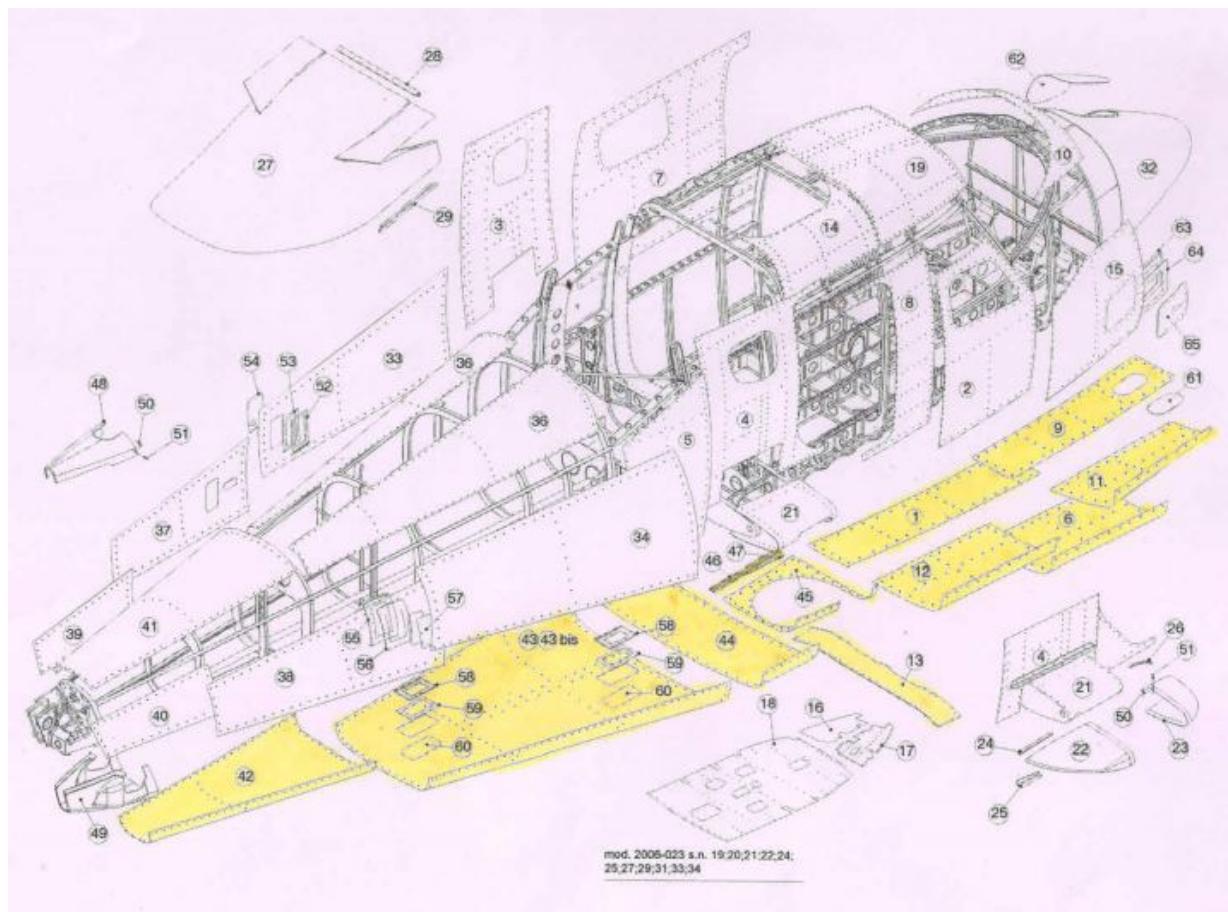


Scuffing damage on LH MLG Wheel



Scuffing damage on RH MLG Wheel

Skin damage:-



#### AIRCRAFT IPC (ILLUSTRATED PARTS CATALOGUE) - SKIN 53-30

Scuffing of skin was observed on LH/RH Forward side lower skin IPC FIG (11), Side central lower skin IPC FIG (6), LH/RH aft side lower skin IPC FIG (12)

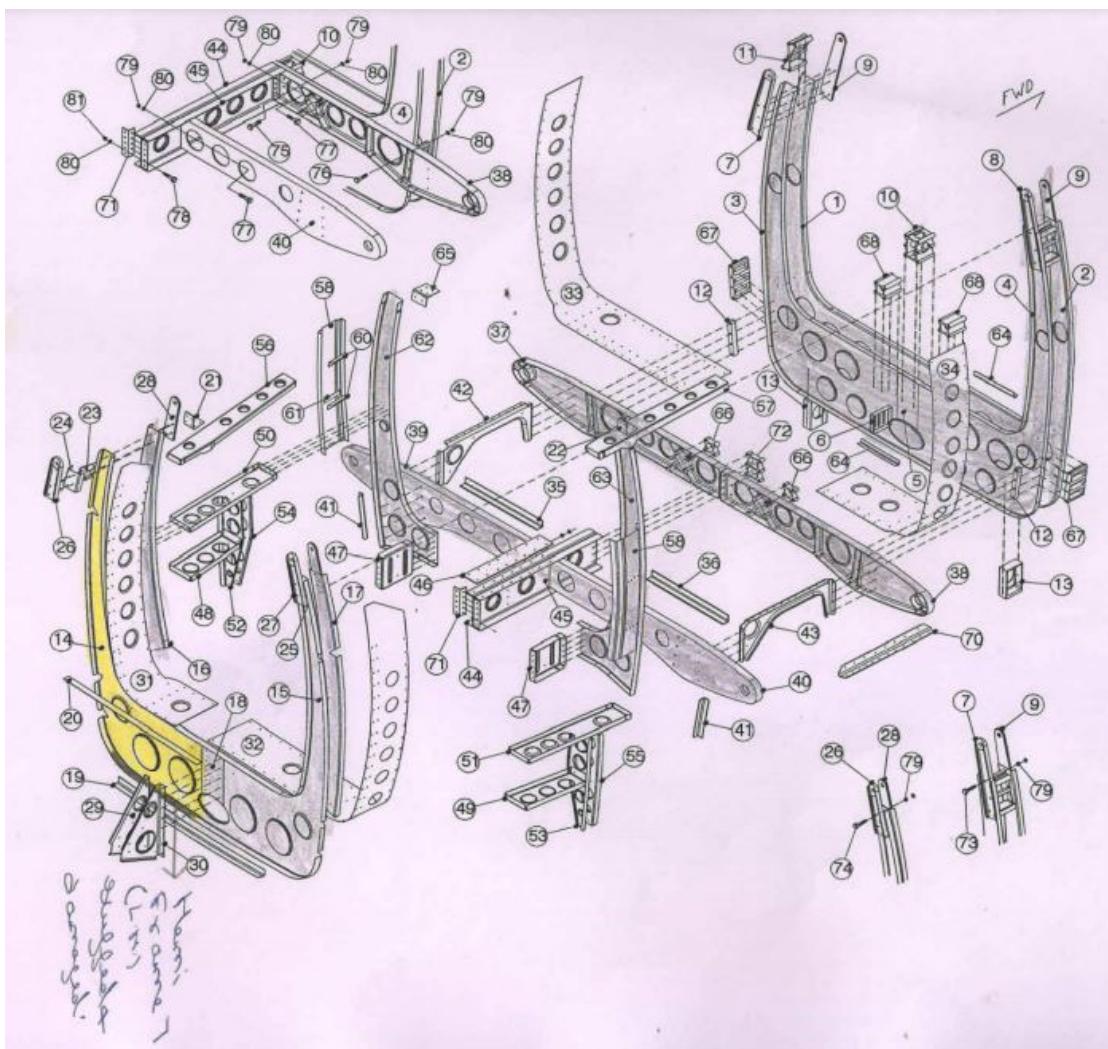
Sever scuffing of skin was reported on Forward Central lower skin IPC FIG(9), Lower Centre Skin IPC FIG (1), External Beam skin IPC FIG (13), Main gear skin IPC FIG (45), Cabin to tail cone lower skin IPC FIG (44), Lower cabin skin IPC FIG (43), Lower stabilator skin IPC FIG (42)

### Auxiliary Structure:-

External Doubler (Mod 2006/087) was found severely scuffed due to impact of landing. Cover plate was found cracked.

### **Structural Members:-**

Hemi Frame 7 LH IPC FIG (14) was scratched, penetrated to the full thickness from outer bottom of the member for about 4-5 "in length but no damage to doubler (19)



AIRCRAFT IPC (ILLUSTRATED PARTS CATALOGUE)- MAIN FRAME 53-10

#### **1.4 Other damages:**

Nil.

## **1.5 Personnel information:**

The details of the licences and ratings held by the Examiner and the pilot undergoing familiarization flight training are as detailed below:-

<b>Personnel Information :</b>		
<b>Details</b>	<b>CPL holder undergoing familiarization (LH seat occupant)</b>	<b>Designated Examiner (RH seat occupant)</b>
a) Type of license	CPL holder	CPL holder
b) Valid upto	31.10.2023	11.04.2021
c) Date of Initial issue	01.11.2018	11.02.1981
d) Class of license	Single Engine, Multi engine	Single Engine, Multi engine
e) Category of license	Aeroplanes	Aeroplanes
f) Date of Birth	14.10.1981	12.04.1956
g) Aircraft Ratings	Cessna 172, Tecnam P2006T	Open on SE upto 1500 kgs and PA34, P68C, BARON G58, TECNAM P2006T
h) Date of Endorsement as PIC on type of aircraft	01.11.2018	23.03.2017
i) Date of Endorsement as Examiner	Not applicable	05.02.2018(on type) Also approved as CFI of Patiala Aviation Club on 25.01.2011
j) Date of last Medical Exam	22.05.2019	11.12.2019
k) Medical Exam validity	07.06.2020	17.06.2020
l) FRTOL Valid upto	31.10.2023	25.06.2022
m) Date of Last IR check	10.08.2018	01.02.2020
n) Date of last Proficiency Check	20.08.2018	01.02.2020
o) Total flying experience	200:00	11773:40
p) Flying Experience on Type	15:00	417:35
q) Last refresher	26.06.2018	19.04.2019

<b>Details</b>	<b>CPL holder undergoing familiarization (LH seat occupant)</b>	<b>Designated Examiner (RH seat occupant)</b>
r) Date of last standardization check	Not applicable	01.02.2020
s) Last flown on Type(date)	10.08.2018	12.02.2020
t) Total flying experience in last 180 days(total and on type)	Nil	Total 432:20 On type 91:35
u) Total flying experience in last 30 days(total and on type)	Nil	Total 70:55 On type 24:30
v) Total flying experience in last 7 days(total and on type)	Nil	Total 31:30 On type 14:10
w) Total flying experience in last 24 hrs.(total and on type)	Nil	Total 08:05 On type 05:40

## **1.6 Aircraft information:**

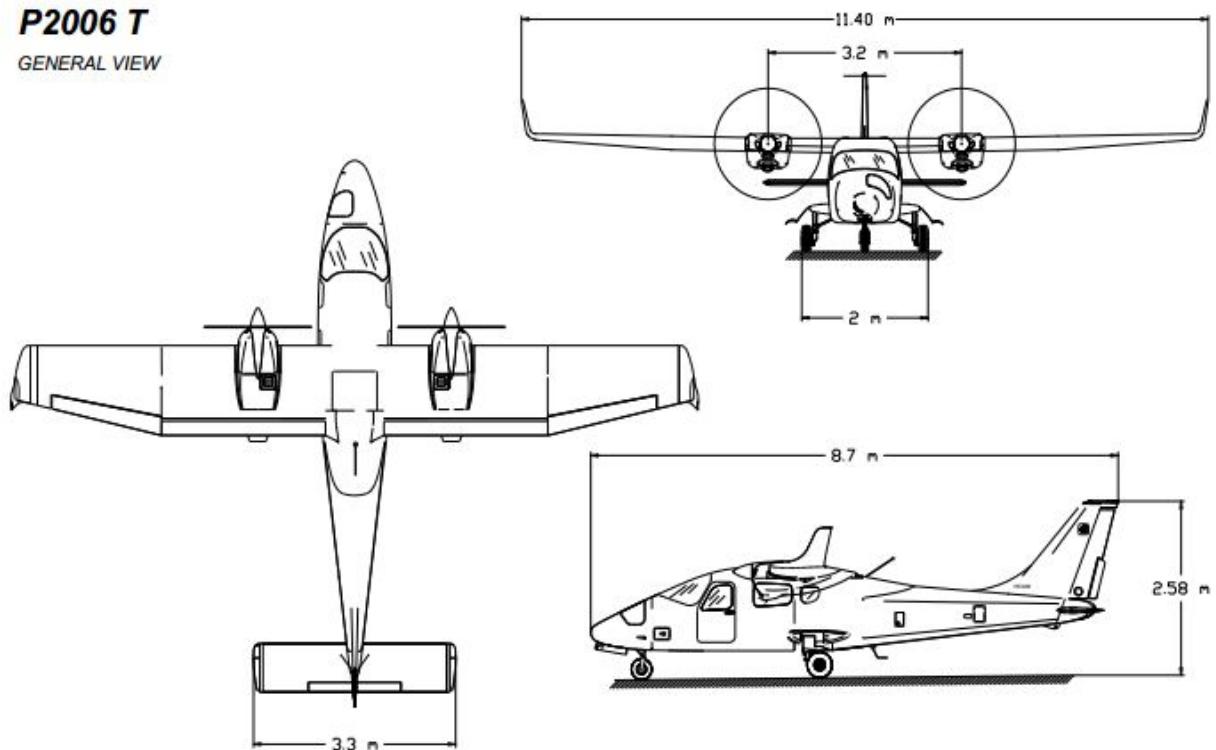
Tecnam P2006T is a twin-engine four-seater aircraft with high cantilevered wing and tricycle retractable landing gear. The aircraft is certified in Normal category, for day and night operation under VFR & IFR. The aircraft is equipped with two four-cylinder four-stroke Rotax 912S engines of 98hp (73kW) each, both rotating clockwise. These are partially liquid cooled and they feature an integrated reduction gear driving constant speed propellers with pitch feathering devices.

<b>1.6.1 Aircraft:-</b>	
Aircraft:- TECNAM P2006T	
a) Manufacturer	COSTRUZIONI AERONAUTICHE TECNAM
b) Type	P2006T
c) Owner	PATIALA AVIATION CLUB
d) Operator	PATIALA AVIATION CLUB
e) Manufacturer Serial no.	187
f) Year of Manufacture	2016
g) Certificate of Airworthiness	NO. 6837 ISSUE DATE 11.01.2018 VALIDITY N/A
h) Airworthiness Review Certificate(with issue date and validity)	NO. ADAW/PAT/ARC/2020/003 ISSUE DATE 31.01. 2020 VALIDITY 30.01.2021

i) Category	NORMAL SUBDIVISION PASSENGER
j) Certificate of Registration	No. 4734 ISSUE DATE 26.09. 2017
k) Minimum Crew Required	01
l) Maximum All Up weight	1230 KG
m) Last Major inspection	GROUP B INSPECTION 19.10.2019 at 892:40Hrs
n) Last inspection	GROUP A INSPECTION 07.02.2020 at 942:30Hrs
o) Airframe Hrs since new	956:10
p) Airframe hours since last C of A	956:10
q) Status of Airworthiness Directive, Service Bulletins, DGCA Mandatory Modifications	UPDATED ON 31.01.2020 (ARC ISSUE DATE)

### P2006 T

GENERAL VIEW



Dimensions TECNAM P2006T

<b>1.6.2 Engine:-</b>	<b>LH</b>	<b>RH</b>
Manufacturer	ROTAX	ROTAX
Type	912 S3	912 S3
Engine Serial no.	9563841	9563842
Time Since new(TSN)	956:10	956:10
Maximum power (at declared rpm)	73.5 kW (98.6hp) @ 5800 rpm –5 min. max 69.0 kW (92.5hp) @ 5500 rpm (continuous)	
Last inspection Carried out	50 HRS ROTAX INSPECTION 07.02.2020	
Average Oil consumption(last 6 months)	LH .125 LTS/HR RH .125 LTS/HR	
Average Fuel consumption(last 6 months)	LH 20 LTS/HR RH 20 LTS/HR	
FUEL USED	AVGAS 100LL	AVGAS 100LL

<b>1.6.3 Propeller:-</b>	<b>LH</b>	<b>RH</b>
Manufacturer	MT Propeller	MT Propeller
Model	MTV-21-A-C-F/CF178-05	MTV-21-A-C-F/CF178-05
Propeller Serial no.	160434	160431
Time Since new(TSN)	956:10	956:10
Blades/Hub	2 wood/composite blades – Aluminium hub	
Type	Variable pitch - hydraulically controlled	

#### **1.6.4 Normal Procedures-Before Landing Checklist (AFM):-**

- 1.Rear Seat Passengers** Seats set at full aft and lower position  
**2.LH and RH Electrical Fuel pump** BOTH ON  
**3. On downwind leg:**

<b>MTOW 1180kg</b>	<b>MTOW 1230 kg</b>
$V_{FE} = 119 \text{ KIAS}$	$V_{FE} = 122 \text{ KIAS}$

- |                                      |                                  |
|--------------------------------------|----------------------------------|
| 4. Speed below applicable VLO/VLE    | Landing gear control knob – DOWN |
| 5. Carburetors heat                  | Check green lights ON            |
| 6. LH and RH Propeller Lever         | CHECK OFF                        |
| 7. On final leg: speed below 93 KIAS | FULL FORWARD                     |
| 8. Final Approach Speed              | Flaps FULL                       |

<b>MTOW 1180kg</b>	<b>MTOW 1230 kg</b>
$V_{APP} = 70KIAS$	$V_{APP} = 71KIAS$

- 9. Landing and taxi light**  
**10. Touchdown speed**

ON  
65 KIAS

### **1.6.5 Normal On-board checklist:**

As per the normal checklist, landing gear extension is included as a part of actions before landing.

AFTER TAKE OFF		
C	LANDING GEAR	With + ROC, UP
C	FLAPS AT 400 AGL	UP
OR	POWER LEVERS	27°/2250 RPM
IED	BOOST PUMPS {1 by 1}	OFF/CHECK
UP	FUEL PRESSURE	CHECK
IDE	CRUISE CLIMB	95-105 KIAS
SET	EXTERNAL LIGHTS	AS REQUIRED
CK		
CRUISE		
	SLOW CRUISE	22°/1900 RPM
CK	MEDIUM CRUISE	22°/2200 RPM
CK		
DESCENT		
	PROPS	2250 RPM
ET	ATIS/ALTIMETER	RECORD SET
R	BOOST PUMPS	BOTH ON
CK	SEATBELTS	FASTENED
WD	APPROACH	BRIEF
EM	EXTERNAL LIGHTS	ALL ON
IO		

LANDING		
ES	PROP LEVERS	FULL FWD
	BOOST PUMPS	CHECK ON
	LDG GEAR <122KIAS	DOWN
LE	FLAPS <122Kts	T/O
CK	LANDING GEAR DOWN	/3 GREEN
DK	FLAPS<93 KIAS	FULL
M	FINAL	75 KIAS
CK		
AFTER LANDING		
	TRANSPOUNDER	SET 2000
ET	FLAPS	UP
R	BOOST PUMPS	BOTH OFF
ES	EXTERNAL LIGHTS	AS REQUIRED
N	PITOT HEAT & A/P MASTER	OFF
D	TRIM PITCH & ROLL	NEUTRAL

### **1.6.6 Landing Gear System:-**

Landing gear of TECNAM P2006T is a retractable tricycle gear with nose wheel steering. The landing gear retraction system is of electro-hydraulic type, powered by a reversible pump which is electrically controlled by the LG control knob located on the LH instrument panel and by the legs position micro switches: these ones allow for detecting landing gear “down-locked” and “up” positions and for alerting the pilot by aural means should the approach and landing configuration be incorrect, in terms of flaps/throttle levers/landing gear position, in order to avoid an unintentional gear-up landing.

The system operates in two modes: normal and emergency.

Normal operation provides gear extension and retraction by means of hydraulic jacks. Gears extension is helped by gravity also.

Emergency operation only provides landing gear extension by means of a hydraulic accumulator which discharges pressurized oil in the above mentioned jacks.

Hydraulic oil, contained in an integrated reservoir located inside the Hydraulic Power Pack, is pressurized by a reversible electric pump: as the LG control knob is placed in either the UP or DOWN position, the pump directs the fluid through the related pressure line toward each hydraulic jack.

In order to prevent an inadvertent LG retraction, the control knob must be pulled before being pushed upward for UP command.

The emergency hydraulic accumulator is used for the landing gear extension: normal extension line and emergency extension line converge in correspondence of the shuttle valves (two valves: the first one for NLG and the second one for MLG emergency operation). The emergency accumulator nitrogen pressure indicator is located on the tail cone, left side; on ground, a red push-button located beneath the pressure indicator allows the electrical pump for charging the accumulator should the nitrogen pressure be below the lower limit indicated on the placard.

Emergency extension is controlled by two distributors located on the cabin floor, under a removable cover in correspondence of the pilot seat.

The LG indication system is electrical and it is composed by the following main components:

1. UP/DN limit micro-switches	6 couples, 2 for each leg
2. Leg position lights, 3 green	Turned ON when the pertinent leg is extended and locked and located on the LH instrument panel.
3. Transition light, 1 red	Turned ON during transition phases.
4. Pump light, 1 amber	GEAR PUMP ON caution amber light turned ON when the pump is electrically supplied
5. Push to test	For landing gear red and green lights operational check

The three green lights illuminate only when the respective gear is “down-locked”; the red light indicates the gear is in transit “up” or “down” and the amber caution light GEAR PUMP ON indicates that the pump is electrically supplied.

The red transition light extinguishes only when all the three gear legs are “downlocked” or they are “up” while the amber caution light extinguishes only when the electrical pump is “off”.

The Up/Down limit switches control the LG lights lighting and pump operation on the basis of LG configuration set by the pilot through the LG control knob.

A “push to test” button is used to check that the landing gear position lights are operating.

A warning horn alerts the pilot when the LG control knob is in UP position and at least one of the two throttle levers and/or flaps are respectively set to idle and to LAND position.

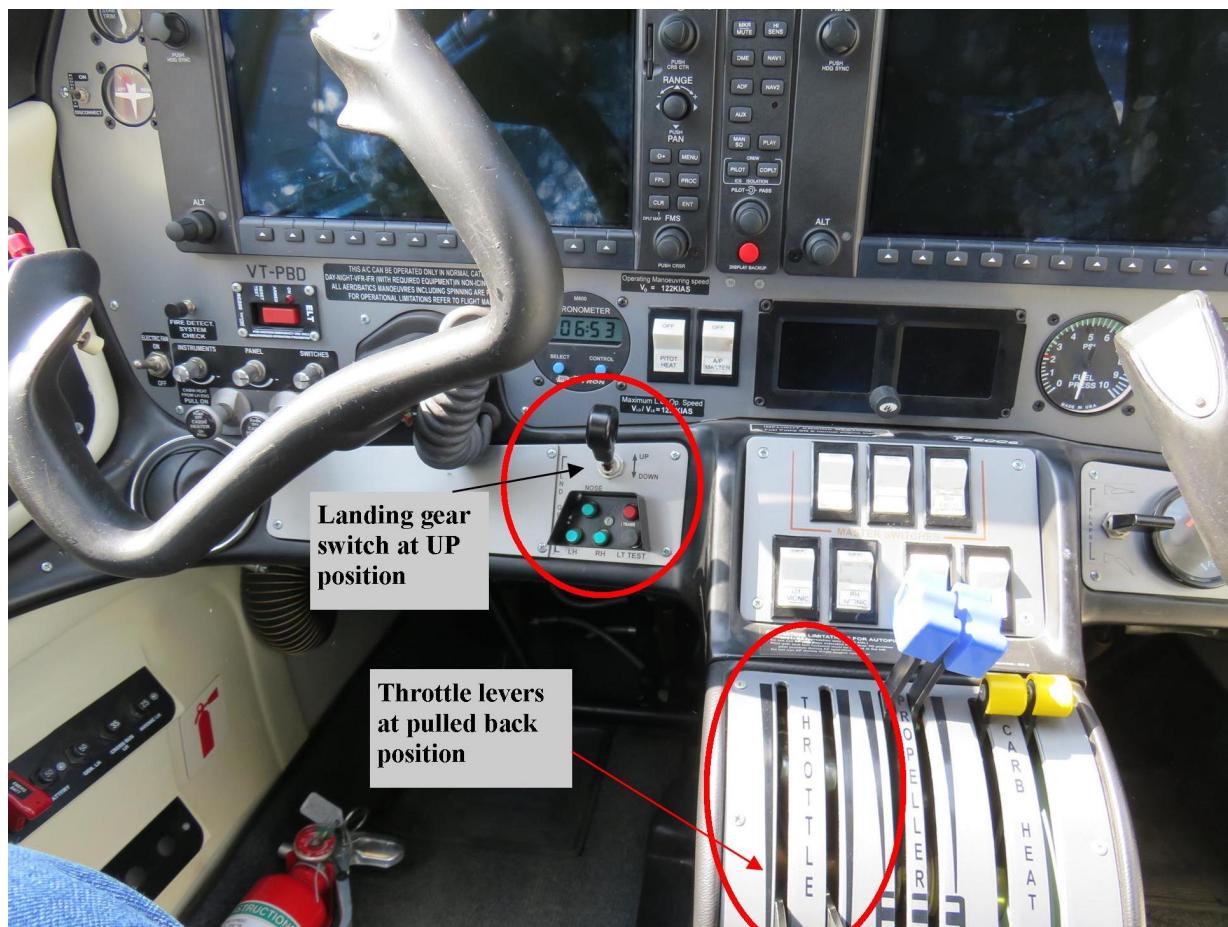
During emergency extension, LG position lights work as per normal extension mode: for this reason the LG control knob must be set on DOWN position before starting the emergency procedure.

### **1.6.7 Aircraft – Landing gear and Flap In-situ condition:-**

1. The landing gear switch in the cockpit was found in the ‘UP’ position and the flaps were in the FULL extended position.



**Flap lever and position indicated as FLAPS FULL**



**Landing Gear lever and throttle lever position**

## **1.7 Meteorological information:**

As per data provided by Indian Army Aviation personnel, who controls radio communication at VIPL(Patiala Aerodrome) the METAR as of 07:30UTC was Surface wind: 290/07, Visibility: 4000m, Present weather: HZ BCMG 5km, QNH:1018.

## **1.8 Aids of navigation:**

The flying exercise conducted was local circuit and landing under VFR (Visual flight rules).

## **1.9 Communication:**

Two way radio communications was available between aircraft and ATC. The radio communications for Patiala aerodrome is handled by a radio controller of Indian Army Aviation. The crew did not report any un-serviceability and/ communication issues.

## **1.10 Aerodrome information:**

Patiala aerodrome is a civil aerodrome located in Patiala, Punjab. The airport is under the management of Government of Punjab. As per available information Indian Army Aviation, Patiala Aviation Club and NCC are operating at the aerodrome. The airport is located at an elevation of about 820ft/250m. The runway available is a non-instrument runway of orientation RWY33 and RWY15.

### **1.10.1 Patiala Aerodrome Runway physical characteristics:-**

RWY Designation	True & MAG BRG	Dimensions of RWY (ft)
15	150° GEO 149° MAG	3840 * 150
33	330° GEO 329° MAG	3840 * 150

## **1.11 Flight recorders:**

### **1.11.1 CVR:-**

The aircraft is not installed with a Cockpit Voice Recorder, as it is not required.

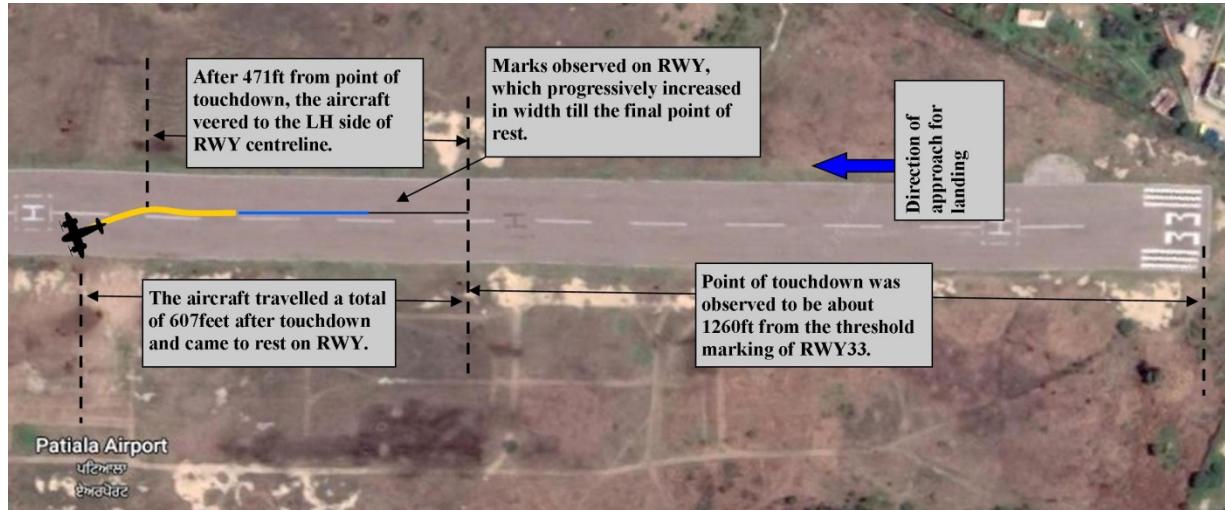
### **1.11.2 FDR:-**

The aircraft is not installed with a Flight Data Recorder, as it is not required.

## **1.12 Wreckage and impact information:**

During inspection of the runway, following were observed:

- (a)The first point of impact is located on the RH side of the RWY centerline (2ft 6 in, from RWY centerline) at a distance of 1260ft after the threshold marking of RWY33.
- (b)The impact marks progressively increased from a single line to wider markings, including marks of rubber (indicating wheel rub marks).



**Figure-I (Not to scale) : Path followed by the aircraft**

- (c) Further moving on the runway, the aircraft veered from the RH side of runway centerline to the LH side of runway centerline and came to a rest.
- (d) At the final location, the aircraft nose was 14ft away from the RWY centerline towards RH side and the tail was found 5ft from the RWY centerline. All the landing gears were found to be in a retracted position and the aircraft fuselage lower skin was in contact with the ground. The final location of the aircraft was approximately 607ft from the first point of touchdown.



**Final location on the aircraft on runway after 1867 feet from RWY 33 threshold marking**



**Aircraft fuselage marks on the RWY33**

### **1.13 Medical and pathological information:**

Post incident the CPL holder (LH seat occupant) undergoing familiarization flying training and the Examiner were subject to breath analyser test for alcohol and the result were found ‘negative’ for both the crew members.

The CPL holder did not have any limitations as per their last Class-I medical assessment certificates. However, the following recommendations were recorded on the last Class-I medical assessment certificate of the Examiner:-

1. Advised to wear corrective glasses while exercising the privileges of license and always carry a spare set of spectacles while flying.
2. Next review with executive report on hearing performance while flying.
3. Advised to use Earplug Defenders in Noisy Environment.

The same were found complied, with no adverse findings in the executive report and in the Class I medical assessment conducted on 03.08.2020 (after the incident).

### **1.14 Fire:**

There was no fire or smoke during or following the incident.

### **1.15 Survival aspects:**

The incident was survivable. There was no injury reported to the crew or any other personnel on ground.

### **1.16 Tests and research:**

1. After retrieval of the aircraft from the incident site, it was shifted to hangar of Patiala Aviation Club. During inspection of the aircraft after supporting it on aircraft jacks the following were observed:-
  - a) Landing gear extension and retraction system functions were observed to be normal based on selections being made from the L/G control switch in the cockpit.
  - b) Landing gear indications in the cockpit were in agreement with the actual landing gear positions.
  - c) Flap operation was found to be satisfactory.
  - d) Operational test of the landing gear alerting system for incorrect position at time of landing was carried out multiple times. The aural alert generation during the approach and landing configuration were simulated; in terms of flaps/throttle levers/landing gear position while the aircraft was lifted on jacks and the aural alerting system was found to be working satisfactory.
2. The aircraft fuel (Aviation Gasoline 100LL) and engine oil samples were retrieved from the aircraft post incident and were examined at DGCA, AED Lab. The samples passed the tests conducted and no abnormalities were reported during the tests.

## **1.17 Organizational & Management Information:-**

### **1.17.1 DGCA:-**

#### **1.17.1.1 Operations Circular no. 02 of 2004:-**

#### **Recency Requirement for Pilot(s)-in-Command & Co-pilot(s) operating aircraft having all-up-weight not exceeding 5,700 kgs**

In order to enhance flight safety in Non-scheduled and General Aviation operations including State Governments and Flying Training Institutes, it has been decided to lay down the following recency requirements for all Pilot(s)-in Command and Co-pilot(s) operating aircraft having all-up-weight not exceeding 5,700 kgs. These requirements shall also be applicable to pilots who exercise their privileges under Open Rating in terms of AIC 3 of 1985.

<b>Sl.No</b>	<b>Period of absence from flying</b>	<b>Requirement of Training/Checks</b>
1.	More than 3 months but not exceeding 6 months.	Ground Refresher on Technical/ Performance with qualified AME/ Examiner on type. The Examiner shall make an endorsement to this effect in the Pilot's Log Book. The pilots shall also update himself from the AME on type about the technical status of the aircraft and also familiarise himself with aircraft's cockpit layout (Instruments & Controls), performance and limitations and the operating speeds from the Pilot's Hand Book or the Operating Manual of aircraft.
2.	More than 6 months but not exceeding 12 months	Ground Refresher on Technical/ Performance with qualified AME/ Examiner on type. The Examiner shall make an endorsement to this effect in the Pilot's Log Book. Thereafter, the pilot shall undergo Familiarization Flying Training by Day or Night of a duration of not less than 00:45 hours with DGCA approved Examiner on type. In case of aeroplanes not equipped with dual controls, the pilot shall undertake solo flying for the same duration without any passenger on board.
3.	Exceeding 12 months.	Ground Refresher on Technical/ Performance with qualified AME/ Examiner on type. The Examiner shall make an endorsement to this effect in the Pilot's Log Book. Thereafter, the pilot shall undergo Familiarization Flying Training by Day or Night of a duration of not less than 00:45 hours followed by Skill Test by day and by night with DGCA approved Examiner on type. The Skill Test shall also include 3 take-off and landing each by day and by night. In case of aeroplanes not equipped with dual controls, the pilot shall undertake a minimum of two hours' solo flying of which one hour shall be by night without any passenger on board. The two hours' solo flying shall include a minimum of 3 take-off and landing each by day and by night.

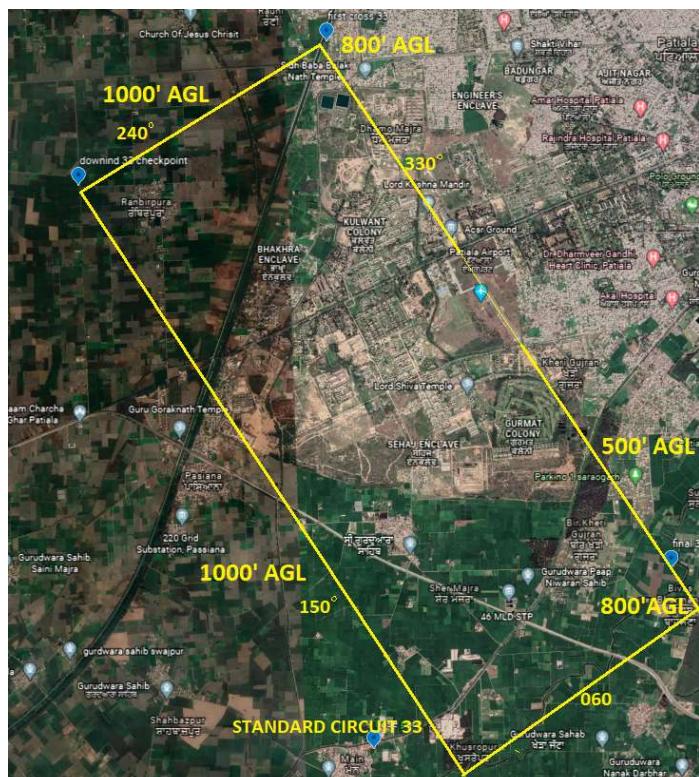
Pilots who have undergone training on simulator as part of their initial endorsement will be required to do re-current training on a similar type/model/series Flight Simulator or Flight Training Device (FTD) at least once in two years. In case specific type simulator is not available, the re-current training can also be carried out on a similar Flight Simulator with prior approval of DGCA.

**Note :** The Ground Refresher on Technical/Performance shall include review of Refresher of Aircraft Systems, Pilot's Flight Manual, Emergency and Abnormal situation. In addition, the pilot will refresh himself on General Meteorology, Climatology of Area of Operation, ATC Procedures, Operational Procedures, various Air Safety Circulars, Airworthiness Advisory Circulars and Operations Circulars issued by DGCA.

### **1.17.2 Patiala Aviation Club :-**

Patiala Aviation Club is a government aided institute under the Punjab State Civil Aviation Council (PSCAC). Patiala Aviation Club has its main base at Patiala with other operation bases at Amritsar and Ludhiana. Patiala Aviation Club is an approved Flying Training Organisation approved by DGCA (AV.22011/23/2001-FG dated 06.05.2016, valid from 05.05.2016 to 12.05.2021) operating a fleet of Cessna 172R(02 aircraft), Cessna 172S(02 aircraft), Cessna-FA152(02 aircraft), Beech Baron G58(01 aircraft) and TECNAM P2006T(01 aircraft) aircraft's. The TECNAM P2006T and Cessna 172S are owned by Patiala Aviation Club and other aircrafts are operated under lease. As on date of incident, the CFI was also acting as the Accountable Manager of the organisation.

#### **1.17.2.1 Circuit Pattern**



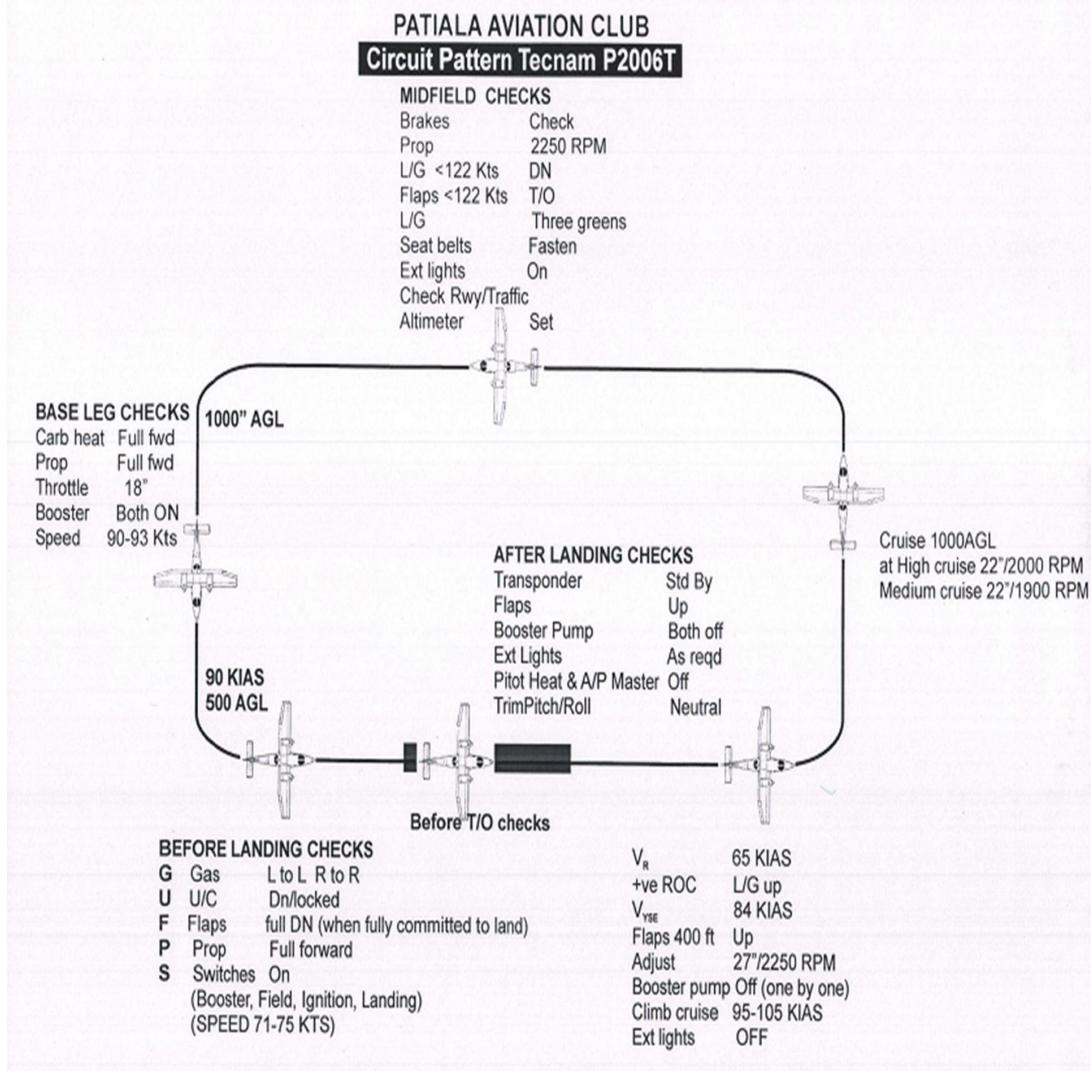
**Standard Circuit Pattern**



**Short Circuit Pattern**

Patiala Aviation Club informed that, they also make use of two circuit patterns. A ‘SHORT CIRCUIT’ pattern, wherein a left turn is taken after 500ft AGL post take-off and a ‘STANDARD CIRCUIT’ wherein a left turn is initiated after 800ft AGL post take-off. The ‘STANDARD CIRCUIT’ and ‘SHORT CIRCUIT’ pattern, as submitted by Patiala Aviation Club is illustrated in page 20. Whereas, the definitions and conditions at which these are followed/used i.e., ‘Standard Circuit Pattern’ and ‘Short Circuit’ is not detailed in the approved Training Procedures Manual.

The circuit pattern with checklist prepared and used by Patiala Aviation Club for TECNAM P2006T aircraft is as illustrated below:



**Figure-II : Circuit Pattern**

### **1.18 Additional information:**

Nil.

### **1.19 Useful or effective investigation techniques:-**

Nil.

## **2. Analysis**

### **2.1 Serviceability of the aircraft:-**

The aircraft VT-PBD was issued a Certificate of Registration on 26.09.2017 by DGCA-INDIA and its last ARC was issued on 31.01.2020 valid till 30.01.2021. The last major inspection carried out was Group B inspection performed on 19.10.2019 and the last inspection carried out was Group A inspection conducted on 07.02.2020. The aircraft had accumulated a total of 956:10Hrs since new. On the date of incident, the aircraft had operated 01 flight sortie (Instrument flying training), without any defects being reported prior to the incident familiarization training flight.

After the incident, operational check of the aircraft landing gear system was performed (after supporting it on aircraft jacks), the landing gear extension and retraction system functions were observed to be normal based on selections being made from the L/G control knob/switch in the cockpit. Landing gear indications in the cockpit were also in agreement with the actual landing gear positions. Further during operational test of aural alert generation w.r.t the landing gear for incorrect position at time of landing, the aural alert generation was found to be satisfactory.

The aircraft was in a serviceable condition when it was released for the familiarisation flying training (circuit and landing) on 12.02.2020. The serviceability of the aircraft was not a factor which contributed to the incident.

### **2.2 Flight Crew- Qualification and training plan:-**

The CPL holder (LH seat occupant) had last exercised the privileges of his CPL on 10.08.2018. Hence, as per DGCA, Operations Circular 02 of 2004 [Recency Requirement for Pilot(s)-in-Command & Co-pilot(s) operating aircraft having all-up-weight not exceeding 5,700 kgs], since the CPL holder(LH seat occupant) had a period of absence from flying exceeding 12 months, he had to undergo the following:-

1. Ground refresher on Technical/Performance with AME/ Examiner on type.
2. Familiarization Flying Training by Day or Night of duration of not less than 00:45 hours.
3. Skill Test by day and by night with DGCA approved Examiner on type. The Skill Test shall also include 03 take-off and landing each by day and by night.

Further, the validity of the IR check of the CPL holder (LH seat occupant) had expired on 09.08.2019. During review of flight documents of the exercises planned for the CPL holder (LH seat occupant), it was observed that, a flight plan was filed for the flight to Ambala(VIAM) airport. This flight was planned to perform the IR check for the CPL holder by the Designated Examiner, as the IR validity of the CPL holder had expired on 09.08.2019. The flight plan was filed by the CPL holder, with a planned departure time of 08:00UTC from Patiala(VIPL) to Ambala(VIAM). Hence, familiarisation flying training and IR check was

planned on 12.02.2020 for the CPL holder with the Examiner. Skill test was planned for a later date.

As per the DGCA guidelines for Recency Requirement for Pilot(s)-in-Command & Co-pilot(s) operating aircraft having all-up-weight not exceeding 5,700 kgs(DGCA Operations Circular 02 of 2004) requires that, Pilot having absence in flying for a period greater than 03 months is required to undergo 'Ground Refresher' training.

The topics to be covered include: Refresher of Aircraft Systems, Pilot's Flight Manual, Emergency and Abnormal situation However, it does not specify any time duration for the training. Based on the duties performed by the Examiner on date of incident, he had limited time of less than 30 minutes for the 'Ground Refresher' since reporting for duty at Patiala Aviation Club on 12.02.2020, which is not sufficient enough for a 'Ground Refresher' training covering a review of Refresher of Aircraft Systems, Pilot's Flight Manual, Emergency & Abnormal situation and the flight briefing of the exercises planned to be performed during the familiarisation flight.

The TPM of Patiala Aviation Club does not include the policy and standards w.r.t training / checks for recency requirements in respect of Operations Circular 02 of 2004.

### **2.3 Operational handling of the aircraft:-**

The CPL holder(LH seat occupant), who was undergoing the familiarization flying training with the Examiner, was performing circuit and landing exercise in-order to complete the 0:45 minutes flying duration as required by DGCA Operations Circular 02 of 2004. Three circuit and landing exercises were planned and two circuit and landings were completed. For the first two circuits, proper use of checklists, commands and response were followed and operations were normal. Being a familiarization flying training the Examiner was assisting the CPL holder (LH seat occupant) in the aircraft operation.

During the third circuit, while passing 500ft after take-off, the Examiner gave a command to the CPL holder (LH seat occupant) to turn left and informed him that this would be a short circuit. Since a normal standard circuit was planned to be performed, the CPL holder undergoing familiarisation training was unable to completely follow the instructions from the Examiner to turn left upon take-off. The checklists were not followed effectively during the third circuit due to the change in circuit plan.

The winds at the time of approach were about 07kts cross from 290°. The Examiner informed that bird activity in the vicinity of operation was observed near Patiala Aerodrome.

Flaps were selected for landing. The Examiner called out for landing gear down, but did not check the Landing gear switch selection or the gear down indications prior to landing and continued with the approach. The Examiner and the CPL holder (LH seat occupant) did not check the position of the landing gear control knob or that of the landing gear position indications prior to landing. The attention of crew members was concentrated to the aircraft control and approach flight path. Both the operating crew members reported that, they did not get any warning/aural alerts w.r.t landing gear in retracted condition during approach. However, post incident no abnormalities were observed during operational check of the

landing gear alerting system for incorrect position at time of landing. The aural alert system was found to be working satisfactory.

From the above, it is evident that, crew did-not operate the landing gear switch during the approach and the aircraft landed on RWY33 with the landing gear in retracted condition.

#### **2.4 Circumstances leading to the incident:-**

The CPL holder (LH seat occupant) had last exercised the privileges of his CPL on 10.08.2018. Therefore, he had to undergo Ground refresher on Technical/Performance with AME/ Examiner on type, Familiarization Flying Training by Day or Night of duration of not less than 00:45 hours and Skill Test by day and by night with DGCA approved Examiner on type, as per DGCA Operations Circular 02 of 2004.

The completion certificate w.r.t ‘Ground Refresher’ was affixed to the Pilot log book of the CPL holder (LH seat occupant) undergoing the familiarization flying training. Based on the time estimates regarding the duties performed by the Examiner on date of incident, he had limited time of less than 30 minutes for the ‘Ground Refresher’ since reporting for duty at Patiala Aviation Club on 12.02.2020, which is not sufficient enough for a ‘Ground Refresher’ training covering subject as detailed in Operations Circular 02 of 2004 and briefing of the exercises planned to be performed during the familiarisation flight.

The CPL holder (LH seat occupant) undergoing the familiarization flying training with the Examiner, started the circuit and landing exercise by 07:10UTC. Two circuit and landings were completed out of the planned 03 circuit and landings. Proper use of checklists, commands and response were followed and operations were normal other than the last circuit and landing. Being a familiarization flying training the Examiner was assisting the CPL holder (LH seat occupant) in the aircraft operations.

The familiarisation flight began at 07:10UTC and the required duration was 45 minutes as per Operations Circular 02 of 2004. For the IR check of the CPL holder (LH seat occupant) a flight was planned to Ambala(VIAM) with planned departure time of 08:00UTC.

After take-off for the last circuit and landing exercise, passing 500ft, the Examiner gave a command to turn left instead of the normal 800ft(as per Patiala Aviation Club Circuit pattern) and informed the CPL holder (LH seat occupant) that this would be a short circuit. Since this was not pre-planned, the CPL holder undergoing familiarisation training was unable to completely follow the instructions from the Examiner to turn left upon take-off. The procedures as per checklists were not followed effectively during the third circuit due to the change in circuit plan.

The crew did-not operate the landing gear during the third approach. The Examiner and the CPL holder (LH seat occupant) did not check the position of the landing gear control knob or that of the landing gear position indications prior to landing, their attention was concentrated to the aircraft control and approach flight path. This could be the reason for both the operating crew members reporting that, they did not get any warning/aural alerts w.r.t landing gear in retracted condition during approach. The aircraft landed by 07:50UTC (approx).

### **3. Conclusion**

#### **3.1 Findings:-**

1. The aircraft was having a valid Certificate of Registration and Airworthiness Review Certificate as on date of incident.
2. The Examiner had valid licences and ratings for operating the aircraft.
3. The Examiner was subjected to pre-flight medical (breath analyser test) prior to the flight at Patiala. The breath analyser test result was negative and he was cleared to operate training flights. Breath analyser test was conducted post incident for both the crew members and the result was negative for both the crew members.
4. Both the crew members had valid Class-I medical, as on date of incident. No limitations were endorsed.
5. The CPL holder (LH seat occupant) undergoing familiarisation flying training was having a period of absence in flying from 10.08.2018 to 12.02.2020.
6. The DGCA Operations Circular 02 of 2004 requires that, any Pilot having absence in flying greater than 12 months is required to undergo ‘Ground Refresher’ training, Familiarization Flying Training and Skill Test by day and by night.
7. The DGCA, Operations Circular 02 of 2004, does not state any training duration for the ‘Ground Refresher’ training and only lists the topics which are required to be covered.
8. The IR validity of the CPL holder (LH seat occupant) had lapsed on 09.08.2018.
9. Duty time of both the crew members was within the defined limits as per TPM of Patiala Aviation Club.
10. The aircraft was released from Patiala in a serviceable condition, for flying training on 12.02.2020. There was no defect reported prior to the incident flight.
11. Based on the duties performed by the Examiner at Patiala Aviation Club on the date of incident, the time available (30 minutes) was not sufficient enough for performing a Ground refresher covering all the topics stated in Operations Circular 02 of 2004.
12. The Examiner had operated one flight on the day of incident (i.e., Patiala-Patiala for duration of 01 hour (Instrument Flying training of another flying trainee).  
After landing at Patiala by 07:00UTC on 12.02.2020, the CPL holder entered the aircraft and the aircraft departed for the first circuit with involved CPL holder (LH seat occupant) at 07:10UTC.
13. As required by DGCA, Operations Circular 02 of 2004, the familiarization flying training was being conducted for the CPL holder (LH seat occupant) by the Examiner. The familiarization flying training was planned to include 03 circuit and landings (total time of 45 minutes).
14. The first two circuit and landings were performed as standard circuits as per procedures of Patiala Flying Club, and was discussed by the Examiner with the LH seat occupant. The first and second circuit and landing's were uneventful. Being a familiarization flight, the Examiner was assisting the CPL holder (LH seat occupant) during the take-off, cruise and approach/landing for the flight.
15. After take-off for third circuit a short circuit was announced by the Examiner which was not discussed/ pre-planned.
16. Due to change in plan from a standard circuit to short circuit which was not pre-planned, normal procedures/checklists were not followed during the third circuit.

17. The crew did-not extend the landing gear during the third approach and the aircraft landed with the landing gear in retracted condition. The aircraft landed by 07:50UTC (approx).
18. Neither was the landing gear extended (by use of the landing gear knob) nor was the Landing gear indicator lights checked to confirm the extension of the landing gear by the CPL holder (LH seat occupant). Designated Examiner also did not cross check and ensure the extension of landing gear for landing.
19. The aural alert generation system activation, indicative of disagreement in Landing Gear selection in comparison to other settings like Flaps, Throttle, was found to be operating satisfactorily during checks conducted after the incident.

### **3.2 Probable cause:-**

The aircraft landed with the landing gear in retracted condition, due to non-adherence to procedures and checklist(s) by both the operating crew during final approach.

Contributory factors to the incident are:-

- a) Execution of a short circuit which was not discussed during briefing of the familiarization flying training exercises.
- b) Inadequate monitoring by the Examiner over the actions being performed by the CPL holder (LH seat occupant) undergoing familiarization flying training.

### **4. Safety Recommendations**

1. Necessary corrective action(s) including training may be considered for the Designated Examiner and the CPL holder (undergoing familiarization flying training), in-view of the findings.
2. DGCA may define the standard minimum time period for the ground refresher training(s) required to be undergone by CPL holders w.r.t Operations Circular 02 of 2004, for the 'Period in absence from flying'.



02/11/2020

(LINJU VALAYIL PHILIP)  
Assistant Director Air Safety  
Investigator-In-Charge

Date: 02/11/2020

Place: New Delhi