



# AIRCRAFT ACCIDENT REPORT

IAC/2019/05/01/F

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**Accident Investigation Bureau**

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**Report on the Serious Incident involving a Diamond  
DA-42 aircraft with Nationality and Registration Marks  
5N-BNH owned and operated by the International  
Aviation College which occurred on Runway 23 Ilorin  
International Airport on 1st of May, 2019**



This report is produced by the Accident Investigation Bureau (AIB), Murtala Muhammed Airport, Ikeja, Lagos.

The report is based upon the investigation carried out by the Accident Investigation Bureau, in accordance with Annex 13 to the Convention on International Civil Aviation, Nigerian Civil Aviation Act 2006, and Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 2016.

In accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of aircraft accident/serious incident investigations to apportion blame or liability.

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Accident Investigation Bureau believes that safety information is of great value if it is passed on for the use of others. Hence, readers are encouraged to copy or reprint for further distribution, acknowledging the Accident Investigation Bureau as the source.

Safety Recommendations in this report are addressed to the Regulatory Authority of the State (NCAA). This authority ensures enforcement.

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## **GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT**

AFM	Aircraft Flight Manual
AIB	Accident Investigation Bureau
AMEL	Aircraft Maintenance Engineer License
AMSL	Above Mean Sea Level
APP	Approach
ARFFS	Aerodrome Rescue and Fire Fighting Service
CPL	Commercial Pilot License
DATCO	Duty Air Traffic Controller
DNIL	ICAO Location Indicator for Ilorin Airport
FI	Flight Instructor
h	hour
hPa	Hecto Pascal
IAC	International Aviation College
KIAS	Indicated Airspeed calibrated in Knots
Kt	Knot
Km	Kilometre
LATCI	Local Air Traffic Control Instruction
LDG	Landing



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LED	Light Emitting Diode
NAMA	Nigerian Airspace Management Agency
NCAA	Nigerian Civil Aviation Authority
NIMET	Nigerian Meteorological Agency
PANS/ATM	Procedure for Air Navigation Services/ Air Traffic Management
PPL	Private Pilot License
QNH	Altimeter Setting above mean sea level
RNAV	Area Navigation
SCT	Scattered
SP	Student Pilot
VOR	Very High Frequency Omni-directional Radio Range



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<b>Report Number:</b>	IAC/2019/05/01/F
<b>Registered Owner and Operator:</b>	International Aviation College (IAC), Ilorin
<b>Aircraft Type and Model:</b>	Diamond DA-42
<b>Manufacturer:</b>	Diamond Aircraft Industries GmbH, Austria
<b>Date of Manufacture:</b>	2006
<b>Nationality and Registration Marks:</b>	5N-BNH
<b>Serial Number:</b>	42.010
<b>Location:</b>	Ilorin International Airport, Kwara State  08° 26' 23" N, 004°29' 38" E
<b>Date and Time:</b>	1st May 2019 at about 11:17 h

*All times in this report are local  
time (equivalent to UTC +1)  
unless otherwise stated*

## **SYNOPSIS**

Accident Investigation Bureau (AIB) was notified by the Rector/CEO of the International Aviation College, Ilorin of the accident involving a Diamond DA-42 aircraft with Nationality and Registration Marks 5N-BNH which occurred on Runway 23, Ilorin International Airport, Ilorin on 1st May 2019.





Air Safety Investigators were dispatched to the scene of the incident the following day and investigation commenced immediately. All stakeholders were duly notified.

The flight was a Commercial Pilot Licence (CPL) mock test with two persons onboard, a Flight Instructor (FI) and a Student Pilot (SP). At the time of the accident, the flight instructor was flying and the student pilot was monitoring.

At about 09:13 h, 5N-BNH took off from runway 23, Ilorin International Airport to Sector One Charlie (1C) and reported established at 09:28 h.

Several manoeuvres were carried out including steep turn, stall in all configurations, emergency descent, one engine inoperative procedure etc.

After two hours of flying at the training area, 5N-BNH was cleared back to the field for RNAV, VOR hold and ILS Approach and missed approach exercises.

At 11:12 h, the aircraft 5N-BNH reported right downwind Runway 23, requesting full stop landing and was granted. The flight instructor did his pre-landing checks.

At 11:15 h, the aircraft touched down with gears up on the runway centreline at a distance of 1,387 m from the threshold, veered right of the runway centerline and stopped 205 m from the touchdown point, 9 m to the right of the runway centreline.

The incident occurred in daylight.

The investigation identified the following causal and contributory factors:

### **Causal Factor**

The crew carried out the approach and landed with landing gears not extended.



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## **Contributory Factors**

1. Inadequate crew coordination during the approach to landing phase of flight.
2. Lack of situational awareness on the position of the landing gears by the flight crew during approach to land.
3. The inappropriate execution of approach and landing check list.

**Three Safety Recommendations were made.**



## 1.0 FACTUAL INFORMATION

### 1.1 History of the Flight

On 1st May, 2019, at about 09:00 h, a Diamond DA-42 aircraft with Nationality and Registration Marks 5N-BNH owned and operated by International Aviation College (IAC), Ilorin, requested for start-up from ATC for training at Sector One Charlie (1C) to maintain FL65 with fuel endurance of five hours. The flight was a Commercial Pilot Licence (CPL) mock test training exercise with two persons onboard, a Flight Instructor (FI) and a Student Pilot (SP). At the time of the incident, the Flight Instructor was flying and the Student Pilot was monitoring.

At about 09:13 h, 5N-BNH was airborne from Runway 23, Ilorin International Airport and reported established at Sector One Charlie (1C) at 09:28 h.

At 10:13 h, FI reported flight details completed at 1C and requested to re-join the airfield for an RNAV (Area Navigation) Approach for Runway 05. The Tower cleared the aircraft to report overhead Ilorin airport VOR (ILR).

At 10:18 h, Tower cleared the aircraft to descend to 3,500 ft for RNAV Approach Runway 05 and to report established. At 10:23 h, 5N-BNH reported established eight miles final Runway 05, later requested for missed approach and was granted by ATC.

At 10:49 h, 5N-BNH reported Procedure Turn Complete. Afterwards, the crew requested clearance for touch-and-go, and to join downwind Runway 05. The aircraft was cleared for touch-and-go and was airborne at 10:59 h. On this circuit, the Flight Instructor instructed the Student Pilot to do a Flapless Landing.

At 11:02 h, 5N-BNH was cleared for touch-and-go on Runway 23 due to a change in wind direction. Two additional touch-and-go exercises were carried out between 11:05 h and 11:09 h.



At 11:09 h, the Flight Instructor took control of the aircraft, to demonstrate a flapless approach and landing to the Student Pilot. The FI extended the upwind leg on this circuit due to traffic.

At 11:12 h, the aircraft reported right downwind Runway 23, requesting full stop landing and was granted.

The Flight Instructor reported that on reaching final, he selected the landing gear switch to extend the landing gear. The FI stated that the switch knob came off in his hand while he did this. He put back the knob and continued the approach. He further stated, "I forgot to verify the 3 greens on the final approach till landing gear warning came up...". The Student Pilot reported that she selected the landing gear switch but the aircraft was too close to the runway surface.

At about 11:17 h, the aircraft impacted the runway surface at a distance of 1,387 m from the threshold of Runway 23, veered right of the runway centreline and stopped at 205 m from the touchdown point, 9 m to the right of the runway centreline, resting on the bottom of the engine cowlings, the stairs, the tail skid and the partially extended nose wheel gear, although the landing time was not passed to 5N-BNH.

The Flight Instructor alerted the Duty Air Traffic Controller (DATCO) of the occurrence and the Tower alerted the Airport Rescue and Fire Fighting Services (ARFFS). From ATC recordings, another aircraft, 5N-BNK was instructed by the controller on duty to taxi to the runway where the aircraft crashed in order to assess the emergency situation. The crew disembarked the aircraft unaided with no injuries. The ARFFS arrived at the site about five minutes after notification as reported by the Flight Instructor.

The incident occurred in daylight and Visual Meteorological Conditions prevailed.



## 1.2 Injuries to Persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal	Nil	Nil	Nil	Nil
Serious	Nil	Nil	Nil	Nil
Minor	Nil	Nil	Nil	Not applicable
None	2	Nil	2	Not applicable
TOTAL	2	Nil	2	Not applicable

## 1.3 Damage to Aircraft

The aircraft was substantially damaged.

## 1.4 Other Damage

Nil.

## 1.5 Personnel Information

### 1.5.1 Flight Instructor

Nationality:	Nigerian
Age:	29 years
License Type:	CPL (A)
License Validity:	23rd September, 2019
Flight Instructor's validity:	20th June, 2020
Medical Validity:	23rd September, 2019

Ratings:	DA-40, DA-42
Instructor's Rating Endorsement:	Single and Multi-Engine Aeroplane or Rotorcraft having MTWA of 5700kg or less and in respect of type rating (s) specified in part 1.
Total Flight Time:	905.6 h
Hours on Type:	120.9 h
Last 90 days:	124 h
Last 28 days:	49.6 h
Last 7 days:	16.8 h
Last 24 hours:	02.10 h

### 1.5.2 Student Pilot

Nationality:	Nigerian
Age:	26 years
License Type:	PPL (A)
License Validity:	4th October, 2019
Medical Validity:	4th October, 2019
Ratings:	Not Applicable
Hours on Type:	Not Applicable
Last 90 days:	23:13 h
Last 28 days:	23:13 h
Last 7 days:	09:40 h

Last 24 hours: 01:12 h

### 1.5.3 Aircraft Engineer

Nationality: Nigerian  
Age: 29 years  
Licence Type: AMEL  
Licence Validity: 30/12/2021  
Ratings: Tampico TB-9, Diamond DA-40 & 42, Lycoming  
0-320-D2A Engine

## 1.6 Aircraft Information

### 1.6.1 General Information

Manufacturer: Diamond Aircraft Industries GmbH,  
Austria  
Model: DA-42  
Serial Number: 42.010  
Year of Manufacture: 2006  
Nationality and Registration Marks: 5N-BNH  
Registered Owner/Operator: International Aviation College, Ilorin  
Total airframe time: 2,316:35 h  
Certificate of Airworthiness: 29th January, 2020  
Certificate of Insurance: 1st August, 2019



**Fuel type:** Jet A1

## **1.7 Meteorological Information: DNIL**

### **Time: 09:00 h**

Wind: 200°/08 kt  
Visibility: 10 km  
Weather: Nil  
Cloud: SCT 300 m  
Temp/Dew: 28°C/24°C  
QNH: 1013 hPa

### **Time: 11:00 h**

Wind: 180/10 kt  
Visibility: 10 km  
Weather: Nil  
Cloud: SCT 330 m  
Temp/Dew: 30°C/24°C  
QNH: 1014 hPa





## **1.8 Aids to Navigation**

Ilorin International Airport is equipped with Very high frequency Omni-directional radio Range (VOR) and Category II Instrument Landing System (ILS), which were serviceable at the time of the occurrence.

The aircraft had all relevant maps and approach plates to aid navigation.

## **1.9 Communication**

There was two-way communication between the aircraft and the Control Tower.

## **1.10 Aerodrome Information**

Ilorin International Airport, Ilorin, Kwara State (DNIL) has Aerodrome Reference Point 08° 26' 23" N, 004° 29' 38" E midpoint of runway. The aerodrome has a runway with orientation of 05/23. The length and width of the runway are 3,100 m and 60 m respectively, with an asphalt/concrete surface and blast pads of 120 m at both ends.

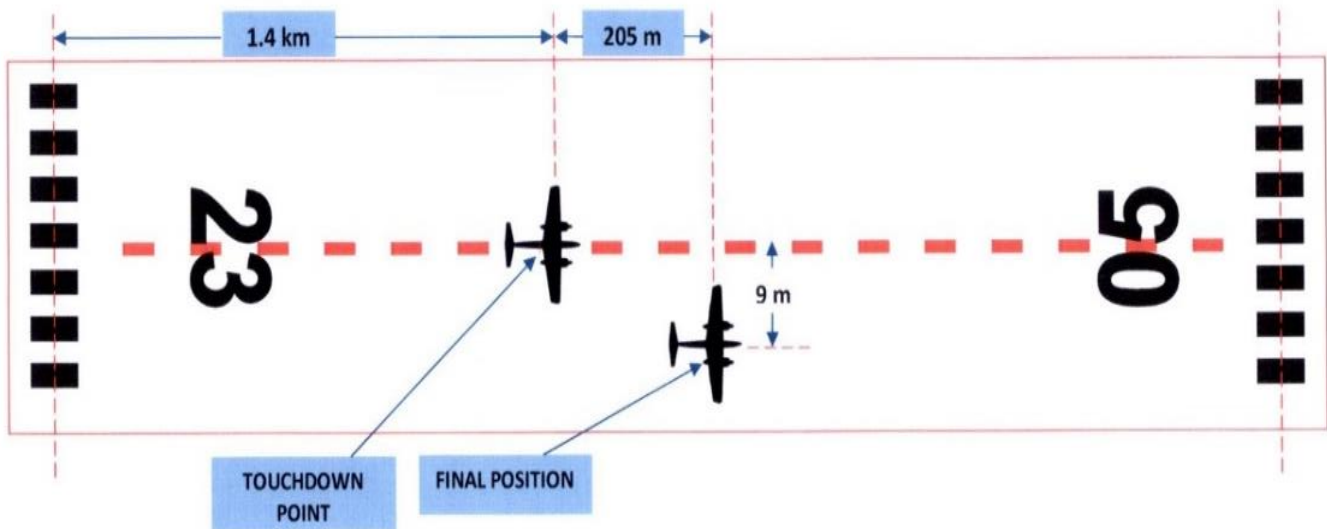
## **1.11 Flight Recorders**

The aircraft is not equipped with a flight data recorder or cockpit voice recorder. Neither recorder was required by the relevant aviation regulations.

## **1.12 Wreckage and Impact Information**

5N-BNH touched down on its engine cowlings at a distance of 1,387 m from the threshold of Runway 23 with the nose in the direction of the runway heading and

stopped at a distance of 205 m from the touchdown point. Although the aircraft structure was relatively in one piece, the left and right steps were found chopped off, the base of the engine cowling and exhaust as well as the tail skid were abraded, and all the propeller blade tips of both engines were broken.



**Figure 1:** A diagram of the position of aircraft on the runway



**Figure 2:** Photo of aircraft landing gear being retracted and extended under test



**Figure 3:** Photo of the knob on the landing gear switch



**Figure 4:** Photo of 5N-BNH standing on its landing gears without support



Exhaust

**Figure 5:** Photo of the base of engine cowling and exhaust abraded after the incident



**Figure 6:** Photo of the tail skid of aircraft resting on the runway



**Figure 7:** Photo of the final position of 5N-BNH on runway 23



**Figure 8:** Photo of the nose-wheel door opened and landing gear partially extended



**Figure 9:** Photo of skid marks made by 5N-BNH on runway 23



**Figure 10:** Photo of the broken left and right steps

### **1.13 Medical and Pathological Information**

Toxicology test was carried out on the crew and the result was found to be negative for drugs and substance abuse.

### **1.14 Fire**

There was no pre or post-impact fire.

### 1.15 Survival Aspect

The cabin section of the aircraft remained intact after the occurrence and there was a liveable volume for survival. The harnesses were intact; the seats were in the normal positions after the incident.



**Figure 11:** Photo of the cabin after the incident

### 1.16 Test and Research

Landing Gear Extension and Retraction test was conducted after the incident in accordance with Aircraft Maintenance Manual 32-30-00 Rev 4 and was found satisfactory.





## **1.17 Organisational and Management Information**

### **1.17.1 The Operator (IAC)**

The International Aviation College concept began in 2006 with the express purpose of offering aviation training to meet the serious shortages of aviation personnel on a global level but more especially in Nigeria and the West African sub-region. It is established to train different professionals for the rapidly expanding Nigerian and international aviation industry including pilots (fixed and rotary wing), cabin crew, air traffic controllers and engineers. The College is located in Ilorin, a city geographically good for flying because of its all year-round good flying weather and flat topography.

#### **1.17.1.1 Excerpt from DA-42 Twin Star Normal Checklist**

##### ***Before Landing Procedure***

*Downwind, latest baseleg*

*Flaps.....APP*

*Gear.....DOWN, CHECK 3 GREENS*

*Landing light.....ON*

*On Final when landing is assured:*

*Flaps.....LDG*

*Gear.....3 GREENS CHECKED*

#### **1.17.1.2 Excerpt from Airplane Flight Manual Section 4A.6.11 on Normal Operating Procedure**

*BEFORE LANDING:*

*10. Airspeed*



*up to 1700 kg (3748 lb).....min. 82 KIAS with FLAPS APP*

*above 1700 kg (3748 lb).....min. 82 KIAS with FLAPS APP*

*up to 1700 kg (3748 lb).....min. 85 KIAS with FLAPS UP*

*above 1700 kg (3748 lb).....min. 86 KIAS with FLAPS UP*

### **1.17.1.3 Airplane Flight Manual Section 4B.4.12**

#### **4B.4.12 CHECK GEAR (IF INSTALLED)**

*CHECK GEAR                    Landing gear is not down and locked*

- 1. Landing gear ..... down / as required*

#### **NOTE**

*If installed the CHECK GEAR caution message is displayed when either the flaps are in LDG position or one POWER lever is less than approximately 20% and the landing gear is not down and locked.*

### **1.17.1.4 Landing Gear**

Aircraft landing gear supports the entire weight of an aircraft during landing and ground operations. They are attached to the primary structural members of the aircraft. The type of gear depends on the aircraft design and its intended use.

#### **Excerpt from DA-42 series Aircraft Maintenance Manual 32-00-00**

- 2. Description*



*The landing gear absorbs landing loads and let you move the airplane on the ground. The landing gear also provides steering control and braking when the airplane is on the ground.*

*The DA 42 has a tricycle landing gear. The landing gear can retract. The left main gear leg attaches to the wing center section on the left side of the fuselage. The right main landing gear attaches the wing center section on the right side of the fuselage. The nose gear leg attaches to the fuselage front bulkhead. All three legs have CFRP<sup>1</sup> doors that seal the landing gear bays when the landing gear is retracted in flight.*

*Each main leg is a tubular steel strut. A trailing arm attaches to the bottom of the strut and an axle for the wheel assembly attaches to the trailing arm. A damper behind the tubular strut also attaches to the trailing arm and absorbs the landing loads. The landing gear hydraulic system holds the main gear legs in the retracted position. When the main gear legs are extended, the legs geometrically lock and a latch holds the legs in the locked position during rebound loads.*

*Each main gear leg has a single main-wheel and a hydraulic disk-brake. Toe pedals on the rudder pedals operate the disk-brakes. The nose gear leg attaches to the fuselage front bulkhead. A steel strut with an integral telescopic damper absorbs the landing loads. The nose gear leg carries a single nose-wheel. The pilot uses the rudder control pedals to steer the nose-wheel. Two steering stops attached to the gear leg limit the rotary motion of the nose landing gear.*

*The landing gear hydraulic system holds the nose leg in the retracted position. When the nose leg is extended the leg geometrically locks and a latch holds the leg in the locked position during rebound loads.*

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<sup>1</sup>Carbon Fibre Reinforced Polymer



*The landing gear has an electrically powered hydraulic supply and control system. The hydraulic supply and control system are mounted on a bracket located in the rear fuselage, near the rear baggage compartment.*

*If the hydraulic system fails, the pilot can extend the landing gear by setting the landing gear lever to the DOWN position. The weight of the landing gear assisted by a spring, will cause the gear to extend.*

*When the gear is fully extended, spring-loaded latches operate and hold the landing gear legs geometrically locked in the down position. The pilot can make a normal landing. The pilot can NOT retract the landing gear if the hydraulic system has failed.*

*Note: A failure of the on-board electrical system causes the landing gear automatically to extend. The hydraulic pump is not driven anymore and both solenoid valves open. The hydraulic locking mechanism of the landing gear system is inoperable. When the gear is fully extended, it will geometrically lock in the down position.*

### **Excerpt from Aircraft Maintenance Manual 32-30-00**

#### *Extension and Retraction of Landing Gear*

*The selector lever is used for normal extension and retraction of the landing gear. Three LEDs located on the instrument panel next to the selector handle (landing gear switch) show the status of the main landing gear.*

#### *Extend the landing gear:*

*Set the landing gear selector lever to DOWN and these events must occur: The red LED (UNSAFE) illuminates and the landing gear extends. When all the landing gear legs are fully extended and locked, the red led (UNSAFE) switches off. The green (SAFE) LEDs illuminates.*



*Retract the landing gear:*

*Set the landing gear selector lever to UP and these events must occur: The green (SAFE) LEDs switch off. The red led (UNSAFE) illuminates. The landing gear retracts. When the gear is fully retracted, the red led (UNSAFE) switches off.*

### **1.17.2 Nigerian Airspace Management Agency (NAMA)**

Air Traffic Control Service (ATCS), presently referred to as Air Traffic Management (ATM) is one of the most important services provided by NAMA.

Air Traffic Control Service (ATCS) is a service provided for the purpose of preventing collisions between aircraft; on the manoeuvring area, between aircraft and obstructions; and to expedite and maintain an orderly flow of air traffic. ATCS is subdivided into area control service, approach control service and aerodrome control service.

Visual observation from a control tower constitutes the primary method of controlling air traffic on the ground and in close proximity of an airport. The control tower is a tall, windowed structure that offers the air traffic controllers a panoramic view covering the airport and its surroundings. Aerodrome controllers - or "tower controllers" - are responsible for the separation and efficient movement of aircraft and vehicles operating on the movement and manoeuvring areas of the airport, as well as the aircraft in the air in the vicinity of the airport.

The areas of responsibility for tower controllers fall into three general operational disciplines; Ground Control, Tower Control, and Approach Control.

Ground Control is responsible for the airport "movement" areas. These include all taxiways, holding areas, and some manoeuvring areas or intersections where aircraft



arrive after having left the runway or the departure gates. Efficient ground control is vital to smooth airport operations because, on top of his most important mission which is to ensure the safety of ground movements, the ground controller is responsible for optimising the order in which the aircraft are sequenced to depart at the runway threshold and this in order to accelerate the take-off rhythm.

The Controller is in charge of the movement on runways as well as for the air traffic in the vicinity of the airport. He clears aircraft for take-off or landing, thereby ensuring that the assigned runway is clear for the foreseen manoeuvre.

## **1.18 Additional Information**

### **1.18.1 Excerpt from ICAO Annex 6 Part 1, Section 4.2.6:**

The checklists provided in accordance with 6.1.4 shall be used by flight crews prior to, during and after all phases of operations, and in emergency, to ensure compliance with the operating procedures contained in the aircraft operating manual and the aeroplane flight manual or other documents associated with the certificate of airworthiness and otherwise in the operations manual, are followed. The design and utilization of checklists shall observe Human Factors principles.

### **1.18.2 Functions of Aerodrome Control Towers**

ICAO Doc. 4444 PANS-ATM: Procedure for Air Navigation Services and Air Traffic Management Chapter 7 paragraph 7.1.1.2. states,

“Aerodrome controllers shall maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome as well as vehicles and personnel on the manoeuvring



area. Watch shall be maintained by visual observation, augmented in low visibility conditions by an ATS surveillance system when available”.

ICAO Doc 4444 PANS/ATM Procedure for Air navigation Services and Air Traffic Management Chapter 7 paragraph 7.1.2.1(a) states,

Aerodrome Control towers are responsible for alerting the rescue and firefighting services whenever:

- (a) an aircraft accident has occurred on or in the vicinity of the aerodrome

ICAO Doc.4444 PANS/ATM 7.1.2.2: Procedures concerning the alerting of the rescue and firefighting services shall be contained in local instruction. Such instructions shall specify the type of information to be provided to the rescue and fire-fighting services, including type of aircraft and type of emergency and when available number of persons onboard, and any dangerous goods carried on the aircraft.

#### **Ilorin International Airport Local Air Traffic Control Instruction (LATCI) Section 4 paragraph 4.7(a)**

**Closure of Aerodrome:** Aerodrome will always be open to air traffic except in the following cases:

- (a) When the surface of the landing area is unfit for the safe operation of aircraft (e.g. soft surfaces rutted, dangerous obstructions on the manoeuvring area etc)



## 2.0 ANALYSIS

### 2.1 Conduct of the Flight

The Flight Instructor stated he did not realise that the landing gear was not selected until the abnormal landing gear configuration aural warning came ON.

DA-42 Aircraft Flight Manual (AFM) Section 4B.4.12 on Abnormal Operating Procedures state that **CHECK GEAR** caution message comes up when either the flaps are in LDG position or one power lever is less than approximately 20% and the landing gear is not down and locked. This is also indicated by a warning chime tone.

From the above section of the manual, the exercise which was conducted required the flaps to be in the UP position for landing. With flaps UP configuration, the aircraft is required to be flown at a minimum approach speed of 85 KIAS, at least 3 KIAS above normal approach speed, requiring the power levers to be retarded later than usual to reduce aircraft speed for landing. This situation inhibited the caution message and warning alerts from annunciating early, and likely, too late for the crew to react.

The **BEFORE LANDING PROCEDURE** in the DA-42 Twin Star Normal Checklist requires the crew to confirm the position of the landing gears after selection by “checking 3 greens”. The crew reported omitting this check, and hence were not alerted that the landing gears were not extended.

The **FINAL CHECK** also requires the crew to confirm the position of the landing gear before landing. These actions were not taken and the situation was not noticed until shortly before the aircraft impacted the runway surface.

The investigation revealed that the final approach for full stop landing was inappropriate as the checklists were not executed and procedures were not followed.





## 2.2 Situational Awareness

Situational awareness can be defined as the ability to identify, process and comprehend all elements of information about what is happening to the flight during a specific period of time.

The Flight Instructor said in his statement, "The landing gear knob pulled out when selecting the gear and I put it back to its position without knowing that the landing gear was not selected."

In accordance with section 32-30-00 of the DA-42 Aircraft Maintenance Manual, when the landing gear selector switch is selected to DOWN, the red LED (UNSAFE) illuminates and the landing gears extend. When all the landing gear legs are fully extended and locked, the red LED (UNSAFE) switches off, the green (SAFE) LEDs illuminate. If the landing gear selector switch is selected to UP, the green (SAFE) LEDs switch off. The red LED (UNSAFE) illuminates. The landing gear retracts. When the gears are fully retracted, the red LED (UNSAFE) switches off.

The landing gear position lights which are located just beside the landing gear selector on the instrument panel would have indicated that the landing gear was not extended during the approach but this was not observed by the crew of 5N-BNH.

The investigation revealed that although information was clearly available for the crew, it was missed due to poor scanning of the forward flight instrument panel.

Good airmanship in flight operations requires pilots to be alert to happenings in the cockpit at all times during the flight. When the requirements of this practice are not met, there may be possibility of loss of situational awareness. The crew of 5N-BNH were not aware of their situation until it was too late.

The investigation also revealed that the crew had opportunities during the final approach, to observe and correct the inappropriate landing configuration. A quick scan



of the instrument panel would have drawn attention to the absence of landing gear indications as they prepared to land.

### **2.3 Aerodrome Control Service**

Aerodrome control towers shall issue information and clearances to aircraft under their control to achieve a safe, orderly and expeditious flow of air traffic on and in the vicinity of an aerodrome with the objective of preventing collision between aircraft.

From ATC download and flight instructor statement, the flight instructor informed the control tower of the crash on the runway, indicating that the DATCO was not aware of the position of the aircraft both on touchdown and at its final position on the runway. Also, it was noticed that no landing time was passed to the aircraft.

Investigation revealed that a continuous watch was not maintained as required by the provision of ICAO Doc. 4444 PANS-ATM: Procedure for Air Navigation Services and Air Traffic Management Chapter 7 paragraph 7.1.1.2.

### **2.4 ATC/Emergency Procedures**

Investigation showed that the execution of the Emergency Procedures carried out after the occurrence were below standard. Contrary to the provisions of Local Air Traffic Instruction (LATCI) of the Ilorin International Airport and ICAO Doc. 4444 PANS-ATM: Procedure for Air Navigation Services and Air Traffic Management, the crash alarm was not activated in the control tower when the crew reported the occurrence. Crash alarm is necessary to alert the appropriate units about an emergency within the vicinity of the aerodrome, although the ARFFS was reported to have been notified over the phone by ATC about the occurrence. Also, ATC recordings revealed that another aircraft, 5N-BNK

was instructed by the controller on duty to taxi to the runway where the aircraft crashed in order to assess the emergency situation. The procedure in accordance with Ilorin International airport LATCI Section 4 paragraph 4.7(a) also indicates that once the runway is occupied by an aircraft wreckage, it results in the closure of the runway which makes it unfit for safe operation. The appropriate unit charged with the responsibility of providing emergency services should always be engaged for such operation and not an aircraft as this could worsen the existing situation.

The investigation believes that this is not the best practice as the Aerodrome Rescue and Fire-Fighting Services is the statutory unit charged with the responsibility to assist any aircraft in distress or emergency condition.



## 3.0 CONCLUSIONS

### 3.1 Findings

1. The aircraft had a valid Certificate of Airworthiness.
2. The FI and SP were licensed and qualified to conduct the flight in accordance with existing regulations.
3. The flight was a Commercial Pilot Licence (CPL) mock test training exercise.
4. The FI was demonstrating flapless approach and landing.
5. The aircraft impacted the runway surface and stopped at a distance of 1,592 m from the threshold of Runway 23, 9 m to the right of the runway centreline.
6. The duty air traffic controller did not observe the aircraft was still on the runway until the FI notified him of the incident.
7. The duty air traffic controller instructed another aircraft, 5N-BNK to assist him by taxiing to the area of the incident aircraft to assess the extent of damage or serious injury to the pilots.
8. Toxicology test was carried out on the pilots and the result was negative for alcohol and any drugs or substance of abuse.
9. There was no fault found during the pre-flight checks and no snag on the aircraft technical log book.
10. The Flight Instructor stated that he did not realise that the landing gear switch was not selected to DOWN.
11. The Flight Instructor reported that on reaching finals, he selected the landing gear switch to extend the landing gear but the switch knob came off while he did this.
12. The Student Pilot reported that she selected the landing gear switch but the aircraft was too close to the landing runway surface, hence the nose gear door was open and the nose gear was in transit at the time of impact with the runway surface.



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### **3.2 Causal Factor**

The crew carried out the approach and landed with landing gears not extended.

### **3.3 Contributory Factors**

- Inadequate coordination during the approach to landing phase of flight.
- Lack of situational awareness on the position of the landing gears by the flight crew during approach to land.
- The inadequate execution of approach and landing check list.



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## **4.0 SAFETY RECOMMENDATIONS**

### **4.1 Safety Recommendations 2019-026**

NCAA should intensify its oversight on IAC and ensure that it adheres strictly to the use of Checklists and appropriate procedures during all training sessions and phases of flight.

### **4.2 Safety Recommendations 2019-027**

IAC should improve on its Crew Resource Management training vis-à-vis the need for trainees to be assertive when necessary.

### **4.3 Safety Recommendations 2019-028**

NAMA should devise means to ensure duty air traffic controllers DATCOs maintain continuous watch on all aircraft movements within the vicinity of the aerodrome.

## APPENDIX

### Appendix A: Report of The Landing Gear Retraction and Extension Test



#### REPORT ON THE OUTCOME OF THE RETRACTION AND EXTENSION TEST CARRIED OUT ON 5N-BNH

As stated on my previous reports; when the aircraft was being jacked up from the runway, the three landing gears were gradually extending until they fully extended and locked by gravity.

Right there, we performed a landing gear retraction and extension test IAW AMM 32-30-00 Rev 4. We powered the aircraft with the aircraft battery the three Landing Gear Green down locked position light came ON.

When the landing gear lever was put on gear up position, the red gear unsafe light came On until the three Landing gears fully retracted and locked UP. Then, the red unsafe light went OFF.

Subsequently, we inspected the tire bay for free rotation of the tires and clearance from the tire cut out wall which was satisfactory. Then, the landing gear lever was put to gear down position. The three landing gears started to extend and the gear unsafe light came ON until the three landing gears fully extended and locked down, then the gear unsafe light went off and the three greens (down & lock position lights) came ON within 15 seconds. Which is satisfactory as per the Maintenance Manual

Also, on the 02/05/2019, a second landing gear retraction and extension exercise was carried out in the presence of the AIB inspector IAW AMM 32-30-00 Rev 4. We powered the aircraft with the aircraft battery the three Landing Gear Green down locked position light came ON.

When the landing gear lever was put on gear up position, the red gear unsafe light came On until the three Landing gears fully retracted and locked UP. Then, the red unsafe light went OFF.

Subsequently, we inspected the tire bay for free rotation of the tires and clearance from the tire cut out wall which was satisfactory. Then, the landing gear lever was put to gear down position.



The three landing gears started to extend, and the gear unsafe light came ON until the three landing gears fully extended and locked down, then the gear unsafe light went off and the three greens (down & lock position lights) came ON within 15 seconds.

In conclusion both Landing gear retraction extension exercises were successful no fault or malfunction or damage was note on the landing gear system

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