

# **AIRCRAFT SERIOUS INCIDENT**

# **FINAL REPORT**

# SI 02/24

# Air Accident Investigation Bureau (AAIB)

# Ministry of Transport, Malaysia

Fixed Wing Aircraft Textron Aviation Cessna 172P, Registration 9M-AZP

at Kota Kinabalu International Airport, Sabah

#### on 11 February 2024



Air Accident Investigation Bureau Ministry of Transport No.26, Jalan Tun Hussein, Precinct 4 Federal Government Administrative Centre 62100 PUTRAJAYA Phone: +603-8892 1072 Fax: +603-8888 0163 E-mail: <u>AAIB@mot.gov.my</u> Website: <u>http://www.mot.gov.my/en</u> Issued on 16 January 2025 MOT(S).600-5/4/105

# AIR ACCIDENT INVESTIGATION BUREAU (AAIB) MALAYSIA

#### REPORT NO.: SI 02/24

| OPERATOR            | : LAYANG-LAYANG FLYING ACADEMY         |
|---------------------|--|
| AIRCRAFT TYPE       | : TEXTRON AVIATION CESSNA 172P         |
| NATIONALITY         | : MALAYSIA                             |
| REGISTRATION        | : 9M-AZP                               |
| PLACE OF OCCURRENCE | : KOTA KINABALU INTERNATIONAL AIRPORT, |
|                     | SABAH                                  |
| DATE AND TIME       | : 11 FEBRUARY 2024 AT 0730LT           |

The sole objective of the investigation is the prevention of accidents and incidents. In accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of this investigation to apportion blame or liability.

All times in this report are Local Time (LT) unless stated otherwise. LT is UTC +8 hours.

#### INTRODUCTION

The Air Accident Investigation Bureau (AAIB) is the authority responsible for investigating air accidents and incidents in Malaysia, operating under the Ministry of Transport. The AAIB's mission is to promote aviation safety through independent and objective investigations into air accidents and serious incidents. Additionally, the AAIB investigates incidents that reveal potential safety issues.

All investigations by the AAIB are conducted in accordance with Annex 13 to the Convention on International Civil Aviation (ICAO Annex 13) and the Civil Aviation Regulations 2016. It is important to note that AAIB reports are not intended to apportion blame or determine liability, as neither the investigations nor the reporting processes are designed for those purposes. The sole objective of this investigation and the Final Report is the prevention of accidents and incidents.

In accordance with ICAO Annex 13 paragraph 4.1, notification of the serious incident was sent out on 16 February 2024 to the National Transport Safety Board (NTSB), United States of America as the State of Design and Manufacture. A copy of the Preliminary Report was submitted to the NTSB, the Civil Aviation Authority of Malaysia (CAAM), the Aircraft Owner and the Aircraft Operator on 11 March 2024. The Draft Final Report was subsequently sent on 10 December 2024 to the aforementioned organisations, inviting their significant and substantiated comments.

Unless otherwise indicated, recommendations in this report are addressed to the investigating or regulatory authorities of the State having responsibility for the matters with which the recommendations are concerned. It is for those authorities to decide what action is to be taken

#### TABLE OF CONTENTS

| CHAPTER |      | TITLE  | PAGE<br>NO |
|---------|------|--|------------|
|         |      |  |            |
|         |      | INTRODUCTION                                 | iii        |
|         |      | TABLE OF CONTENTS                            | iv         |
|         |      | LIST OF APPENDICES                           | v          |
|         |      | GLOSSARY OF ABBREVIATIONS                    | vi         |
|         |      |  |            |
|         |      | SYNOPSIS                                     | 1          |
|         |      |  |            |
| 1.0     |      | FACTUAL INFORMATION                          | 2          |
|         | 1.1  | History of the Flight                        | 2          |
|         | 1.2  | Injuries to Persons                          | 3          |
|         | 1.3  | Damage to Aircraft                           | 3          |
|         | 1.4  | Other Damage                                 | 5          |
|         | 1.5  | Personnel Information                        | 6          |
|         | 1.6  | Aircraft Information                         | 7          |
|         | 1.7  | Meteorological Information                   | 8          |
|         | 1.8  | Aids to Navigation                           | 8          |
|         | 1.9  | Communications                               | 9          |
|         | 1.10 | Aerodrome Information                        | 9          |
|         | 1.11 | Flight Recorders                             | 9          |
|         | 1.12 | Wreckage and Impact Information              | 10         |
|         | 1.13 | Medical and Pathological Information         | 10         |
|         | 1.14 | Fire   | 10         |
|         | 1.15 | Survival Aspects                             | 11         |
|         | 1.16 | Tests and Research                           | 11         |
|         | 1.17 | Organisational and Management Information    | 11         |
|         | 1.18 | Additional Information                       | 12         |
|         | 1.19 | Useful or Effective Investigation Techniques | 12         |
|         |      |  |            |
| 2.0     |      | ANALYSIS                                     | 14         |
|         |      |  |            |
| 3.0     |      | CONCLUSIONS                                  | 21         |
|         | 3.1  | Findings                                     | 21         |
|         | 3.2  | Causes/Contributing factors                  | 22         |
|         |      |  |            |
| 4.0     |      | SAFETY RECOMMENDATIONS                       | 24         |
|         |      |  |            |
| 5.0     |      | COMMENTS TO DRAFT FINAL REPORT               | 24         |
|         |      |  |            |
|         |      | CONCLUDING STATEMENT                         | 25         |

#### LIST of APPENDICES

| Α | Jet Blast Area Single Engine and Dual Engine GL 5000         | A-1 to A-3  |
|---|--|-------------|
| В | Certificate of Airworthiness and Certificate of Registration | B-1 to B-4  |
| С | Initial Aircraft Damage Assessment                           | C-1 to C-10 |
| D | HFACS Worksheet  | D-1 to D-9  |

#### **GLOSSARY OF ABBREVIATIONS**

| AAIB   | Air Accident Investigation Bureau                |  |
|--------|--|--|
| AFRS   | Airport Fire & Rescue Service                    |  |
| ATC    | Air Traffic Controller                           |  |
| АТР    | Airline Transport Pilot                          |  |
| BKI    | Kota Kinabalu International Airport (IATA code)  |  |
| CAAM   | Civil Aviation Authority of Malaysia             |  |
| ССТV   | Closed-Circuit Television                        |  |
| C of A | Certificate of Airworthiness                     |  |
| C of R | Certificate of Registration                      |  |
| CVR    | Cockpit Voice Recorder                           |  |
| ETD    | Estimated Time Departure                         |  |
| FDR    | Flight Data Recorder                             |  |
| FOD    | Foreign Object Debris                            |  |
| HFACS  | Human Factors Analysis and Classification System |  |
| Hrs    | Hours  |  |
| ΙΑΤΑ   | International Air Transport Association          |  |
| ICAO   | International Civil Aviation Organisation        |  |
| KKIA   | Kota Kinabalu International Airport              |  |
| Km/h   | Kilometre/hour                                   |  |
| LLA    | Layang Layang Academy                            |  |
| LT     | Local Time                                       |  |
| LH     | Left Hand  |  |
| МАНВ   | Malaysia Airport Holding Berhad                  |  |
| MASB   | Malaysia Airport Sendirian Berhad                |  |
| MRO    | Maintenance, Repair, and Overhaul                |  |
| MOR    | Mandatory Occurrence Reporting                   |  |
| PIPO   | Power In - Power Out                             |  |
| PIPB   | Power In - Push Back                             |  |
| SDK    | Sandakan   |  |

| UTC  | Universal Coordinated Time                      |
|------|---|
| VIP  | Very Important Person                           |
| WBKK | Kota Kinabalu International Airport (IATA code) |

#### **SYNOPSIS**

On 11 February 2024, a Cessna 172P aircraft, registration 9M-AZP, was parked at the designated area within LLA Hangar 'C', secured with all wheels chocked and the parking brake engaged. A Bombardier Global 5000 aircraft, registration T7-SABAH, was taxiing near LLA Hangar 'C'. During this manoeuvre, a hazardous jet blast was generated, causing the 9M-AZP to lift and shift from its parking position.

The force of the jet blast dislodged all chocks, causing the tail section of the Cessna 172P to contact the ground. The momentum from the blast then propelled the aircraft into a sliding motion, which ended when the left-hand wingtip collided with the roll cage of a forklift parked within the hangar.

The aircraft T7-SABAH continued its taxi and subsequently took off, despite the resulting damage caused by the jet blast. Initial investigations revealed damage to the left-hand wingtip and the lower tail section of the Cessna 172P. As a precaution, 9M-AZP remains in its current position, enclosed by safety barriers and under quarantine pending further assessment of the damages incurred.

A safety report was filed by Sabah Air and Weststar personnel approximately 10 minutes after the occurrence. A Mandatory Occurrence Report (MOR) was also submitted by the aircraft operator to the Civil Aviation Authority of Malaysia (CAAM) and the Air Accident Investigation Bureau Malaysia (AAIB) as notification of the incident.

#### 1.0 FACTUAL INFORMATION

#### 1.1 History of the Flight

On 11 February 2024, a Bombardier Global 5000 aircraft parked at Bay 26 was required to be repositioned to Bay 32 for a VIP flight with an estimated time of departure (ETD) at 0830 LT. The aircraft was started at Bay 26 and, after obtaining clearance, commenced taxiing using a single engine at approximately 0730 LT. During the taxi-out (push-in/pull-out or PIPO) from Bay 26, as indicated by the red dashed line in Figure 1, the aircraft performed a tight 180-degree turn to avoid Bay 27, which was occupied by a Weststar AW139 helicopter.

The jet blast generated during this manoeuvre caused the Cessna 172P, registration 9M-AZP, to shift from its parking position, as shown by the yellow arrowhead in Figure 1. The force dislodged all wheel chocks and caused the tail section of the Cessna to contact the ground. The momentum from the blast propelled the aircraft into a sliding motion, which ended when the left-hand wingtip collided with the roll cage of a forklift parked within the hangar. Additionally, the Spraidex zinc sheet installed at the perimeter fence, as indicated by the yellow rectangle in Figure 1, was dislodged by the jet blast. This damage nearly caused the fencing to collapse.



Figure 1: Position of Aircraft

#### 1.2 Injuries to Persons

| Injuries   | Crew | Passengers | Others | Total |
|------------|------|------------|--------|-------|
| Fatal      | NIL  | NIL        | NIL    | NIL   |
| Serious    | NIL  | NIL        | NIL    | NIL   |
| Minor/None | NIL  | NIL        | NIL    | NIL   |

#### 1.3 Damage to Aircraft

Significant damage was observed on the left-hand (LH) wingtip assembly, as shown in Figures 2, 3, 4, and 5, including noticeable cracks and puncture damage in the forward section. Analysis confirms that the LH wing sustained impact forces upon collision with a forklift parked nearby, caused by the jet blast generated during the taxiing of the aircraft from the terminal. Assessments have determined that the deformation of the wingtip assembly exceeds permissible limits.



Figure 2: LH wing tip damage area



Figure 3: Visible deformation of LH wing tip

The left-wing leading edge exhibits a significant inward deformation, attributed to the forces generated by the jet blast. No additional defects have been identified; further inspections are required.



Figure 4: LH Wing Strut

The tail section and tail cone were severely impacted against the ground due to the jet blast, which caused the aircraft to shift from its parked position. No additional defects have been identified at this stage; further inspections are required.



Figure 5: Tail Section

#### 1.4 Other Damage

There are other damages sustained other than the aircraft.





Figure 6: Damage sustained by the perimeter fence and inside compound LLA

# 1.5 Personnel Information

#### 15.1 Pilot T7-SABAH

| Status              | Pilot in Command (PIC)    |
|---------------------|---------------------------|
| Nationality         | Australia                 |
| Age                 | 42 years old              |
| Gender              | Male                      |
| License Type        | ATP (3620512)             |
| License Validity    | Valid until 19 March 2024 |
| Aircraft Rating     | Multi-Engine Land         |
| Total Hours on Type | 58.8hrs                   |
| Total Flying Hours  | 6010hrs                   |

| Rest Period Since Last Flight | 24hrs             |
|-------------------------------|-------------------|
| Medical Expiry Date           | 18 September 2024 |

#### 1.5.2 Co-Pilot T7-SABAH

| Status                        | Second in Command          |
|-------------------------------|----------------------------|
| Nationality                   | USA                        |
| Age                           | 62 years old               |
| Gender                        | Male                       |
| License Type                  | ATP (3181084)              |
| License Validity              | Valid until 21 August 2026 |
| Aircraft Rating               | Multi-Engine Land          |
| Total Hours on Type           | 57.2hrs                    |
| Total Flying Hours            | 7499hrs                    |
| Rest Period Since Last Flight | 24hrs                      |
| Medical Expiry Date           | 29 February 2024           |

Both pilots were appropriately licensed, qualified, and approved to conduct the flight in compliance with existing regulations. They were medically fit and sufficiently rested to operate the flight.

#### 1.6 Aircraft Information

| Aircraft Type        | Bombardier GL 5000 |
|----------------------|--------------------|
| Manufacturer         | Bombardier Inc.    |
| Year of Manufacturer | 2014               |
| Owner                | Innosky Ltd        |
| Registration No.     | T7-SABAH           |

| Aircraft Serial No. | 9668             |
|---------------------|------------------|
| C of A Expiry Date  | 20 November 2025 |
| C of R Issued Date  | 09 August 2023   |

| Aircraft Type        | Cessna 172P       |
|----------------------|-------------------|
| Manufacturer         | Textron Aviation  |
| Year of Manufacturer | 1983              |
| Owner                | Sabah Flying Club |
| Registration No.     | 9M-AZP            |
| Aircraft Serial No.  | 17275854          |
| C of A Expiry Date   | 13 April 2024     |
| C of R Expiry Date   | 16 May 2025       |

The Bombardier Global 5000 aircraft was airworthy, while the Cessna 172P was undergoing inspection by the Civil Aviation Authority of Malaysia (CAAM). Both aircraft held valid registrations and Certificates of Airworthiness (C of A) and had been maintained in compliance with regulations. Maintenance records confirmed that the aircraft were equipped and maintained in accordance with existing regulations and approved procedures.

The jet blast area for the Bombardier Global 5000 is detailed in Appendix A.

#### **1.7** Meteorological Information

The occurrence took place during daylight with visibility exceeding 10 kilometres. The weather conditions on the day of the occurrence did not contribute to the event.

#### 1.8 Aids to Navigation

Not applicable.

#### 1.9 Communications

All ATC communication frequencies were operating normally.

#### **1.10 Aerodrome Information**

Kota Kinabalu International Airport (KKIA) (IATA: BKI, ICAO: WBKK) is an international airport located approximately 8 km (5.0 mi) southwest of Kota Kinabalu, the state capital of Sabah, Malaysia. The airport's coordinates are 05°56'41" N, 116°03'31" E. It has a single runway, designated Runway 02/20, which is approximately 3,788 metres in length and situated at an elevation of 2 metres above sea level.



Figure 7: General description of KKIA

#### 1.11 Flight Recorders

The Bombardier Global 5000 aircraft, registration T7-SABAH, was equipped with a Flight Data Recorder (FDR) and a Cockpit Voice Recorder (CVR). The data from both the FDR and CVR were successfully downloaded on 15 February 2024.

#### 1.12 Wreckage and Impact Information

Figure 8 below provides a general layout of KKIA Terminal 2 and the location of the incident. The Bombardier Global 5000 aircraft, registration T7-SABAH, started up using the push-in/pull-out (PIPO) method at Bay 26 to reposition to Bay 32. Initially facing the terminal, the aircraft taxied and performed a 180-degree tight turn to avoid Bay 27, which was occupied by a Weststar AW139 helicopter. The red dashed line in Figure 8 indicates the taxi route taken by the Bombardier Global 5000.



Figure 8: General description map of the incident

#### 1.13 Medical and Pathological Information

Both pilots underwent urine drug panel screening, and the results were negative for substance abuse.

#### 1.14 Fire

Nil

#### 1.15 Survival Aspects

Not applicable.

#### 1.16 Tests and Research

Not applicable.

#### 1.17 Organisational and Management Information

#### 1.17.1 Aircraft Owner

The Cessna 172P, registration 9M-AZP, is owned by Sabah Flying Club, while the Bombardier Global 5000, registration T7-SABAH, is owned by Innosky Ltd. Innosky Ltd is a wholly owned subsidiary of Sabah Air Aviation Sdn Bhd, holding 100% of its share capital.

#### 1.17.2 Aircraft Operator

The Bombardier Global 5000, registration T7-SABAH, is operated by Sabah Air Aviation Sdn Bhd, while the Cessna 172P, registration 9M-AZP, is operated by Layang Layang Flying Academy.

#### 1.17.3 Aerodrome Operator

KKIA is operated by Malaysia Airports Sendirian Berhad (MASB), a subsidiary of Malaysia Airports Holdings Berhad (MAHB). MASB is licensed by the Ministry of Transport Malaysia to operate, manage, and maintain all airports in Malaysia, except Kuala Lumpur International Airport (KLIA) and Senai International Airport.

As an aerodrome operator certified under the Civil Aviation Regulations (Aerodrome Operations) 2016, MASB is required to comply with any regulations or requirements determined by the Director General.

#### 1.17.4 Aerodrome Terminal 2 Facilities

#### 1.17.4.1 CCTV Footage

KKIA Terminal 2 is equipped with several surveillance cameras (CCTV); however, none were serviceable at the time of the incident. No video footage was obtained from the jet blast incident.

#### 1.17.4.2 PIPB Procedures

All taxi lines to parking areas at KKIA Terminal 2 adhere to the Push-In/Push-Back (PIPB) procedures, which require aircraft to be pushed back before engine start.

#### 1.18 Additional Information

Nil

#### 1.19 Useful or Effective Investigation Techniques

#### 1.19.1 Reason's "Swiss Cheese" Model

The Reason "Swiss Cheese" Model (Figure 9) was used to describe the layers of defences at which both active and latent failures/conditions may occur in this event. Based on the evidence examined, it is determined that this mishap is human factor-related.



Figure 9: Reason's 'Swiss Cheese' Model Aviation

#### 1.19.2 Human Factors Analysis and Classification System (HFACS)

HFACS is used to evaluate and identify the various preconditions that led to unsafe acts, based on the layers of defence described in the Swiss Cheese model. This model helps pinpoint where both active and latent failures/conditions may have occurred during the event. The supervisory and organisational difficulties that contributed to these preconditions were also assessed. Finally, as shown in Figure 10, this provides a comprehensive human factors analysis of the events leading up to the mishap.





#### 2.0 ANALYSIS

#### 2.1 Ground Movements and Power in and Push Back (PIPB) procedures

Ground operations involve all aspects of aircraft handling at the airport and aircraft movement around the aerodrome, except on active runways. The safety challenges of ground operations are partly associated directly with these activities, such as ensuring that aircraft do not collide and that jet efflux from large aircraft does not endanger smaller ones. The jet blast hazard resulting from the operation of aircraft engines at power settings above idle is well recognised within the ramp environment.

The potential risks from jet blast on aerodromes are widely acknowledged. According to ICAO Document 9157 (Aerodrome Design Manual), Part 2, Appendix 2, "jet blast velocities above 56 km/h are considered undesirable for personal comfort or for the operation of vehicles or other equipment in the movement area." To mitigate the hazard of jet blast velocities, blast fences are used at aerodromes to reduce or eliminate detrimental effects by deflecting high air velocities. The use of fences or screens is necessary when it is impractical to provide safe separation between aircraft engines and people, buildings, or other objects on the aerodrome.

Many aerodromes allow aircraft to taxi only at minimum engine speed on the apron. Additionally, so-called break-away areas have been established to ensure that breakaway thrust is applied only in areas where it is safe to do so. Some aerodromes further restrict the application of thrust.

For KKIA Terminal 2, the taxiway line is designed for PIPB procedures, which require aircraft to be pushed back before engine start. This procedure aims to minimise the jet blast effects on the terminal and surrounding area. This incident highlights the importance of situational awareness for all pilots regarding operational hazards.

#### 2.1 FDR and CVR Analysis

The FDR data provided includes the last two hours of flight operation, along with 30 minutes of audio from the CVR. This dataset was downloaded by the MRO and handed over to the investigator. However, upon review, it was found that the data did not cover the critical moments of the incident. The earliest timestamp in the FDR data is 23:33:07 UTC (07:33 LT), three minutes after the incident occurred at 23:30 UTC (07:30 LT). As a result, it is not possible to analyse engine performance or determine the power output during the turn leading up to the incident.

Regarding the CVR, its 30-minute recording capacity meant that the audio from the BKI/SDK sector was overwritten by the recording from the SDK/BKI sector, rendering it unavailable for review.



#### 2.2 Human Factor Analysis

Human factors issues related to this accident were examined using Reason's Swiss Cheese model and the HFACS worksheet, provided in **Appendix D**. The HFACS worksheet includes evidence statements for ratings of 2, 3, and 4, as outlined in paragraphs 2.3.1 to 2.3.4. The series of latent failures that led to unsafe acts, which breached the safety barriers and ultimately caused the mishap, are detailed in these paragraphs. Subsequently, an Investigation Analysis Summary is presented in Figure 10.

#### 2.2.1 Tier 1 – Unsafe Acts

Unsafe acts are those most closely tied to the mishap and can be described as active failures or actions that result in human error or unsafe situations. These active failures or actions are categorised as Errors and Violations.

| AE     | ERRORS  | EVIDENCE   |
|--------|---|--|
| AE 1   | Risk Assessment - During<br>Operation   |  |
| AE 2.1 | Risk Assessment – During<br>Operation is a factor when the<br>individual fails to adequately<br>evaluate the risks associated with<br>a particular course of action and<br>this faulty evaluation leads to<br>inappropriate decision and<br>subsequent unsafe situation. This<br>failure occurs in real-time when<br>formal risk-assessment<br>procedures are not possible. | The decision to taxy which<br>requires sharp turning aggravates<br>the situation since more thrust<br>power is required to taxy. |

| AV   | VIOLATIONS   | EVIDENCE  |
|------|--|---|
| AV 1 | Violation - Based on Risk<br>Assessment  |   |
| AV 1 | Violation- Based on Risk<br>Assessment is a factor when the<br>consequences/risk of violating<br>published procedures was<br>recognized, consciously assessed<br>and honestly determined by the<br>individual, crew or team to be the<br>best course of action. Routine<br>"work-around" and unofficial<br>procedures that are accepted by<br>the community as necessary for<br>operations are also captured<br>under this code. | The decision to taxy using power<br>out even though the taxy line<br>indicate PIPB procedures violates<br>the Kota Kinabalu International<br>Airport- Apron Management<br>Procedures. |

Although aware of the situation, the pilot's decision to taxi using one engine was further aggravated by the proximity of another helicopter that had started up. This taxi-out movement required the aircraft to make a sharp turn, which necessitated increased power from the engine.

#### 2.2.2 Tier 2 – Preconditions for Unsafe Acts

| PP      | PERSONNEL FACTORS   | EVIDENCE   |
|---------|---|--|
| PP 1.10 | <b>Mission Briefing.</b> Mission briefing<br>is a factor when information and<br>instructions provided to individuals,<br>crew, or teams were insufficient, or<br>participants failed to discuss<br>contingencies and strategies to<br>cope with contingencies. | No briefing discussed the jet<br>blast area during pre-flight or<br>before taxy out. |

The breach in the precondition for the unsafe act defence layer is a combination of cognitive and perceptual factors that contributed to the unsafe act, as analysed in paragraph 2.3.2. There is no evidence that the crew discussed the jet blast effect on the surrounding area.

#### 2.2.3 Tier 3 – Unsafe Supervision

| SF   | FAILURE TO CORRECT KNOWN<br>PROBLEM   | EVIDENCE   |
|------|---|--|
| SF 2 | <b>Operations Management.</b><br>Operations Management is a factor<br>when a supervisor fails to correct<br>known hazardous practices,<br>conditions or guidance that allows<br>for hazardous practices within the<br>scope of his/her command. | Management failed to provide<br>tow truck and tow bar for the<br>operation of this aircraft at<br>KKIA terminal 2 even though<br>aware of PIPB Procedures in<br>KKIA terminal 2. |

As mentioned, management failed to provide a tow truck and tow bar for the operation of the aircraft at KKIA Terminal 2, despite being aware of the PIPB Procedures at the terminal. In this case, the failure to correct a known problem refers to instances when deficiencies related to individuals, equipment, training, or other safety areas are "known" to the supervisor but are allowed to continue uncorrected.

#### 2.2.4 Tier 4 – Organisational Influences

| OP   | ORGANISATIONAL PROCESS  | EVIDENCE  |
|------|---|---|
| OP 6 | Program Oversight/Program<br>Management. Program<br>oversight/Program management is a<br>factor when programs are<br>implemented without sufficient<br>support, oversight or planning and<br>this leads to an unsafe situation. | The procurement/least<br>process of Bombardier<br>GL5000 aircraft was done<br>without considering all<br>logistical support required<br>such as the hangar, tow bar<br>and tractor. |

It is clear that the operation of the Bombardier GL5000 aircraft was carried out without considering all the necessary logistical support, such as the hangar, tow bar, and tractor. These inadequacies created unsafe situations when the aircraft needed to operate at KKIA Terminal 2 due to the PIPB procedures.

|               | TIER 1 – UNSAFE ACTS - ERRORS         | 4        | 3        | 2        | 1         |
|---------------|---------------------------------------|----------|----------|----------|-----------|
| AE 1          | Skill-Based Errors                    |          |          |          | 6         |
| AE 2          | Judgment & Decision-Making Errors     | 1        |          |          | 5         |
| AE 3          | Misperception Error                   |          |          |          | 1         |
|               |                                       |          |          |          |           |
| TIER 1        | - UNSAFE ACTS - VIOLATIONS            |          |          |          |           |
| AV 1          | Violations – Based on Risk Assessment | 1        |          |          | 0         |
| AV 2          | Violations – Routine/Widespread       |          |          |          | 1         |
| AV 3          | Violations – Lack of Discipline       |          |          |          | 1         |
| <u>TIER 1</u> | - UNSAFE ACTS SUB TOTAL               | <u>2</u> | <u>0</u> | <u>0</u> | <u>14</u> |
| TIER 2        | - PRECONDITIONS FOR UNSAFE ACTS -     |          |          |          |           |
| ENVIR         | ONMENTAL FACTORS                      |          |          |          |           |
| PE 1          | Physical Environment                  |          |          |          | 11        |
| PE 2          | Technology Environment                |          |          |          | 8         |
|               |                                       |          |          |          |           |
| TIER 2        | - PRECONDITIONS FOR UNSAFE ACTS -     |          |          |          |           |
| COND          | ITIONS OF INDIVIDUAL                  |          |          |          |           |
| PC 1          | Cognitive Factors                     |          |          |          | 8         |

| PC 2            | Psycho-behavioural Factors                         |          |          |          | 15         |
|-----------------|--|----------|----------|----------|------------|
| PC 3            | Adverse Physiological State                        |          |          |          | 16         |
| PC 4            | Physical/Mental Limitations                        |          |          |          | 5          |
| PC 5            | Perceptual Factors                                 |          |          |          | 11         |
|                 |  |          |          |          |            |
| TIER 2          | - PRECONDITIONS FOR UNSAFE ACTS –<br>ONNEL FACTORS |          |          |          |            |
| PP 1            | Coordination/Communication/Planning Factors        |          | 1        |          | 11         |
| PP 2            | Self-Imposed Stress                                |          |          |          | 6          |
| TIER 2<br>TOTAL | - PRECONDITIONS FOR UNSAFE ACTS SUB                | <u>0</u> | 1        | <u>0</u> | <u>91</u>  |
|                 |  |          |          |          |            |
| TIER 3          | – UNSAFE SUPERVISION                               |          |          |          |            |
| SI              | Inadequate Supervision                             |          |          |          | 6          |
| SP              | Planned Inappropriate Operations                   |          |          |          | 7          |
| SF              | Failure Correct Known Problem                      |          | 1        |          | 1          |
| SV              | Supervisory Violations                             |          |          |          | 4          |
|                 |  |          |          |          |            |
| TIER 3          | - UNSAFE SUPERVISION SUB TOTAL                     | <u>0</u> | <u>1</u> | <u>0</u> | <u>18</u>  |
|                 |  |          |          |          |            |
| TIER 4          | - ORGANISATIONAL INFLUENCES                        |          |          |          |            |
| OR              | Resource/Acquisition Management                    |          |          |          | 8          |
| OC              | Organisational Climate                             |          |          |          | 5          |
| OP              | Organisational Processes                           |          | 1        |          | 5          |
| TIER 4          | - ORGANISATIONAL INFLUENCES SUB TOTAL              | <u>0</u> | <u>2</u> | <u>0</u> | <u>18</u>  |
|                 |  |          |          |          |            |
| TOTAL           | UNSAFE ACTS  | <u>2</u> | <u>3</u> | <u>0</u> | <u>141</u> |

Figure 10: Summary of HFACS Worksheet

#### 3.0 CONCLUSION

#### 3.1 Findings

#### 3.1.1 Pilot

3.1.1.1 Both pilots were qualified and approved to perform the flight in accordance with existing regulations.

3.1.1.2 Both pilots were medically fit and adequately rested to operate the flight.

3.1.1.3 Results from the urine drug panel screen test were negative for substance abuse, and the blood alcohol screening test was within the limit.

#### 3.1.2 Aircraft Cessna 172P, Registration 9M-AZP

3.1.2.1 The aircraft was not airworthy at the time and was grounded, awaiting CAAM airworthiness inspection.

3.1.2.2 The aircraft is certified, equipped, and maintained in accordance with existing regulations and approved procedures.

3.1.2.3 The aircraft has a valid Certificate of Airworthiness (C of A) and has been maintained in compliance with regulations.

3.1.2.4 Maintenance records indicate that the aircraft is equipped and maintained in accordance with existing regulations and approved procedures.

3.1.2.5 The aircraft was parked in a designated parking area.

#### 3.1.3 Aircraft Bombardier GL5000, RegistrationT7-SABAH

3.1.3.1 The aircraft was airworthy when cleared for the flight.

3.1.3.2 The aircraft is certified, equipped, and maintained in accordance with existing regulations and approved procedures.

3.1.3.3 The aircraft has a valid Certificate of Airworthiness (C of A) and has complied with regulations.

3.1.3.4 Maintenance records indicate that the aircraft is equipped and maintained in accordance with existing regulations and approved procedures.

#### 3.1.4 Aircraft Operator

3.1.4.1 The management of the Bombardier GL5000 failed to provide a tow truck and tow bar for the operation of this aircraft at KKIA Terminal 2, despite being aware of the PIPB procedures in place at KKIA Terminal 2.

3.1.4.2 The procurement/lease process for the Bombardier GL5000 aircraft was conducted without considering all logistical support required, such as the hangar, tow bar, and tow truck.

#### 3.1.5 Aerodrome

3.1.5.1 The KKIA Terminal 2 Apron is equipped with only a single set of aircraft stands configured for PIPB operations.

3.1.5.2 All CCTV cameras at KKIA Terminal 2 Apron are not serviceable.

#### 3.2 Causes/Contributing Factors

3.2.1 **Primary Cause**. From HFACS summary in Figure 10 (see **Appendix D** for details), the primary cause for the mishap is attributed to:

3.2.1.1 One (1) Tier 1- Unsafe Act – Errors as follows:

a. Judgement and Decision-Making Error.

One (1) Tier 1 – Unsafe Act – Violation as follows:

a. Violations - Based on Risk Assessment.

3.2.3 The primary cause of the accident is attributed to a **Judgment and Decision-Making Error and Violation**—based on risk assessment. The decision to taxi using engine power, despite the taxiway line indicating PIPB procedures, violated the Kota Kinabalu International Airport - Apron Management Procedures. Consequently, the accident is categorised as **Ground Handling (RAMP)**.

3.2.4 **Secondary Causes**. From HFACS summary in Figure 10 (see **Appendix D** for details), the secondary causes are attributed to:

- 3.2.4.1 One (1) Preconditions of Unsafe Acts (Tier 2) as follows:
  - a. Personnel Factors.
- 3.2.4.2 One (1) Unsafe Supervision (Tier 3) as follows:
  - a. Failure Correct Known Problem
- 3.2.4.3 One (1) Organisational Influence (Tier 4) as follows:
  - a. Organisational Processes

3.2.5 The contributing factors were attributed to:

3.2.5.1 No briefing was conducted regarding the jet blast area during pre-flight or prior to taxiing out.

3.2.5.2 Management's failure to provide a tow truck and tow bar for the operation of the Bombardier GL5000 aircraft at KKIA Terminal 2, despite being aware of PIPB Procedures, created an unsafe situation.

3.2.5.3 The procurement and leasing process for the Bombardier GL5000 aircraft did not consider all necessary logistical support, such as the availability of a hangar, tow bar, and tractor.

23

#### 4.0 SAFETY RECOMMENDATION

#### 4.1 Aircraft Operator (Bombardier GL5000, RegistrationT7-SABAH)

4.1.1 The KKIA Terminal 2 Apron is equipped with a single set of aircraft stands configured for PIPB procedures. The operator shall ensure that the PIPO configuration is not utilised.

4.1.2 The aircraft operator shall provide a towing facility for its aircraft to facilitate the aircraft push-back configuration.

#### 4.2 Aerodrome Operator

4.2.1 The aerodrome operator shall enforce PIPB configuration at KKIA Terminal2 apron.

4.2.2 The aerodrome operator shall ensure all KKIA Terminal 2 Apron CCTV cameras are in serviceable condition.

#### 5.0 COMMENTS TO DRAFT FINAL REPORT

In accordance with ICAO Annex 13, paragraph 6.3, the Draft Final Report was sent to the State of Registry (CAAM), Design and Manufacturer (NTSB), as well as the aircraft operator (LLA) inviting their significant and substantiated comments on the report. The following (Table 7) is the status of the comments received:

| Organisations                  | Status of Significant and |
|--------------------------------|---------------------------|
| Organisations                  | Substantiated Comments    |
| NTSB, United States of America | No comments received      |
| CAAM, Malaysia                 | No comments received.     |
| LLA                            | No comments received.     |

 Table 7: Status of significant and substantiated comments.

#### **CONCLUDING STATEMENT**

This investigation has revealed instances of non-compliance and errors; however, it is crucial to emphasise that these findings are not intended for the purposes of apportioning blame or liability. Rather, they are solely for the purpose of preventing accidents in the future and improving aviation safety on the whole. Addressing the identified findings and implementing the recommended safety measures will enhance aviation safety and mitigate risks associated with operational lapses and regulatory gaps. It is imperative that all stakeholders prioritise safety and commit to implementing the necessary measures to prevent recurrence.

Investigator-In-Charge Air Accident Investigation Bureau Ministry of Transport, Malaysia

#### **APPENDIX A**

#### Jet Blast Area Single Engine And Dual Engine





Danger Areas - Engine Intake and Exhaust





#### **APPENDIX B**

|  | PIHAK BE  | ERKUASA PENERBANGAN AWAM MALAYSIA  | No. AR/16/08   |
|--|---|--|--|
| CAAM   | CIV   | IL AVIATION AUTHORITY OF MALAYSIA<br>PERAKUAN PENDAFTARAN<br>ERTIFICATE OF REGISTRATION  |  |
| Tanda-Tanda Kenegaraan dan Per<br>Nationality and Registration M.<br><b>9M-AZP</b>   | ndaftaran<br>Iarks  | Pembuat dan Nama Sebutan Kapal Udara<br>Manufacturer and Manufacturer's Designation of Aircraft<br>TEXTRON AVIATION INC.<br>172P   | Nombor Siri Kapal Uda<br>Aircraft Serial Number<br>17275854  |
| Nama dan         SABAH FL           Alamat Pemunya         P.O BOX 1           Name and Address         SABAH.           of Owner         SABAH.   | LYING CLUE<br>10747,<br>TA KINABAI  | 3,<br>LU,  |  |
| Adalah dengan ini diperakui bahawa<br>Konvensyen Penerbangan Awam An   | kapal udara<br>ntarabangsa  | a yang diperihalkan di atas telah dimasukan dalam Daftar K<br>bertarikh 7 Disember 1944 dan Akta Penerbangan Awam  | Kapal Udara menurut<br>1969, dan peraturan-  |
| peraturan yang dikeluarkan di bawah  | nnya.   |  |  |
| peraturan yang dikeluarkan di bawah<br>It is hereby certified that the above de<br>on International Civil Aviation dated 7   | nnya.<br>Iescribed ain<br>7 December  | craft has been duly entered on the Aircraft Register in according to the crystal state of the | ordance with the Convention issued therein the Convention issued therein the convention of the convent |
| peraturan yang dikeluarkan di bawah<br>It is hereby certified that the above du<br>on International Civil Aviation dated 7<br>Tarikh dikeluarkan<br>Date of issue 17-May   | nnya.<br>Iescribed ain<br>7 December<br><b>y-2022</b>                                     | craft has been duly entered on the Aircraft Register in according to the Aircraft Register in according to the Civil Aviation Act 1969 and regulations Air 1   | ordance with the Convention<br>issued thereunder HOR<br>CAAM   |
| peraturan yang dikeluarkan di bawah<br>It is hereby certified that the above di<br>on International Civil Aviation dated 7<br>Tarikh dikeluarkan<br>Date of issue<br>Tarikh tamat tempoh<br>Date of expiry<br>16-May   | nnya.<br>lescribed ain<br>7 December<br>y-2022<br>y-2025                                  | craft has been duly entered on the Aircraft Register in accc<br>1944 and with the Civil Aviation Act 1969 and regulations<br>Air 1<br><u>DATUK CAPT, CHESTER VOC</u><br>Pihak Berkuasa Penerbangan<br>Civil Aviation Authority of  | ordance with the Convention<br>issued theremost HOR<br>CAAM<br>O CHEE SOON<br>A Awam Malaysia  |
| peraturan yang dikeluarkan di bawah<br>It is hereby certified that the above di<br>on International Civil Aviation dated 7<br>Tarikh dikeluarkan<br>Date of issue<br>Tarikh tamat tempoh<br>Date of expiry<br>Nama penyewa atau pencarter, men<br>Name of hirer or charterer, pursuant | nnya.<br>lescribed ain<br>7 December<br>y-2022<br>y-2025<br>ngikut peratu<br>to regulatio | craft has been duly entered on the Aircraft Register in accc<br>1944 and with the Civil Aviation Act 1969 and regulations<br>Air 1<br>DATUK CAPT. CHESTER VOO<br>Pihak Berkuasa Penerbangan<br>Civil Aviation Authority o<br>uran 6(4) Peraturan-Peraturan Penerbangan Awam 2016.<br>In 6(4) of Civil Aviation Regulations 2016.   | O CHEE SOOR & T  |

| CAAM  | PIHAK BERK<br>CIVIL A<br>PERAKU<br>CERTI  | AVIASA PENERBANGAN AWAM MALAYSIA<br>AVIATION AUTHORITY OF MALAYSIA<br>JAN KESELAMATAN TERBANG<br>IFICATE OF AIRWORTHINESS   |  |
|---|---|---|--|
| Tanda-Tanda Kenega<br>Dan Pendaftaran<br>Nationality and Registr<br>Marks<br>9M-AZI   | Pen<br>Manufactu<br>P   | nbuat dan Nama Sebutan Kapal Udara<br>urer and Manufacturer's Designation of Aircraft<br>TEXTRON AVITION INC<br>172P  | Nombor Sirl Kapal Udara<br>Aircraft Serial Number<br>17275854  |
| Perakuan Keselamatan I  | ngan Awam 1969 da   | an peraturan-peraturan yang dikeluarkan di baw  | ahnya, untuk kapal udara yang  |
| 1944 dan Akta Penerba<br>tersebut di atas yang d<br>tersebut, dan had-had pe<br>This Certificate of Airwoi<br>and with the Civil Aviatic<br>considered to be airworth<br>limitations. | lidapati layak untuk<br>enerbangan yang ber<br>rthiness is issued pu<br>on Act 1969 and reg<br>hy if maintained and o | terbang jika disenggarai dan dikendalikan me<br>rsabit.<br>Insuant to the Convention on International Civil A<br>ulations issued thereunder, in respect of the ab<br>operated in accordance with the foregoing regula | Aviation dated 7 December 1944<br>ove-mentioned aircraft, which is<br>ations and the pertinent operating |

| TEL   | REPUBLIC of<br>CIVIL AVIATIO<br>Via Consiglio<br>47891<br>Republic o<br>: +378 (0549) 882929                      | A SAN MARINO<br>SAN MARINO<br>ON AUTHORITY<br>dei Sessanta, 99<br>Dogana<br>f San Marino<br>  FAX: +378 (0549) 882 | 2928  |
|---|---|--|---|
|   | Certificate o<br>Certifica  | of Airworthiness<br>te No. 735   |   |
| Nationality and<br>Registration Mark:   | Manufacturer a<br>Designatio  | and Manufacturer's<br>on of Aircraft:  | Aircraft Serial No.:  |
| Т7-ЅАВАН  | BOMBA<br>BD-7   | ARDIER INC.<br>000-1A11  | 9668  |
| This aircraft conforms to the SM<br>Certificate reference:  | A CAA accepted Type   | EASA IM.A.009  |   |
| December 1944 – Annex 8 and<br>aircraft, which is considered to<br>and the pertinent operating limi<br>The Aircraft Flight Manual is dee<br>flights together with a current m | the Republic of San Ma<br>be airworthy when ma<br>itations.<br>emed to be integral par<br>nass and balance diagra | arino Civil Aviation Act in<br>aintained and operated in<br>t of this certificate and sh<br>m.                     | respect of the above mention<br>a accordance with the foreg<br>nall be carried on board durin |
| Valid from:   |   | Director General:  |   |
| 21/11/2023  |   |  |   |
| Valid until:  |   | Eng. Marco Conti   | Digitally sign<br>by: Marco C<br>Date:<br>21/11/2023<br>17:21:04                              |
| 20/11/2025  |   | S. Banderson   |   |
|   | and the second second   |  | 1 11 11 11 11 11  |

| Certificate No. 964  | REPUBLIC OF SAN MAR<br>CIVIL AVIATION AUTHOR   | FORM SM 31 Issue N° 03  |
|--|--|---|
| . Nationality and<br>Registration Mark:  | 2. Manufacturer and Manufacturer's<br>Designation of Aircraft:   | 3. Aircraft Serial No.:   |
| т7-ѕаван   | BOMBARDIER INC.<br>BD-700-1A11   | 9668  |
| <ol> <li>Name of Owner:</li> <li>Address of Owner:</li> </ol>  | INNOSKY LIMITED<br>LOT 1, 2ND FLOOR, WISMA SIAMLOH, J<br>KEMAJUAN<br>87007 FEDERAL TERRITORY OF LABUAN<br>MALAYSIA           | ALAN  |
| <ol> <li>It is hereby certified that<br/>of San Marino in accor<br/>and with the Republic</li> </ol> | It the above-described aircraft has been du<br>dance with the Convention on Internation<br>of San Marino Civil Aviation Law. | y entered on the Register of the Repu<br>al Civil Aviation dated 7 December 1 |
| Date of Issue:   | Signature:   |   |
| 09/08/2023   | Eng. Marco   | Conti Digitally signe<br>Marco Conti<br>Date: 09/08/2<br>14:25:35             |

APPENDIX C



# Layang Layang Aerospace Sdn. Bhd. (243883-v)

# **INITIAL DAMAGE ASSESSMENT REPORT (IDA)**

**9M-AZP IN KOTA KINABALU AIRPORT** 

Document Reference : LLA/IDM/2024/01

Date

MOR Reference : MOR/2024/01

:  $11^{TH}$  February 2024

# Prepared by:

.....

Azmir Engineering Controller

Validate by:

Gor don Poong Type Rated Engineer In - Charge

# **ACCIDENT / INCIDENT DETAILS**

| Accident / Incident          | Foreign Object Damage (Jet      |  |  |  |
|------------------------------|---------------------------------|--|--|--|
|                              | Blast) In Kota Kinabalu Airport |  |  |  |
| Accident / Incident Category | MOR NON-MOR                     |  |  |  |
| Name of the Operator         | LAYANG LAYANG FLYING ACADEMY    |  |  |  |
| Operator Type                | AOC NON AOC                     |  |  |  |
| Date of Incident             | 11 February 2024                |  |  |  |
| Time of Incident             | 0730 Hours                      |  |  |  |
| Date of MOR Submitted        | 11 February 2024                |  |  |  |

# **AIRCRAFT DETAILS**

| Aircraft OEM                | TEXTRON             |             |  |  |
|-----------------------------|---------------------|-------------|--|--|
| Model                       | CESSN               | IA 172 P    |  |  |
| Aircraft Serial Number      | 172                 | 75854       |  |  |
| Registration Marks          | 9N                  | 1-AZP       |  |  |
| Airframe Hours              | 65                  | 76:15       |  |  |
| Engine Hours                | 1950:51             |             |  |  |
| Last Base Maintenance       | Airframe Hours      | Date        |  |  |
|                             | 6537:30             | 17 JAN 2024 |  |  |
| Last Maintenance Activities | Type of Maintenance | Date        |  |  |
|                             |                     |             |  |  |
|                             | OPS CHECK 2 /       | 17 JAN 2024 |  |  |
|                             | 50H, 100H, 400H     |             |  |  |
|                             | ENGINE              |             |  |  |
|                             | INSPECTION          |             |  |  |

# SUMMARY OF THE ACCIDENT

On February 11, 2024. Aircraft model Cessna 172P with registration of 9M-AZP parked at the designated area within LLA Hangar 'C', secured with all wheels chocked and the parking brake engaged. A Bombardier Global 5000, bearing registration number T7-SABAH, was taxiing in close proximity to LLA Hangar 'C'. During this maneuver, a hazardous jet-blast was generated by the aircraft, resulting in an unintended lift and displacement of the LLA aircraft.

The force of the jet blast caused 9M-AZP to shift from its parking position, dislodging all chocks and causing the tail section of the aircraft to make contact with the ground. The momentum from the blast propelled the aircraft into a sliding motion, ultimately halting when the left-hand wing tip collided with the roll cage of a forklift parked within the hangar.

Post to the incident, the aircraft T7-SABAH has proceeded to take off after the incident, despite the damage done from the outcome of the jet blast.

Initial investigations have revealed damage to the left-hand wing tip and the lower tail section of the aircraft. As a precautionary measure, the aircraft remains in its current position, enclosed by safety barriers. It has been placed under quarantine pending further assessment and evaluation of the extent of damages incurred.

A safety report was raised by Sabah Air and Weststar Personnel approximately 10-minutes after the occurrence.

### **INITIAL DAMAGE ASSESSMENT OVERVIEW**

The **Initial Damage Assessment Report (IDA)** serves as a crucial tool for evaluating the preliminary damage incurred by an aircraft through a comprehensive physical inspection. Aircraft undergoing Mandatory Occurrence Report (MOR) are mandated to undergo quarantine until the completion of the initial investigation by the Aircraft Accident Investigation Bureau (AAIB) and the Civil Aviation Authority of Malaysia (CAAM).

The primary objective of the Initial Damage Assessment Report is to provide a systematic and analysis of the initial damage sustained by the aircraft. This report is instrumental in facilitating a thorough understanding of the extent of damage, enabling timely decision-making and subsequent corrective actions.

The assessment process involves a physical inspection carried out by qualified personnel. The findings are then documented in the Initial Damage Assessment Report, ensuring accuracy and completeness. The aircraft remains under quarantine to facilitate the unhindered investigation conducted by the AAIB and CAAM.

Upon release by the AAIB, a comprehensive and thorough inspection assessment will be conducted by qualified personnel. This in-depth evaluation aims to delve deeper into the damage identified during the initial assessment. The findings of this extensive inspection will be documented in the **Damage Assessment Inspection Report (DAI)**.

The Initial Damage Assessment Report, in conjunction with the subsequent Thorough Inspection Assessment, plays a pivotal role in the aviation safety protocol. By adhering to established procedures and involving the relevant

authorities, these reports contribute to the overall safety and integrity of aviation operations.

#### Components

LEFT WING TIP ASSEMBLY P/N: 0723200-5

#### Condition of the Components (Visual Inspection Only)

Significant damage has been observed on Left Wing Tip assembly, with noticeable crack and puncture damages on the front area. Preliminary analysis indicates that the left wing sustained impact or striking forces by impacting with forklift parked nearby, likely attributable by jet blast from the aircraft taxi from terminal. Upon initial assessment, it is apparent that the Wing tip assembly has exceeded the permissible limit for deformation.

#### Picture



| Components   |
|--|
| LEFT WING LEADING EDGE – Zone 500  |
|  |
|  |
|  |
| Condition of the Components (Visual Inspection Only)   |
| The left-wing leading edge exhibits a notable inward deformation, likely attributable to the forces experienced during the jet blast. No additional defects have been identified until further inspection  |
|  |
|  |
|  |
|  |
|  |
|  |
| Picture  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
| and the second s |
|  |

| Components   |
|--|
| TAIL SECTION AND TAIL CONE ASSEMBLY  |
|  |
|  |
|  |
| Condition of the Components (Visual Inspection Only)   |
| Tail section and tail cone severely impacted to the ground due to the jet blast and caused the aircraft shift from parked position. No additional defects have been identified until further inspection. |
|  |
|  |
|  |
|  |
|  |
| Picture  |
|  |

| Components  |  |
|---|--|
| .H Wing Strut   |  |
|   |  |
|   |  |
|   |  |
| Condition of the Components (Visual Inspection Only)  |  |
| There is no available damage that can been seen during the visual inspection. No additic defects have been identified until further inspection. |  |
|   |  |
|   |  |
|   |  |
|   |  |
| Picture   |  |
| e l   |  |



#### Components

LH AND RH ELEVATOR ASSEMBLY

Condition of the Components (Visual Inspection Only)

Both LH and RH Elevator assembly trailing edge cracked and dented due impact caused by tail strike. No additional defects have been identified until further inspection.

Picture





LLA-F-209-00Page

# **INITIAL DAMAGE ASSESSMENT CONCLUSION**

I,Gordon Poong, holding LLA License Number [LLA 34], hereby declare that all information presented in this Initial Damage Assessment Report is accurate. This report will serve as the foundation for the assessment. A comprehensive damage assessment will be conducted once more subsequent to the release of the aircraft by AAIB and CAAM, under the Aircraft Damage Assessment Report. This subsequent report will provide an in-depth analysis of the damages sustained by the aircraft.

#### APPENDIX D

#### HUMAN FACTORS ANALYSIS AND CLASSIFICATION SYSTEM (HFACS) WORKSHEET INCIDENT INVESTIGATION AND DATA ANALYSIS TOOL

1. This worksheet is on HFACS. It is divided into four (4) sections having question pertaining to that area. There are total 147 statements and each statement is to be rated on a 4-point scale, where:

a. **4 - Primary cause**. Main factors that directly contributed to / responsible for accident/incident.

b. **3 - Secondary cause**. Factor was present but not the most important / critical factor responsible for accident / incident and contributed indirectly.

c. **2** - Factor was present but didn't affect the outcome at all, was not contributory.

d. **1** - Factor was not present.

2. It is mandatory to rate each statement. Wherever the rating is 2, 3 or 4 the explanation has to be provided for the reasons responsible in a narrative form at the end of the rating sheet.

#### UNSAFE ACTS

3. **AE - Errors** 

|        |   | 4 | 3 | 2 | 1 |
|--------|---|---|---|---|---|
| AE 1   | Skill-Based Errors                      |   |   |   |   |
| AE 1.1 | Inadvertent Operation                   |   |   |   |   |
| AE 1.2 | Checklist Error                         |   |   |   |   |
| AE 1.3 | Procedural Error                        |   |   |   |   |
| AE 1.4 | Over-control / Under-control            |   |   |   |   |
| AE 1.5 | Breakdown in Visual Scan                |   |   |   |   |
| AE 1.6 | Inadequate Anti-'G' Straining Manoeuvre |   |   |   |   |

|        |                                      | 4 | 3 | 2 | 1 |
|--------|--------------------------------------|---|---|---|---|
| AE 2   | Judgement and Decision Making Errors |   |   |   |   |
| AE 2.1 | Risk Assessment – During Operation   |   |   |   |   |
| AE 2.2 | Task Misprioritization               |   |   |   |   |
| AE 2.3 | Necessary Action – Rushed            |   |   |   |   |
| AE 2.4 | Necessary Action – Delayed           |   |   |   |   |
| AE 2.5 | Caution / Warning – Ignored          |   |   |   |   |
| AE 2.6 | Decision-making During Operation     |   |   |   |   |
|        |                                      | 4 | 3 | 2 | 1 |
| AE 3   | Misperception Error                  |   |   |   |   |
| AE 3.1 | Errors due to Misperception          |   |   |   |   |

#### 4. **AV – Violations**

|      |                                       | 4 | 3 | 2 | 1 |
|------|---------------------------------------|---|---|---|---|
| AV 1 | Violations - Based on Risk Assessment |   |   |   |   |
| AV 2 | Violations - Routine / Widespread     |   |   |   |   |
| AV 3 | Violations – Lack of Discipline       |   |   |   |   |

#### PRECONDITIONS FOR UNSAFE ACTS

#### 5. **PE - Environmental Factors**

|         |   | 4 | 3 | 2 | 1 |
|---------|---|---|---|---|---|
| PE 1    | Physical Environment                              |   |   |   |   |
| PE 1.1  | Vision Restricted by Icing/Windows Fogging/etc.   |   |   |   |   |
| PE 1.2  | Vision Restricted by Meteorology Conditions       |   |   |   |   |
| PE 1.3  | Vibration   |   |   |   |   |
| PE 1.4  | Vision Restricted in Workspace by Dust/Smoke/etc. |   |   |   |   |
| PE 1.5  | Windblast   |   |   |   |   |
| PE 1.6  | Thermal Stress-Cold                               |   |   |   |   |
| PE 1.7  | Thermal Stress-Heat                               |   |   |   |   |
| PE 1.8  | Manoeuvring Forces-In-Flight                      |   |   |   |   |
| PE 1.9  | Lighting of Other Aircraft / Vehicle              |   |   |   |   |
| PE1.10  | Noise Interference                                |   |   |   |   |
| PE 1.11 | Brownout / Whiteout                               |   |   |   |   |

|        |  | 4 | 3 | 2 | 1 |
|--------|--|---|---|---|---|
| PE 2   | Technology Environment                       |   |   |   |   |
| PE 2.1 | Seating and Restraints                       |   |   |   |   |
| PE 2.2 | Instrumentation and Sensory Feedback Systems |   |   |   |   |
| PE 2.3 | Visibility Restriction                       |   |   |   |   |
| PE 2.4 | Controls and Switches                        |   |   |   |   |
| PE 2.5 | Automation                                   |   |   |   |   |
| PE 2.6 | Workspace Incompatible with Human            |   |   |   |   |
| PE 2.7 | Personal Equipment Interference              |   |   |   |   |
| PE 2.8 | Communications - Equipment                   |   |   |   |   |

#### 6. PC - Conditions of Individual

|        |                                  | 4 | 3 | 2 | 1 |
|--------|----------------------------------|---|---|---|---|
| PC 1   | Cognitive Factors                |   |   |   |   |
| PC 1.1 | Inattention                      |   |   |   |   |
| PC 1.2 | Channelized attention            |   |   |   |   |
| PC 1.3 | Cognitive Task Oversaturation    |   |   |   |   |
| PC 1.4 | Confusion                        |   |   |   |   |
| PC 1.5 | Negative Transfer                |   |   |   |   |
| PC 1.6 | Distraction                      |   |   |   |   |
| PC 1.7 | Geographic Misorientation (Lost) |   |   |   |   |
| PC 1.8 | Checklist Interference           |   |   |   |   |

|         |                                     | 4 | 3 | 2 | 1            |
|---------|-------------------------------------|---|---|---|--------------|
| PC 2    | Psycho-Behavioural Factors          |   |   |   |              |
| PC 2.1  | Pre-Existing Personality Disorder   |   |   |   |              |
| PC 2.2  | Pre-Existing Psychological Disorder |   |   |   |              |
| PC 2.3  | Pre-Existing Psychosocial Disorder  |   |   |   |              |
| PC 2.4  | Emotional State                     |   |   |   | $\checkmark$ |
| PC 2.5  | Personality Style                   |   |   |   | $\checkmark$ |
| PC 2.6  | Overconfidence                      |   |   |   |              |
| PC 2.7  | Pressing Beyond Limits              |   |   |   |              |
| PC 2.8  | Complacency                         |   |   |   | $\checkmark$ |
| PC 2.9  | Inadequate Motivation               |   |   |   | $\checkmark$ |
| PC 2.10 | Misplaced Motivation                |   |   |   | $\checkmark$ |
| PC 2.11 | Overaggressive                      |   |   |   |              |
| PC 2.12 | Excessive Motivation to Succeed     |   |   |   | $\checkmark$ |
| PC 2.13 | Get-Home-It is / Get-There-Itis     |   |   |   |              |
| PC 2.14 | Response Set                        |   |   |   |              |
| PC 2.15 | Motivational Exhaustion (Burn out)  |   |   |   |              |

|         |   | 4 | 3 | 2 | 1 |
|---------|---|---|---|---|---|
| PC 3    | Adverse Physiological State             |   |   |   |   |
| PC 3.1  | Effects of G-Forces (G-LOC, etc,)       |   |   |   |   |
| PC 3.2  | Prescribed Drugs                        |   |   |   |   |
| PC 3.3  | Operational Injury/Illness              |   |   |   |   |
| PC 3.4  | Sudden Incapacitation / Unconsciousness |   |   |   |   |
| PC 3.5  | Pre-Existing Physical Illness/Deficit   |   |   |   |   |
| PC 3.6  | Physical Fatigue (Overexertion)         |   |   |   |   |
| PC 3.7  | Fatigue – Physiological / Mental        |   |   |   |   |
| PC 3.8  | Circadian Rhythm Desynchrony            |   |   |   |   |
| PC 3.9  | Motion Sickness                         |   |   |   |   |
| PC 3.10 | Trapped Gas Disorders                   |   |   |   |   |
| PC 3.11 | Evolved Gas Disorders                   |   |   |   |   |
| PC 3.12 | Нурохіа                                 |   |   |   |   |
| PC 3.13 | Hyperventilation                        |   |   |   |   |
| PC 3.14 | Visual Adaption                         |   |   |   |   |
| PC 3.15 | Dehydration                             |   |   |   |   |
| PC 3.16 | Physical Task Oversaturation            |   |   |   |   |

|        |   | 4 | 3 | 2 | 1 |
|--------|---|---|---|---|---|
| PC 4   | Physical / Mental Limitation                    |   |   |   |   |
| PC 4.1 | Learning Ability / Rate                         |   |   |   |   |
| PC 4.2 | Memory Ability / Lapses                         |   |   |   |   |
| PC 4.3 | Anthropometric / Biomechanical Limitations      |   |   |   |   |
| PC 4.4 | Motor skill / Coordination or Timing deficiency |   |   |   |   |
| PC 4.5 | Technical / Procedural Knowledge                |   |   |   |   |
|        |   |   |   |   |   |

·------

|      |                    | 4 | 3 | 2 | 1 |
|------|--------------------|---|---|---|---|
| PC 5 | Perceptual Factors |   |   |   |   |
|      |                    |   |   |   |   |

| PC 5.1  | Illusion – Kinesthetic                         |  |  |
|---------|--|--|--|
| PC 5.2  | Illusion – Vestibular                          |  |  |
| PC 5.3  | Illusion – Visual                              |  |  |
| PC 5.4  | Misperception of Operational Conditions        |  |  |
| PC 5.5  | Misinterpreted / Misread Instrument            |  |  |
| PC 5.6  | Expectancy                                     |  |  |
| PC 5.7  | Auditory Cues                                  |  |  |
| PC 5.8  | Spatial Disorientation (Type 1) Unrecognized   |  |  |
| PC 5.9  | Spatial Disorientation (Type 2) Recognized     |  |  |
| PC 5.10 | Spatial Disorientation (Type 3) Incapacitating |  |  |
| PC 5.11 | Temporal Distortion                            |  |  |

#### 7. **PP - Personnel Factors**

|         |   | 4 | 3 | 2 | 1 |
|---------|---|---|---|---|---|
| PP 1    | Coordination/Communication/Planning Factors |   |   |   |   |
| PP 1.1  | Crew/Team Leadership                        |   |   |   |   |
| PP 1.2  | Cross-Monitoring Performance                |   |   |   |   |
| PP 1.3  | Task Delegation                             |   |   |   |   |
| PP 1.4  | Rank / Position Authority Gradient          |   |   |   |   |
| PP 1.5  | Assertiveness                               |   |   |   |   |
| PP 1.6  | Communicating Critical Information          |   |   |   |   |
| PP 1.7  | Standard / Proper Terminology               |   |   |   |   |
| PP 1.8  | Challenge and Reply                         |   |   |   |   |
| PP 1.9  | Mission Planning                            |   |   |   |   |
| PP 1.10 | Mission Briefing                            |   |   |   |   |
| PP 1.11 | Task/Mission-In-Progress Re-Planning        |   |   |   |   |
| PP 1.12 | Miscommunication                            |   |   |   |   |

|        |  | 4 | 3 | 2 | 1 |
|--------|--|---|---|---|---|
| PP 2   | Self-Imposed Stress                        |   |   |   |   |
| PP 2.1 | Physical Fitness                           |   |   |   |   |
| PP 2.2 | Alcohol                                    |   |   |   |   |
| PP 2.3 | Drugs/Supplements/Self-Medication          |   |   |   |   |
| PP 2.4 | Nutrition                                  |   |   |   |   |
| PP 2.5 | Inadequate Rest                            |   |   |   |   |
| PP 2.6 | Unreported Disqualifying Medical Condition |   |   |   |   |

#### SUPERVISION

#### 8. SI - Inadequate Supervision

|      |   | 4 | 3 | 2 | 1 |
|------|---|---|---|---|---|
| SI 1 | Leadership / Supervision / Oversight Inadequate |   |   |   |   |
| SI 2 | Supervision-Modelling                           |   |   |   |   |
| SI 3 | Local Training Issues / Programs                |   |   |   |   |
| SI 4 | Supervision – Policy                            |   |   |   |   |

| SI 5 | Supervision – Personality Conflict |  | $\checkmark$ |
|------|------------------------------------|--|--------------|
| SI 6 | Supervision-Lack of Feedback       |  |              |

#### 9. SP – Planned Inappropriate Operations

|      |  | 4 | 3 | 2 | 1 |
|------|--|---|---|---|---|
| SP 1 | Ordered / Led on Mission Beyond Capability |   |   |   |   |
| SP 2 | Crew / Team / Flight Makeup / Composition  |   |   |   |   |
| SP 3 | Limited Recent Experience                  |   |   |   |   |
| SP 4 | Limited Total Experience                   |   |   |   |   |
| SP 5 | Proficiency                                |   |   |   |   |
| SP 6 | Risk Assessment – Formal                   |   |   |   |   |
| SP 7 | Authorized Unnecessary Hazard              |   |   |   |   |

#### 10. SF - Failure Correct Known Problem

|      |                       | 4 | 3 | 2 | 1 |
|------|-----------------------|---|---|---|---|
| SF 1 | Personnel Management  |   |   |   |   |
| SF 2 | Operations Management |   |   |   |   |

#### 11. SV - Supervisory Violations

|      |   | 4 | 3 | 2 | 1            |
|------|---|---|---|---|--------------|
| SV 1 | Supervision – Discipline Enforcement (Supervision act of<br>Omission) |   |   |   | $\checkmark$ |
| SV 2 | Supervision – Defacto Policy  |   |   |   |              |
| SV 3 | Directed Violation  |   |   |   |              |
| SV 4 | Currency  |   |   |   |              |

#### ORGANIZATIONAL INFLUENCES

#### 12. OR - Resource/Acquisition Management

|      |   | 4 | 3 | 2 | 1 |
|------|---|---|---|---|---|
| OR 1 | Air Traffic Control Resources           |   |   |   |   |
| OR 2 | Air Field Resources                     |   |   |   |   |
| OR 3 | Operator Support                        |   |   |   |   |
| OR 4 | Acquisition Policies / Design Processes |   |   |   |   |
| OR 5 | Attrition Policies                      |   |   |   |   |
| OR 6 | Accession/Selection Policies            |   |   |   |   |
| OR 7 | Personnel Resources                     |   |   |   |   |
| OR 8 | Informational Resources / Support       |   |   |   |   |
| OR 9 | Financial Resources / Support           |   |   |   |   |

#### 13. OC - Organisational Climate

|      |  | 4 | 3 | 2 | 1 |
|------|--|---|---|---|---|
| OC 1 | Unit / Organisational Values / Culture                                       |   |   |   |   |
| OC 2 | Evaluation / Promotion / Upgrade   |   |   |   |   |
| OC 3 | Perceptions of Equipment   |   |   |   |   |
| OC 4 | Unit Mission / Aircraft / Vehicle / Equipment Change or Unit<br>Deactivation |   |   |   |   |
| OC 5 | Organisational Structure   |   |   |   |   |

#### 14. **OP - Organisational Processes**

|      |   | 4 | 3 | 2 | 1 |
|------|---|---|---|---|---|
| OP 1 | Ops Tempo / Workload                      |   |   |   |   |
| OP 2 | Program and Policy Risk Assessment        |   |   |   |   |
| OP 3 | Procedural Guidance / Publications        |   |   |   |   |
| OP 4 | Organisational Training Issues / Programs |   |   |   |   |
| OP 5 | Doctrine                                  |   |   |   |   |
| OP 6 | Program Oversight / Program Management    |   |   |   |   |

#### SUMMARY OF HFACS WORKSHEET

|  | TIER 1 – UNSAFE ACTS - ERRORS         | 4        | 3        | 2        | 1         |
|--|---------------------------------------|----------|----------|----------|-----------|
| AE 1                                     | Skill-Based Errors                    |          |          |          | 6         |
| AE 2                                     | Judgment & Decision-Making Errors     | 1        |          |          | 5         |
| AE 3                                     | Misperception Error                   |          |          |          | 1         |
|  |                                       |          |          |          |           |
| TIER 1                                   | – UNSAFE ACTS - VIOLATIONS            |          |          |          |           |
| AV 1                                     | Violations – Based on Risk Assessment | 1        |          |          | 0         |
| AV 2                                     | Violations – Routine/Widespread       |          |          |          | 1         |
| AV 3                                     | Violations – Lack of Discipline       |          |          |          | 1         |
| TIER 1 – UNSAFE ACTS SUB TOTAL           |                                       | <u>2</u> | <u>0</u> | <u>0</u> | <u>14</u> |
|  |                                       |          |          |          |           |
| TIER 2                                   | - PRECONDITIONS FOR UNSAFE ACTS -     |          |          |          |           |
| ENVIR                                    | ONMENTAL FACTORS                      |          |          |          |           |
| PE 1                                     | Physical Environment                  |          |          |          | 11        |
| PE 2                                     | Technology Environment                |          |          |          | 8         |
|  |                                       |          |          |          |           |
| TIER 2 – PRECONDITIONS FOR UNSAFE ACTS – |                                       |          |          |          |           |
| COND                                     | CONDITIONS OF INDIVIDUAL              |          |          |          |           |

| PC 1   | Cognitive Factors                                  |          |          |          | 8          |
|--|--|----------|----------|----------|------------|
| PC 2   | Psycho-behavioral Factors                          |          |          |          | 15         |
| PC 3   | Adverse Physiological State                        |          |          |          | 16         |
| PC 4   | Physical/Mental Limitations                        |          |          |          | 5          |
| PC 5   | Perceptual Factors                                 |          |          |          | 11         |
|  |  |          |          |          |            |
| TIER 2                                       | - PRECONDITIONS FOR UNSAFE ACTS -<br>ONNEL FACTORS |          |          |          |            |
| PP 1   | Coordination/Communication/Planning Factors        |          | 1        |          | 11         |
| PP 2   | Self-Imposed Stress                                |          |          |          | 6          |
| TIER   | 2 – PRECONDITIONS FOR UNSAFE ACTS SUB              | 0        | 1        | 0        | 91         |
| <u>101AI</u>                                 | =  |          |          |          |            |
| TIER 3 – UNSAFE SUPERVISION                  |  |          |          |          |            |
| SI   | Inadequate Supervision                             |          |          |          | 6          |
| SP   | Planned Inappropriate Operations                   |          |          |          | 7          |
| SF   | Failure Correct Known Problem                      |          | 1        |          | 1          |
| SV   | Supervisory Violations                             |          |          |          | 4          |
|  |  |          |          |          |            |
| TIER 3                                       | - UNSAFE SUPERVISION SUB TOTAL                     | <u>0</u> | 1        | <u>0</u> | <u>18</u>  |
|  |  |          |          |          |            |
| TIER 4                                       | - ORGANISATIONAL INFLUENCES                        |          |          |          |            |
| OR   | Resource/Acquisition Management                    |          |          |          | 8          |
| OC   | Organisational Climate                             |          |          |          | 5          |
| OP   | Organisational Processes                           |          | 1        |          | 5          |
| TIER 4 – ORGANISATIONAL INFLUENCES SUB TOTAL |  | <u>0</u> | <u>1</u> | <u>0</u> | <u>18</u>  |
|  |  |          |          |          |            |
| TOTAL UNSAFE ACTS                            |  | <u>2</u> | <u>3</u> | <u>0</u> | <u>141</u> |

#### **EXPLANATION OF HFACS**

#### UNSAFE ACTS.

| AE     | ERRORS  | EVIDENCE   |
|--------|---|--|
| AE 1   | Risk Assessment - During<br>Operation   |  |
| AE 2.1 | Risk Assessment – During<br>Operation is a factor when the<br>individual fails to adequately<br>evaluate the risks associated with<br>a particular course of action and<br>this faulty evaluation leads to<br>inappropriate decision and<br>subsequent unsafe situation. This<br>failure occurs in real-time when<br>formal risk-assessment<br>procedures are not possible. | The decision to taxy which<br>requires sharp turning aggravates<br>the situation since more thrust<br>power is required to taxy. |

| AV   | VIOLATIONS   | EVIDENCE  |
|------|--|---|
| AV 1 | Violation - Based on Risk<br>Assessment  |   |
| AV 1 | Violation- Based on Risk<br>Assessment is a factor when the<br>consequences/risk of violating<br>published procedures was<br>recognized, consciously assessed<br>and honestly determined by the<br>individual, crew or team to be the<br>best course of action. Routine<br>"work-around" and unofficial<br>procedures that are accepted by<br>the community as necessary for<br>operations are also captured<br>under this code. | The decision to taxy using power<br>out even though the taxy line<br>indicate PIPB procedures violates<br>the Kota Kinabalu International<br>Airport- Apron Management<br>Procedures. |

#### PRECONDITIONS FOR UNSAFE ACTS

| PP      | PERSONNEL FACTORS  | EVIDENCE   |
|---------|--|--|
| PP 1.10 | <b>Mission Briefing.</b> Mission briefing<br>is a factor when information and<br>instructions provided to individuals,<br>crew, or teams were insufficient, or<br>participants failed to discuss<br>contingencies and strategies to<br>cope with contigencies. | No briefing discussed the jet<br>blast area during pre-flight or<br>before taxy out. |

#### **SUPERVISION**

| SF   | FAILURE TO CORRECT KNOWN<br>PROBLEM   | EVIDENCE   |
|------|---|--|
| SF 2 | <b>Operations Management.</b><br>Operations Management is a factor<br>when a supervisor fails to correct<br>known hazardous practices,<br>conditions or guidance that allows<br>for hazardous practices within the<br>scope of his/her command. | Management failed to provide<br>tow truck and tow bar for the<br>operation of this aircraft at<br>KKIA terminal 2 even though<br>aware of PIPB Procedures in<br>KKIA terminal 2. |

#### **ORGANIZATIONAL INFLUENCES**

| OP   | ORGANISATIONAL PROCESS  | EVIDENCE  |
|------|---|---|
| OP 6 | Program Oversight/Program<br>Management. Program<br>oversight/Program management is a<br>factor when programs are<br>implemented without sufficient<br>support, oversight or planning and<br>this leads to an unsafe situation. | The procurement/least<br>process of Bombardier<br>GL5000 aircraft was done<br>without considering all<br>logistical support required<br>such as the hangar, tow bar<br>and tractor. |