



**Final Investigation Report on accident involving Cessna 172S aircraft
VT-CHP belonging to M/s Chimes Aviation Academy at Guna airport,
Madhya Pradesh on 06 March 2024.**

**Aircraft Accident Investigation Bureau
Ministry of Civil Aviation
Government of India**

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
AFI	Assistant Flight Instructor
AGL	Above Ground Level
AME	Aircraft Maintenance Engineer
ARC	Airworthiness Review Certificate
ATC	Air Traffic Control
AUW	All Up Weight
BA test	Breath Analyser test
BHP	Brake Horse Power
CAR	Civil Aviation Requirements
CCTV	Close Circuit Television
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CFI	Chief Flying Instructor
CG	Center of Gravity
CPL	Commercial Pilot License
DFT	Directorate of Flying Training
DGCA	Directorate General of Civil Aviation
ELT	Emergency Location Transmitter
FOB	Flying Order Book
FRTOL	Flight Radio Telephone Operator's License
fpm	Feet per minute
ft	Feet
FTO	Flight Training Organisation
HAT	Heading Altitude Time Check
Hrs.	Hours
IAS	Indicated Air Speed
INMCC	Indian Mission Control Center
Kgs	Kilograms
Kts	Knots
L&T	Load and Trim
MFD	Multi-Functional Display
MRO	Maintenance Repair Overhaul
MTOW	Maximum Take-Off Weight
PDR	Pilot Defect Report
PFL	Practice of forced landing
POD	Pilot on Duty
SMS	Safety Management System
SPL	Student Pilot License
SPWD	State Public Works Department
RAIM	Receiver Autonomous Integrity Monitoring
RESA	Runway End Safety Area
RT	Radio Telephony
SB	Service Bulletin
TPM	Training and Procedures Manual
TTTTT	Turn Time Twist Throttle Talk Check
UTC	Universal Coordinated Time
VHF	Very High Frequency

SYNOPSIS

On 06 Mar 24, at about 0855 UTC, a Cessna 172S aircraft operated by Chimes Aviation Academy, Dhana (Near Sagar, Madhya Pradesh) bearing registration VT-CHP was involved in an accident at Guna Aerodrome. The accident occurred while landing at Guna airfield.

Earlier, at 0342 UTC the aircraft had taken off from Dhana airfield for Neemuch airfield. The aircraft was being flown by Student pilot and was undertaking solo cross-country flight of 300 Nm as per DGCA approved syllabus. The route planned for cross country training flight was Dhana-Neemuch-Guna-Dhana with landings at Neemuch and Guna.

The first leg of the flight was uneventful and the aircraft landed at Neemuch. The aircraft was refueled at Neemuch and took-off for Guna Airfield. No abnormality was reported by the Pilot enroute to Neemuch or Guna. While landing at Guna airfield the aircraft touched down on runway after crossing nearly two third of the runway. After touch down, PIC applied brakes to stop the aircraft. Due to inadequate runway available ahead, PIC anticipated that the aircraft may not come to a complete stop and opened power for going around. The aircraft overran the runway edge and lifted-off the ground. Thereafter, it collided with a small tree (on take-off path) at an approximate distance of 410 feet from the runway edge. Due to impact with tree, the aircraft crashed. The Pilot came out of the aircraft with minor bruises and was taken to the hospital.

The occurrence was classified as an Accident as per Aircraft (Investigation of Accidents and Incidents) Rules, 2017 investigation into circumstances of this accident was ordered vide order no. INV.11011/1/2024-AAIB dated 13th March 2024, under Rule 11(1) of Aircraft (Investigation of Accidents and Incidents) Rules, 2017.

SUMMARY

Final Investigation Report on accident involving Cessna 172S aircraft bearing registration VT-CHP operated by Chimes Aviation Academy at Guna, Madhya Pradesh on 06 th March 2024.			
1.	Aircraft	Type	Cessna 172S
		Nationality	Indian
		Registration	VT-CHP
2.	Owner		Chimes Aviation Academy
3.	Operator		Chimes Aviation Academy
4.	Pilot in Command		Student Pilot
5.	Co-Pilot		Nil
6.	No. of Persons on board		01
7.	Date & Time of accident		06 March 2024 ,0855 UTC
8.	Place of accident		Guna Aerodrome
9.	Co-ordinates of Accident Site		24°65'905"N, 77°34'363"E
10.	Last point of Departure		Neemuch Airfield
11.	Intended landing place		Guna Airfield
12.	Type of Operation		Instructional Flying (300 Nm Cross country)
13.	Phase of operation		Landing
14.	Extent of Injuries		Minor Bruises

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

1 FACTUAL INFORMATION

1.1 History of Flight

On 5th March 2024, a cross-country training flight, scheduled from Dhana to Guna, was operated by Student pilot under the supervision of AFI. This was a 300 NM cross-country preparatory sortie planned for assisting the student pilot and to make the trainee familiar with the airport topography and runway.

The student pilot was undergoing CPL course from the FTO and was landing at Guna for the first time. The 300 NM solo cross-country sortie was being undertaken as per the DGCA approved syllabus. The student pilot planned the sortie under the supervision of Instructor. The map planning, Navlog preparation and coordination was carried out by the student pilot before operating the training flight. After carrying out the pre-flight checks and briefing, the Cessna 172 aircraft VT-CAZ took off from Dhana at 0720 UTC. Instructor found the preparation, cockpit planning RAIM, taxi and RT calls as satisfactory. The weather at base and enroute was good. On reaching Guna airfield, the student pilot was able to maintain track and Heading for the approach and flare. At the time of landing, instructor noticed that the flare was high and verbally corrected the same. The touchdown was satisfactory. Subsequently, post switching off of the aircraft engines, the Student Pilot was briefed about correcting the flare during landing.

Thereafter, while returning back from Guna after a brief halt, the instructor told the Student Pilot to practice circuit, approach and landing at Guna once again. The student pilot practiced the given exercise and after landing at Guna the aircraft backtracked and took-off again from Guna for Dhana. Instructor found the approach, flare and landing at Dhana as satisfactory. Subsequently the student pilot was cleared for 300 NM solo cross-country flight.

Next day, i.e. on 06 Mar 24 the student pilot planned flight for 300 NM solo cross-country flight from Dhana as per DGCA approved training syllabus. The route planned was Dhana-Neemuch- Guna-Dhana with landing and switch off at Neemuch and Guna airfields. The flight was duly authorized by CFI in the Flight Authorization Book. The following three entries were made in the Authorisation book:

- (a) Dhana to Neemuch
- (b) Neemuch to Guna
- (c) Guna to Dhana

The trainee pilot underwent BA test before operating the first flight of the day. Thereafter, after obtaining FIC and ADC clearances, the Pilot proceeded to the aircraft. After preflight checks, the aircraft VT-CHP took off from Dhana airfield at around 0342 UTC and landed at Neemuch at around 0643 UTC. The flight was uneventful. The aircraft was refueled with 54 ltr of fuel at Neemuch, bringing the total fuel in aircraft to 150 ltr. Thereafter the aircraft took-off from Neemuch at about 0722 UTC for the next planned landing at Guna airfield. Enroute to Guna, no abnormality was reported by the student pilot.

According to one student pilot who witnessed the event from ground observed that, while landing at Guna airfield, aircraft landed on runway very late and almost consumed nearly 2/3rd of the runway before making contact. After touch down, smoke was observed from the wheels.

According to the statement of student pilot, due to inadequate runway available ahead and anticipating that aircraft may not come to a complete stop power was opened for go around. The aircraft overran the runway edge and barely lifted-off the ground. Thereafter, it collided with a small tree (on take-off path) at an approximate distance of 410 feet from the runway edge. Due to impact with tree, the aircraft crashed. After aircraft settled on the ground, Student Pilot came out of the aircraft with minor bruises. Thereafter, trainee was taken to the first aid room to provide initial treatment.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor	01	Nil	Nil

1.3 Damage to Aircraft

The aircraft sustained substantial damage to the fuselage, empennage, and both wings. The damage sustained by the aircraft is given in the section 1.12 of this report.

1.4 Other Damage

There was no other damage to life or property.

1.5 Personal Information

1.5.1 Student Pilot

Nationality	Indian
Age on the day of accident	21 Year, 7 Months
Date of joining the Organization	05 August 2019
License Type	Student Pilots License (SPL)
Date of issue	04/04/2023
Valid Up to	03/04/2033
Category	AEROPLANE SINGLE ENGINE LAND

Endorsements as PIC	C-172
Date of Medical Exam	24-Nov-2023
Medical Validity	30-Nov-2024
FRTOL Date of Issue/Validity	09-May-2023 / 08-May-2033
Total Flying Experience	148:25 hrs.
Hours Flown on Type	148:25 hrs.
Previous Flight (Date of Last Flight)	05-March-2024
Experience as PIC on Type	77:00 hrs.
Total Hours of flying at the time of accident	148:25 hrs.
Hours flown in last 365 days	148:25 hrs.
Hours flown in last 180 days	107:20 hrs.
Hours flown in last 90 days	59:05 hrs.
Hours flown in last 30 days	13:00 hrs.
Hours flown in last 7 days	02:50 hrs.
Hours flown in last 24Hrs.	02:50 hrs.
Rest period before the flight	15 Hrs.
Previous incident history	None

Post accident, Student Pilot's FTPR was examined to verify whether all the relevant training modules had been satisfactorily completed before the trainee was released for solo cross-country flight. FTPR also revealed regarding the skills trainee had acquired during the training period and performance displayed at the time of actual training flights.

FTPR scrutiny revealed following regarding the Student Pilot's flying training:

1. During initial phase of training, trainee's pace of learning was slow.
2. Trainee's casual response during training flights was a common concern among all instructors; consequently, trainee was released for first solo at 36:35 hours after exhibiting basic flying skills satisfactorily.
3. All relevant emergency exercises defined in the CAA's flying syllabus had been conducted before releasing on Solo flying.
4. Non adherence to checklist, altitude variation, long flare and non-adherence to RT calls were few of the areas where trainee performance appeared non consistent.
5. During cross country flights, trainee's HAT checks were mostly found non satisfactory.
6. Proper callouts were missing during previous day cross-country sortie commenced on 5th March 2024 (Dhana-Guna-Dhana). According to Flying instructor's assessment, during that flight student casually carried out HAT and TTTT checks.
7. During previous flight to Guna (on 5th March 2024), while coming for landing, aircraft was high

on flare; consequently, Instructor assisted the trainee verbally and thereafter aircraft landed uneventfully.

8. Following this check, Flying Instructor apprised the CFI that as the performance was satisfactory, therefore, trainee could be released on first Solo 300 Nm cross country flight.
9. FTPR also revealed that trainee had already completed Instrument Flying prior to operating the accident flight.
10. As per FTPR, a total of 44:55 hrs. had been accumulated by student pilot during cross-country flights before accident occurred on 6 March 2024.

Post accident, when enquired about the short-field takeoff or landing exercises, CFI revealed that trainee had never practiced these techniques prior to the accident flight.

1.6 Aircraft Information

1.6.1 General Description: Cessna 172S

Cessna 172S is a four-seater, high wing monoplane of all metal semi-monocoque construction, nose mounted single- engine and is designed for general utility and training purposes. The aircraft is equipped with fixed tricycle type landing gear with tubular spring steel main landing gear struts. The Nose Landing Gear is steerable and equipped with an air/oil shock strut. Cabin doors are installed on each side of the airplane.

The air plane has a single-disc, hydraulically actuated brake on each main landing gear wheel. Each brake is connected, by a hydraulic line, to a master cylinder attached to each of the pilot's rudder pedals. The brakes are operated by applying pressure to the top of either the left (pilot's) or right (co-pilot's) set of rudder pedals, which are interconnected.

Engine:

When the aircraft was delivered to the operator it was fitted with Lycoming engine IO-360-L2A. It is a normally aspirated, direct drive, air-cooled, horizontally opposed, fuel injected, four-cylinder engine with 360.0 cu. in. displacement. This engine produces 180 rated BHP at 2700 RPM. The propeller fitted on Lycoming engine was a McCauley Propeller System with fixed pitch mechanism.

Later, on 02 June 2022, aircraft VT-CHP was retrofitted with Continental Aerospace Technologies GmbH manufactured engine model TAE 125-02-99.

TAE 125 engine variants are liquid cooled in-line four-stroke 4-cylinder motors with DOHC (double overhead camshaft) and are direct Diesel injection engines with common-rail technology and turbocharging. This engine is controlled by a FADEC system. The propeller is driven by a built-in gearbox with mechanical vibration dampening and overload release.

Continental TAE 125-02-99 engine is a constant-speed, three wooden blade MT Propeller (MTV-6-A/190-69 with a 1.90 m diameter) which produces a maximum continuous and take-off power of 99 kW (135 HP) at 2300 RPM.

Since the engine was compatible with Jet fuel variants, operator opted for Jet A-1 fuel (ASTM 1655) commonly used by jet engines. As the retrofit engine TAE 125-02-99 weight was slightly higher than Lycoming IO-360-L2A, this imposed weight penalty on maximum take-off and landing weight. The MTOW for Cessna 172S aircraft reduced to 1134 kg when TAE 125-02-99 and propeller MTV 6-A/190-69 was installed.

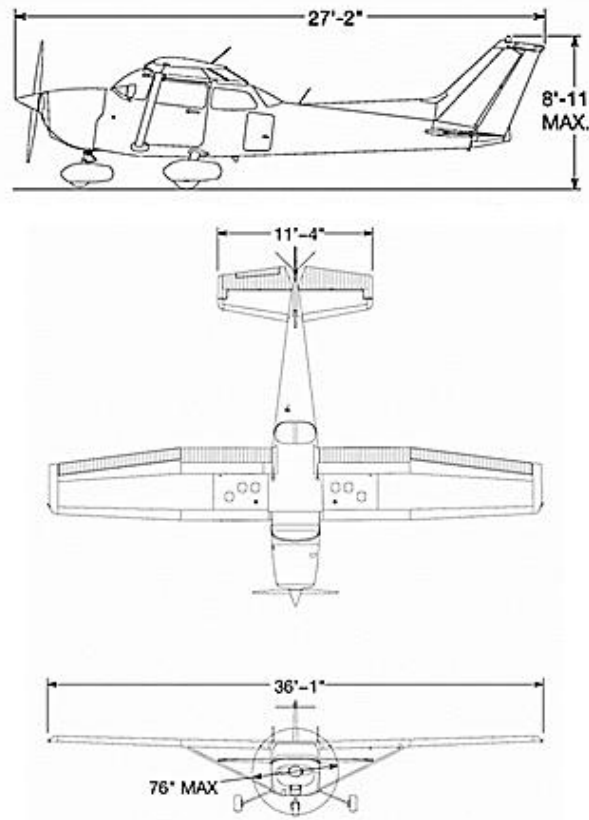


Figure 1. Aircraft Dimensions

STANDARD AVIONICS

The Garmin G1000 Avionics System is an integrated flight control and navigation system. The system combines primary flight instruments, communications, airplane system information and navigational information all displayed on two color displays. The G1000 system consists of the following pieces of equipment:

GARMIN DISPLAY UNIT

Two identical units are mounted on the instrument panel. One, located in front of the pilot, is configured as a PFD. A second panel, located to the right, is configured as a MFD.

The PFD displays roll and pitch information, heading and course navigation information, plus altitude, airspeed and vertical speed information to the pilot. The PFD also controls and displays all communication and navigation frequencies as well as displaying warning/status annunciations of airplane systems.

G1000 system has a Flight Data Logging feature which automatically store critical flight and engine data on an SD data card (upto 8GB) inserted into the top card slot of the MFD.

1.6.2 VT-CHP Specific Information

Aircraft Model	Cessna 172S
MSN	172S12402
Year of Manufacture	2019
Name of Owner	CHIMES AVIATION PVT. LTD.
C of R/ Date of issue	5276/ 25-NOV-2020
C of A/Date of issue	7379/2 Date of issue:02-AUG-2022
Category	NORMAL (PASSENGER)
A R C issued	2023/DAW/RAC/000000349 issued on 04-AUG-2023
ARC valid up to	03-AUG-2024
Aircraft Empty Weight	830.33 Kg
Maximum Takeoff weight	1134.0 Kg
Date of Aircraft weighment	17-JUN-2022
Operating Empty Weight	830.33 Kg
Max Usable Fuel	168.8 ltrs
Max Payload with full fuel	76.88 Kg
Operating Empty Weight C.G	105.58 cm
Next Weighing due	N/A
Total Aircraft Hours	3284:10 hrs
Last major inspection	Phase 3: 600 HRS/01 YEAR INSP @3108:45 A/F TSN on 22-JAN-2024 Phase 2: 100 HRS/02 MONTHS INSP @3208:35 A/F TSN on 09-FEB-2024 Phase 1: 50 HRS/01 MONTH INSP @3258:15 A/F TSN on 26-FEB-2024
List of Repairs carried out after last major inspection till date of accident:	NIL
Engine Type	TAE 125-02-99 (CD 135)
Date of Manufacture	08-MAR-2022
Engine Sl. No.	02-02-06157
Last major inspection	Phase 3: 600 HRS/01 YEAR INSP @1775:50 ENG TSN on 22-JAN-2024 Phase 2: 100 HRS/02 MONTHS INSP @1874:15 ENG TSN on 09-FEB-2024 Phase 1: 50 HRS/01 MONTH INSP @1923:55 ENG TSN on 26-FEB-2024
List of Repairs carried out after last major inspection till date of accident:	NIL
Total Engine Hours/Cycles	1949:50 Hrs.
Aero mobile License	Licence No. A-043/019/RLO(NR) dated 30/03/2021

Before the accident flight, all applicable Airworthiness Directives, mandatory Service Bulletins, and DGCA Mandatory Modifications for both the aircraft and its engines had been satisfactorily addressed. Furthermore, a thorough review of the Technical Log Book and the Pilot Defect Report (PDR) register confirmed the absence of any outstanding issues or postponed maintenance tasks on the aircraft. Consequently, the aircraft was cleared for regular flight operations on the day of the accident. From scrutiny of the load and trim sheet, it was determined that the CG and MTOW were within the limits for the flight.

Scrutiny of propeller, engine and airframe log book revealed following regarding maintenance activities that had already been carried out, and were due at next inspections:

Engine Log Book

The last weekly inspection (W1) was carried out on 4 March 2024 at 3265:55 a/c hours (TSN) and 1931:35 Engine hours (TSN). Following this scheduled inspection, the aircraft logged approximately 7 hours and 35 minutes of flight time before being involved in an accident on 6 March 2024, at Guna Airfield.

Furthermore, the aircraft had accumulated 644 flight hours since its Airworthiness Review Certificate (ARC) was last renewed on 4 August, 2023.

According to the airframe logbook, both main landing gear tires were also replaced on 13 June 2023, at 2528:00 a/c hours (TSN). Subsequently, the aircraft accumulated an additional 756:10 hours, reaching 3284:10 hours (TSN) at the time of the accident.

1.7 Meteorological Information

According to the MET register maintained at Sha Shib Flying Academy, METAR information recorded on 6th March 2024 pertaining to Guna Airfield is provided below:

VAGN METAR 060330 Z 04503 KT 6000 27/13 QNH 1016 NOSIG

As per the MET register, no significant weather was observed by MET department at Guna Airfield at around 0330 UTC. Despite the local flying was in progress at Guna Airfield and Sha Shib's aircraft were also engaged in local sorties, no weather information at regular interval was recorded by the Training Institute. Hence, METAR applicable at around the time of accident was not available in their MET register.

1.8 Aids to Navigation

Guna Airfield, being an uncontrolled aerodrome, does not have any navigational aids installed. The aerodrome features a single runway designed for visual approaches. On the day of the accident, the airfield was equipped with a windsock to assist trainees in assessing local wind conditions.

1.9 Communication

The Guna Airfield is an 'uncontrolled airfield.' However, an ATC tower has been set up by M/s Sha Shib Aviation Academy for flight coordination, which is generally manned by a student pilot or an instructor holding an RTR license. The academy utilizes 122.65 MHz frequency for VHF communication between ATC (Guna) and flying aircraft in Local Flying Area (LFA).

The communication system of the aircraft was serviceable and the aircraft was in positive contact with the Tower prior to the accident.

As per statement of the AFI manning the Guna ATC, aircraft appeared high on short finals and therefore, a message was transmitted on RT informing the student pilot about the approach being high and may plan for a go-around. However, during interaction with investigation team, the student pilot denied receiving any such RT call from the Tower and accordingly neither responded nor initiated a go around.

In absence of any recording medium, the investigation team could not verify whether the said information was communicated to the student pilot through RT call on time.

1.10 Aerodrome Information

The Guna Airfield (ICAO Code: VAGN, IATA Code: GUX) is owned by Government of Madhya Pradesh, and leased to the FTO M/s Sha Shib Flying Academy. The airfield has one runway with orientation 32/14 made of asphalt surface. The co-ordinates of the Airfield are 24°39'16"N, 77°20'50"E. The elevation of Guna Airport is approximately 1,600 feet (488 meters) above mean sea level (AMSL).

The runway is approximately 914.4 meters (3000 feet) in length and 70 feet in width. The runway has upward gradient as viewed from either end of the runway and middle is approximately 20 feet higher.

One lake is present towards runway 14 at a distance of approximately 650 feet from its threshold area. The terrain ahead of runway 14 consists of rocky ground with a steep slope descending toward the lake, where shrubs and small trees are present. According to records provided by CPWD, Guna, the slope gradients for runways 14 and 32 are approximately 1:0.00594 and 1:0.00698, respectively.

1.11 Flight Recorders

VT-CHP was not required to be fitted with CVR or DFDR as per the prevailing Civil Aviation Requirements. Therefore, aircraft was neither fitted with CVR nor DFDR. However, the Garmin G1000 integrated flight instrument system fitted on the aircraft had a Flight Data Logging feature, which allowed critical flight parameters to be recorded at one second interval on an SD data card inserted in the MFD.

The SD data card was removed from the aircraft and data from one of the SD cards was successfully retrieved and analysed.

In addition to Garmin system, aircraft was also fitted with Continental Technologies Engine Control Unit (ECU) having the capability of recording engine parameters along with other flight data.

The ECU unit was sent to the State of Engine Manufacture, Germany to assist in the readout and its analysis. The State's investigation agency i.e. BFU had executed the readout process and following results were shared with the AAIB:

ECU Description:

The ECU unit installed on the aircraft consisted of two completely independent circuit boards for redundancy purpose. Each board recorded an event log and a total of 24 engine parameters, such as engine RPM, load lever position etc. The recording frequencies for those parameters were 100 Hz (last two hours of operation) and 1 Hz (last 200 hours of operation).

External condition of ECU:

A visual inspection of the circuit boards and check of both round connectors revealed no damage.

Readout:

The unit was readout according to the manufacturer's standard readout process through the CAN-Bus. The Power/CAN cables were set on the unit's round connectors and powered with 14 VDC. The peak consumption for both boards together was around 2 A. The CAN bus connection with the PC was established through the manufacturer's CAN-USB interface.

The software "TAE Operator" (Version 1.0) was used for the download of the event logs and engine recordings. It was possible to download all engine recordings and event logs from both units. Data from the accident flight was identified on all recordings.

The BFU and AAIB representatives together analysed the data from the ECU. A representative from the engine manufacturer Continental also participated in the analysis and discussion.

The following conclusions were drawn based on the readout analysis:

- i. The event log did not contain any warning or error messages during the event flight, except for two messages, which were recorded at the moment of impact with terrain after the runway excursion.
- ii. The recorded engine data did not record any abnormality of the engines behavior and the engine responded as expected to the load lever position in all phases of the descend and landing sequences including the go-around maneuver until impact with terrain.
- iii. The load lever was moved from idle to 100% around 120 m before the end of the runway at a speed of around 40 knots IAS. The pitch angle of the aircraft increased from 2 to 8 degrees

around two seconds after the load lever was put to 100 % and around 80 m before the end of the runway.

ECU and SD card data was utilized to draw the aircraft track on google map and to prepare the Plots encompassing significant events occurred during the flight. They are included at relevant sections of the report.

1.12 Wreckage and Impact Information

Before joining the downwind leg, student pilot commenced one orbit. After completing the orbit, aircraft flew straight for about 0.5 nm, made a 90° left turn at an altitude of 844 ft to join the downwind towards Runway 32. Based on the tire marks and analysis of data, retrieved from both ECU as well as SD card, crew action and aircraft position superimposed on the google map are shown below:



Figure 2. Aircraft touchdown point, Go-around initiated and Crash Site

Post accident, measurements of tire marks revealed following about the aircraft landing. Aircraft flared for approximately 2028 ft before touching down slightly right of the centerline. Subsequently, heavy brakes were applied for approximately 08 seconds as tire marks were prominently visible on the runway and this braking action assisted in deacceleration of aircraft speed up to 32 knots within 556 feet of runway (Refer Fig: 6). The tire marks further changed course to the left and continued onto the runway slope before they again changed their course to right near runway marking 14 (see Figures 3 and 4).



Figure 3. Tire Marks (Start)



Figure 4. Tire Skid Marks

Main landing gear tire marks on the runway indicated that the aircraft was skidding while decelerating and appeared not to be under the full control of the student pilot. Since the aircraft did not respond as per the inputs, Student pilot anticipated aircraft would not stop on available runway and finally decided for mislanding/go around. To initiate the go around, brakes were released and throttle was moved to full power position while the flap lever position was kept same i.e., 10° setting.

Despite an increase in acceleration, the aircraft failed to achieve takeoff speed before it reached at the end of the runway. Further, no tire marks were observed on ground which was full of grass and gravel indicating that aircraft wings started generating lift and full weight did not act on ground at that point of time. Thereafter, the aircraft exited the level ground after travelling approximately 66 m (216 feet) beyond the runway end and struck a small tree situated on the steep slope.

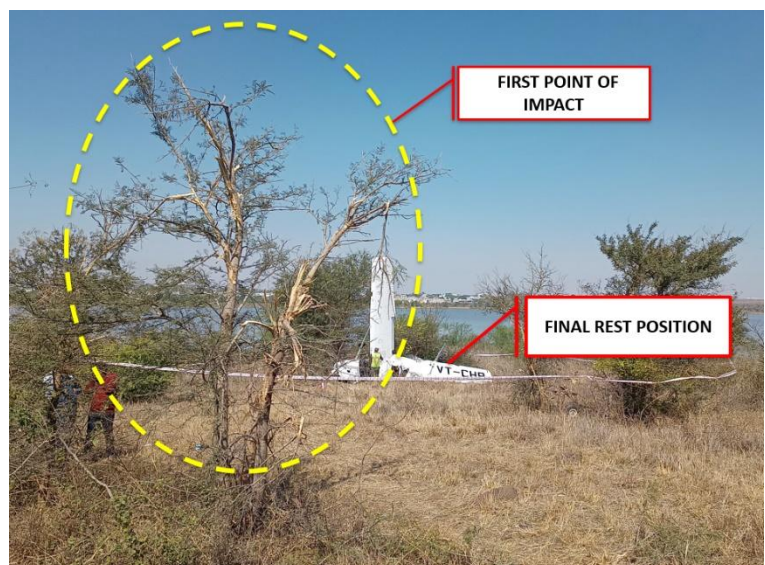


Figure 5. First point of impact and Final Position

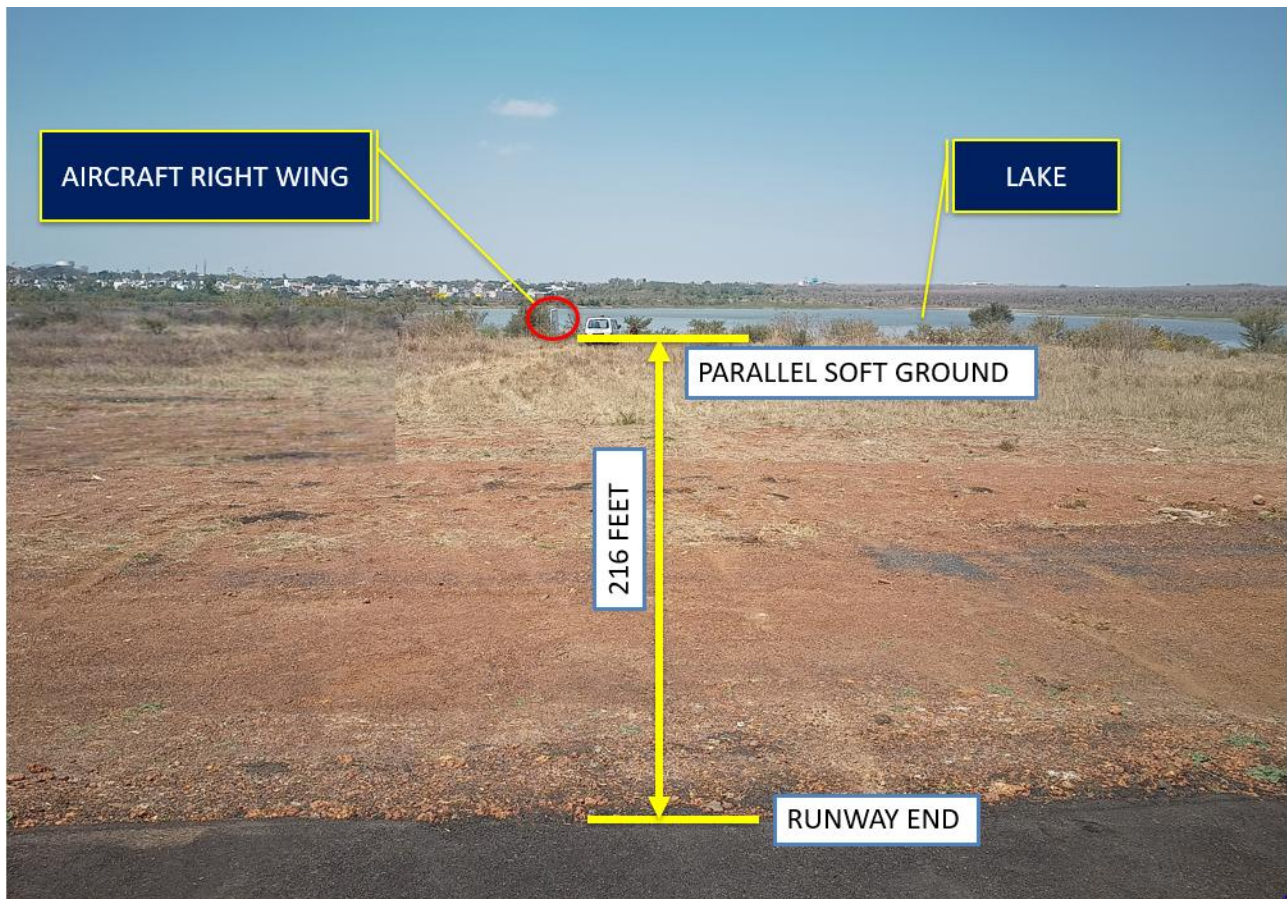


Figure 6. Soft Ground beyond runway 14 end

The aircraft's left main landing gear along with left wing collided with this tree which was approximately 10 ft in height.

No impact marks were observed on the aircraft fuselage other than on main landing gears and left wing's leading edge. After the impact, left main landing gear detached from the fuselage. It appears that to avoid the collision with the tree and make the aircraft climb; in fear Student pilot pulled the control column back. As the control column was pulled back instantaneously, aircraft pitch significantly increased and reached upto 13° in one second. Since the Student pilot was completely unable to make out the aircraft's attitude at all, aircraft lift suddenly dropped and it could not sustain the flight. As the tree acted as pivot at the time of impact, aircraft heading suddenly changed and thereafter, aircraft collided with the ground in left attitude resulting into detachment of left wing from attachment points due to impact load.



Figure 7. Projection of aircraft distance at different locations along the runway

Aircraft finally came to stop on its left side resulting into right wing up in the air. All the three wooden propeller blades sheared off from root section after hitting on ground and this consequently resulted into engine shut down. Since the aircraft was resting on its left side, the left door could not be opened as there was insufficient space between the door and the ground. The right door present above the head area of Student pilot could not be opened by due to its own weight acting towards the ground. Consequently, the student pilot decided to evacuate from broken windshield area.

Thereafter, student pilot had unfastened the harness and escaped from broken windshield. According to Student Pilot, before leaving the aircraft, master switch was turned off. Post accident, two Sha Shib vehicles rushed to the scene for SAR operations. After reaching at the site, Sha Shib rescue personnel found that trainee had already exited the aircraft. Thereafter, Student pilot was immediately taken to the Sha Shib's First Aid room for dressing. Once the First Aid treatment was over, Student Pilot was shifted to the nearest hospital for further medical examination.

Post accident, the position of various switches and control levers in the cockpit were recorded, and the following was observed regarding their final positions:

1. Fuel Selector valve was at Left position
2. Thrust lever was at Full Forward
3. Flap lever was at 10 degrees

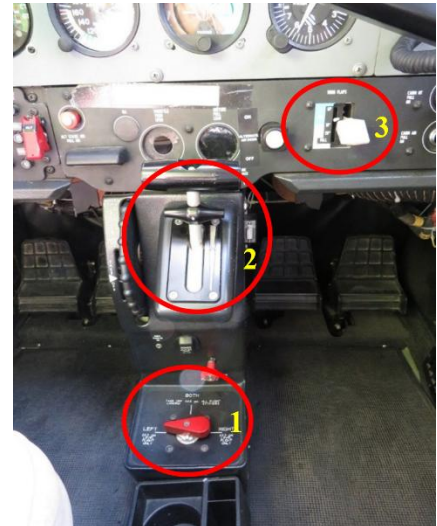


Figure 8. Lever and Switch positions

In addition, the physical condition and tyre pressures were checked by the investigation team. During these checks, the following observations were made:

1. Pressure of both main landing tires were around 45 psi.
2. Due to impact with tree, rubbing marks were observed on the RH main Landing gear tire
3. Both main landing tires were almost “bald” as no visible grooves were present on them



Figure 9. Right MLG Tire



Figure 10. Left MLG Tire



Figure 11. Right MLG Tire Pressure



Figure 12. Left MLG Tire Pressure

Damage to Aircraft:

The aircraft was destroyed due to initial impact with trees and subsequently with ground. The detailed damage report sustained by the aircraft is provided as Annexure 'A' attached to this report.

1.13 Medical and Pathological Information

The Student Pilot was subjected to BA test at Dhana airport before departure as per requirement of CAR Section 5, Series F, Part III. The test result was satisfactory.

As stipulated in the CAR, post-accident medical examination of the trainee was conducted in a nearby hospital. The test results to determine alcohol consumption were found negative (Satisfactory).

1.14 Fire

There was no fire post-crash.

1.15 Survival Aspects

The accident was survivable.

1.16 Tests and Research

Nil

1.17 Organizational and Management Information

1.17.1 Chimes Aviation Academy

Chimes Aviation Academy is a DGCA approved flying training organization. The school conducts flying training from two primary bases namely Dhana and Neemuch, both are situated in Madhya Pradesh, India. Chimes Aviation Academy imparts training with a mixed fleet comprising of ten single engine Cessna 172-R/S aircraft and two Diamond DA-42 aircraft.

Since the Academy also has a DGCA approval as a Maintenance Organization under CAR 145 and a Continuing Airworthiness Management Organization under CAR M, it carries out maintenance of its fleet in house.

The school is authorized to provide training services for PPL, CPL, IR, AFIR, FIR, and extension of Single Engine / Multi Engine aircraft ratings on aeroplanes in accordance with its approval scope. The Organisation Chart of the FTO is shown below: -

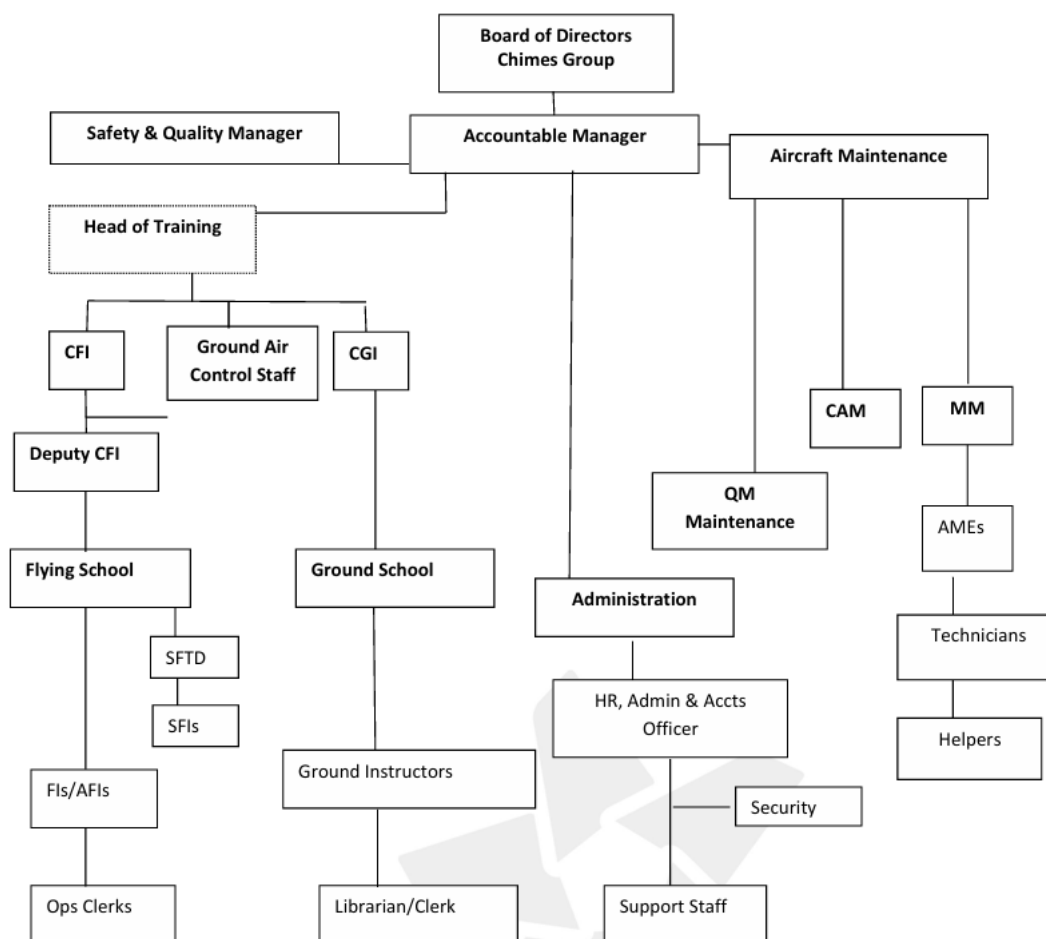


Figure 13. Organization Structure

1.17.1.1 TPM (Training Procedure Manual)

Excerpt from Operator's Training Procedure Manual Issue 02 Rev. 8 dated 10th Jan 2024 relevant to this investigation is reproduced below:

CHAPTER 5: BRIEFING AND AIR EXERCISES

Para 5.1-Air exercise

The flying training Syllabi laid down by the DGCA CAR Section 7, Series B Part VII Issue I dated 16 Aug 1999 lays down the flying training syllabus for various licenses and ratings. Based on the mentioned CAR a detailed syllabus giving the contents of each exercise and the sequence in which the exercises are to be flown has been prepared by CAA and is placed at Annexure 1 to this Manual.

CHAPTER 9: ROUTES

Para 10.1-Performance (legislation, take-off, route, landing, etc)

d) Landing Procedures. The aircraft on approach to land must be established by 400 ft AGL on the final leg. Go around shall be made if the aircraft is not in the stable approach by 200 ft AGL. All criteria and limitations for the landing shall be observed in order to achieve a safe landing or touch and go.

Further, SOP for Cross- Country training flight on single and multi-engine along with the routes to be followed during approved cross-country flights are mentioned at Annexure 1A.

Both Annexure 1 and Annexure 1A provided in company's TPM are attached to this report as Annexure C.

CAA's Contingency Plan

This plan is incorporated in TPM as Annexure 6. The portion of the Annexure applicable to AAIB is attached to this report as Annexure 'D'.

1.17.1.2 Flying Order Book

On 15th Jan 2020, CAA had prepared and issued the Flying Order Book (FOB) in compliance with DGCA CAR Section 7 – Flight Crew Standards, Training & Licensing, Series D, Part I, Issue II, dated 30th January 2015.

According to FTO's Flying Order Book, it provides essential safety related operational information designed for everyday use by instructors and students. It further states that orders contained in this book are to be read in conjunction with respective Pilot Operating Handbooks (POH), SOPs issued by Chimes Aviation Academy, Approved Training & Procedures & Manual, DGCA issued CAR and other regulations.

According to FOB Order No. 2/9 issued by the CFI, at CAA all landings on Cessna 172 aircraft are carried out at flaps 20°.

FOB Orders and content relevant to this investigation are attached as Annexure 'E' to this report.

1.17.1.3 Safety Management System Manual

FTO's SMS manual Issue-01 Rev.00 dated 12 Aug 2022 underscored the guidelines on accident and incident reporting procedure, Notification and actions to be taken post accidents, such as removal of aircraft from the crash site or custody and release of wreckage. Relevant sections of this manual where roles of AAIB or DGCA are defined is attached to this report as Annexure 'F'.

1.17.2 Sha-Shib Flying Academy

Sha- Shib Flying Academy is a DGCA approved Flying Training Organisation authorised to conduct Pilot Training Courses as per CAR Section -7, Series 'D' Part-I.

1.17.2.1 TPM

Procedures and guidelines stipulated in Organization's TPM relevant to this case are quoted below:

Para 11.3-Check availability of smooth runway of adequate length for the type of a/c.

Check availability of smooth runway of adequate length for the type of a/c: -Cessna -172 & Thorp T-211 requires standard distance of 945 ft. for take-off roll and 550 ft for landing roll.

The runway length of academy is 3000 feet which is more than sufficient for flight operation.

Para 11.7-Safety Services as Per Requirements

Proper and adequate safety service are provided by the training institute or by ATC (as applicable).

The academy has a fire vehicle and an ambulance on duty during ongoing flight operations. It has a dedicated ground to ground VHF RT communication facility approved by Ministry of Telecommunication.

Para 11.13-Ground Communication with Flying Training Activities

Proper air ground communication to supervise the flying training activity: The academy utilizes a fixed Ground RT and a hand held Icom RT device established at a frequency of 122.65 for air- ground communications being supervised and monitored by the Instructors/ATCOs during flying activity.

1.18 Additional information

1.18.1 Pilot's Operating Handbook (POH):

POH for Cessna 172S model was prepare by Textron Aviation and this same document approved by FAA as Airplane Flight Manual with revision 4 was issued on 11 June 2021.

This Pilot's Operating Handbook has been prepared as a guide containing information about airplane's equipment, operating procedures, performance and suggested service and care.

According to this document, following are the performance specifications mentioned for Cessna 172 aircraft:

SPEED

Maximum at Sea Level 126 KNOTS

TAKEOFF PERFORMANCE:

Ground Roll 960 FEET

LANDING PERFORMANCE:

Ground Roll 575 FEET

STALL SPEED:

Flaps UP, Power Idle 53 KCAS

Flaps FULL, Power Idle 48 KCAS

The servicing criteria for landing gears and brakes as per the POH is provided in below table:

COMPONENT	SERVICING CRITERIA
Nose Wheel (5.00-5, 6-Ply Rated Tire)	45.0 PSI
Main Wheel (6.00-6, 6-Ply Rated Tire)	42.0 PSI
Brakes	MIL-H-5606
Nose Gear Shock Strut	MIL-H-5606; 45.0 PSI *

NORMAL PROCEDURES

The Section 4 of the POH 'Normal procedures' outlined the procedures and amplified instructions for normal operations using standard equipment. The excerpt from Section 4 of the POH on normal landing and short field landing techniques is provided below:

NORMAL LANDING

Normal landing approaches can be made with power on or power off with any flap setting within the flap airspeed limits. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds. Steep slips with flap settings greater than 20° can cause a slight tendency for the elevator to oscillate under certain combinations of airspeed, sideslip angle, and center of gravity loadings.

Landing at slower speeds will result in shorter landing distances and minimum wear to tires and brakes. Power must be at idle as the main wheels touch the ground. The main wheels must touch the ground before the nosewheel. The nosewheel must be lowered to the runway carefully after the speed has diminished to avoid unnecessary nose gear loads. This procedure is very important for rough or soft field landings.

SHORT FIELD LANDING

For a short field landing in smooth air conditions, approach at 61 KIAS with FULL flaps using enough power to control the glide path. Slightly higher approach speeds should be used in turbulent air conditions. After all approach obstacles are cleared, smoothly reduce power and hold the approach speed by lowering the nose of the airplane. The main wheels must touch the ground before the nosewheel with power at idle. Immediately after the main wheels touch the ground, carefully lower the nosewheel and apply heavy braking as required. For maximum brake performance, retract the flaps, hold the control wheel full back, and apply maximum brake pressure without skidding the tires.

1.18.2 Supplement Pilot's Operating Handbook

In accordance with EASA STC A.S.0 1527 or EASA STC 10014287, Continental Aerospace Technologies GmbH had issued the Supplement Pilot's Operating Handbook for Cessna 172S equipped with TAE 125-02-99.

The procedures and techniques to be followed by trainees during different phases of operation of Cessna 172S aircraft fitted with engine TAE 125-02-99 are enumerated in the Supplement POH.

The relevant sections from Supplement POH are given below:

WING FLAP SETTINGS

Flap deflections greater than 10° are not approved for normal and short field takeoffs. Using 10° wing flaps reduces the ground roll and total distance over a 15 m obstacle by approximately 10%.

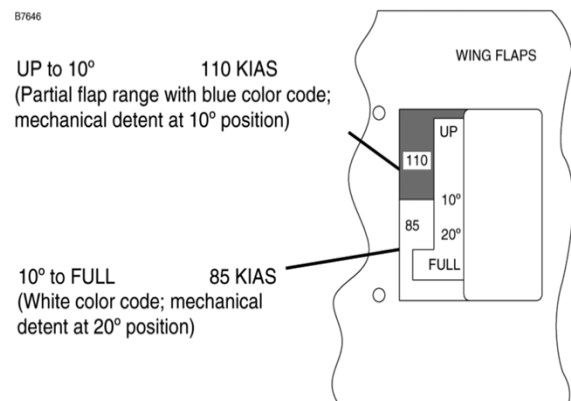


Figure 14. Flap positions

Actions to be taken by crew during normal take-off and short field take-off illustrated in supplementary document is shown below:

NORMAL TAKEOFF

1. Wing Flaps – 0° or 10°
2. Thrust Lever – FULL FORWARD
3. Elevator Control – LIFT NOSE WHEEL at 55 KIAS

4. Climb Speed – 65 to 80 KIAS

SHORT FIELD TAKEOFF

1. Wing Flaps – 10°

2. Brakes – APPLY

3. Thrust Lever – FULL FORWARD

4. Brakes – RELEASE

5. Elevator Control – SLIGHTLY TAIL LOW

6. Elevator Control – LIFT NOSE WHEEL at 51 KIAS

7. Climb Speed – 57 KIAS (until all obstacles are cleared)

Actions to be carried out by crew during Normal Landing and Short Field Landing as enumerated in the Supplementary POH:

NORMAL LANDING

1. Airspeed – 69 to 80 KIAS (wing flaps UP)

2. Wing Flaps – AS REQUIRED (0°–10° below 110 KIAS; 10°–Full below 85 KIAS)

3. Airspeed – 60 to 70 KIAS (Flaps DOWN)

4. Touchdown – MAIN WHEELS FIRST

5. Landing Roll – LOWER NOSE WHEEL GENTLY

6. Brakes – MINIMUM REQUIRED

SHORT FIELD LANDING

1. Airspeed – 69 to 80 KIAS (Flaps UP)

2. Wing Flaps – **FULL DOWN**

3. Airspeed – 62 KIAS (until flare)

4. Power – REDUCE to idle after clearing obstacles

5. Touchdown – MAIN WHEELS FIRST

6. Brakes – APPLY HEAVILY

7. Wing Flaps – RETRACT

GROUND ROLL AND TAKE-OFF DISTANCE at 1134 kg (2500 lbs)

SHORT FIELD TAKEOFF

Conditions:

- **Flaps 10°**

- Full Power Prior to Brake Release

- Paved, level, dry runway

- Zero Wind

Lift Off: 51 KIAS

Speed at 15 m / 50 ft: 56 KIAS

Notes:

For operation on dry, **grass runway**, increase distances by **15%** of the "ground roll" figure.

EMERGENCY PROCEDURES

Procedures to be followed by crew during emergencies such as engine malfunction or emergency landing laid down in POH are reproduced below:

ENGINE MALFUNCTION

IMMEDIATELY AFTER TAKE-OFF

If there is an engine malfunction after take-off, lower the nose to keep the airspeed and attain gliding attitude. In most cases, landing should be executed straight ahead with only small heading corrections to avoid obstacles.

▲ WARNING: Altitude and airspeed are seldom sufficient for a return to the airfield with a 180° turn while gliding.

- (1) Airspeed.....65 KIAS (wing flaps retracted)
..... 60 KIAS (wing flaps extended)
- (2) Fuel Shut-off Valve – CLOSED
- (3) Engine Master ("IGN" resp.) – OFF
- (4) Wing flaps – as required (30° recommended)
- (5) Alternator, Main Bus and Battery switch – OFF

EMERGENCY LANDING

EMERGENCY LANDING WITH ENGINE OUT

If all attempts to restart the engine fail and an emergency landing is imminent, select suitable site and proceed as follows:

- (1) Airspeed
 - i) 65 KIAS (flaps retracted)
 - ii) 60 KIAS (flaps extended)
- (2) Fuel Shut-off Valve – CLOSED
- (3) Engine Master ("IGN" resp.) – OFF
- (4) **Wing Flaps** – as required (**Full down recommended**)
- (5) Alternator, Main Bus and Battery switch – OFF
- (6) Cabin Doors – unlock before touch-down
- (7) Touch-down – slightly nose up attitude
- (8) Brake firmly

During aforementioned emergencies, OEM has recommended to carry out the landing with flap 30°.

1.18.3 Garmin & FADEC Data Analysis:

During cruise, aircraft maintained around 6000-6500 feet AGL. At **08:43:16**, TOD was initiated to join the circuit altitude. Garmin data showed that at **08:45:54**, when the aircraft was descending below 2500 feet AGL, aircraft descent rate and speed reached to 3011 fpm and 145 knots respectively whereas load recorded was zero.

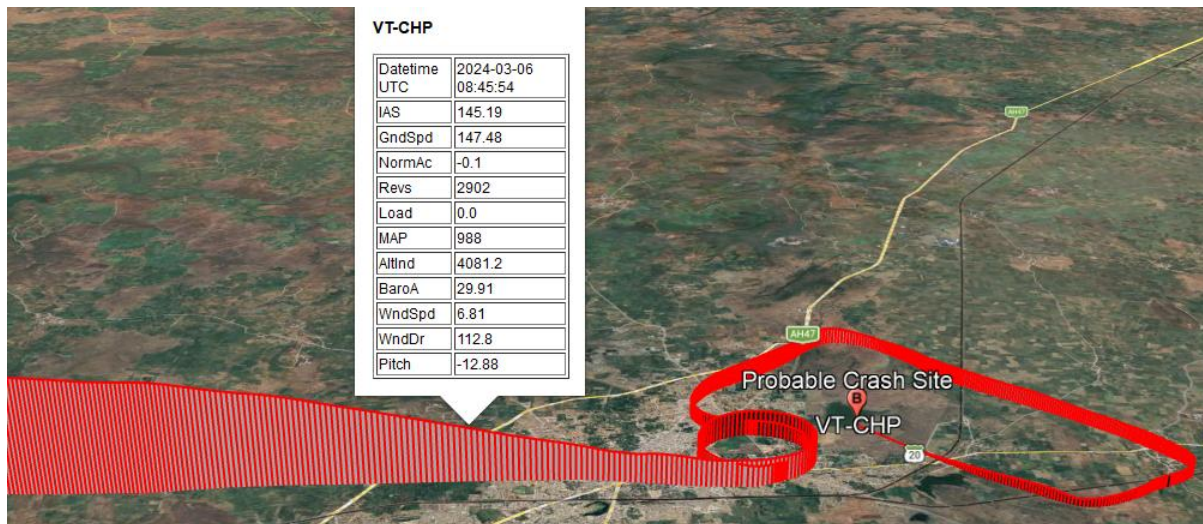


Figure 15. Descent profile

At **08:50:17**, the trainee joined the downwind leg at 780' AGL (2399.5 ft MSL) with the engine at 2947 Revs, a Load of 15.2%, and a MAP of 1144. Subsequently, the aircraft further descended to 576' AGL at **08:50:31** (2257.3 ft MSL), where power parameters increased to 3240 Revs, 48.4% Load, and 1611 MAP. On downwind, the aircraft altitude kept varying between 800 feet to 600 feet.

At **08:53:28**, after completion of the Base leg, the aircraft made a turn at 381 feet AGL (2017.7 ft MSL) to join the final leg using 3217 Revs, 51.9% Load, and 1697 MAP. However, a cut in approach was observed before the aircraft joined the Final leg. On the Base leg, the aircraft's descending altitude varied between 575 feet to 381 feet.

At **08:53:36**, the aircraft joined the final leg at 359 feet AGL (2019.6 ft MSL) with 3190 Revs, 52.6% Load, and 1702 MAP, when it was approximately 1 Nm away from the runway 32 threshold. After joining Finals, the aircraft started climbing once. At **08:53:43**, the aircraft reached approximately 488 feet (2111.4 ft MSL) while operating at 3067 Revs, 40.6% Load, and 1481 MAP. At this point, the aircraft was flying significantly higher than the standard 3° glide slope.



Figure 16. Aircraft speed along circuit

At **08:54:20**, while approaching runway 32, aircraft speed was around 75 knots and its ROD reached 928 fpm when engine was running at 2471 Revs, 0% Load and 1029 MAP. Seven seconds later, the aircraft flew above the threshold at approximately 56 feet AGL (1647.9 ft MSL) with 2407 Revs, 0% Load, and 1024 MAP.

Round out was performed by levelling the pitch/nose to the runway immediately after crossing the threshold. After 04 seconds, the rate of descent reduced to -130 fpm and both ground speed and airspeed reached 72 kts. The aircraft pitch was not steady and kept fluctuating (2.94, 1.48, 5.43, 2.9, 7.3, 3.9). IAS dropped to 53 kts and ground speed to 62 kts, resulting in a difference of 9 kts. During flare, approximately 2028 feet of runway was consumed.

At **08:54:45**, the ground speed had dropped to 52 knots and the vertical speed became positive (+45.7 fpm), indicating the transition from flight to the ground rollout, with the engine at 1731 Revs, 0% Load, and 988 MAP. Further, at the start of the flare sequence, the aircraft was at an indicated altitude of 1,604.2 ft MSL. By the time of touchdown, the altitude had decreased to approximately 1,580 ft MSL. Subsequently, braking action was observed for 08 seconds and aircraft airspeed and ground speed reduced to 32 kts.

At **08:54:53**, go-around action was initiated at 32 knots (GS) when approximately 276 feet of runway was only available, indicated by sudden increase in engine power (3804 Revs, 100% Load and 2020 MAP). Thereafter, Ground speed and IAS increased to 47 kts and 43 kts respectively. Pitch gradually started increasing and reached 9.2 degrees after 5 seconds at **08:54:58**, with the engine maintaining 100% Load and 2121 MAP.

At **08:54:57**, when the aircraft was about to leave the runway after crossing the threshold, the ground speed was 39 knots with the engine at 3893 Revs, 100% Load, and 2109 MAP. The aircraft kept accelerating, and at **08:55:01**, IAS and GS reached 43 knots and 47 knots respectively at 298 feet ahead of the threshold, marked by the maximum recorded MAP of 2175 at 100% Load. At **08:55:02**, the aircraft pitch reached 13.73 degrees while the engine was at 3067 Revs, 100% Load, and 2148 MAP. At **08:55:04**, the aircraft came to rest as IAS dropped to zero and recording of parameters stopped. Relevant graphs pertaining to accident flight depicting different parameters are attached to this report as Annexure 'B'.

1.18.4 Video Footage

In compliance to DGCA's FLYING TRAINING CIRCULAR 01 of 2022, camera's covering entire runway were installed at Guna airfield for capturing landings and takeoffs by trainees. Post accident, investigation team was able to retrieve the DVR recording. During analysis, it has been verified that all the cameras were working properly and relevant recordings pertaining to the accident flight have been captured by respective camera. Video recordings were analyzed to corroborate with other available evidences.

Camera No. 5- This camera captures the final approach and threshold area of runway 32. Recording of the camera established that aircraft flew parallelly at a height of approximately 6 feet above the threshold area.

Camera No.4- It showed that aircraft was continuously floating over the runway and maintaining the same attitude and height until aircraft reached over the middle of the runway (Infront of taxiway).



Figure 17. Aircraft above threshold of runway 32

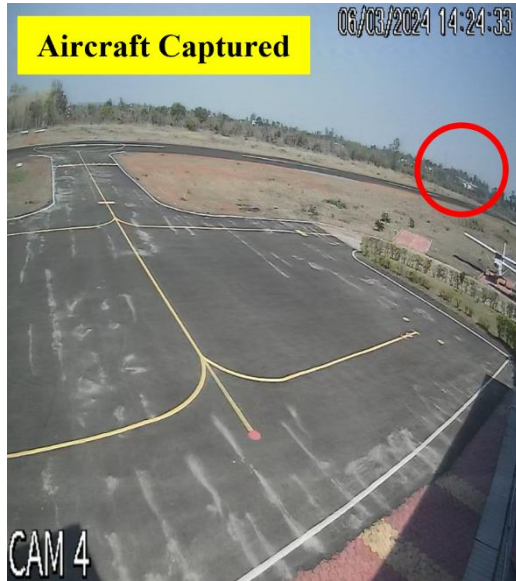


Figure 18. Aircraft captured by CAM 4



Figure 19. Aircraft flare captured by CAM 4

Camera No. 3- As it was facing straight towards the runway, it captured the middle section of the runway. The frame of this camera confirmed that aircraft neither lost height nor speed while floating and subsequently crossed the middle of the runway at approximately 6 feet above. Additionally, video from this camera also showed that aircraft started losing height after leaving the middle of the runway.



Figure 20. Aircraft height in front of Taxiway



Figure 21. Aircraft crossed middle of runway

Camera No. 2-

This camera captured end of the runway and showed that aircraft started losing height, and finally landed when approximately one fourth of the runway was remaining. Aircraft appeared continuously rolling until it reached end of runway 14. Further, this camera captured the aircraft rolling until aircraft suddenly disappeared when it went below the ground level.

In addition, aircraft profile while flying over the downward slope is shown below:



Figure 22. Aircraft profile on downward slope

1.18.5 Landing distance calculations

According to records produced by local authorities, the slope gradients measured for runways 14 and 32 are approximately 1:0.00594 and 1:0.00698, respectively.

A slope gradient of 1:0.00594 means that for every 01 meter runway distance, elevation changes by 0.00594 m.

According to the POH, the ground roll distance required for landing by Cessna 172 aircraft having AUW 1134 kgs at 30 flap setting is approximately 175 m (575 feet) at sea level.

According to Student Pilot, flap 20 config was selected for landing at Guna airfield, where pressure altitude is around 1600 feet (Baro height of the airfield).

Taking into consideration that runway was dry and winds calm, corrections applied to calculate the ground roll:

Pressure Altitude Correction

Landing distance typically increases about 5% per 1000 ft.

For 1600 ft:

$$175 \text{ m} \times 1.08 = 189 \text{ m}$$

Flap 20° Correction

Reducing flap from 30° to 20° generally increases landing roll by approximately 15% :

$$189 \text{ m} \times 1.15 = 217 \text{ m}$$

Downhill Slope Correction

A downhill slope increases landing roll approximately 10% per 1% downhill slope

For slope of 0.594% downhill:

$$217 \text{ m} \times 1.0594 = 230 \text{ m (755 feet)}$$

Since the Cessna 172S aircraft landed on downhill side with flaps 20 °, the rolling distance required at 1600 feet for stopping the aircraft on runway is approximately 230 m (755 feet) when other factors such as tire conditions not taken into consideration.

Landing distance calculations indicated that, at the aircraft's landing weight and the downward slope from the middle of the runway at Guna, the rolling distance required under ISA conditions was 755 feet.

2. ANALYSIS

2.1 Serviceability of Aircraft

The aircraft had a current and valid Certificate of Airworthiness, an Airworthiness Review Certificate, and an Aero Mobile License as required by applicable regulations on the day of the accident. Prior to the accident flight, all applicable Airworthiness Directives, mandatory Service Bulletins, and DGCA Mandatory Modifications for both the aircraft and its engines had been satisfactorily addressed. Scrutiny of the Technical Log Book, Snag Register and the Pilot Defect Report (PDR) register confirmed the absence of any outstanding issues or postponed maintenance tasks on the aircraft, hence it was not operating under any MEL.

In addition, no technical snag or issue was reported by trainee neither during previous sortie nor at any time during the accident flight. Furthermore, post-accident analysis of data retrieved from the Garmin G1000 and ECU revealed no evidence of malfunction or issues with the aircraft or its engine.

Before operating the accident flight, trainee had followed the checklist and accordingly, hold aircraft on brakes until 1800 rpm was achieved. During this action, no deficiency in aircraft braking was observed.

Judging by the condition of the tire marks left by the both main landing gear on the runway, it is certain that the aircraft's brakes continued to function normally from the moment they were applied until the brakes were released and go around was executed.

However, the tire pressure of both main landing gears was around 45 psi, higher than the OEM prescribed pressure i.e 42 psi. Further, both tires were worn out beyond the permissible tread depth, which is very critical for traction. Since tyre pressure and grooves have direct relation with the aircraft traction therefore fitment of non-standard tires contributed in less effective braking action required at critical juncture.

2.2 Weather

The student pilot had obtained weather information for the destination airport prior to commencing the cross-country flight; conditions were conducive for the planned flight.

While approaching runway 32 at Guna airfield, wind information was again communicated to the student pilot by local ATC. The wind parameters were well within the aircraft's landing limitations. However, it has been observed that hourly weather information for Guna Airfield was not being recorded by the Sha-Shib Academy. Consequently, METAR information for the period 0800 UTC to 0900 UTC was not available in the MET register. But, METAR of 0330 UTC was found indicating that Academy was recording weather information only prior to commencement of the first flight of the day.

Analysis of Garmin G1000 and ECU data revealed no evidence of weather contributing to the accident.

2.3 Runway Aspect

Since no displacement in threshold position at either end at Guna airfield, approximately 3000 feet of length of runway is safe & sufficient for landing and takeoff operations for Category A aircraft under normal conditions. However, the slope gradient towards the runway 14 from middle of the runway is high and may significantly impact the landing and takeoff. Therefore, Guna Airfield is considered challenging for trainees primarily due to high slope gradient at both ends.

Since landing is considered the most difficult part of training, therefore, if a runway is short, it significantly reduces the margin for error and can be risky for inexperienced student particularly when the approach is high, aircraft flares for too long and simultaneously aircraft speed does not wash off.

Despite the aircraft consumed more than half of the runway, student pilot managed to land the aircraft on the remaining runway where the slope was negative (downward). This situation overall affected aircraft controllability and later affected the decision making of the trainee.

Since the aircraft was flying over the negative slope of the runway, it appears that Student pilot probably could not judge the aircraft height along the runway and instead of correcting the pitch of the aircraft proportionately, aircraft attitude was kept same. And this could have led to longer flare than usual.

As the aircraft flared longer, it resulted into late touchdown which eventually made the less runway available ahead to execute the firm landing. Furthermore, downhill landing increases the landing distance because runway slope does not allow the aircraft momentum to come down instantaneously even after brakes are applied immediately after touchdown. Therefore, the landing roll distance increases and this same situation was faced by the student pilot. Even heavy brakes were applied but the aircraft speed did not decrease as student pilot was expecting.

Aircraft main landing gear tires without grooves and pressure above the maximum limit led to skidding of tires when heavy brakes were applied after touchdown. Due to skidding on paved surface, aircraft did not stop on the paved surface till the brakes were applied.

Furthermore, downslope creates an illusion that runway is shorter in length than its actual length. While the aircraft was rolling towards the runway 14 threshold, Student pilot observed the lake at the end of the runway and presumed the remaining distance would be insufficient to stop on the paved surface, even though the aircraft was deaccelerating. Thereafter, Student pilot had suddenly decided for go around and throttle was set to full power position.

The aircraft touched down approximately 2,028 feet past the Runway 32 threshold, consequently leaving only 972 feet of runway for ground roll. Runway markings also indicated that aircraft covered a distance of around 556 feet while brakes were engaged. Now the distance available for landing roll and stopping of aircraft on paved surface left was approx. 412 feet. This established that instead of continuously applying the brakes for 755 feet (distance required for stopping the aircraft), trainee released the brakes much early i.e., at 556 feet. Thereafter, aircraft throttle shifted from idle to full power to execute the go around. At this point of time, only 412 feet of runway was available for executing the take-off roll. However, according to the POH, the ground roll required during take-off roll under normal condition is around 960 feet.

The investigation team reckoned that even if the paved surface (412 feet) and the soft ground available ahead of the runway end (216 feet) were used by the trainee for takeoff purposes, the total length of 628 feet was still much less than specified in the POH (960 feet).

2.4 Crew Aspect

2.4.1 Crew Flying Experience and Qualification

All the requirements including medical, licenses of the trainee pilot were current as on date of accident. Further, trainee possessed the required qualification for conduct of Solo cross country flight. The trainee pilot had about 148:25 hours of total flying experience and about 77 hours on type as PIC. Before operating the accident flight, trainee had around 44:55 hours of cross-country flying experience.

As the last flight to Guna was operated by the Student Pilot just one day prior to accident day, hence, trainee was familiar with the topography of the airfield and its surroundings. During that flight all ground landmarks to be noticed by trainee while approaching Guna airfield were briefed by the Flying Instructor.

During this flight, aircraft was high on flare, therefore, instructor assisted the student pilot verbally and provided guidance on aircraft configuration for normal landing. Thereafter, trainee managed to land aircraft with flap 20 configuration.

Before planning departure to Dhana, Instructor requested Guna ATC to grant permission to carry out

one X-Country approach & landing practice before leaving for Dhana. The purpose of this additional sortie was to make the student familiar one more time regarding circuit profile and ground features to be observed & followed at Guna airfield. Notwithstanding that the trainee had not been provided any kind of assistance during this sortie, the aircraft landed safely at Guna Airfield.

2.4.2 Standard Procedures and Guidelines (POH, TPM & FOB)

During cruise, Student pilot would be able to manage engine's parameter and aircraft speed within limits laid down in company documents and OEM's POH. However, Student Pilot could not maintain the speed and ROD of the aircraft at TOD phase. During descent phase, for a moment aircraft speed exceeded and reached upto 145 knots against the Maximum speed limit 126 knots mentioned in the POH. Consequently, aircraft ROD also reached 3011 fpm which was significantly higher than the safe operational limit of 1000 fpm.

On the day of accident, while following downwind leg and base leg, student pilot selected flap 10. Further, the analysis of data revealed that the approach profile was not smooth as aircraft altitude kept varying between 600 feet to 800 feet AGL. However, the minimum circuit altitude restricted by CAA in its TPM and FOB is not less than 1000 feet AGL.

The normal circuit to be carried out by Cessna 172 aircraft for landing at Guna airfield was compared with the accident flight circuit. Through this comparison it can be clearly established that though the downwind leg was extended by the Student pilot, the final leg was joined by cutting the approach. And therefore, initially aircraft could not align with the final approach path. Further, as the aircraft was high on final approach, it missed the 3° glide slope. Aircraft neither followed the standard 3° glide slope nor it aligned to runway on final approach. According to the Student Pilot, to avoid high tension cables in approach path, aircraft was intentionally kept high on approach. Consequently, this resulted into higher rate of descent on final approach. Since the aircraft was neither vertically nor laterally aligned during the initial phase of final leg, this situation could have pushed the trainee towards tunnel vision effect, where his main focus was confined to two tasks. First was to bring the aircraft on correct glide slope and second was to align the aircraft with runway centerline. And due to this effect, there was a high possibility that trainee might have ignored other critical parameters.



Figure 23. Comparison of actual flight

Further, “Before Approach” procedures stipulated in POH and Pre Landing Checklist of CAA mandates selection of Fuel Selector valve to ‘BOTH’. However, post-accident, when position of cockpit switches

was analyzed, it confirmed that fuel selector valve was not reset from 'Left' to 'Both'. This shows that the checklist was not followed meticulously by trainee.

The Flying Order Book of the organization has stipulated the guidelines and procedures needs to be followed at the time of go around and Landing flap selection. According to the FOB, all landings on Cessna 172 needs to be carried out with flaps 20 configuration. But the flight profile and aircraft behavior at the time of landing indicates that landing did not perform at flap 20 config instead it was performed at flaps 10. The analysis of post-accident cockpit photographs supported this fact and this could have contributed in slightly long flare.

Additionally, the standard procedure defined regarding go around/miss landing was not followed by the trainee even though 1000 feet marker was missed due to long flaring of the aircraft and touch down could not be achieved till two third of the runway was consumed. In this case, aircraft had consumed about 2028 feet (68% of runway's total length) before it touchdown on the paved surface.

Further, guidelines of FOB on go around were disregarded and landing was continued though parameters required for safe landing could not be achieved during approach and landing phase.

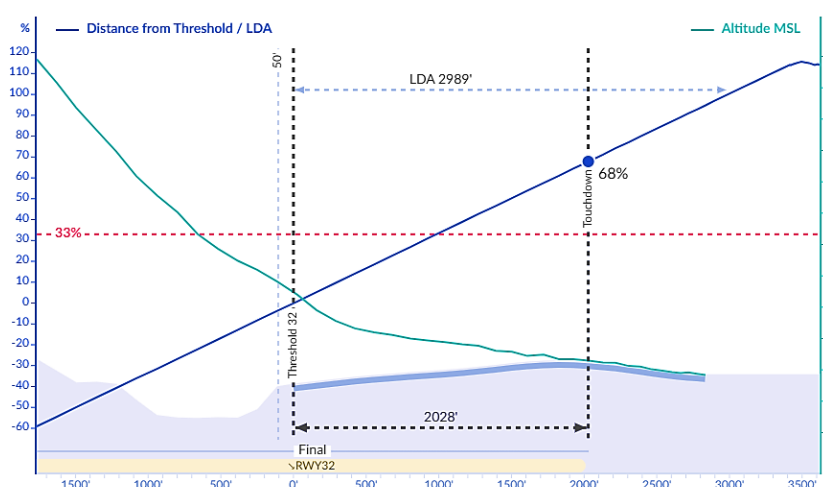


Figure 24. Runway consumed before touchdown

2.4.3 Training

Student pilot operated the aircraft according to the procedures defined for normal landing and takeoff. Prior to the accident flight, trainee had never practiced short field landing and short field takeoffs. Therefore, trainee had never experienced the aircraft landing with flap 30 configuration (Full down). Further, trainees were advised not to land at full flap configuration, hence, had no prior experience of short field landing techniques. According to Flight Instructor, this technique was never imparted to trainees, believing that in case any unexpected situation warrants a go around at last moment, then there would be a high possibility that student pilots under such conditions may not handle the go around properly if flaps have already been set to full down. Therefore, all students were advised to practice landing at 20° flaps setting only.

The procedures laid down in POH regarding short field take off, flaps at 10° and thrust lever fully forward, was followed by the student pilot once realized runway available ahead is not sufficient. But, as the aircraft did not attain the lift off speed of around 51 knots despite thrust lever was moved to maximum, aircraft could not lift off from the ground.

2.5 Organizational Aspect

2.5.1 Short field landing & take off and Emergencies

Student pilot had accumulated around 148:25 hrs of flying hours and therefore, gained sufficient experience on GF, Solo Flying and IFR Flying but was lacking skills to handle the aircraft during unforeseen situations like landing or takeoff from short field.

Furthermore, the POH recommends landing the Cessna 172 aircraft with Flaps 30 (full down) in certain emergency situations. Therefore, practice of Flaps 30 landings should form part of the trainee's flight training. The procedures to be followed during such emergency situations should be adequately taught and practiced by the trainee so that trainees will be able to manage unforeseen situations during solo flights. However, prior to the accident, which occurred during 300 NM solo cross-country flight, the trainee had never practiced landing with Flaps 30. It can therefore be inferred that the trainee had no practical experience of Flaps 30 landings and may not have been adequately prepared to handle emergency situations. Further, trainee had no previous experience of short-field landing or short-field take-off.

Training syllabus of few foreign FTOs revealed that these training are imparted before the trainees are released for solo cross-country flights.

2.5.2 Training Syllabus

Since the flying training syllabus of the FTO was not comprehensively defined in their document, the sequence of few exercises may keep on changing during the course of training. Further, it has been noted that at few occasions it changes according to the CFI or Dy CFI who is entrusted with the responsibility of defining the training syllabus of the FTO.

As FTOs do not have a well-defined Syllabus covering every aspect of training to be followed in a sequential manner during Flying training, this sometime results into releasing the trainee for Solo flights without making them practice few critical exercises. And this sometimes led to their trapping in unforeseen situations where trainees could not handle those critical/emergency situations. To avoid such situations in future and making trainees aware of exercise sequence to be mandatorily followed during different phases of training, a comprehensive training syllabus must be designed and implemented by all FTOs.

Further, this will not only streamline the course content across Flying Training Organizations operating in India but during audits by DGCA, it can be used as a tool to ensure all flying exercises are followed in a well-defined sequence, thereby bringing flying syllabus of all FTOs at par with each other and will ensure same standards being followed at every FTO.

2.5.3 Documents

Scrutiny of the TPM and SMS Manual of the organization, approved and accepted by DGCA, revealed that they were not in line with the prevailing Aircraft (Investigation of Accidents and Incidents) Rules,

2017 at the time of the accident. Further, these documents still reflected old terminologies such as **Inquiry Officer, Inspector of Accidents, and Committee of Inquiry** at many places in the said documents.

Further, the Emergency Response Plan (ERP) prepared by the FTO was found to be outdated and, therefore, the procedures and guidelines contained therein were effectively inapplicable in the event of any accident or serious incident.

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.

2.6 Previous Recommendations pertaining to ATC communication recording

As per prevailing guidelines or regulations of DGCA, at uncontrolled aerodromes, provision of recording of ATC communication is not mandatory. Therefore, communication held between the involved aircraft and ATC was not recorded by Guna ATC and consequently could not be preserved for investigation purpose.

In absence of any recording medium either in aircraft or Guna ATC, and ambiguity in the statements of ATC personnel and Student Pilot, the investigation team could not verify whether the ATC personnel had alerted the Student Pilot about being high on approach.

During investigation, Instructor manning the ATC stated that he had communicated to the trainee that aircraft was high on approach and accordingly may plan for go around. Whereas the student pilot denied any such advice or message communicated to him while aircraft was approaching for landing. According to trainee, if any such message had been transmitted, trainee could have planned for go around rather than executing a landing.

To mitigate such situations' philosophy of 'hearback' and 'readback' is already in place which clearly says that whenever an air traffic controller issues an instruction, pilots must acknowledge its reception and comply with it. Both persons involved must state their request/intentions, listen for feedback and acknowledge the other person's response. However, no second transmission was made by ATC.

Since provision to record and retrieve the VHF communication held between aircraft and local ATC is presently nowhere mandated under DGCA regulations, therefore, most of the FTOs do not have any setup for the same.

During the course of investigation, it was observed that AAIB had already recommended DGCA regarding mandating the recording and preservation of communication between ATC and aircraft in its three earlier investigation reports (accident to VT-CAF at Dhana on 3 Jan 2020, the accident to VT-RBE at Baramati on 20 Sep 2021, and the accident to VT-FAO at Nagarjuna Sagar on 26 Feb 2022). However, the same recommendation is still pending.

Early compliance of aforesaid recommendation will provide better monitoring and surveillance of training aircraft operating from uncontrolled airfields.

2.7 ECU and Garmin data analysis

Based on the Garmin and ECU data, performance and aircraft handling skills of student pilot was analysed and can be characterized as an unstabilized approach, poor energy management, and delayed decision-making during the go-around.



Figure 25. Aircraft parameters at different positions

Unstabilized Final Approach

- Instead of descending, the aircraft initiated a climb at 08:53:36, with vertical speeds reaching as high as +1329 fpm. This resulted in the aircraft reaching an altitude of 2111.4 ft MSL (approx. 488' AGL) at 08:53:43, placing it significantly above the standard 3-degree glide slope.
- Idle Power Descent: To compensate for being high, the pilot flew the remaining approach from 140 feet AGL down to the threshold at 0% engine load, which contributed to a steep rate of descent (-928 fpm) and therefore, lacking power stabilization.

Long Flare and Pitch Control

Once over the runway, the pilot struggled to maintain a steady attitude, leading to an inefficient landing sequence.

- Pitch Fluctuations: During the flare (08:54:36–08:54:44), the pitch was highly unstable, oscillating between 1.48 and 7.75 degrees. This instability was likely a reaction to the rapid decay of indicated airspeed, which dropped from 69 knots to 52 knots during the "round out".
- Excessive Runway Consumption: Due to the unstable pitch and the attempt to bleed off

excess height, the aircraft consumed 2028 feet of runway during the flare alone before making ground contact.

Delayed Go-Around Execution

The most critical handling error was the timing and execution of the go-around.

- Late Initiation: The pilot waited until 08:54:53 to initiate a go-around, by which time the ground speed had already slowed to 32 knots and only 276 feet of runway remained.
- Aggressive Pitch Up: Upon applying full power (100% Load), the pilot pulled the nose up aggressively, reaching a pitch of 13.73 degrees at 08:55:02.
- Failure to Accelerate: Although the engine reached maximum MAP (2175), the aircraft only accelerated to a maximum ground speed of 47 knots before the aircraft exited the soft ground and collided with a tree situated at 668 feet from the end of runway 14.

3. CONCLUSIONS

3.1 Findings

1. The Certificate of Airworthiness, Certificate of Registration and Airworthiness Review Certificate of the aircraft were valid on the day of accident.
2. The aircraft and its engine was being maintained as per continuous maintenance program approved by the DGCA. All other laid down requirements pertaining to serviceability of aircraft were complied with.
3. No outstanding snag, deferred defect, or MEL item existed on the aircraft or engine prior to the accident flight.
4. Load and Trim sheet was prepared by the Student Pilot before commencing the cross country flight and according to the calculations in Load & Trim Sheet, C.G of the aircraft was within the limits.
5. Both pre-flight and post flight Breath Analyzer Test carried out and the results were negative.
6. Post-accident, medical examination of the trainee was conducted at the nearest available hospital and results were found negative (Satisfactory).
7. No abnormality was observed on the aircraft by the trainee during the pre-flight check or during the entire flight. The serviceability of the aircraft did not contribute to the accident.
8. The Student pilot was qualified to operate the flight and his licenses and medical were valid as on date of accident.
9. Analysis of Garmin G1000 and ECU data revealed no indication of engine power loss or system malfunction during the accident flight.
10. Weather conditions at the time of the accident were conducive for landing at Guna Airfield and in no sense attributed in this accident.

11. FTO responsible for RT communication at Guna Airfield did not maintain hourly MET observations and therefore, METAR information at the time of accident was unavailable in their MET register.
12. The runway length at Guna airfield was adequate for Cessna 172S aircraft under stabilized approach and landing conditions; however, the significant downward slope towards runway 14 reduced operational margins and therefore, it is prone to occurrences under unstabilised landings.
13. The student pilot conducted an unstabilized approach, characterized by excessive height on final approach, deviation from the standard 3° glide path, and improper lateral alignment while approaching for landing.
14. During descent, aircraft parameters exceeded prescribed operational limits and maximum airspeed and ROD reached approximately 145 knots 3011 fpm respectively.
15. The student pilot extended the downwind leg but subsequently joined the final leg by cutting the approach path, resulting in improper stabilization on finals.
16. The aircraft pitch attitude fluctuated significantly during flare, resulting in a prolonged float and delayed touchdown.
17. The aircraft touched down approximately 2028 feet from the threshold of runway 32, leaving only about 972 feet of runway remaining for landing roll.
18. The prolonged flare and late touchdown substantially reduced the available stopping distance.
19. The aircraft landed on the downward slope portion of the runway, which increased landing roll distance and adversely affected deceleration performance.
20. Both main landing gear tires were found inflated above the OEM recommended pressure and lacked adequate tread grooves resulting into adverse braking and traction during landing roll.
21. Tire marks on the runway confirmed that brakes were applied after touchdown and were functioning normally.
22. The student pilot perceived that runway left post heavy braking was not sufficient to stop aircraft on paved surface therefore, braking action was discontinued in spite aircraft speed was decelerating.
23. The go-around was initiated at a very late stage when insufficient runway distance remained for safe acceleration and lift-off.
24. The aircraft did not achieve the required lift-off speed before overrunning the paved surface.
25. The student pilot had no prior experience of short field landing and short field take-off before released for solo sorties.
26. Flap 30 landing is part of emergency exercises such as Engine Failure and Emergency landing but it was never practised by the trainee prior to solo flights.
27. The fuel selector valve was found positioned to "LEFT" instead of "BOTH," indicating that 'Before Approach' checklist was not followed meticulously.
28. Standard stabilized approach and go-around criteria laid down in the operator's procedures were not adhered to during the approach and landing.
29. The student pilot continued the landing despite excessive runway consumption and failed to

touchdown within the prescribed touchdown zone.

30. The organization's training syllabus was not comprehensive and did not ensure sequential completion of all critical flying exercises or emergency exercises before solo release.
31. Communication between the aircraft and local ATC was not recorded as it was not mandated according to prevailing DGCA regulations.

3.2 PROBABLE CAUSE

The accident occurred when Student Pilot could not stop the aircraft within the runway and subsequently when go around was tried, it overran and hit a tree at a steep slope resulting in damage to the aircraft.

Contributory Factors:

1. Unstabilised Approach
2. Aircraft consumed more than half of the runway before landing
3. Touchdown at runway's negative slope gradient
4. Late decision of Student pilot to initiate go around
5. No prior experience of short field takeoff and landing
6. Maintaining higher pressure than OEM recommended value and degraded tire treads
7. No timely communication from ATC even after a very long flare

4. SAFETY RECOMMENDATIONS:

- 4.1 DGCA may suggest all the FTOs to assess their runway characteristic and in case, hostile terrain or steep slope beyond the runway end is present, they may be advised to take proactive actions to stop overrun.
- 4.2 DGCA may suggest all FTOs to devise a comprehensive training syllabus according to the category of License for standardization of syllabus across all FTOs.
- 4.3 DGCA may issue instruction to all FTOs to ensure that trainees have adequately practiced all critical exercises and emergency procedures prior to authorized for solo flights.
- 4.4 The CAA must issue instructions directing trainees to initiate a go-around without hesitation whenever the aircraft is not properly configured or aligned for a safe landing.
- 4.5 Sha Shib Flying Academy, responsible for RT communication at Guna Airfield, must inform all trainees to initiate a go-around whenever notices aircraft is high in approach and, due to unusually long flaring, a high possibility of overshoot arises.
- 4.6 Sha Shib Flying Academy may caution crew members of other organizations regarding a significant downward slope towards runway 14 at Guna Airfield. The FTO must ensure that no aircraft touches down beyond half of the runway, where the negative slope adversely

affects braking.

4.7 Sha Shib Flying Academy must comply with DGCA guidelines and regulations and accordingly weather information on hourly basis shall be maintained at its base.

Place: Delhi

Date: 29 Sep 2026

DETAILS OF DAMAGE ON EACH INDIVIDUAL SECTION

NOSE - ENGINE SECTION

1. The propeller spinner was broken from tip to middle.
2. All blades of the Propeller are completely broken into pieces approximately 6 inches of the root.
3. Top and bottom cowling especially in left side severely damaged.
4. All anti shock cowl mounts were found sheared off

NOSE LANDING GEAR:

1. Landing gear found intact with strut fully extended.
2. The torque link and shimmy dampener were found intact.
3. Lower strut and fork found intact.
4. The steering mechanism and wheel assembly were found intact

CABIN:

1. Windshield broken in pieces.
2. Left door detached from fuselage. The right door found deformed.
3. Instrument panel found intact, PFD, MFD, Audio panel and all standby instruments were found intact.
4. Seat and seat rail were found intact.
5. The frames of the cabin were bent.
6. LH Wing attachment points of the fuselage sheared off.
7. The roof of the Cabin was found bent, buckled, and damaged.
8. Windshield above passenger seat found broken

FUSELAGE:

1. The empennage of fuselage bent upward, twisted, and broken.
2. The entire LH side of fuselage has dents, wrinkles, and scratches.
3. The bottom of fuselage has minor dents and scratches.

EMPENNAG:

1. Empennage of fuselage near Attachment bulkhead of Tail plane is sheared off, twisted, and broken apart from fuselage.
2. LH side horizontal stabilizer from middle, damaged and bent upward.
3. LH side Elevator from middle, damaged and bent upward.
4. Tips of LH horizontal stabilizer and Elevator damaged and broken.
5. Trailing edge of RH elevator twisted, and Trim tab twisted and bent upward.
6. Dent on Bottom leading edge of Vertical Stabilizer.
7. Fairings around bottom of vertical stabilizer is sheared off.
8. Rudder was found intact with vertical stabilizer.

LH MAIN LANDING GEAR:

1. Landing gear sheared off from fuselage attachment.
2. Wheel assembly along with brake unit, brake disc and Linings are intact with wheel and having heavy landing mark on tire.
3. Sheared off bolt attaching Landing gear to fuselage has already been handed over to AAIB team.

RH MAIN LANDING GEAR:

1. Landing gear strut, wheel assembly, brake unit, brake disc and Linings are intact and having heavy landing mark on tire.

RH WING:

1. Bent downward at trailing edge of wing around station 100 over leading-edge outboard end of flap.
2. RH Wing in total including Flap, Aileron and wing strut found intact.

LH WING:

1. The wing-fuselage attachment sheared off.
2. LH wing strut found broken approximately from middle.
3. Bottom of Wing root around station 22.85 found damaged.
4. The inside side of flap was damaged and bent downward.
5. LH wing leading edge from station 23 to 100 found damaged and broken.
6. Bottom of wing from station 71 to 100 found damaged and broken.
7. LH aileron found bent and twisted.
8. LH wing leading edge station 118 found damaged.
9. Wing tip station 208 was found damaged

ANNEXURE 'B'

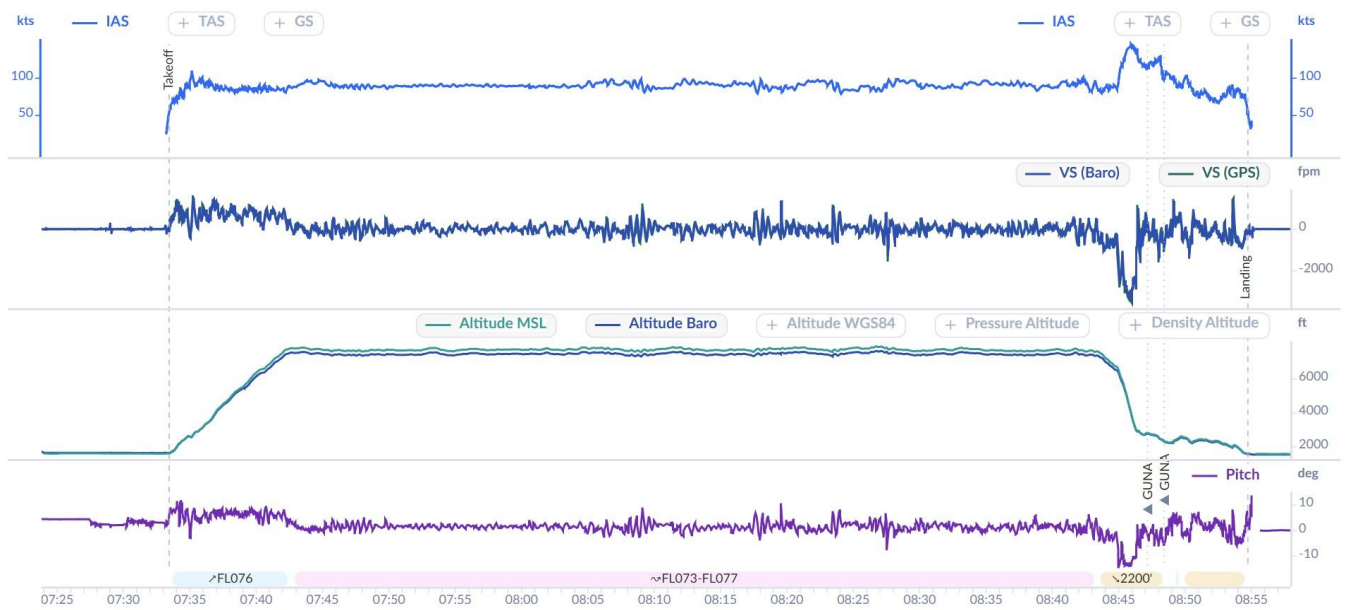


Fig: Graphs capturing the Entire Accident Sortie



Fig: Graphs showing Landing Phase of Accident Sortie

Annexure-1
Training & Procedures Manual
Issue 2, 11 January 2021

Flying Training Syllabi & its Implementation

1. Chimes Aviation Academy follows 2 Syllabi for CPL & 1 Syllabus as PPL given below. Sequence & Number of exercises and Time for each exercise is for guidance and may be varied as long as DGCA requirement for issue of CPL, CPL/IR & PPL are satisfied.
2. Single Engine 185:00 Hrs + Multi-Engine 15:00 Hrs. (Phase-wise CPL Syllabus) – Page AN-1/ 2 to 10
3. Single Engine 180:00 Hrs + Multi-Engine 20:00 Hrs. (Phase-wise CPL Syllabus) - Page AN-1/ 11 to 16
4. Single Engine PPL Syllabus 55:00 Hrs. (Phase-wise PPL Syllabus) - Page AN-1/ 17 to 19
5. Sequence of Exercises in Phase-1 is to be followed strictly. Sequence of Exercises in the remaining Phases is to be followed however, CFI/Dy.CFI or an FI may alter the sequence due to operational or weather reasons.
6. Additional flights may become necessary if a student's performance is not Satisfactory in each Phase. Approval for additional flights for a student is to be taken from CFI/Dy.CFI by respective Instructors, on case to case basis.
7. In case of only Single Engine CPL, CFI/Dy. CFI may increase the Single Engine Syllabus to 200:00 Hrs by increasing flights in SE Syllabus appropriately.
8. Cross Country Flights by Day & Night are to be carried out as per the SOP which has been prepared in accordance with DGCA Flying Training Circular 4/2020 dated 31 December 2020, and placed at the end of this Annexure -1 A.

CPL FLYING TRAINING SYLLABUS SE & ME 185:00 +15:00 = 200:00 Hours

No.	AIR EXERCISES	TYPE	DAY			NIGHT			DAY		NIGHT	INSTRUMENT		PROG TOTAL
			DUAL	SOLO	PI U/S	DUAL	SOLO	PI U/S	SOLO X-CTY	PI U/S X-CTY	PI U/S X-CTY	AIRCRAFT	SIMULATOR	
1	AIR EXPERIENCE	GF DAY	0:30											0:30
2	EFFECTS OF CONTROLS 1	GF DAY	1:00											1:30
3	EFFECTS OF CONTROLS 2	GF DAY	1:00											2:30
4	STRAIGHT AND LEVEL 1	GF DAY	1:00											3:30
5	STRAIGHT AND LEVEL 2	GF DAY	1:00											4:30
6	CLIMB AND DESCENT 1	GF DAY	1:00											5:30
7	CLIMB AND DESCENT 2	GF DAY	1:00											6:30
8	MEDIUM TURNS	GF DAY	1:00											7:30
9	STALLING 1	GF DAY	1:00											8:30
10	STALLING 2	GF DAY	1:00											9:30
11	CIRCUITS 1 (NORMAL CIRCUITS)	GF DAY	0:45											10:15
12	CIRCUITS 2 (NORMAL AND FLAPLESS)	GF DAY	0:45											11:00
13	CFT's PROGRESS CHECK	GF DAY	0:45											11:45
14	CIRCUITS 3 (NORMAL FLAPLESS AND GLIDE)	GF DAY	1:00											12:45
15	CIRCUITS (CONSOLIDATION) ⁴	GF DAY	1:00											13:45
16	CIRCUITS (CONSOLIDATION) ⁵	GF DAY	1:00											14:45
17	CIRCUITS (CONSOLIDATION) ⁶	GF DAY	1:00											15:45
18	CIRCUITS & LANDING 7 (SOLO CHECK)	GF DAY	0:45											16:30
19	CIRCUITS (1st SOLO)	GF DAY		0:15										16:45

Phase-1- 16:45 hrs

No.	AIR EXERCISES	TYPE	DAY			NIGHT			DAY		NIGHT	INSTRUMENT		PROG TOTAL
			DUAL	SOLO	PI U/S	DUAL	SOLO	PI U/S	SOLO X-CTY	P1 U/S X-CTY	P1 U/S X-CTY	AIRCRAFT	SIMULATOR	
20	CIRCUITS & LANDING (2ND SOLO CHECK)	GF DAY	0:45											17:30
21	CIRCUITS (2 ND SOLO)	GF DAY		0:30										18:00
22	CIRCUITS & LANDING (3RD SOLO CHECK)	GF DAY	0:45											18:45
23	CIRCUITS (3 RD SOLO)	GF DAY		0:30										19:15
24	CIRCUITS & LANDING (4TH SOLO CHECK)	GF DAY	0:45											20:00
25	CIRCUITS (4 TH SOLO)	GF DAY		0:45										20:45
26	CIRCUITS (Circuit Check Free)	GF DAY		1:00										21:45
27	CIRCUITS & LANDING	GF DAY		1:00										22:45
28	CIRCUITS & LANDING	GF DAY		1:00										23:45
29	CIRCUITS & LANDING	GF DAY		1:00										24:45
30	CIRCUITS & LANDING	GF DAY		1:00										25:45
31	CIRCUITS & LANDING	GF DAY		1:00										26:45
32	GENERAL FLYING	GF DAY	1:00											27:45
33	GENERAL FLYING	GF DAY		1:00										28:45
34	GENERAL FLYING	GF DAY	1:00											29:45
35	GENERAL FLYING	GF DAY		1:00										30:45
36	GENERAL FLYING	GF DAY		1:00										31:45
37	GENERAL FLYING	GF DAY		1:00										32:45
38	GENERAL FLYING	GF DAY		1:00										33:45
39	GENERAL FLYING	GF DAY		1:00										34:45
40	INSTRUMENTS FLYING 1 (NO HOOD)	IF	1:10									1:00		35:55
41	CIRCUITS & LANDING	GF DAY		1:00										36:55
42	INSTRUMENTS FLYING 2 (WITH HOOD)	IF	1:10									1:00		38:05
43	CIRCUITS & LANDING	GF DAY		1:00										39:05
44	INSTRUMENTS FLYING 3 (WITH HOOD)	IF	1:10									1:00		40:15
45	CIRCUITS & LANDING	GF DAY		1:00										41:15
46	INSTRUMENTS FLYING 4 (WITH HOOD)	IF	1:10									1:00		42:25
47	GENERAL FLYING PROGRESS CHECK	GF DAY		1:00										43:25

Phase-2- 26:40 hrs

No.	AIR EXERCISES	TYPE	DAY			NIGHT			DAY		NIGHT	INSTRUMENT		PROG TOTAL
			DUAL	SOLO	PI U/S	DUAL	SOLO	PI U/S	SOLO X-CTY	P1 U/S X-CTY	P1 U/S X-CTY	AIRCRAFT	SIMULATOR	
74	INSTRUMENTS FLYING 10 (WITH HOOD)	IF	1:10									1:00		102:45
75	IFR CROSS-COUNTRY-1	IFXCO	4:30									3:00		107:15
76	CIRCUITS & LANDING	GF DAY		1:00										108:15
77	GENERAL FLYING	GF DAY		1:00										109:15
78	IFR CROSS-COUNTRY-2	IFXCO	4:30									3:00		113:45
79	CIRCUITS & LANDING	GF DAY		1:00										114:45
80	GENERAL FLYING	GF DAY		1:00										115:45
81	IFR CROSS-COUNTRY-3 PROGRESS CHECK	IFXCO	3:45									2:45		119:30
82	GENERAL FLYING	GF DAY		1:00										120:30
83	CIRCUITS & LANDING	GF DAY	1:00											121:30
84	GENERAL FLYING	GF DAY	1:00											122:30
85	CROSS-COUNTRY-16 300 nm SOLO X-CTY	XCO							5:00					127:30
86	CIRCUITS & LANDING	GF DAY		1:00										128:30
87	GENERAL FLYING	GF DAY		1:00										129:30
88	CIRCUITS & LANDING	GF DAY		1:00										130:30
89	GENERAL FLYING	GF DAY		1:00										131:30
90	CIRCUITS & LANDING	GF DAY	1:00											132:30
91	GENERAL FLYING	GF DAY	1:00											133:30
92	GENERAL FLYING	GF DAY		1:00										134:30
93	CIRCUITS & LANDING	GF DAY		1:00										135:30
94	CROSS-COUNTRY-17 SOLO	XCO							3:10					138:40
95	CIRCUITS & LANDING	GF DAY		1:00										139:40
96	GENERAL FLYING	GF DAY		1:00										140:40
97	CROSS-COUNTRY-18 SOLO	XCO							3:20					144:00
98	CROSS-COUNTRY-19 SOLO	XCO							3:20					147:20
99	CROSS-COUNTRY-20 SOLO	XCO							3:00					150:20

No.	AIR EXERCISES	TYPE	DAY			NIGHT			DAY		NIGHT	INSTRUMEN		PROG TOTAL
			DUAL	SOLO	PI U/S	DUAL	SOLO	PI U/S	SOLO X-CTY	P1 U/S X-CTY	P1 U/S X-CTY	AIRCRAFT	SIMULATOR	
100	GENERAL FLYING	GF DAY	1:00			Phase-3- Continued								151:20
101	GENERAL FLYING	GF DAY		1:00		120:05 hrs								152:20
102	CROSS-COUNTRY-21 SOLO	XCO							3:00					155:20
103	CROSS-COUNTRY-22 DUAL	XCO	4:00											159:20
104	CROSS-COUNTRY-23 250nm X-CTY Check	XCO								4:10				163:30
105	GENERAL FLYING	GF DAY		1:00		Phase-4- 21:30 hrs								164:30
106	NIGHT FAMILIARISATION	NT GF				1:00								165:30
107	NIGHT IF	NT IF				1:10						1:00		166:40
108	NIGHT CIRCUIT & LANDING	NT GF				1:00								167:40
109	NIGHT CIRCUIT & LANDING & EMERGENCIES	NT GF				1:00								168:40
110	NIGHT SOLO CHECK - PROGRESS CHECK	NT GF				0:50								169:30
111	CIRUIT & LANDING NIGHT SOLO	NT GF					1:00							170:30
112	CIRCUIT & LANDING NIGHT SOLO	NT GF					1:00							171:30
113	GF & CIRCUIT & LANDING NIGHT SOLO	NT GF					1:00							172:30
114	GF & CIRCUIT & LANDING NIGHT SOLO	NT GF					1:00							173:30
115	GF & CIRCUIT & LANDING NIGHT SOLO	NT GF					1:30							175:00
116	GF & CIRCUIT & LANDING NIGHT SOLO	NT GF					1:30							176:30
117	GF & CIRCUIT & LANDING NIGHT SOLO	NT GF					1:30							178:00
118	GF & CIRCUIT & LANDING NIGHT SOLO	NT GF					1:30							179:30
119	CROSS-COUNTRY-30 120nm NIGHT X-CTY Check	NTXCO									2:30			182:00
120	GENERAL FLYING CHECK - NIGHT	NTGF						1:00						183:00
121	GENERAL FLYING CHECK- DAY	GF DAY			1:00									184:00
122	INSTRUMENT FLYING CHECK (FOR SEIR)	IF			1:00							0:50		185:00
	TOTAL CPL FLYING SE ONLY	C-172	64:10	37:00	2:00	5:00	10:00	1:00	59:10	4:10	2:30	19:45	15:00	185:00

MULTI-ENGINE SYLLABUS						
NO.	AIR EXERCISES	TYPE	DUAL	SOLO	PI U/S	PROG TOTAL
118	FAMILIARISATION FLIGHT ME	GF DAY	01:00			186:00
119	CIRCUIT & LANDING DAY	GF DAY	01:00			187:00
120	ASYMMETRIC FLYING (6 LANDINGS)	GF DAY	01:30			188:30
121	EMERGENCY PROCEDURES & ASYMMETRIC CIRCUIT & LANDING	GF DAY	01:30			190:00
122	INSTRUMENT FLYING & INSTRUMENT APPROACHES	IF	01:30			191:30
123	AIRWAYS FLYING	XCO	02:00			193:30
124	AIRWAYS FLYING	XCO	02:00			195:30
125	NIGHT CIRCUITS & LANDING	NT GF	01:30			197:00
126	GENERAL FLYING- TEST DAY	GF DAY			01:00	198:00
127	GENERAL FLYING- TEST NIGHT	NT GF			01:00	199:00
128	INSTRUMENT RATING CHECK*	IF			01:00	200:00
	TOTAL MULTI ENGINE		12:00		03:00	15:00
	TOTAL SINGLE & MULTI ENGINE		81:10	106:10	12:40	200:00

COMPLETE SUMMARY & COMPARISON WITH DGCA REQUIREMENT FOR CPL

SUMMARY OF ALL CPL FLYING AT CHIMES AVIATION ACADEMY (CAA)	GRAND TOTAL	Total PIC (Solo+P1 U/S)	PIC X-CO	TOTAL IF	INSTRUMENT TIME A/C	INSTRUMENT TIME SIM	NIGHT DUAL	NIGHT PIC	TOTAL NIGHT FLYING
	200:00	115:50	65:50	53:55	23:55	30:00	07:30	17:30	24:00
DGCA REQUIREMENT (MINIMUM)	GRAND TOTAL	Total PIC	PIC X-CO	TOTAL IF	INSTRUMENT TIME A/C	INSTRUMENT TIME SIM	DUAL	NIGHT PIC	TOTAL NIGHT FLYING
	200:00	100:00	50:00	40:00	20:00	20:00	05:00	05:00	10:00
TOTAL CPL FLYING SE ONLY (CAA)	185:00	115:50	65:50	29:45	19:45	10:00	05:00	13:30	18:30
TOTAL MULTI ENGINE DA 42 (CAA)	15:00	03:00	00:00	03:30	03:30	10:00	02:30	01:00	03:30
TOTAL SE+ ME (SUMMARY OF ALL FLYING) (CAA)	200:00	118:50	00:00	33:15	23:15	20:00	07:30	14:30	22:00

CONTINGENCY PLAN**b. Accident Outside the Aerodrome Area**

If an accident occurs outside the aerodrome area, the first action is to locate the exact site of the accident. After the accident site is located, a crash party consisting of CFI/Dy. CFI, FSO, CEM/MM, local Police personnel, and an adequate number of technicians along with a medical doctor is to proceed to the site. At the site, the following actions are to be taken:

- i. Render medical aid to the injured.
- ii. Remove dead bodies, if any.
- iii. Secure the aircraft with the help of local Police personnel.
- iv. Conduct preliminary investigation and take appropriate photographs.
- v. Arrange for the removal of the aircraft after obtaining clearance from the **Regional Controller of Airworthiness or Air Safety department of DGCA.**

6. Removal of Disabled Aircraft

Whether the accident/incident is at the airport or away from the airport, the disabled aircraft is not to be removed from its position without the prior permission of the **Regional Director of Air Safety Investigating team**. However, if the disabled aircraft is on the runway, in the vicinity of the airport, or in a position where it can pose a hazard to other aircraft operating at the airport, it may be removed to a safe location with prior permission of the **Regional Director of Air Safety**, after necessary photographs of the site of accident/incident have been taken.

FLYING ORDER BOOK**ORDER 2/9
GO-AROUND AND MIS-LANDING**

Pilots shall initiate go-around/miss landing action if there is any doubt regarding the ability to land the aircraft safely. In particular, go-around/miss landing action shall be initiated:

- a) If the landing area is obstructed.
- b) The approach path or speed is unsatisfactory.
- c) The prevailing wind or weather exceeds his limits or ability.
- d) When initiated by Air Traffic Control
- e) In the event of a balloon, bounced landing or pilot induced oscillation

Actions In the event of a go-around C-172 Aircraft.

- a) Apply full power (Nose will pitch up & must be controlled to maintain correct go-around attitude)
- b) Establish a safe climb attitude on take-off heading
- c) All landings at CAA on C-172 are carried out with 20° flaps. During a go-around flaps are to be left at 20° but remember there will be a noticeable pitch-up when full power is applied. This pitch-up must be controlled by forward pressure on control column to maintain correct attitude for climb. Subsequently, trim the aircraft to maintain correct attitude.
- d) Climb on take-off heading
- e) Once above 300ft AGL Retract the flaps in stages to zero degrees.
- f) Advise ATC through a radio call.
- g) Complete another circuit and land.

Actions In the event of a go-around Multi-Engine Aircraft

- a) Apply full power
- b) Establish a safe climb attitude on take-off heading
- c) Remove drag flaps
- d) Select gear up
- e) Climb on take-off heading
- f) Once above 300ft AGL Retract the flaps in stages to zero degrees.
- g) Advise ATC through a radio call.
- h) Complete another circuit and land.

Date: 15 May 2020

Chief Flying Instructor

ORDER 4/2
TAXIING PROCEDURES

- a) Pilots shall obtain permission from the ATC before taxiing any aircraft.
- b) A functional check of the aircraft braking system shall be carried out as soon as practicable after starting to taxi and prior to entering the apron after landing. The check shall be conducted in an area such that in the event of brake failure or partial brake failure there is no possibility of collision with any other aircraft or object.
- c) Taxiing shall be carried out at a speed that will enable the aircraft to be brought to a safe halt in the stopping distance available.
- d) Aircraft shall not be taxied into or out of hangars.

Date: 15 May 2020

Chief Flying Instructor

ORDER 4/4
CIRCUIT PROCEDURE

1. Circuit Pattern & Procedure.

Standard rectangular circuit pattern at an altitude is 2700 ft on QNH (1000 ft AGL) is to be flown. Circuit direction for Runway 17 is Left Hand and for Runway 35 is Right Hand. **No turn to first cross below 500 ft AGL**

2. Circuit Spacing.

Proper circuit spacing is to be maintained by adjusting the Upwind/Take-off leg. Downwind direction and length are not to be varied to adjust circuit spacing.

3. Short Circuit. Or Low-Level Circuit

Short circuits are NOT to be carried out. Standard circuit pattern as listed at para 1 above is to be followed.

4. Touch-and-Go.

Students are NOT permitted to carry out touch-and-go. CFI/FII/PI can do touch-and-go. AFI's are to be specifically cleared for touch-and-go by the CFI/FII. While carrying out touch-and-go the following is to be taken into consideration: -

- a. If the touch down is not achieved by 1000 ft marker on the runway, touch-and-go is not to be carried out. Instead Go-around and make another circuit and Approach.
- b. If full throttle has not been applied by the middle-marker touch-and-go is not to be done: instead the landing is to be converted to full-stop.

5. Go-Around.

- a. If clearance to land on the final approach is not received by 200 ft AGL (1900 ft on QNH) all aircraft are to initiate go-around. After the aircraft has stabilized in a steady climb the aircraft are to fly on the dead side.
- b. If touch down is not achieved by middle marker, all aircraft are to Go-Around.
- c. Go around may be carried out at any time during the approach and landing phase if the correct parameters are not achieved.

d.

Date: 15 May 2020

Chief Flying Instructor

SMS MANUAL**CHAPTER 7: Safety Reporting & Remedial Actions****7.11 Accident and Incident Reporting Procedure****7.11.1 Internal Notification.**

When an aircraft accident or incident occurs, the Pilot-in-command (if he is not injured or incapacitated)/ Safety Officer of the academy (Pilot on type)/ATC/Ground Staff will immediately inform the Safety Manager and Accountable Executive of the academy, thereafter, the notification to DGCA and other agencies will be sent as per para 7.12 below.

7.12 Notification of Accidents and Incidents to DGCA and other agencies.

(CAR Section 5 - Air Safety Series 'C' Part 1 Issue II, 20th October 2015; Rev 5 dated 10th June 2022 refers)

7.12.1 It is incumbent that the notice and information of occurrences as listed in attached Appendix in the prescribed format shall be sent as soon as possible by the quickest means available (SMS, Fax, Telephone, Mobile) and in any case within 24 hours by the person in command of the aircraft or if he be killed or incapacitated, then the owner, operator, the hirer or other persons on whose behalf he was in command of the aircraft/ Airport Director/ATC in charge/Communication in charge/Aerodrome in charge/Safety Investigation Coordinator (SIC) to the following officers:

7.12.1.1 Director General of Civil Aviation (Attn: Director Air Safety, HQ)

7.12.1.2 Joint Director General (Air Safety) - DGCA (Hqrs).

7.12.1.3 Deputy Director Air Safety DGCA (Hqrs.)

7.12.1.4 Director/Officer In-charge of the Mumbai Regional Office of Air Safety Directorate.

7.12.1.5 Deputy Director General- AAIB 1

7.12.1.6 Director- AAIB 2

7.12.1.7 Information regarding occurrence to AAIB control room

Chapter 15: Emergency/Contingency Response Plan**15.5 Accident outside the Aerodrome Area.**

If an accident occurs outside the aerodrome area the first action is to locate the exact site of the accident. After the accident site is located a crash party consisting of Chief Pilot, Safety Officer, Engineering Manager, local Police personnel and adequate number of technicians along with a medical doctor is to proceed to the site. At the site following actions are to be taken:

15.5.1 Render medical aid to the injured.

15.5.2 Remove dead bodies, if any.

15.5.3 Secure the aircraft with the help of local Police personnel.

15.5.4 Conduct preliminary investigation and take appropriate photographs.

15.5.5 Arrange for the removal of aircraft after obtaining clearance from the Regional Controller of Airworthiness or Air Safety department of DGCA.

15.7 Removal of Disabled Aircraft.

Whether the accident/incident is at the airport or away from the airport, the disabled aircraft is not to be removed from its position without the prior permission of **Regional Director of Air Safety Investigating team**. However, if the disabled aircraft is on the Runway/vicinity of the airport or in position where it can pose a hazard to the other aircraft operating at the airport, it may be removed to safe location with prior permission of **regional Director of Air Safety** after necessary photographs of the site of accident/incident have been taken.