Republic of the Philippines
DEPARTMENT OF TRANSPORTATION
**CIVIL AVIATION AUTHORITY OF THE PHILIPPINES**
MIA Road, Pasay City 1300

# AIRCRAFT ACCIDENT INVESTIGATION AND INQUIRY BOARD

## FINAL REPORT

## RP-C1028
## TEXTRON AVIATION CESSNA 152

***OPERATOR: WCC AVIATION COMPANY, INC.***

***TYPE OF OPERATION: FLIGHT TRAINING***

***DATE OF OCCURRENCE: APRIL 21, 2022***

***PLACE OF OCCURRENCE: BARANGAY LINMANSANGAN, BINALONAN, PANGASINAN, PHILIPPINES***

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(Textron Aviation Cessna 152, RP-C1028 Final Report)

# FOREWORD

This report was produced by the Aircraft Accident Investigation and Inquiry Board (AAIIB), Civil Aviation Authority of the Philippines, MIA Road, Pasay City, Philippines.

The report is based upon the investigation carried out by the AAIIB in accordance with Annex 13 to the Convention on International Civil Aviation, Republic Act 9497 Section 42 and Philippine Civil Aviation Regulation Part 13.

Readers are advised that the AAIIB investigates for the sole purpose of enhancing aviation safety. Consequently, AAIIB reports are confined to matters of safety significance and may be misleading if used for any other purpose. It should be noted that the information in AAIIB reports and recommendations is provided to promote aviation safety and in no case is it intended to imply blame or liability.

Furthermore, No part of AAIIB report or reports relating to any accident or investigation shall be admitted as evidence or used in any suit or action for damages arising out of any matter mentioned in such report or reports.

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# FINAL REPORT

**TITLE**: Serious Incident involving a Textron Aviation C-152 type of aircraft with Registry Number RP-C1028 owned and operated by WCC Aviation Company, Inc. that had a forced landing incident at the diversion road of Brgy. Linmansangan, Binalonan, Pangasinan, Philippines, on April 21, 2022, at around 0630H.

## Notification of Occurrence to National Authority

The notification of the serious incident to the CAAP AAIIB was relayed by the CAAP Operations Center on April 21, 2022.

## Identification of the Investigation Authority

The Aircraft Accident Investigation and Inquiry Board (AAIIB), the mandated accident investigation organization within the Civil Aviation Authority of the Philippines (CAAP) as the state of Occurrence/Registry/Operator conducted the investigation.

## Organization of the Investigation

In accordance with the provisions of Philippine Civil Aviation Regulation (PCAR) Part 13, an Investigator-In-Charge and a Deputy Investigator-In-Charge were appointed.

## Authority Releasing the Report

The Final Investigation Report was released by Aircraft Accident Investigation and Inquiry Board (AAIIB) and published on the CAAP website on **09 August 2022.**

## Synopsis:

At approximately 0630H on April 21, 2022, a Textron Aviation C-152 aircraft with Registry Number RP-C1028 made a forced landing along the diversion road of Brgy. Linmansangan, Binalonan, Pangasinan. The aircraft is being operated by WCC Aviation Company, Inc. On board were one (1) flight instructor and one (1) student pilot. Both occupants exited the aircraft without any reported injuries, and the aircraft sustained only minor damage to its right wingtip and right main landing gear. During the investigation, post-incident evaluation and engine testing were unable to specifically confirm or replicate the problem encountered during the flight. As a result, no definite or confirmed root cause was identified in this case.

## LIST OF ACRONYMS AND ABBREVIATIONS

| | | |
|---|---|---|
| AAIIB | : | Aircraft Accident Investigation and Inquiry Board |
| ATOC | : | Approved Training Organization Certificate |
| BRGY | : | Barangay |
| CAAP | : | Civil Aviation Authority of the Philippines |
| CPL | : | Commercial Pilot License |
| FI | : | Flight Instructor |
| OFSAM | : | Office of the Flight Surgeon and Aviation Medicine |
| PCAR | : | Philippine Civil Aviation Regulation |
| SP | : | Student Pilot |
| SPL | : | Student Pilot License |
| TSN | : | Time since New |
| TSO | : | Time since Overhaul |
| VFR | : | Visual Flight Rules |
| VHF | : | Very High Frequency |
| VMC | : | Visual Meteorological Condition |

# 1. FACTUAL INFORMATION

| | | |
|---|---|---|
| Aircraft Registration No. | : | RP-C1028 |
| Aircraft Type/Model | : | Textron Aviation Cessna 152 |
| Operator | : | WCC Aviation Company, Inc. |
| Address of Operator | : | 960 Aurora Blvd., Cubao, Quezon City |
| Place of Occurrence | : | Brgy. Linmansangan, Binalonan, Pangasinan, Philippines |
| Date/Time of Occurrence | : | April 21, 2022 at about 0630H/2230UTC |
| Type of Operation | : | Flight Training |
| Phase of Flight | : | Climb |
| Type of Occurrence | : | Reciprocating engine - non-mechanical failure |

## 1.1 History of Flight

On or about 0630H of 21 April 2022, a Textron Aviation Cessna 152 (C-152) type of aircraft with Registry Number RP-C1028 had a forced landing along the diversion road of Brgy. Linmansangan, Binalonan, Pangasinan. The aircraft is being operated by WCC Aviation Company, Inc. On board the aircraft were one (1) Flight Instructor/FI and one (1) Student Pilot/SP.

The aircraft took-off from Binalonan Airfield utilizing runway 17 for a scheduled pre-solo training flight of the SP. The flight was uneventful from take-off roll until rotation. However, during climb and passing 100-250 feet, the pilot heard a knocking sound followed by an engine choking and vibration. The FI noted that all the parameters were normal except for the engine rpm that started to decrease from 2,300 rpm to 2,000 rpm. The FI decided to return to the runway and initiated a right-hand turn. With limited altitude where they may not be able to reach the runway, the FI opted to land the aircraft in a diversion road parallel to the runway. The aircraft touchdown at the right-hand side of the road and continued to roll for 270 meters before coming to a full stop.



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### 1.2 Injuries to Person (s)

| Injuries | Crew | Passengers | Others | **TOTAL** |
|---|---|---|---|---|
| Fatal | 0 | 0 | 0 | **0** |
| Serious | 0 | 0 | 0 | **0** |
| Minor | 0 | 0 | 0 | **0** |
| None | 2 | 0 | 0 | 2 |

### 1.3 Damage to Aircraft

The aircraft sustained minor damage.

### 1.4 Personnel Information

#### 1.4.1 Flight Instructor

| | | |
|---|---|---|
| Gender | : | Male |
| Date of Birth | : | November 03, 1975 |
| Nationality | : | Indian |
| License | : | 129316 CPL/FI |
| Valid up to | : | December 31, 2024 (CPL)<br>February 29, 2024 (FI) |
| Type rating | : | Single Engine Land-Instrument – C-152, C-172 (CPL)<br>Single Engine Land C-152 (FI) |
| Medical Certificate | : | Class 1 valid until October September 15, 2022 |
| Date of last medical | : | March 09, 2022 |
| Total Flying Time | : | 2,000 Hours as per Pilot logbook |
| Total Flying Time On type | : | 1,200 Hours as per Pilot logbook |

#### 1.4.2 Student Pilot

| | | |
|---|---|---|
| Gender | : | Male |
| Date of Birth | : | April 05, 2000 |
| Nationality | : | Filipino |
| License | : | 142866 SPL |
| Valid up to | : | March 16, 2024 |
| Type rating | : | Single Engine Land – C-152 |
| Medical Certificate | : | Class 2 valid until November 29, 2023 |
| Date of last medical | : | March 16, 2022 |
| Total Flying Time | : | 0 Hours as per Pilot logbook |
| Total Flying Time On type | : | 0 Hours as per Pilot logbook |



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## 1.5 Aircraft Information

The Textron Aviation Inc. Cessna 152 is a two-seat, fixed-tricycle gear, general aviation airplane used primarily for flight training and personal use.

### 1.5.1 Aircraft Data

| | | |
|---|---|---|
| Registration Mark | : | RP-C1028 |
| Manufacturer | : | Textron Aviation Inc. |
| Type/Model | : | Cessna 152 |
| Serial Number | : | 15280819 |
| Date of Manufactured | : | 1978 |
| Aircraft Total Time | : | 17,709+50 Hours as of 21 April 2022 |
| Certificate of Airworthiness | : | Valid until February 13, 2023 |
| Certificate of Registration | : | Valid until April 22, 2023 |
| Gross Weight | : | 757 kilograms (kgs.) |

### 1.5.2 Engine Data

The Lycoming O-235-L2C is a four-cylinder, horizontally opposed piston aircraft engine produced by Lycoming Engines. The engine design was derived from the earlier released O-233 engine. The engines are all carburetor-equipped, feature dual magneto ignition and have a displacement of 233 cubic inches (3.82 L). The first O-235 model was certified on 11 February 1942.

| | | |
|---|---|---|
| Manufacturer | : | Lycoming |
| Type/Model | : | Piston/ O-235-L2C |
| Engine Serial Number | : | L-20434-15 |
| Time Between Overhaul | : | 2,400 Hours |
| Time Since Overhaul | : | 1,598+59 Hours as of 21 April 2022 |
| Time Since New | : | 8,170+13 Hours as of 21 April 2022 |

### 1.5.3 Propeller Data

| | | |
|---|---|---|
| Manufacturer | : | Sensenich |
| Type/Model | : | Fixed-Pitch Metal /72CKS6-0-54 |
| Propeller Serial Number | : | K11127 |
| Time Between Overhaul | : | 2,000 Hours |
| Time Since Overhaul | : | 1,598+59 Hours as of 21 April 2022 |
| Time Since New | : | 3,256+04 Hours as of 21 April 2022 |

## 1.6 Meteorological Information

Visual Meteorological Conditions (VMC) prevailed at the time of the incident.



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## 1.7 Aids to Navigation

The flight was carried out under Visual Flight Rules (VFR). Using VFR, the pilot must be able to operate the aircraft with visual references to the ground and visually avoiding obstructions and other aircraft.

## 1.8 Communications

The aircraft is equipped with an operational Very High Frequency (VHF) transceiver used for communicating with other pilots/traffic in the area.

## 1.9 Flight Recorders

The aircraft is not equipped with flight recorders and existing Philippine Civil Aviation Regulation does not require such for that type of aircraft.

## 1.10 Wreckage and Impact Information

The incident site is along the newly constructed diversion road situated on the left-hand side of runway 35 which is about 150 meters from the runway centerline. Tire markings (Figure 1) indicated that the aircraft landed on the right-hand side of the road with its RH wing tip getting in contact with the concrete roadside barrier (Figure 2). After touchdown, the aircraft continue to roll for 270 meters and came to a complete stop at coordinates 16°03'05.8" N, 120°34'49.4" E with last heading of 300° (Figure 3). The FI and SP egress safely from the aircraft and later assisted by WCC Aviation personnel. The aircraft sustained damaged on the following (Figure 4 and 5):

a. RH wing tip damaged.
b. Broken RH main landing gear brake assembly (bended brake disc, missing brake caliper and detached brake lining).

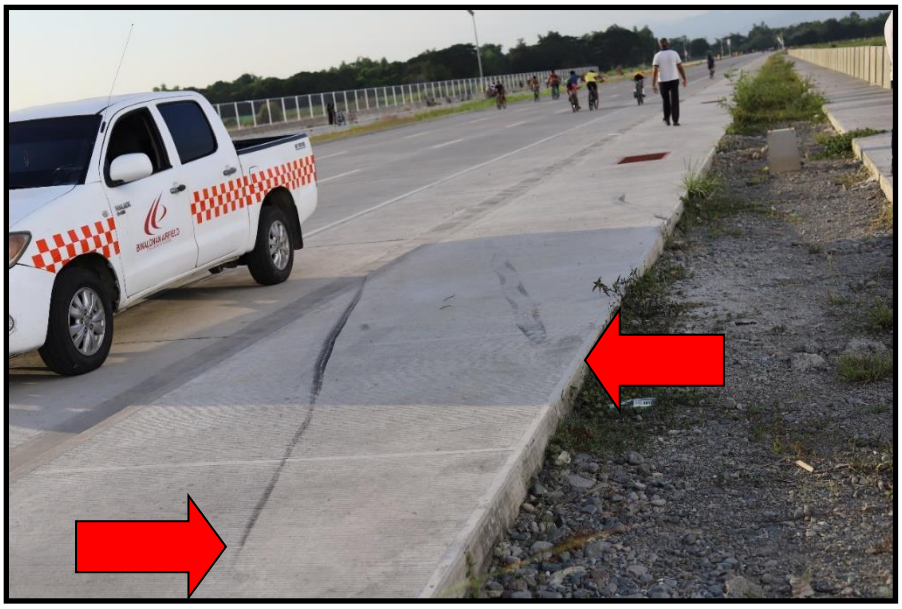

Figure 1 – Tire marks on the touchdown area of RP-C1028



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Figure 2 – Scratches on the roadside concrete barrier due to contact with the wing tip


Figure 3 – RP-C1028 at the incident site



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Figure 4 – Damaged on the RH wing tip

Figure 5 – Broken RH main landing gear brake assembly



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### 1.11 Medical and Pathological Information

The FI and SP completed the mandatory drug and alcohol testing at the local hospital which was later endorsed to CAAP OFSAM for the required post-accident medical examination. Both pilots were later issued with a medical clearance by the mentioned CAAP office.

### 1.12 Fire

There was no post-crash fire observed during on-site investigation

### 1.13 Survival Aspects

The crash was survivable since after the forced landing, the aircraft was generally intact with only minor damages and as a result, the occupants were able to immediately vacate the aircraft without any restrictions. Further, the incident site was within the periphery of the airfield hence assistance was provided right away by responding WCC Aviation personnel.

### 1.14 Organizational and Management Information

WCC Aviation Company, Inc. was founded in 2005 with the vision of being a complete and exceptional aviation school and at the same time a community of aviation professionals. It has a CAAP Approved Training Organization Certificate (ATOC) to offer pilot courses, and Diploma in Aircraft Maintenance Technology (AMT) program. The aviation school also expanded their offerings to BS Aviation, BS Aeronautical Engineering, BS Tourism and Senior High School ABM and STEM track focusing on the aviation industry.

## 2.0 ANALYSIS

### 2.1 General

The Flight Instructor was certified and qualified under PCAR for such type of aircraft and to perform his functions.

For the aircraft, it has a valid issued Certificate of Registration and Certificate of Airworthiness.

### 2.2 Flight Crew

The FI has been with WCC as FI since CY2015. Currently, he is the Chief Ground Instructor of the company. He has ratings on C152 and C172 as well as flight experienced on C150, Piper Seneca and Beech 76 aircraft.

As for the student pilot, he enrolled at WCC last CY2018 and was able to complete his simulator and taxiing lessons last CY 2019. On the day of the incident, it was supposed to be his first orientation flight and they are scheduled to conduct airworks training within the area of Urdaneta, Pangasinan. He was initially scheduled to fly the day before the incident, but it was moved due to on-going check ride activities by CAAP check airmen.



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During the interview of both pilots, there was no mention of any mental or physical issues encountered prior to their flight. On further evaluation of their qualifications and competency particularly with the involved FI to include physical and human factor capabilities, it can be noted that there are no issues that can be attributed as one of the factors on this incident.

## 2.3 Flight Operations

On the review of WCC Training Manual, it was stated under chapter 4.2.1 – Private Pilot License Course, Course Introduction, the requirement of "Prior to beginning each lesson, a pre-briefing is required to discuss the lesson tasks." On the interview of both pilots, it was mentioned that for this flight, there was no formal pre-flight briefing conducted between the FI and the SP. Per the FI, this is because he conducted the briefing the day before which is their original flight schedule.

During the take-off, the FI was in the controls of the aircraft with the SP also allowed to feel the controls during rotation as part of his orientation training. When the issue was noted on the engine, it was then that the FI took over the full control and management in the cockpit. Thereafter, emergency procedure was performed solely by the FI since per the narrative of the SP, he felt to have almost "passed out" from the moment that he learned about their engine problem and only able to regain his awareness after they have landed.

Based on the Cessna 152 Aircraft Flight Manual particularly under Section 3 – Emergency Procedures, the published first response to an engine failure after take-off was the prompt lowering of the aircraft nose to maintain airspeed and establish a glide attitude. Likewise in most cases, the landing should be planned straight ahead with only small changes in the direction to avoid obstructions. In the time of the incident, the FI initially planned to have the emergency landing within the open area of the B-Meg Pangasinan Plant which is approximately 1.4 kilometers (0.76 NM) ahead of the departure runway. However, he later decided to return the aircraft to its departure airfield after assessing that his current engine rpm of 2,000 rpm will not be enough to sustain the flight towards the initial preferred emergency landing spot. On his assessment, it is much doable to make a safe landing within the Binalonan runway based on his current altitude and engine parameters. On this action of the FI, we can say that it was an acceptable mitigation that resulted in a safe landing even if it was not part of the aircraft manufacturer's recommendations.

## 2.4 Aircraft Status

### 2.4.1 Maintenance Records

Review of the aircraft maintenance records was made and found the following:

a. Airframe/Propeller/Engine logbooks are available and in order.
b. Aircraft Flight and Maintenance Logbook from 30 March 2022 – 21 April 2022 is available and in order.
c. Cessna 152/172 Pre-Flight Inspection Checklist from 28 March 2022 – 21 April 2022 are available and in order.

Based on the above-mentioned aircraft records, there was no recorded maintenance issue on the aircraft prior to its flight last 21 April 2022.



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### 2.4.2 Refueling Procedure

Since the reported problem was about the engine performance, Investigators initiated to look also into possible fuel related issue that affected the engine. Procedure regarding refueling was gathered to include interview of concerned personnel. During the investigation, WCC was able to present their documented SOPs for fueling activities such as the following:

a. Maintenance Organization Procedures Manual Chapter 1.2.2 – Line Maintenance Procedures Related to Servicing and Fueling
b. Maintenance Control Manual Chapter 6.2 – Fueling

As stated on the said manuals, the above defines WCC's standards in ensuring elimination of fuel contamination, prevention of fire incidents as well as the safety of personnel.

On the interview with the on-duty mechanic, he stated that refueling of the aircraft is usually being done after the last flight of the day to eliminate moisture build-up on the fuel tanks. Refueling is thru a fuel pump connected to a drum (Figure 6). Pumps are equipped with Facet's Fuel-Gard Aviation Spin-On filters to ensure that water and ultra-fine solids are absorbed. Though there are documented process available for WCC, these two (2) mentioned items are not yet part of the manual.


Figure 6 – Refueling drum with pump



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With reference to the submitted documents and statements provided by the concerned personnel related to the conduct of fueling/refueling activities, there was no significant issue noted that can be attributed as a factor on this occurrence.

### 2.4.3 Pre-Flight Inspection

Prior to the aircraft's first flight of the day, a pre-flight inspection is being conducted by the on-duty mechanic. This inspection is being accomplished and recorded thru WCC's Cessna 152/172 Pre-Flight Inspection Checklist form no. RS-PFC-001-01/Series 2002/Rev. 4.

Part of the above inspection is the draining of fuel to check for possible contamination and engine run-up to check the engine performance. On the day of the incident, the mechanic on-duty stated that there was no discrepancy noted during his pre-flight inspection as confirmed also thru the available checklist. Drained fuel was found to be free from any contamination and engine parameters check (i.e., magneto check, engine rpm, carburetor heat, oil pressure and temperature) found to be all within limits. In addition to the mechanic's inspection, the flight crew involved also conducted their own pre-flight inspection on that day in line with WCC's Cessna 152 checklist. No discrepancy was also noted thus they continue with the scheduled flight for that day.

### 2.4.4 Scheduled 200 Hours Inspection

The 200 hours inspection of the airframe, propeller and engine were completed last 20 April 2022 which was the day prior to the incident. During the inspection, all items have been found to be all in airworthy condition.

As for the involved engine, the interview with the assigned mechanic reveals that nothing unusual was done or noted during the conduct of the required annual inspection. Based on his recollection, the only usual issue being reported on the aircraft engine was the magneto drop which at times falls beyond limits.

Magneto drop is the reduction in RPM when either of the magnetos in a dual ignition reciprocating engine is switched off. It is a standard procedure to check the mag drop case prior to takeoff to confirm that both systems are operative since magnetos produces pulses of high voltage electricity that provide energy to the spark plugs used in the ignition systems of gasoline-powered internal combustion engines. The usual cause of this magneto drop discrepancy is the presence of carbon deposits within the spark plugs, a bad ignition wire, improper timing or a bad magneto.

During the last 200 hours inspection, cleaning and checking of torque and proper gap was accomplished on the engine spark plugs. Likewise, external and internal checking of the magnetos were done to include magneto to engine timing.

On the evaluation of available records and interview of personnel related to this 200 hour inspection, there was no notable issue particularly on the engine that can be associated to the incident last 21 April 2022.



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## 2.5 Aircraft Post-Incident Inspection

Right after the emergency landing, maintenance personnel conducted an engine run-up to replicate the issue encountered by the aircraft during its initial climb. Per the statement of the assigned mechanic who conducted the test, there was no fault found and all engine parameters are normal. Likewise, another aircraft engine run-up was later conducted under the presence of AAIIB Investigators. During this test, it yielded the same result and there was no indication of any technical issue on the aircraft.

With the above results, establishing the specific root cause of the reported engine problem seems to be a predicament to the investigation. Further analysis and research on such occurence may only arrive to the following list of factors that might have caused the incident:

1. The engine encountered a vapor lock occurrence wherein the liquid fuel becomes hot enough to vaporize. The vaporized fuel created a lean condition (not enough liquid fuel) which prevented the fuel system in delivering the proper amount of fuel to the engine.
2. The reported knocking/choking of the engine may have been due to the combustion of some of the air/fuel mixture in the cylinder that does not result from propagation of the flame front ignited by the spark plug. One or more pockets of air/fuel mixture may have exploded outside the envelope of the normal combustion front.
3. One of the magnetos fails while the other is unaffected. The engine continues to operate normally, although it resulted to a slight decrease in engine power.

# 3. CONCLUSIONS

## 3.1. Findings

**3.1.1** The aircraft has current Certificate of Registration valid until 22 April 2023.
**3.1.2** The aircraft has current Certificate of Airworthiness valid until 13 February 2023.
**3.1.3** The Pilot has valid and current Commercial Pilot/Flight Instructor License and Medical Certificate.
**3.1.4** The aircraft logbook recorded no discrepancy for the past seven (7) days.
**3.1.5** The aircraft has just completed its 200 hours inspection.

## 3.2 Probable Cause

**a.** The list presented under item 2.5 of the Analysis section of this report can be considered only as the closest probable cause of this engine performance degradation encountered by RP-C1028 last 21 April 2022 since the post incident evaluation and testing of the engine cannot specifically confirmed nor replicate the problem encountered during the flight of the involved aircraft.



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## 4. SAFETY RECOMMENDATIONS

**4.1** As a result of the analysis, there is no definite or confirmed root cause identified for this case. With this, there will be no particular recommendation to be proposed that is directly related to this engine performance issue. However, as part of the continuous improvement of the involved operator's internal process, the following are hereby submitted for consideration:

For **CAAP-FSIS** to ensure that the Operator:

**a.** Include in their existing manuals the following internal current practices:
   **1.** Refuelling of the aircraft after each day's operations to prevent possible moisture build up on the fuel tanks;
   **2.** Conduct of refuelling using pumps equipped with Facet's Fuel-Gard Aviation Spin-On filters to ensure that water and ultra-fine solids are absorbed during the process.

## 5. SAFETY ACTIONS

**5.1** Following this occurrence, WCC Aviation Company, Inc. also initiated the following safety corrective action on the observed deviation on the conduct of the required pre-flight briefing prior to each day's flight sortie:

**a.** Issuance of an internal Memorandum dated 22 April 2022 reiterating to all concerned Flight Instructors the conduct of the required flight briefings (Appendix A).

**-END-**



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