AIRCRAFT SERIOUS INCIDENT

FINAL REPORT

SI 04/24

Air Accident Investigation Bureau (AAIB)

Ministry of Transport, Malaysia

Fixed Wing Aircraft Boeing 737-800, Registration 9M-LCM

at Kuching International Airport, Sarawak

on 13 February 2024

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FINAL REPORT SI 04/24

AIR ACCIDENT INVESTIGATION BUREAU (AAIB)MALAYSIA

REPORT NO.: SI 04/24

OPERATOR	**: BATIK AIR MALAYSIA**
AIRCRAFT TYPE	**: BOEING 737-800**
NATIONALITY	**: MALAYSIA**
REGISTRATION	**: 9M-LCM**
PLACE OF OCCURRENCE	**: KUCHING INTERNATIONAL AIRPORT, SARAWAK**
DATE AND TIME	**: 13 FEBRUARY 2024 AT 2130 LT (1330 UTC)**

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 Coordinated Universal Time (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, 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, and to the International Civil Aviation Organisation (ICAO). The Preliminary Report for this serious incident was submitted to the NTSB, the Civil Aviation Authority of Malaysia (CAAM) and the aircraft operator on 16 March 2024.

In accordance with ICAO Annex 13 paragraph 6.3, a copy of the Draft Final Report was sent on 11 December 2024 to the NTSB, the CAAM and the aircraft operator inviting their significant and substantiated comments on the report.

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.

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APPENDICES

GLOSSARY OF ABBREVIATIONS

A	
AAIB	Air Accident Investigation Bureau
AFRS	Airport Fire & Rescue Service
AFTO	Approved Flight Training Organisation
ATC	Air Traffic Controller
AJL	Aircraft Journey Log
AMM	Aircraft Maintenance Manual
ACAU	Air Conditioning Accessory Unit
ARS	Airworthiness Release Section
B	
BTH	Hang Nadim International Airport, Batam
C	
CAAM	Civil Aviation Authority of Malaysia
CDI	Course Deviation Indicator
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CP	Cadet Pilot
CVR	Cockpit Voice Recorder
CAD	Civil Aviation Directive
D	
DME	Distance Measuring Equipment
DMI	Deferred Maintenance Item
E	
EGR	Engine Ground Run
F	
FDR	Flight Data Recorder
FI	Flight Instructor

ft	feet
FOD	Foreign Object Debris
FIM	Fault Isolation Manual

G

GPS	Global Positioning System

H

hrs	hours

I

IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IR	Instrument Rating

K

Km	Kilometer
KCH	Kuching, Sarawak
KUL	Kuala Lumpur

L

LT	Local Time
LH	Left Hand
LO	Low

M

MAHB	Malaysia Airport Holding Berhad
MASB	Malaysia Airport Sendirian Berhad
MTBUR	Mean Time Between Unscheduled Removal
mi	miles
MOR	Mandatory Occurrence Reporting
m	meter
MMO	Maximum Mach Operating Speed

N

NTSB	National Transport Safety Board

P

PAPI	Precision Approach Path Indicator
PIREP	Pilot Report
PEN	Pulau Pinang

Q

QA	Quality Assurance

R

REV	Revision
RH	Right Hand

S

SPL	Student Pilot License
SPD	Speed

T

TES	Technical Service Engineering
TAT	Total Air Temperature

V

VFR	Visual Flight Rules
VOR	Very High-Frequency Omni-Directional Range
VMO	Maximum Operating Velocity

W

WMKK	Kuala Lumpur International Airport (KUL - IATA code)
WBGS	Sibu Airport (SBW - IATA code)
WBGG	Kuching International Airport (KCH - IATA code

SYNOPSIS

On 13 February 2024, a Boeing 737-800, registration 9M-LCM, operated by Batik Air Malaysia on flight MXD 1904, experienced an uncontrolled cabin pressurisation issue during a scheduled passenger flight from Kuala Lumpur International Airport (WMKK) to Sibu Airport (WBGS). The flight carried a total of 92 passengers and crew. The incident began following the illumination of the Engine No. 2 Bleed Trip light and a subsequent issue with the Engine No. 1 Thermal Anti-Icing (TAI) system.

While cruising at FL290, the situation escalated, necessitating an emergency descent and the deployment of passenger oxygen masks. The situation was stabilised at approximately FL100, and the distress signal was cancelled. The aircraft was diverted to Kuching International Airport (WBGG), where it landed safely at 2153 LT without any casualties.

A Mandatory Occurrence Report (MOR) was submitted by the operator to the Civil Aviation Authority of Malaysia (CAAM) and the Air Accident Investigation Bureau, Malaysia (AAIB), as required to notify them of the incident.

1.0 FACTUAL INFORMATION

1.1 History of the Flight

On 13 February 2024, a Boeing 737-800, registration 9M-LCM, operated by Batik Air Malaysia, was conducting a scheduled passenger flight (flight number MXD 1904) from Kuala Lumpur International Airport (WMKK) to Sibu Airport (WBGS). During the flight, the aircraft had to perform an emergency descent due to uncontrolled cabin pressurisation. A total of 92 people was on board. The Pilot in Command (PIC), acting as the Pilot Flying (PF), was supported by the Second in Command (SIC), who acted as the Pilot Monitoring (PM), along with four flight attendants.

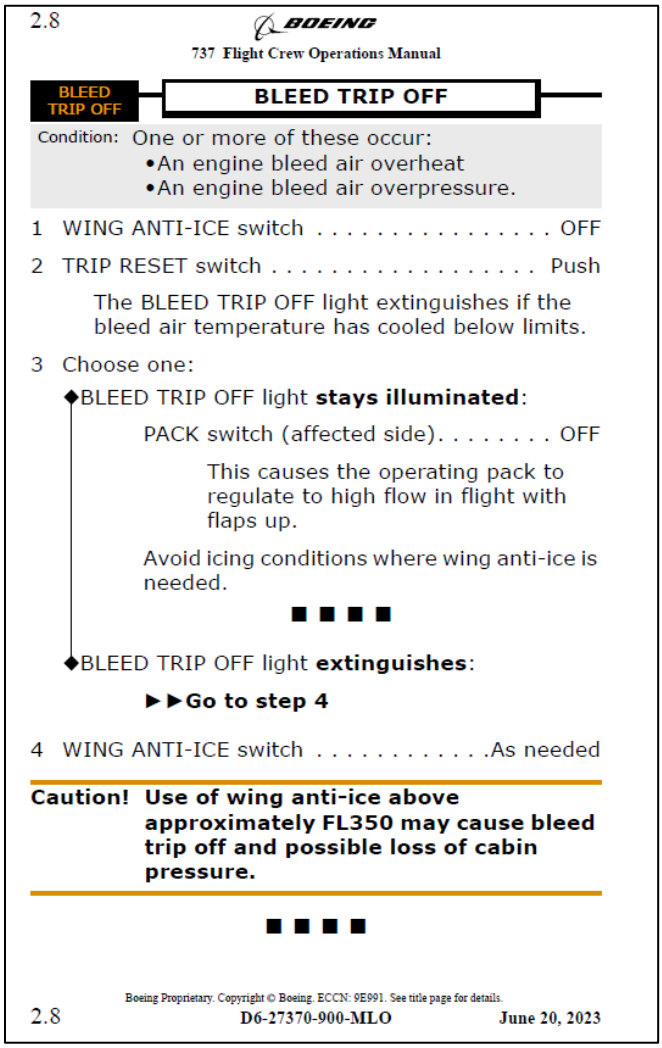
The aircraft had last operated in May 2023 and subsequently underwent a maintenance check at the Batam Aero Technic (BAT) hangar. After maintenance was completed, the aircraft was ferried from Batam, Indonesia, to Kuala Lumpur on 30 November 2023. It was then grounded for approximately two and a half months for additional inspections and de-registration procedures related to its transfer from Batik Air Indonesia (PK-LZP) to Batik Air Malaysia (9M-LCM). The Kuala Lumpur to Sibu (KUL-SBW) sector was its first revenue flight after being on ground at the BAT hangar.

During pre-flight checks, the aircraft was powered using the Auxiliary Power Unit (APU). The flight crew and flight attendants identified discrepancies in the onboard emergency equipment, and a placard in the cockpit still displayed the previous registration, PK-LZP. Additionally, both the cabin and flight deck were noticeably warm, and passengers expressed discomfort with the cabin temperature during boarding.

Efforts to address the cabin temperature, including recycling the trim air switch during taxi, provided some improvement. However, the temperature remained warm but was deemed tolerable by the flight attendants. The aircraft subsequently taxied and departed for Sibu, with an uneventful take-off at 1925 LT.

During the climb from WMKK, at approximately 5,000 feet, the BLEED TRIP OFF No. 2 light illuminated. The crew followed the associated Non-Normal Checklist (NNC) procedures, which included switching off Pack No. 2. This action deactivated the No. 2

bleed air system annunciator.



2.8

737 Flight Crew Operations Manual

BLEED TRIP OFF

BLEED TRIP OFF

Condition: One or more of these occur:
- An engine bleed air overheat
- An engine bleed air overpressure.

1 WING ANTI-ICE switch . . . . . OFF

2 TRIP RESET switch . . . . . Push

The BLEED TRIP OFF light extinguishes if the bleed air temperature has cooled below limits.

3 Choose one:

◆BLEED TRIP OFF light **stays illuminated**:

PACK switch (affected side). . . . . OFF

This causes the operating pack to regulate to high flow in flight with flaps up.

Avoid icing conditions where wing anti-ice is needed.

■ ■ ■ ■

◆BLEED TRIP OFF light **extinguishes**:

►►**Go to step 4**

4 WING ANTI-ICE switch . . . . . .As needed

Caution! Use of wing anti-ice above approximately FL350 may cause bleed trip off and possible loss of cabin pressure.

■ ■ ■ ■

Figure 1: Boeing 737- 800 NNC Bleed Trip Off

The flight crew contacted the Maintenance Control Centre (MCC)[1] at Batik Air Malaysia Operations via Satellite Communication (SATCOM)[2] and were advised to continue flight operations to WBGS. The crew concurred with this instruction, as the NNC permits single-pack operation provided that icing conditions are avoided.

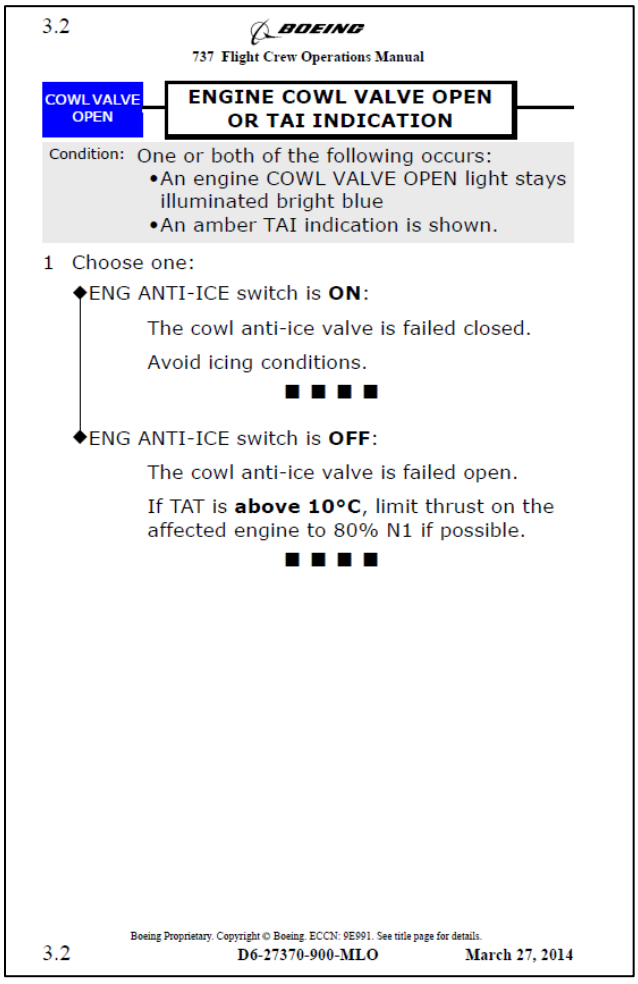
During the climb to FL290, the crew monitored the pressurisation indicators on the overhead panel, which remained within normal parameters throughout the ascent.

[1] Maintenance Control Centre (MCC) is a centralised facility overseeing aircraft maintenance activities including schedule and troubleshooting.

[2] Satellite Communication (SATCOM) is a facilitates communication between aircraft and ground stations or other aircraft using satellite technology. It enables voice, data, and internet access, particularly useful in remote or oceanic areas where traditional communication infrastructure is lacking

Upon reaching FL290, the flight crew observed layers of clouds illuminated by moonlight. The Total Air Temperature (TAT) gauge indicated that the ambient air temperature was within the icing range, prompting the activation of the ENGINE ANTI-ICE switches.

Shortly thereafter, the Thermal Anti-Ice (TAI) annunciator for Engine No. 1 illuminated amber. The crew referenced the ENGINE COWL VALVE OPEN OR TAI INDICATION NNC, which determined that the Engine No. 1 TAI valve was stuck in the open position.



3.2

BOEING

737 Flight Crew Operations Manual

COWL VALVE OPEN

ENGINE COWL VALVE OPEN OR TAI INDICATION

Condition: One or both of the following occurs:
- An engine COWL VALVE OPEN light stays illuminated bright blue
- An amber TAI indication is shown.

1 Choose one:

◆ENG ANTI-ICE switch is **ON**:

The cowl anti-ice valve is failed closed.

Avoid icing conditions.

■ ■ ■ ■

◆ENG ANTI-ICE switch is **OFF**:

The cowl anti-ice valve is failed open.

If TAT is **above 10°C**, limit thrust on the affected engine to 80% N1 if possible.

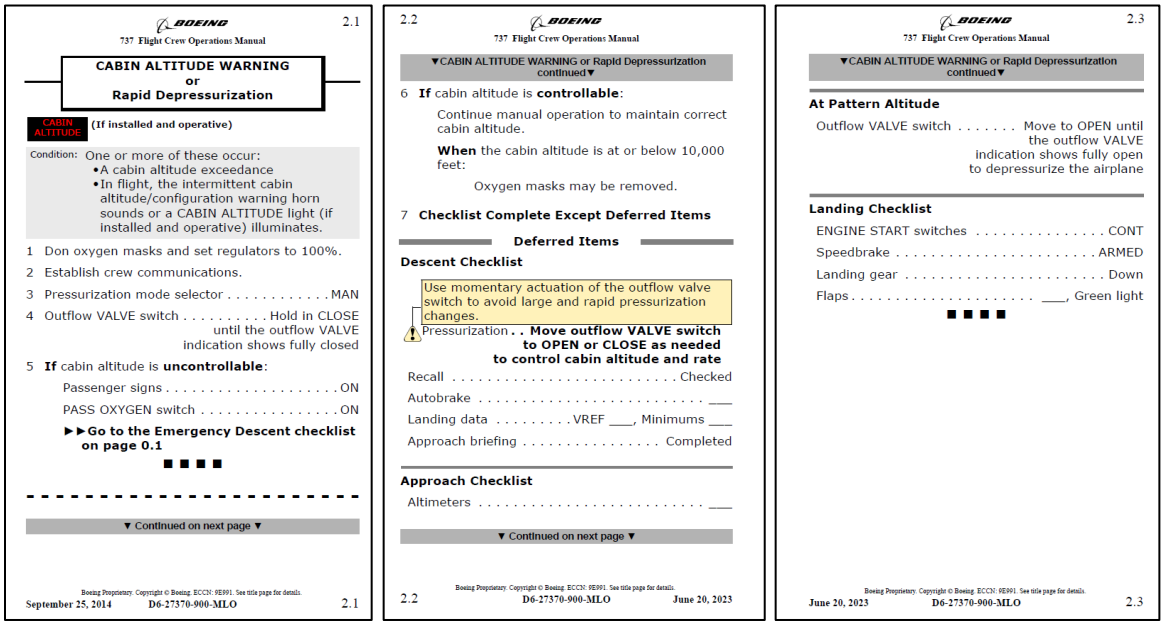
■ ■ ■ ■

Figure 2: Boeing 737- 800 NNC Engine Cowl Valve Open or TAI Indication

As the affected engine's anti-icing system was deemed inoperative, the flight crew decided to climb to FL350 to avoid potential icing conditions, as ice formation was unlikely at higher altitudes. The TAT indication remained below -40°C during this phase of the flight.

Upon entering Kuching airspace, the Kuching Air Traffic Controller (ATC) instructed the flight crew to contact the company via SATCOM. The company directed the flight to divert to WBGG due to technical limitations, as no technical support or Engineer on Board (EOB) was available at Sibu. The flight crew collected the necessary data for a technical diversion to WBGG.

During the descent, at approximately FL200, and while setting up for the arrival into WBGG, the cabin altitude warning was triggered.



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CABIN ALTITUDE WARNING or Rapid Depressurization

CABIN ALTITUDE (If installed and operative)

Condition: One or more of these occur:
- A cabin altitude exceedance
- In flight, the intermittent cabin altitude/configuration warning horn sounds or a CABIN ALTITUDE light (if installed and operative) illuminates.

1 Don oxygen masks and set regulators to 100%.
2 Establish crew communications.
3 Pressurization mode selector . . . . . MAN
4 Outflow VALVE switch . . . . . Hold in CLOSE until the outflow VALVE indication shows fully closed
5 **If** cabin altitude is **uncontrollable**:
Passenger signs . . . . . ON
PASS OXYGEN switch . . . . . ON
►►Go to the Emergency Descent checklist on page 0.1
■ ■ ■ ■

▼ Continued on next page ▼

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737 Flight Crew Operations Manual — 2.2

▼CABIN ALTITUDE WARNING or Rapid Depressurization continued▼

6 **If** cabin altitude is **controllable**:
Continue manual operation to maintain correct cabin altitude.
When the cabin altitude is at or below 10,000 feet:
Oxygen masks may be removed.

7 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.
Pressurization . . **Move outflow VALVE switch to OPEN or CLOSE as needed to control cabin altitude and rate**
Recall . . . . . Checked
Autobrake . . . . . ___
Landing data . . . . . VREF ___, Minimums ___
Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . ___

▼ Continued on next page ▼

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737 Flight Crew Operations Manual — 2.3

▼CABIN ALTITUDE WARNING or Rapid Depressurization continued▼

At Pattern Altitude

Outflow VALVE switch . . . . . Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

Landing Checklist

ENGINE START switches . . . . . CONT
Speedbrake . . . . . ARMED
Landing gear . . . . . Down
Flaps . . . . . ___, Green light
■ ■ ■ ■

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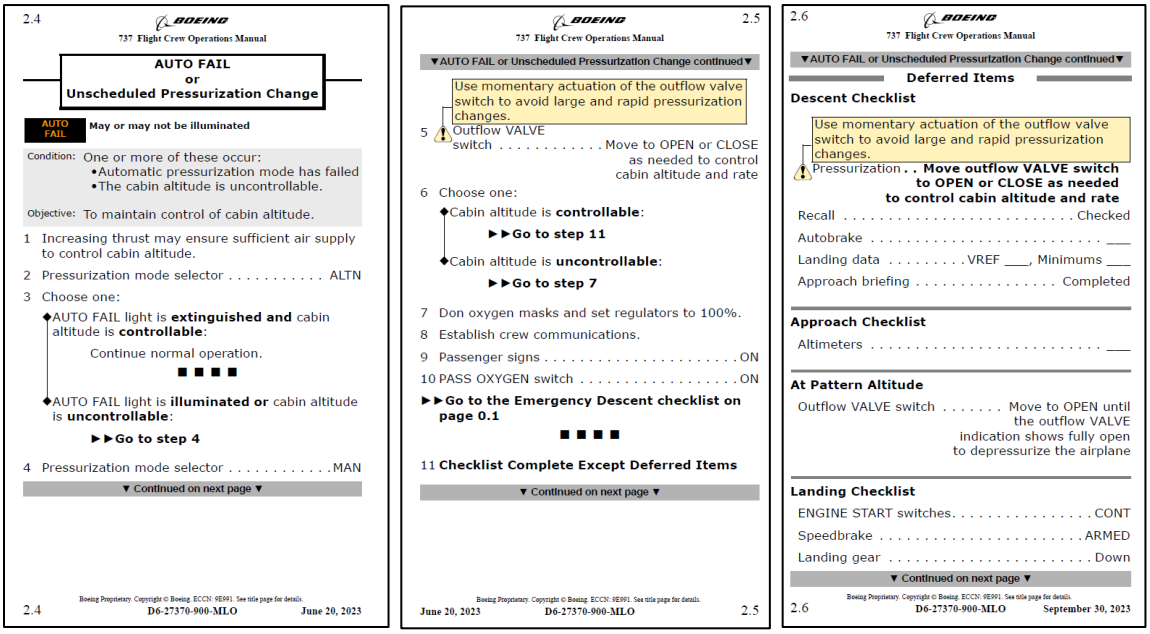
Figure 3: Boeing 737- 800 NNC Cabin Altitude Warning

The flight crew promptly executed the Cabin Altitude Warning Memory Items. Upon completing these procedures, the crew identified that the cabin altitude was uncontrollable and heard the cabin altitude warning horn. Recognising a potential pressurisation issue, the crew initiated an emergency descent.



2.4

BOEING

737 Flight Crew Operations Manual

AUTO FAIL or Unscheduled Pressurization Change

AUTO FAIL — **May or may not be illuminated**

Condition: One or more of these occur:
- Automatic pressurization mode has failed
- The cabin altitude is uncontrollable.

Objective: To maintain control of cabin altitude.

1 Increasing thrust may ensure sufficient air supply to control cabin altitude.

2 Pressurization mode selector . . . . . ALTN

3 Choose one:

◆AUTO FAIL light is **extinguished and** cabin altitude is **controllable**:

Continue normal operation.

■ ■ ■ ■

◆AUTO FAIL light is **illuminated or** cabin altitude is **uncontrollable**:

►►**Go to step 4**

4 Pressurization mode selector . . . . . .MAN

▼ Continued on next page ▼

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2.4 D6-27370-900-MLO June 20, 2023

BOEING 2.5

737 Flight Crew Operations Manual

▼AUTO FAIL or Unscheduled Pressurization Change continued▼

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

5 Outflow VALVE switch . . . . . Move to OPEN or CLOSE as needed to control cabin altitude and rate

6 Choose one:

◆Cabin altitude is **controllable**:

►►**Go to step 11**

◆Cabin altitude is **uncontrollable**:

►►**Go to step 7**

7 Don oxygen masks and set regulators to 100%.

8 Establish crew communications.

9 Passenger signs . . . . . .ON

10 PASS OXYGEN switch . . . . . .ON

►►**Go to the Emergency Descent checklist on page 0.1**

■ ■ ■ ■

11 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

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2.6

BOEING

737 Flight Crew Operations Manual

▼AUTO FAIL or Unscheduled Pressurization Change continued▼

Deferred Items

Descent Checklist

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

Pressurization . . **Move outflow VALVE switch to OPEN or CLOSE as needed to control cabin altitude and rate**

Recall . . . . . Checked

Autobrake . . . . . ___

Landing data . . . . . .VREF ___, Minimums ___

Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . ___

At Pattern Altitude

Outflow VALVE switch . . . . . Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

Landing Checklist

ENGINE START switches. . . . . .CONT

Speedbrake . . . . . .ARMED

Landing gear . . . . . .Down

▼ Continued on next page ▼

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2.6 D6-27370-900-MLO September 30, 2023

Figure 4: Boeing 737- 800 NNC Auto Fail or Unscheduled Pressurisation Change

The PIC immediately informed ATC of the emergency descent and declared an emergency via a Mayday call. Simultaneously, the PIC communicated the emergency descent to the flight attendants using the Passenger Address (PA) system. Oxygen masks were deployed swiftly to ensure the safety of all occupants.

The descent was stabilised at FL100, where the cabin altitude normalised, allowing the crew to remove their oxygen masks safely. The distress situation was subsequently cancelled.

Following the completion of the applicable NNC procedures, the flight crew continued the flight to WBGG. The Automatic Terminal Information Service (ATIS) reported weather conditions within approach minima, including visibility of approximately 2 km. Due to the declared emergency, ATC prioritised the landing of flight MXD 1904.

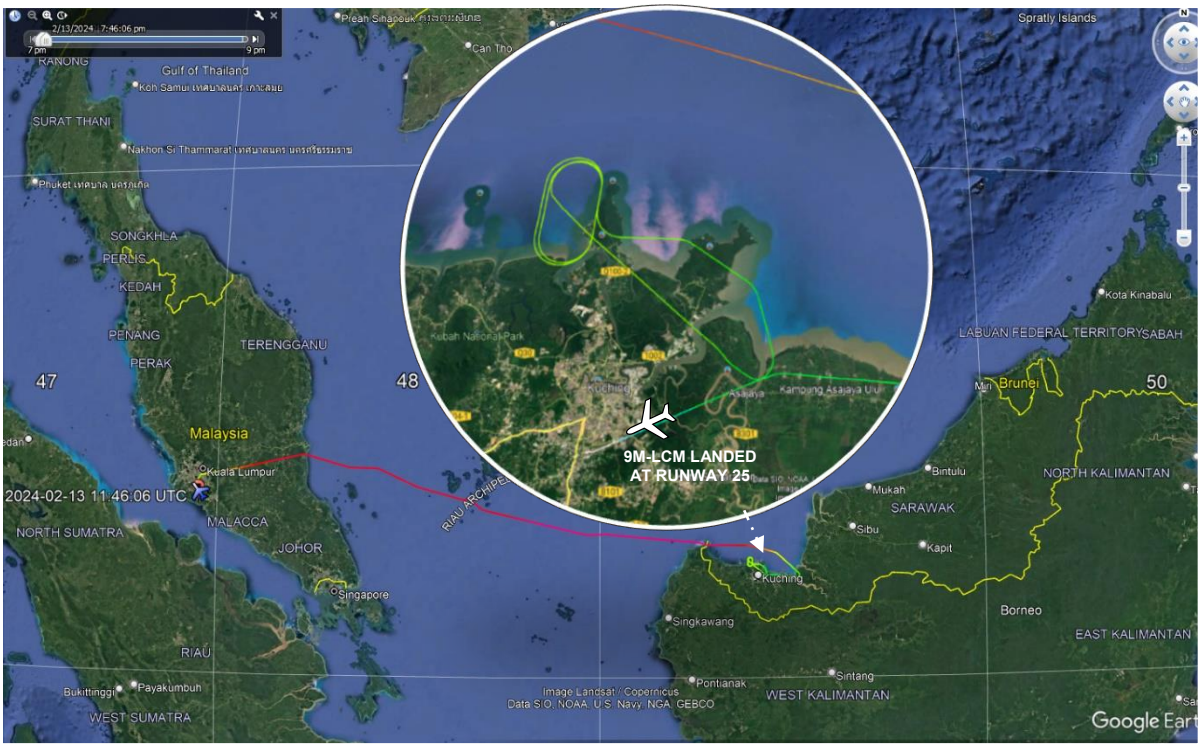


Figure 5: Flight Path of 9M-LCM

Prior to commencing the approach, the flight crew observed deteriorating weather conditions at WBGG, with visibility reducing to 1.8 km. The crew also overheard radio communications indicating that another aircraft had executed a go-around due to the adverse weather. The approach was subsequently cancelled after the aircraft had been configured to flaps 5, and ATC cleared the flight to hold at the DOTUG[3] waypoint while awaiting improved weather conditions.

The aircraft remained in the holding pattern near WBGG for approximately 20 minutes. During this time, the flight crew gathered additional data and informed passengers via the PA system about the situation and the updated estimated time of arrival.

Once weather conditions improved, the flight crew proceeded with an Instrument Landing System (ILS) approach to Runway 25 at WBGG. The approach was uneventful, and the flight landed safely at 2153 LT without any casualties. Following the landing, the aircraft was inspected and removed from service by the operator under the direction and approval of the Air Accident Investigation Bureau (AAIB).

[3] DOTUG is a waypoint near WBGG, where the aircraft was instructed to hold while awaiting improved weather conditions.

In response to the incident, the operator immediately sought technical assistance from Boeing. Boeing provided troubleshooting recommendations and preventive measures to address the identified issues and prevent recurrence. After three days of troubleshooting, the system failure was successfully resolved.

On 16 February 2024, at 2030 LT, the aircraft performed a ferry flight back to WMKK without passengers. The flight landed safely at WMKK at 2215 LT, concluding the post-incident operations.

1.2 Injuries to Persons

There was no injury to any of the aircraft occupant or personnel on ground

Injuries	Crew	Passengers	Others	Total
Fatal	NIL	NIL	NIL	NIL
Serious	NIL	NIL	NIL	NIL
Minor	NIL	NIL	NIL	NIL
None	6	86	NIL	92

Table 1: Injuries to persons

1.3 Damage to Aircraft

A general visual inspection was conducted to assess and identify any damage to the aircraft following the occurrence. The inspection confirmed that the aircraft sustained no damage.

1.4 Other Damage

There was no reported damage to aerodrome facilities or any other properties.

1.5 Personnel Information

1.5.1 Pilot B737-800

Status	Pilot in Command (PIC)
Nationality	Malaysian
Age	38 years old
Gender	Male
License Type	ATPL4730
License Validity	Valid until 31 March 2024
Aircraft Rating	Multi-Engine Land
Total Hours on Type	5872:14 hours
Total Flying Hours	6625:19 hours
Rest Period Since Last Flight	14:50 hours
Date of Medical Examination	31 March 2024

Table 2: Personnel Information – Pilot in Command

1.5.2 Pilot B737-800

Status	Second in Command (SIC)
Nationality	Malaysian
Age	34 years old
Gender	Male
License Type	CPL I/R 5853
License Validity	Valid until 30 April 2024
Aircraft Rating	Multi-Engine Land
Total Hours on Type	3240:06 hours
Total Flying Hours	3775:53 hours
Rest Period Since Last Flight	33:50 hours
Date of Medical Examination	30 April 2024

Table 3: Personnel Information – Pilot Second in Command

Both pilots were licensed, qualified, and approved to operate the flight in accordance with existing regulations. They were medically fit and adequately rested for the flight.

1.6 Aircraft Information

1.6.1 General

Boeing B737-800 is a subsonic, medium range, civil transport aircraft. The aircraft is installed with two high bypass turbofan engines manufactured by international Aero Engines. The aircraft is designed for operation with two pilots and passenger seating capacity of 189. The maximum take-off weight (MTOW) is 79015Kgs. The maximum landing weight is 65317Kgs. The aircraft length 39.47 meters, wingspan is 34.31 meters and height is 12.57 meters. The distance between main wheel centres is 5.71 meters. The ground clearance is 0.48 meters.

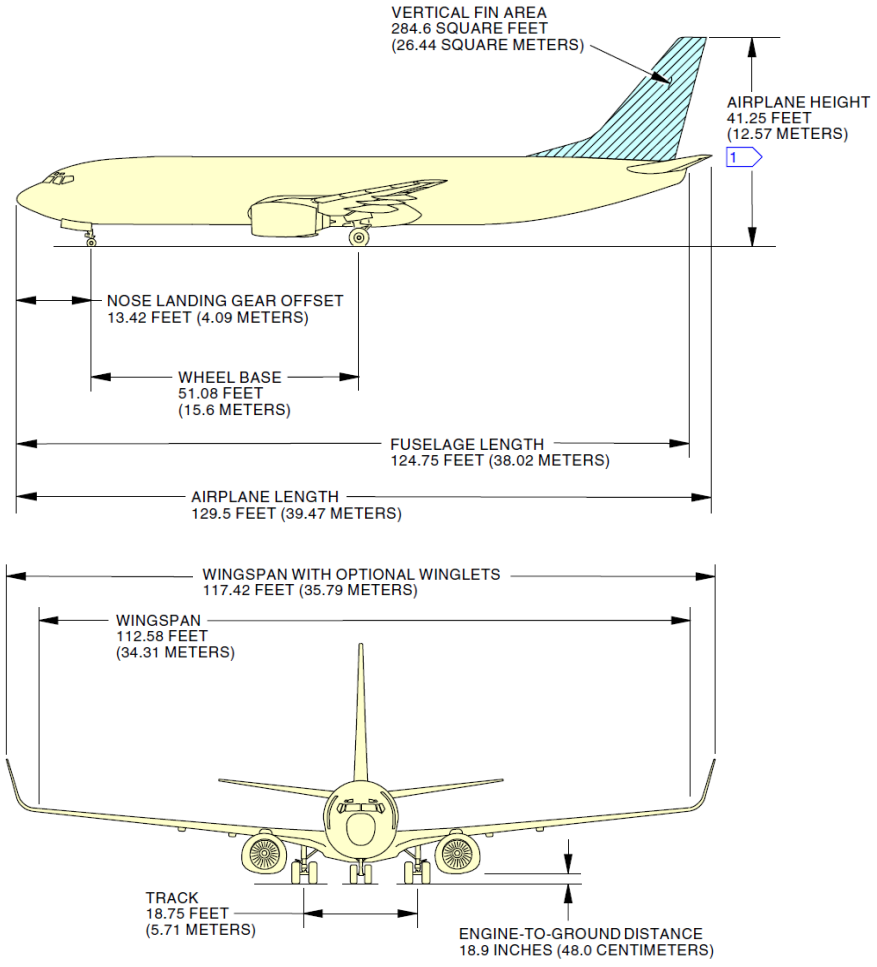


Figure 6: 737-800 Structure Dimension

1.6.2 Aircraft Data

The aircraft was inactive for approximately two and a half months, starting in early December 2023, due to the de-registration and maintenance programme related to its transfer from Batik Air Indonesia (PK-LZP) to Batik Air Malaysia (9M-LCM). The aircraft holds a valid registration and Certificate of Airworthiness (C of A) and has been maintained in full compliance with applicable regulations. The tables below provide the aircraft information and the relevant components involved in the occurrence.

Aircraft Type	Boeing 737-800
Manufacturer	Boeing Company
Year of Manufacturer	2017
Owner	BOC
Registration No.	9M-LCM
Aircraft Serial No.	39840
Time Since New	18,153.44 hours
Cycles Since New	9,017 Cycles
Last Major Check	20 November 2023 (CO2 Check Inspection)
Last Minor Check	24 November 2023 (Phase 20 Check)
C of A Expiry Date	08 February 2025 (**Appendix A**)
C of R Expiry Date	06 December 2026 (**Appendix B)**

Table 4: Aircraft General Information

Manufacturer	CFM International	
Type/Model	CFM56-7B24EG05	
Position	Engine No 1	Engine No 2
Serial Number	864834	864849
Time Since New	18,144.37	18,144.37
Cycles Since New	9,006	9,006
Install Date	2 March 2017	21 December 2016

Table 5: Aircraft Engine Information

Description	Pre-Cooler Control Valve Engine No 2
Manufacturer	Honeywell Intl Inc Engine
Type/Model	63292146-1
Serial Number	9262
Time Since New	5,253.41
Cycles Since New	3,161
Install Date	7 November 2023
Status	Previously used by PK-LDH aircraft

Table 6: Pre-Cooler Control Valve Engine No 2

Description	High Stage Valve Assy Engine	
Manufacturer	Honeywell Intl Inc Engine	
Type/Model	3214446-4	
Position	Engine No 1	Engine No 2
Serial Number	18530	18531
Time Since New	18,150.50	18,244.21
Cycles Since New	9,013	9,085
Install Date	2 March 2017	21 December 2016

Table 7: High Stage Valve Assy Engine

Description	High Stage Regulator Engine No 2
Manufacturer	Honeywell Intl Inc Engine
Type/Model	107484-7
Serial Number	14921
Time Since New	32,291.55
Cycles Since New	13,328
Install Date	21 October 2023
Status	Previously used by PK-LDH aircraft

Table 8: High Stage Regulator Engine No 2

1.6.2.1 General Engine Bleed System Description

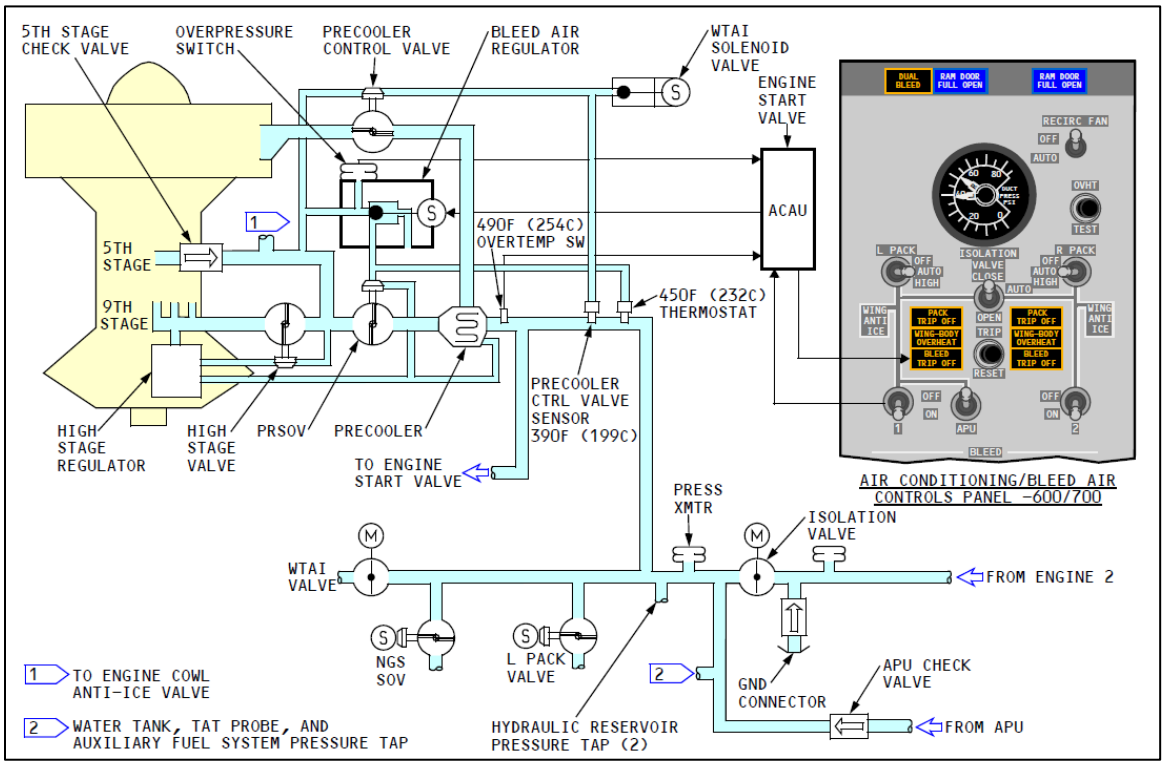


Figure 7: Pneumatic Functional Description

As illustrated in Figure 2, Bleed air comes from the 9th and 5th stages of the engine high stage compressor. At low speed, the pneumatic system used 9th stage air is not sufficient for pneumatic system demands at low engine speeds. At low engine speed the HSR and HSV control the pressure of the engine bleed air.

At low engine speed the 5th stage check valve prevents reverse flow. At high engine speed the HSV close and the 5th stage valve open to supply bleed air to the pressure regulating shut off valve (PRSOV). The air conditioning bleed air controls panel has engine bleed switches to control the pressure regulating shut off valve. Also, there are BLEED TRIP OFF light to show over pressure or over temperature condition.

The Bleed Air Regulation (BAR) and PRSOV control the flow of engine bleed air to the pneumatic manifold. The BAR has over pressure switches to prevents over pressure conditions and turn on the BLEED TRIP OFF lights. The 450°F (232°C) thermostats make the PRSOV move toward closed when the temperature gets to 450°F (232°C). The air conditioning accessory unit (ACAU) is an interface between the air conditioning

bleed air controls panel and the PRSOVs. The 490°F (245°C) overheat switches turn on the BLEED TRIP OFF lights and close the PRSOVS. This prevents overheat damage to the pneumatic manifold and user systems.

1.6.2.2 High Stage Regulator (HSR) and High Stage Valve (HSV)

The HSR controls the HSV. The HSV controls the flow of bleed air from the 9th stage engine bleed air manifold. The HSV is a butterfly valve, spring loaded to the closed position. The operation of HSR is automatic. There are no operational controls. The operation of the HSV is automatic. Also, there is a manual override to lock the valve in the closed position. The HSR and HSV can be tested using external test equipment (Engine Bleed Air System Test)

1.6.2.3 Bleed Air Regulator (BAR) and Pressure Regulator and Shut Off Valve (PRSOV)

The BAR operates the PRSOV. The PRSOV controls the flow of bleed air from the engine. These are the PRSOV control functions:

- Shut off of engine bleed air
- Pressure regulation of engine bleed air (42 psi nominal)
- Temperature limitation of engine bleed air (450°F/232°C)

1.6.2.4 Engine Bleed Air Cooling Functional Description

A precooler system cools engine bleed air. The precooler system is automatic. The precooler system keeps engine bleed air temperature between 390°F (199°C) and 440°F (229°C). The precooler control valve control fan air flow to the precooler. The precooler control valve modulates is response to these components:

- The precooler control valve sensor
- The wing thermal anti-ice (WTA) solenoid valve

The 450°F (232°C) thermostats bleeds control from the PRSOV if the engine bleed air downstream of the precooler is 450°F (232°C) or higher. This causes the PRSOV to

modulate toward closed. The reduced airflow though the PRSOV has these effects:

- Prevents bleed trip off conditions
- A drop in pneumatic manifold pressure

1.6.2.5 Engine Bleed Air Pre-cooler system

The precooler supplies a large surface for efficient heat transfer from the bleed air to the fan air (heat sink). As the engine bleed air moves through the precooler, the bleed air gives up heat to the walls of the precooler. The walls are made of plates and fins. Engine fan air that goes through the precooler on the other side of the walls, removes the heat and carries it away. Heat transfer goes from the bleed air to the precooler walls, to the fan air. The fan air then flows over the engine case and overboard through the case vents. A sense line connection connects to the PRSOV and HSR.

The PCCV controls the flow of fan air to the precooler. The precooler system controls the engine bleed air temperature. The PCCV, precooler control valve sensor, and WTAI solenoid valve control the flow of fan air to the precooler.

1.6.2.6 Precooler Control Valve Sensor 390°F

The PCCV sensor 390°F (190°C) control the movement of the precooler control valve. The precooler control valve sensor is a bleed-off thermostat. The operation of the precooler control valve sensor is automatic. The lower part of the sensor is in the bleed air duct downstream of the precooler. This portion of the sensor has oil-filled sense coils. As heat causes the oil to expand. It pushes a ball valve in the upper part of the sensor to open. The higher the duct temperature, the more the oil expansion and the more the ball valve opens. The sensor ball valve starts to open at 390°F (199°C) and is fully open at 440°F (227°C) (nominal value). The open sensor ball valve bleeds off pressure to operate the precooler control valve actuator. This causes the PCCV to move toward open by spring force.

The precooler control valve operates in all parallel with the WTAI solenoid valve to control the PCCV. The energized WTAI solenoid valve bleeds off all the pressure that

operates the PCCV. The sensor does not have any effect for this operation. The WTAI makes sure the bleed air will receive maximum cooling for ground operation of the WTAI system.

1.6.2.7 450F Thermostat (Temperature Sensor)

The 450°F(232°C) thermostat bleeds of pressure that operates the PRSOV. This occurs when engine bleed air temperature is more than 450°F (232°C). The 450°F (232°C) thermostat supplies the PRSOV a temperature control function.

1.6.2.8 490°F Overtemperature Switch

The 490°F (254°C) over temperature switch protects the pneumatic manifold from overheat condition

1.6.2.9 Bleed Trip

The BLEED TRIP OFF light are amber light. There is one BLEED TRIP OFF light for the left and right pneumatic manifold. They turn on when the pneumatic system has an overpressure or overtemperature condition.

Operation of either the 220psi overpressure switch or the 490°F (254°C) overheat switch will cause a bleed trip off condition. A bleed trip of condition sends a signal from the Air Conditioning Accessory Unit (ACAU) to close the BAR solenoid valve regardless of bleed switch position.

1.6.2.10 Preventive Maintenance

Prior to its registration as 9M-LCM, the aircraft involved in the occurrence was designated PK-LZP under Batik Air Indonesia. PK-LZP last operated in May 2023 and underwent scheduled maintenance, including CO2 checks, Phase 19 and Phase 20 checks, as well as deregistration to become 9M-LCM at the BAT hangar. Following this maintenance, the aircraft departed the hangar and flew the Batam to Kuala Lumpur (BTH-KUL) route on 30 November 2023, with no reported issues related to

the Bleed Air system.

1.6.2.11 Corrective Maintenance

The investigation revealed that the aircraft experienced bleed air system issues prior to its revenue flight on 13 February 2024. A detailed review of the Aircraft Journey Log (AJL), spanning from 9 February 2024 to 22 February 2024, highlighted multiple component defects affecting both engines. By 22 February 2024, all identified issues were addressed, with no further recurrences reported. **Appendix C** provides a comprehensive timeline of the Engine Bleed Trip events and the corrective actions implemented by the operator.

1.6.2.12 Cannibalised Component

During the aircraft's maintenance at the BAT hangar, the operator acknowledged that component cannibalization had occurred. Due to limited parts availability and internal company policies, certain components were removed from the aircraft to support the operation of other aircraft.

In accordance with the Maintenance Organisation Exposition (MOE) – Part 2, Maintenance Procedure and CAD 8601, the cannibalization of aircraft parts is allowed as long as the cannibalized parts do not have any reported defects on the donor aircraft and have sufficient remaining life for parts with life limitations and without any life limitation for on condition parts.

The operator confirmed that not all parts reinstalled during the aircraft’s return to service were new. Some components were repaired or cannibalised from other aircraft. Cannibalised parts related to the Engine Bleed Air system on the PK-LZP aircraft included the Pre-Cooler Control Valve (PCCV) sensor, the Temperature 450F sensor, the High Stage Regulator (HSR), and the Bleed Air Regulator (BAR). The PCCV was replaced following maintenance findings.

The operator also reported a loss of data records for some cannibalised components within the eMRO[4] system. This data loss was attributed to mishandling or system-related issues encountered during the transition from the TRAX[5] system to the eMRO system.

1.7 Meteorological Information

On the day of the incident, weather conditions at WBGG were initially below minima, requiring 9M-LCM to hold for 20 minutes until conditions improved. Once the weather met approach minima, the aircraft landed safely at 2153 LT. Light turbulence and a wet runway presented additional challenges, but the crew managed a safe landing.

The weather, though temporarily adverse, did not contribute to the incident. The recorded weather parameters at the time of landing were as follow.

METAR WBGG 131230Z VRB02KT 9999 SCT020 27/25 Q1012 NOSIG RMK F02 R91=

METAR WBGG 131300Z VRB06KT 9999 -RA FEW015CB SCT020 27/25 Q1013 TEMPO 7000 TSRA RMK 1 CB NW F60 P1.2 R91 I NW=

SPECI WBGG 131319Z 35007KT 310V070 5000 RA FEW015CB SCT020 26/25 Q1013 TEMPO 5000 TSRA RMK 1 CB NW F62 R98 I NW=

METAR WBGG 131330Z 01007G17KT 290V060 2000 +RA FEW015CB SCT020 26/25 Q1013 TEMPO 2000 +TSRA RMK 1 CB NW F64 R97 I NW=

1.8 Aids to Navigation

All navigation aids were operating normally.

[4] eMRO is comprehensive software solution designed to cater to various aspects of aircraft maintenance and fleet management.

[5] TRAX is a leading provider of aviation maintenance software solutions. It offers a comprehensive suite of products designed to cater to all aspects of aircraft maintenance and fleet management. TRAX is known for its user-friendly interface, robust features, and ability to streamline maintenance processes.

1.9 Communications

The aircraft maintained normal two-way communication with ATC.

1.10 Aerodrome Information

Kuching International Airport (IATA: KCH, ICAO: WBGG) is an international airport in the state of Sarawak. It is located approximately 11km (6.8 miles) south of Kuching city centre, with coordinates on the map at 01˚29'04.91" N 110˚20'48.96" E. The airport features a single runway for both departures and arrivals: Runway 07 and Runway 25, with a length of approximately 3,780m and an elevation of approximately 27m. Its terminal is capable of handling 5.3 million passengers annually (5.3 mppa).

Figure 8: Aerial view of Kuching International Airport (Source: Google Earth)

1.11 Flight Recorders

The aircraft (9M-LCM) was equipped with both a Flight Data Recorder (FDR) and a Cockpit Voice Recorder (CVR). Data from both recorders were downloaded on 15 February 2024, two days after the incident, and sent to the AAIB's Flight Recorder Laboratory for analysis. Details of the FDR and CVR are as follows.

Description	Flight Data Recorder	Cockpit Voice Recorder
Part No.	980-4750-003	980-6032-001
Serial No.	05453	CVR-03875
Manufacturer	Honeywell	Honeywell
Model	HFR5-D	HFR5-V
Manufacture Date	01 March 2017	12 September 2015

Table 9: Aircraft Flight Recorder 9M-LCM

The flight data downloaded from the FDR was verified and found to align with data from the aircraft manufacturer, providing reliable evidence to support the findings in this report. The results of the data analysis are presented in Section 2.

Regarding the CVR, the recording was retrieved during the investigation but unfortunately contained no relevant information, as it had been overwritten.

1.12 Wreckage and Impact Information

There was no damage to the aircraft.

1.13 Medical and Pathological Information

The pilots underwent a urine drug screen, with negative results for substance abuse. Blood alcohol testing showed results within normal limits.

1.14 Fire

There was no evidence of fire inflight or after landing.

1.15 Survival Aspects

There were no reported injuries among the passengers or crew. All individuals safely exited the aircraft without incident, and no further medical assistance was required.

1.16 Tests and Research

The malfunctioning components related to Engine No. 2 Bleed Trip and Engine No. 1 Low Bleed Pressure were sent to Honeywell Int. in Singapore for further analysis.

During the climb, the right-hand bleed air system (Engine No. 2) experienced an over-temperature condition, resulting in its automatic shutdown. This caused the right air conditioning pack to cease operation, as indicated by the illuminated "BLEED TRIP OFF" light on the overhead panel. Troubleshooting revealed that the Pre-Cooler Control Valve (PCCV) Part No: 63292146-1, Serial No: 9262, was partially closed, leading to an increase in cabin temperature. With the right air conditioning pack offline, the aircraft's air supply relied solely on the left-hand Engine No. 1 air conditioning pack. Further analysis by the Original Equipment Manufacturer (OEM) identified a diaphragm leakage in the PCCV (refer to **Appendix D**).

During the descent, the left-hand bleed air system (Engine No. 1) also experienced a low bleed pressure condition while the engine was running at a low power setting. Details regarding the High Stage Valve (HSV) are provided in Table 6.

Troubleshooting revealed that the HSV Part No: 3214446-4, Serial No: 18530, on Engine No. 1 bleed was supplying low pressure due to a failure to open during the descent. The HSV was sent to the OEM for further analysis. Inspection at the OEM identified significant air leakage from the actuator vent and lower bearing bore, as well as binding in the butterfly plate operation. These defects led to the HSV's failure to meet leakage check and functional requirements (refer to **Appendix E**).

1.17 Organisational and Management Information

1.17.1 Aircraft Operator

Batik Air Malaysia, previously known as Malindo Air, is a full-service airline operating domestic and international flights. It is part of the Lion Air Group. The airline's fleet includes various aircraft types, managed to meet market demands and ensure operational efficiency. Efficient fleet management is essential for safety and

competitiveness in the aviation industry.

1.17.2 Proactive Measures Taken by the Aircraft Operator

The aircraft operator proactively contacted Boeing for assistance, requesting troubleshooting recommendations and preventive measures to avoid future incidents (Refer to **Annex F**). After three days of troubleshooting, the system failure was corrected. The aircraft conducted a ferry flight from WBGG to WMKK on 16 February 2024, landing safely at 2215 LT.

To ensure the safety and airworthiness of the aircraft, a thorough investigation was initiated on 17 February 2024 and completed by 22 February 2024, in response to recurring snags. Comprehensive tests and inspections were carried out on critical systems, including the bleed air system and engine components, to verify their functionality and compliance with airworthiness standards. Each snag was analysed, and corrective actions were implemented.

The aircraft operator also convened an immediate meeting with relevant personnel to address the issues affecting aircraft 9M-LCM, demonstrating their commitment to safety and swift resolution. As a result, all identified snags were resolved by 22 February 2024, with no further issues reported. Aircraft 9M-LCM accumulated 2,173:50 flight hours (FH) and 1,156 flight cycles (FC) from 22 February 2024 to 25 November 2024, without recurrence of snags.

1.18 Additional Information

1.18.1 Reliability Component

The Component Reliability Control Report indicates that, in the past year, there were only five replacements of High Stage Valve (HSV) components within the Batik Air fleet. The fleet's Mean Time Between Unscheduled Removals (MTBUR) for HSV components is 31,250 hours, which is significantly higher than the global MTBUR of 23,815 hours, suggesting that the HSV components are considered reliable.

However, there were fourteen replacements of High Stage Regulator (HSR) components in the past year, with Batik Air's MTBUR for these components being 11,111 hours. This is slightly lower than the global MTBUR of 12,913 hours, indicating that HSR components are considered less reliable.

1.18.2 Availability of Component

As of 12 March 2024, the stock level dashboard indicates that 20 HSV components are required to meet the minimum Serviceable Stock Availability (SSA), but only 4 are serviceable, with 25 undergoing repairs. For the HSR components, 13 are required to meet SSA, but only two are serviceable, with 58 undergoing repairs.

1.18.3 List Replacement Part in Hangar

The list of replacement parts related to the Bleed Air System on the PK-LZP during maintenance at BAT hangar is provided below:

NO	ROTATABLE CONTROL TAG	POSITION	DESCRIPTION	PART NUMBER	REMOVED SERIAL NUMBER	INSTALLED SERIAL NUMBER	STATUS
1.	138544	ENGINE 1	BLEED AIR REGULATOR	107492-6	19019	18706	OVERHAULED
2.	197593	ENGINE 1	HIGH STAGE REGULATOR	107484-7	10700	14921	EX PK-LDH
3.	197576	ENGINE 1	PRECOOLER CONTROL VALVE SENSOR (390)	129666-3	22408	24960	EX PK-LDH
4.	115648	ENGINE 1	PRECOOLER CONTROL VALVE	63292146-1	424	11253	REPAIRED
5.	158814	ENGINE 2	BLEED AIR OVERTEMP SENSOR (390)	129694-3	2591	14820	REPAIRED
6.	198682	ENGINE 2	PRECOOLER CONTROL VALVE SENSOR (390)	129666-3	21399	16898	REPAIRED
7.	197594	ENGINE 2	HIGH STAGE REGULATOR	107484-7	9684	16374	EX PK-LDH
8.	198326	ENGINE 2	PRECOOLER CONTROL VALVE	63292146-1	416	9262	EX PK-LDH

Table 10: Replacement of Parts at Batam Aero Technic Hangar

1.18.4 Maintenance at Batam Aero Technic Hangar

Prior to its operation as 9M-LCM by Batik Air Malaysia, the aircraft was registered as PK-LZP under Batik Air Indonesia. In May 2023, the aircraft underwent maintenance checks at the BAT hangar. During this period, some engine components, including the High Stage Regulator (HSR) from Engine No. 2, were cannibalised to support the operation of other aircraft. However, both High Stage Valves (HSV) on PK-LZP were original components and were not part of the cannibalisation. These HSVs had accumulated 18,244 flight hours.

The HSR installed on Engine No. 2 of PK-LZP was sourced from Engine No. 1 of PK-LDH, having logged 32,115 flight hours since new and 9,733 flight hours since its last repair and installation on PK-LDH.

Before returning 9M-LCM to Malaysia, the operator dispatched a team comprising representatives from Quality Assurance (QA), the Airworthiness Release Section (ARS), and Technical Services Engineering (TSE) to the BAT hangar. This team conducted a comprehensive assessment to ensure the airworthiness of 9M-LCM.

1.9 Useful or Effective Investigation Techniques

The investigation into the rapid decompression incident involved a comprehensive approach, starting with the collection of witness statements from the flight crew, maintenance personnel, and other relevant individuals. These statements provided critical first-hand accounts, contributing to the understanding of the incident. Additionally, a detailed system analysis of the aircraft's bleed air system and pressurisation components was conducted to identify any potential mechanical failures that could have contributed to the event.

The investigation also focused on human factors, examining the flight crew's actions and adherence to procedures, as well as any operational decisions that may have influenced the incident. Maintenance records were reviewed to evaluate any recent work on the pressurisation and bleed air systems, aiming to identify overlooked issues or procedural discrepancies. By combining mechanical analysis with human factor

assessments, the investigation provided a well-rounded understanding of the event.

2.0 ANALYSIS

2.1 FDR Analysis

The FDR analysis of the occurrence flight identified three main events: Engine No 2 Bleed Trip, Engine No 1 TAI Disagree (with the TAI stuck in the closed position), and a Cabin Altitude Warning.

2.1.1 Engine No 2 Bleed Trip

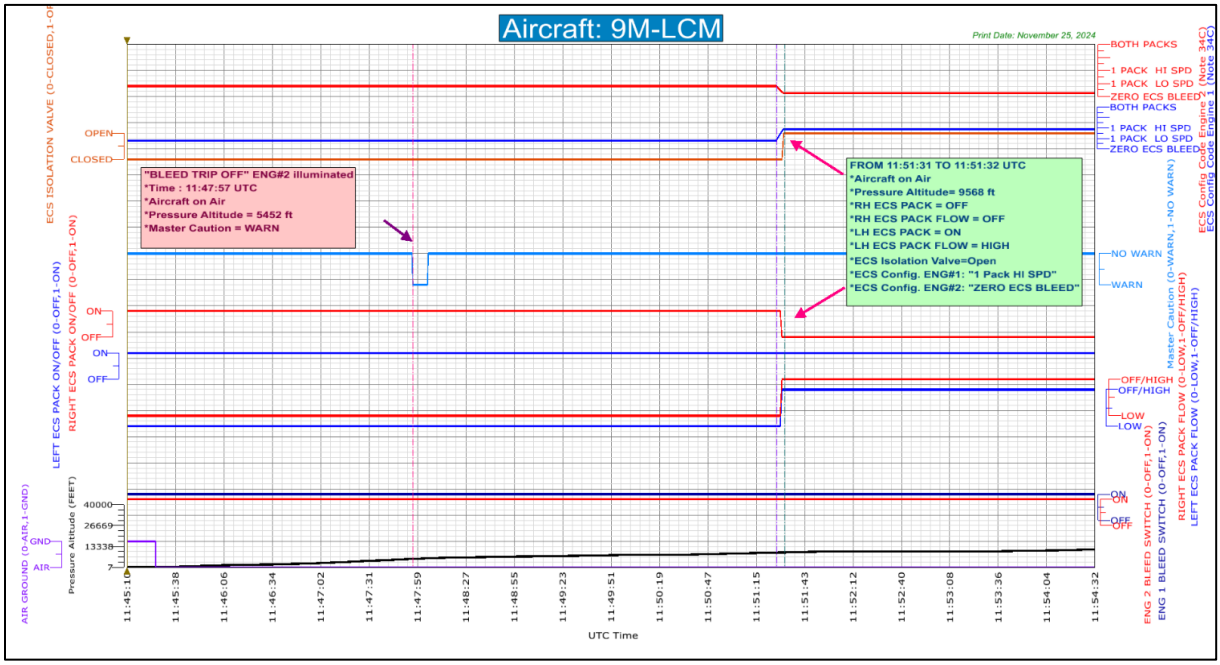


Figure 9: Engine No 2 Bleed Trip Event

- At 19:47:57 LT, during the climb, the Engine No 2 bleed trip-off light illuminated, accompanied by a 'Master Caution' warning at a pressure altitude of 5,452 ft.

- This occurred due to the engine bleed air temperature or pressure exceeding a predetermined limit, triggering the over-temperature/over-pressure condition.

- Attempts to reset the system were unsuccessful, leaving the aircraft to operate

with a single bleed for the remainder of the flight.

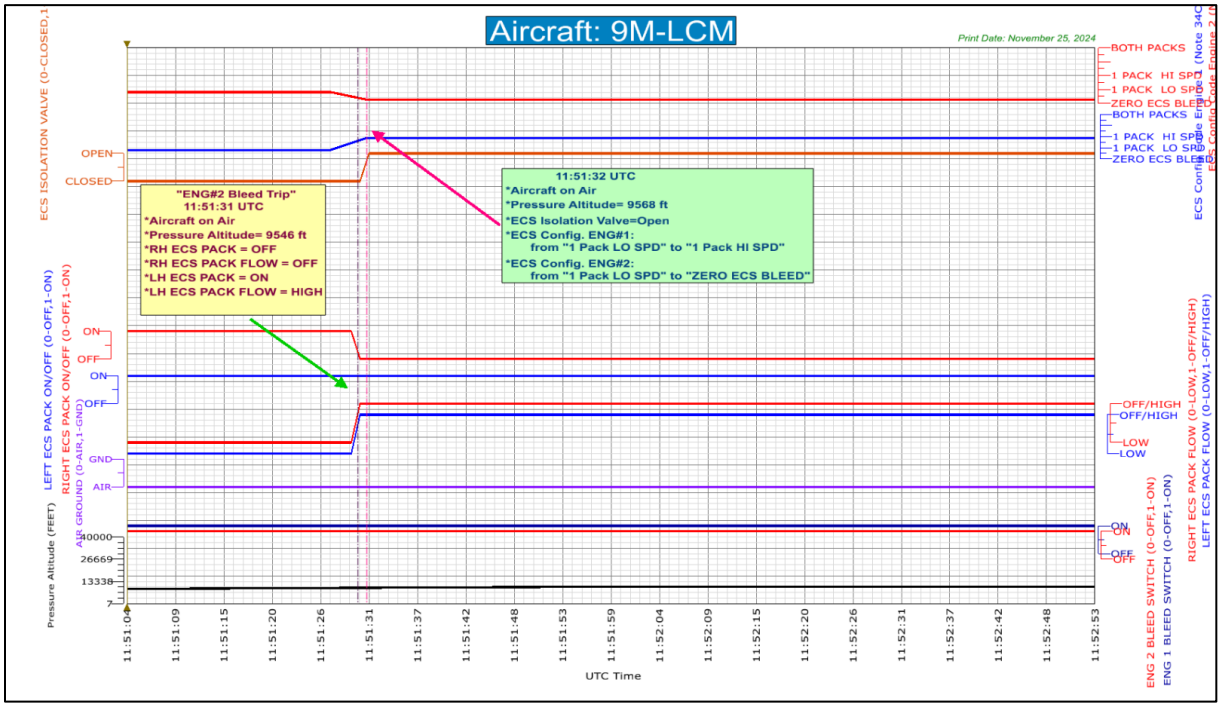


Figure 10: Engine No 2 Bleed Trip Event - Environmental Control System (ECS)

- At 19:51:31 LT, with a pressure altitude of 9,546 ft:
  - 'RH ECS PACK' was set to OFF, and 'RH ECS PACK FLOW' was OFF.
  - 'LH ECS PACK' was ON, and 'LH ECS PACK FLOW' was set to HIGH.

- At 19:51:32 LT, with a pressure altitude of 9,568 ft:
  - 'ECS Isolation Valve' was OPEN.
  - 'ECS Config. Engine No 1' changed from "1 Pack LO SPD" to "1 Pack HI SPD."
  - 'ECS Config. Engine No 2' changed from "1 Pack LO SPD" to "ZERO ECS BLEED

2.1.2 Engine No 1 TAI Disagree

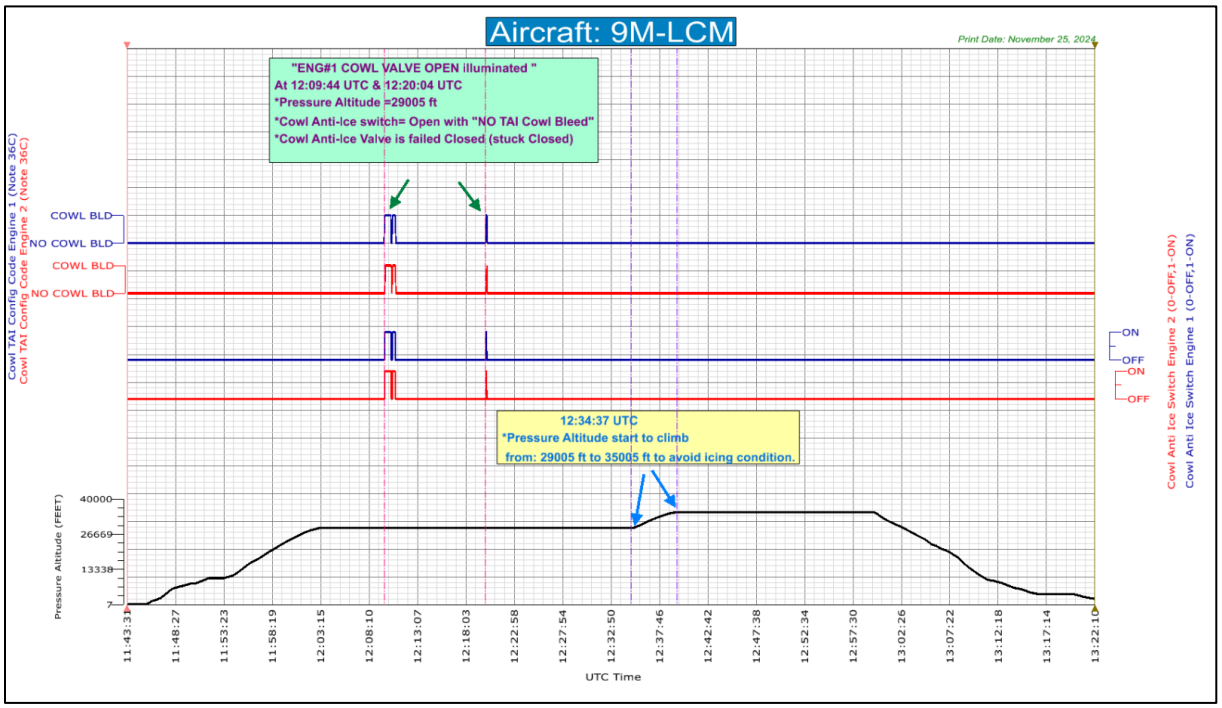


Figure 11: Engine No 1 TAI Disagree Event

- At 20:09:44 LT and 20:20:04 LT, during cruise with icing conditions (visible clouds and TAT below 10°C) at a pressure altitude of 29,005 ft, the "Cowl Anti-Ice switch" was set to OPEN. When the pilot attempted to open the cowl TAI switch, the COWL VALVE OPEN light illuminated, prompting the crew to switch off the COWL TAI. This was repeated several times.

- On Engine No 1, the COWL VALVE OPEN light was illuminated in bright blue, and an amber TAI indication appeared on the CDS, indicating that the cowl anti-ice valve was "not in the commanded position."

- The ENG ANTI-ICE switch was ON, showing that the cowl anti-ice valve had failed closed (stuck closed), leading to a failure of the thermal anti-ice system on this engine.

- At 20:34:37 LT, the aircraft began to climb, increasing the pressure altitude from 29,005 ft to 35,005 ft to avoid the icing condition.

2.1.3 Cabin Altitude Warning

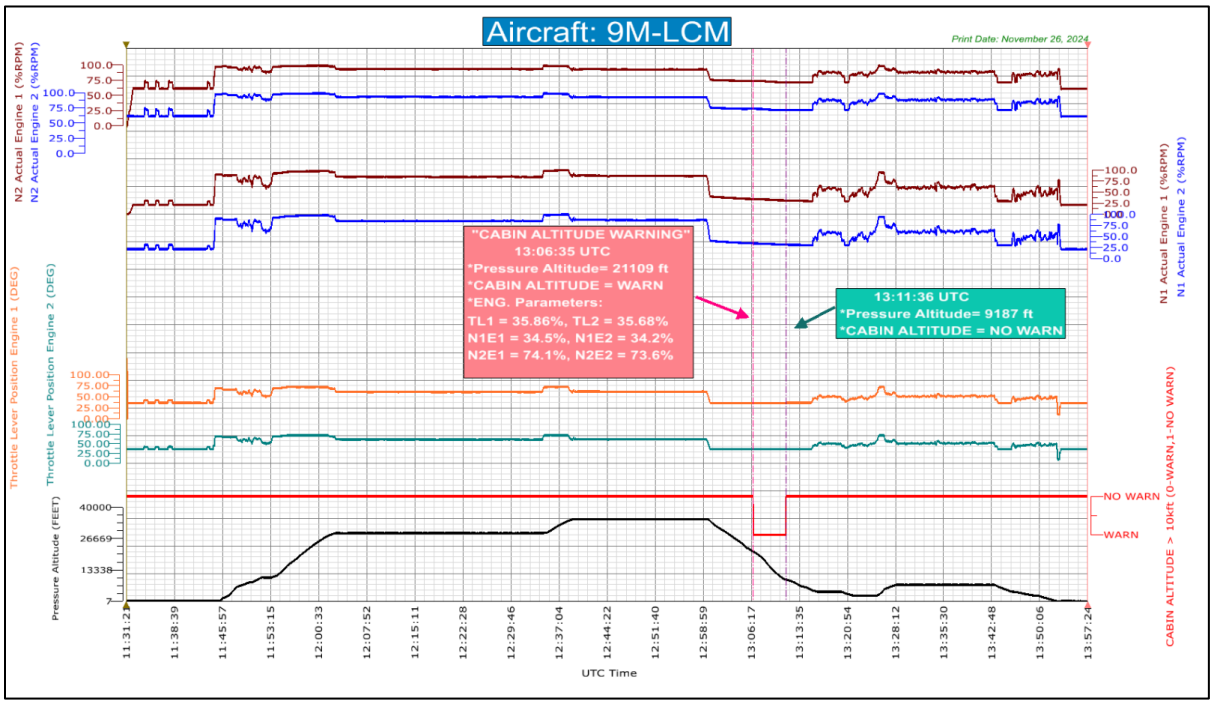


Figure 12: Cabin Altitude Warning Event

- During normal descent at a pressure altitude of 21,109 ft, with the throttle lever almost at 36%, N1 for both engines around 34%, and N2 for both engines approximately 74%, the CABIN ALTITUDE WARNING was triggered at 21:06:35 LT. This was indicated by the intermittent cabin altitude/ configuration warning horn, signalling that the cabin altitude had exceeded 10,000 ft.

- In response, the pilot initiated an emergency descent from FL200 to FL100, as the cabin pressure remained uncontrolled above 14,000 ft, suggesting that the outflow valve (OFV) did not return to the closed position when manually operated.

- The most probable cause of this failure occurred during descent, likely due to low flow from only one engine operating at idle.

- With the aircraft operating on a single pack and a low engine power setting (Flight IDLE), it is suspected that the high-pressure regulator valve (PRSOV) failed to open according to the proper schedule.

2.2 Troubleshooting Analysis of Engine No 2 Bleed Trip

CONDITION	GROUND/TAXI	TAKE OFF	CLIMB	CRUISE	IDLE DESCENT
Normal Operation	WTAI OFF -18 to 22 psig WTAI ON – 12 to 14 psig HSV: Full OPEN PRSOV: Full OPEN PCCV: CLOSED Engine supply pressure and temperature are below regulation levels	37 to 53 psig HSV: CLOSED PRSOV: Regulating PCCV: Regulating Engine supply pressure and temperature are being regulated	37 to 53 psig HSV: CLOSED PRSOV: Regulating PCCV: Regulating Engine supply pressure and temperature are being regulated	26 to 45 psig HSV: May be CLOSED or Regulating PRSOV: May be Regulating or OPEN PCCV: May be Regulating or CLOSED At lower cruise settings, engine pressure and temperature drop below regulated levels	WTAI OFF – 18 to 25 psig HSV: Full OPEN PRSOV: Full OPEN PCCV: CLOSED Engine supply pressure and temperature are below regulation levels
Climb Fault	No Faults	No Faults	**BLEED TRIP Over temperature – First and second level temperature control not operating (PCCV/390F Sensor,450F Sensor, or plugged Sense liens -HSV leakage)**	No Faults	No Faults

Table 11: Bleed Trip Fault Table Organised by Flight Phase

The bleed trip can occur when the over-temperature switch is triggered, which happens when the bleed air temperature reaches 490°F. As shown in Figure 7, the temperature switch is positioned in the PRSOV pneumatic downstream duct. During the climb phase, the normal configuration of bleed air components operates with the Stage-5 bleed air check valve open, the PRSOV open and regulating (as sensed by the 450°F sensor), the HSV closed, and the PCCV open and regulating depending on the engine supply temperature, as sensed by the 390°F sensor. If there are abnormalities with the HSV (such as it remaining open), it can cause the temperature

in the duct system to rise.

If both the PCCV and PRSOV fail to recover from this condition, the 490°F over-temperature switch triggers the Bleed Air Regulator (BAR) to close the PRSOV, causing the Air Conditioning Accessory Unit (ACAU) to illuminate the Bleed Trip off light in the flight deck.

Based on the data collected, the first Engine No 2 Bleed Trip fault was identified during an engine idle run check conducted during active storage maintenance, four days prior to the incident. During this check, the Bleed Trip Off light could not be reset. Due to a misunderstanding when referencing FIM 36-10 Task 801, titled "Engine Bleed Trip Off Light Cannot Be Reset," the maintenance crew replaced the BAR as a solution, attributing the issue solely to a BAR malfunction.

However, since the bleed trip occurred during an idle run, it was recognised that this might not reflect the actual operational condition. Consequently, comprehensive troubleshooting of other potential components was performed the following day as per Table 11.

After the aircraft was serviceable on 10 February 2024, its first revenue flight took place on 13 February 2024. During the climb phase of this flight, Engine No 2 experienced a Bleed Trip. According to FIM 36-10, the most likely cause of this event was a malfunction of the HSV. The high duct temperature during the climb, detected by the 490°F sensor, triggered the Bleed Trip Off light. However, it's important to note that bleed trips can occur due to various factors, not solely a single cause.

The initial troubleshooting by the maintenance team involved checking the condition of the PCCV, which was found not to be in the fully open position. This partially closed PCCV contributed to the uncontrolled temperature increase in Engine No 2 bleed air. The Precooler, an air-to-air heat exchanger, cools engine bleed air before it enters the pneumatic manifold, and the PRSOV regulates the bleed supply pressure to maintain a maximum temperature of 450°F. If the bleed temperature exceeds this limit due to an abnormal PCCV, the 490°F over-temperature switch triggers the ACAU and BAR to close the PRSOV, stopping the bleed air supply and activating the Bleed Trip

indication on the flight deck.

Following FIM 36-10 Task 801, the PCCV was replaced, but the Bleed Trip problem persisted, indicating that additional factors were contributing to the issue. Further comprehensive troubleshooting was necessary to identify the root cause, as bleed trips can be caused by multiple factors.

The crew performed manual operation checks and conducted an engine bleed health inspection using an engine bleed air system tester on Engine No 2. It was discovered that the HSV was stuck in the open position, leading to its incorrect operation. Additionally, the HSR was found to have a leak in the reverse flow diaphragm. This leak prevented the HSR from supplying the necessary control pressure to the HSV, further contributing to the HSV's inability to close properly. As a result, hot air entered the pneumatic duct during high engine power settings, causing an over-temperature condition (reaching 490°F) and triggering the bleed trip.

2.3 Troubleshooting Analysis of Engine No 1 Low Bleed Flow

The decompression event occurred due to insufficient bleed air supply for scheduled cabin pressurisation during descent. Prior to the event, Engine No 2's bleed air was unavailable because the bleed trip off light had illuminated during the climb. As a result, only Engine No 1 was supplying bleed air to the left pack system. During the climb phase, the left pack was sufficient to maintain cabin pressurisation. However, during descent, the bleed air supply was lower than normal, disrupting the scheduled cabin pressurisation and leading to the decompression.

Under normal conditions, the HSV remains fully open during low engine power settings, providing pneumatic pressure to the cabin. However, during descent, the cabin vertical rate indication increased, and the pneumatic supply to the cabin decreased. This condition led to the decompression event. Since there was no indication of a bleed trip for Engine No 1, it suggests that the PRSOV remained open during descent, and the low bleed indication pointed to an issue with the HSV. The HSV was likely partially open or stuck closed, which caused the bleed air supply pressure to drop. During an idle run check, the maintenance crew discovered that the

HSV was difficult to operate and could not return to the closed position. It was confirmed that the HSV was sticky and needed replacement, which resolved the low bleed problem. The HSV, being the original component on the aircraft with 18,244 flight hours, was likely affected by aging.

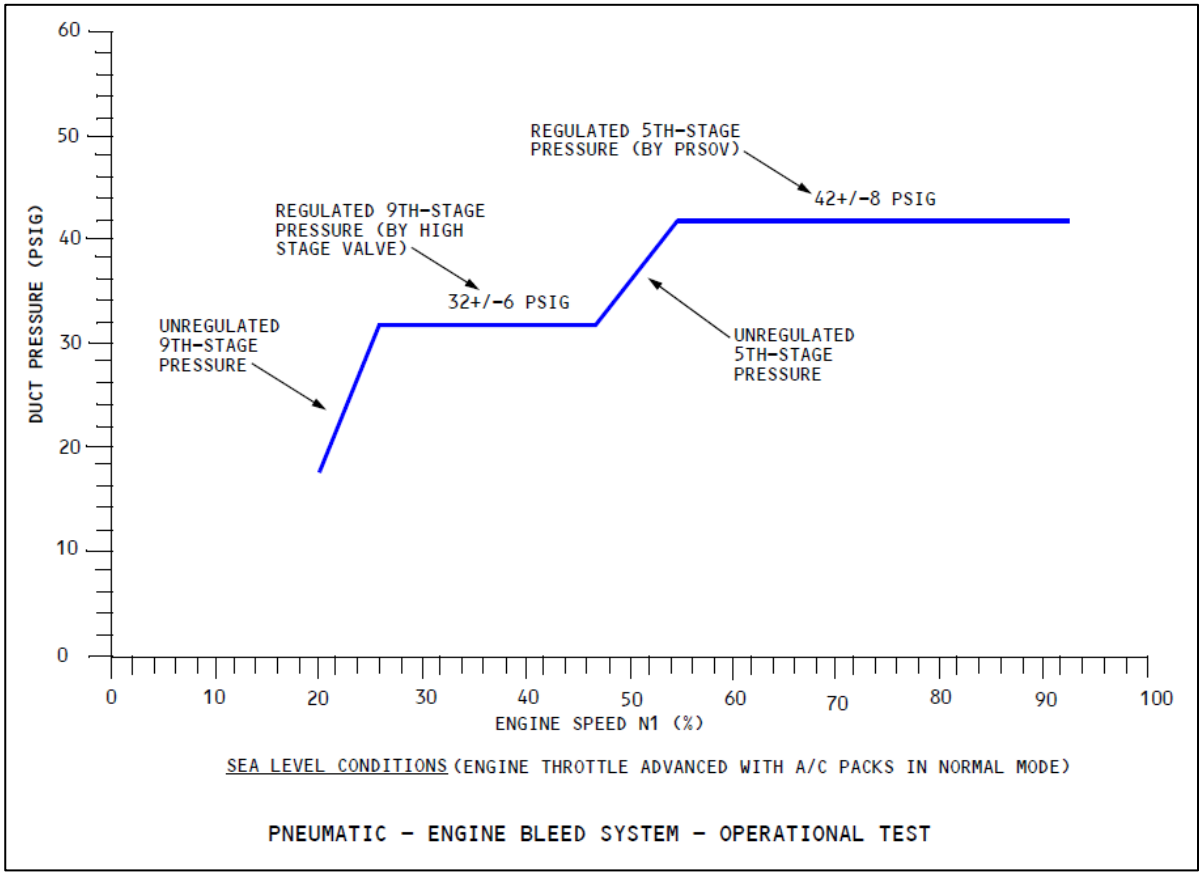


Figure 13: Engine Bleed Air Operation

Based on FIM 36-10 Support, during ground idle, the engine bleed pressure supplied by the HSV (9th-stage) is typically between 18-32 psig. During flight idle (with the throttle retarded), the engine bleed pressure supplied by the HSV ranges from 20-32 psig. The maintenance crew conducted a cabin leakage confirmation through a pressurisation test to verify that there were no leakage issues on the aircraft. The results of this test were satisfactory. Therefore, it was concluded that the cabin decompression was caused by an abnormality in the operation of the HSV during descent.

2.4 Decompression Event

MXD 1904 experienced an issue when the Engine No. 2 Bleed Trip Off light illuminated during climb, triggered by an over-temperature condition in the bleed air system. As the descent began, Engine No. 1 experienced a low bleed condition. The combination of the bleed trip in Engine No. 2 and the low bleed from Engine No. 1 resulted in an insufficient bleed air supply to the pack systems, disrupting the cabin pressurisation.

This insufficient bleed air supply caused the aircraft to struggle in maintaining the scheduled cabin pressure, which led to a rise in cabin altitude, triggering the Cabin Altitude Warning. Ultimately, this escalated into a decompression event. The flight crew promptly initiated an Emergency Descent Procedure.

2.5 Cabin Altitude Warning

The Cabin Altitude Warning was triggered when the aircraft was at an altitude of 21,055 feet MSL, remaining active until the aircraft descended to 9,207 feet MSL. Interviews with the flight crew revealed that, while they attempted to perform the Cabin Altitude Warning memory items, they found the cabin altitude uncontrollable. This prompted them to proceed with the emergency descent memory items.

There were some differences in how the crew executed the memory items due to adverse weather conditions, leading to an increase in airspeed from 245 knots to 280 knots, instead of adhering strictly to MMO/VMO. This deviation was necessary to manage the conditions more effectively.

The aircraft took five minutes and eight seconds from the activation of the Cabin Altitude Warning to reach a safe altitude, extinguishing the warning. This duration was well within the capability of the passenger oxygen system, which supplies oxygen for approximately 12 minutes. Therefore, the flight crew’s actions during the emergency descent were deemed safe.

3.0 CONCLUSION

3.1 Findings

The findings of this investigation should not be seen as assigning blame or liability to any specific organisation or individual. They highlight safety factors, events, and conditions that have increased risk, including contributing elements that, while not directly linked to the occurrence, are important for improving safety awareness. The report may also include additional findings relevant to the broader context.

3.1.1 Crew/Pilot

3.1.1.1 Both pilots were qualified and authorised to operate the flight in accordance with existing regulations.

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

3.1.1.3 The results of the urine drug panel screen were negative for substance abuse, and the blood alcohol screening test was within the prescribed limit.

3.1.1.4 There was no evidence suggesting that incapacitation or any physiological factors affected the performance of the flight crew.

3.1.1.5 The decision to continue the flight and divert to KCH was made by the flight crew in accordance with the Flight Operations Division – Operations Manual, Part A – General, Section 8.5.8.4, After Engine Start.

3.1.2 Aircraft

3.1.2.1 The aircraft was airworthy when cleared for the flight.

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

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

3.1.2.4 The cabin area and flight deck temperature were warm prior to take-off.

3.1.2.5 The passenger oxygen masks were deployed by the flight crew.

3.1.3 Aircraft Operator

3.1.3.1 The operator has proactively contacted Boeing for troubleshooting recommendations and preventive actions to reduce the risk of future incidents.

3.1.3.2 The operator's team, including QA, ARS, and TSE, assessed the aircraft at the Batam Aero Technic (BAT) hangar.

3.1.4 Flight Recorders

3.1.4.1 The 120-minute CVR recording was overwritten and did not provide any relevant information from the flight.

3.1.5 Maintenance

3.1.5.1 The loss of data records for cannibalised parts during the transition from TRAX to eMRO highlights gaps in data management, necessitating improved measures for record transfer.

3.1.5.2 Serviceability of HSV and HSR components is limited, with many undergoing repairs, which impacts maintenance delays and troubleshooting

3.1.5.3 The serious incident involving 9M-LCM was caused by a component defect.

3.2 Causes/Contributing Factors

The rapid decompression event was primarily attributed to malfunctions in the bleed air systems of both engines.

- On 9 February 2024, an Engine No. 2 Bleed Trip occurred during an idle run inspection, which led to the temporary replacement of the Bleed Air Regulator (BAR). However, persistent issues resurfaced during subsequent flights.

- On 13 February 2024, Engine No. 2 experienced a Bleed Trip during climb due to faults in the High-Stage Valve (HSV) and High-Stage Regulator (HSR). The HSV was prone to sticking in the open position, while the HSR's reverse flow diaphragm was leaking, compromising the system's ability to maintain cabin pressure.

- During descent, Engine No. 1 encountered a Low Bleed issue caused by a partially open HSV, restricting airflow and exacerbating the decompression.

- Cannibalised components, such as the Pressure Control Check Valve (PCCV) on Engine No. 2 sourced from donor aircraft PK-LDH, introduced further potential vulnerabilities.

The combination of these component failures across both engines under varying altitude and power conditions culminated in a loss of cabin pressurisation. The serious incident is classified as System/Component Failure or Malfunction (Non-Powerplant) **(SCF-NP)**.

4.0 SAFETY RECOMMENDATIOS

4.1 Immediate Safety Actions of Preliminary Report

4.1.1 The Preliminary Report for this serious incident, issued on 15 March 2024, included the following safety recommendations for pilots:

“Encouraging pilots to report any abnormalities or concerns regarding aircraft systems is essential, as it enables timely troubleshooting and intervention by maintenance teams. This proactive communication ensures that issues are addressed promptly, minimizing risks and maintaining the aircraft's airworthiness”

“Maintaining Situational Awareness: Pilots should maintain a high level of situational awareness during all phases of flight, particularly regarding aircraft systems and performance. Vigilance in monitoring cockpit instrumentation and responding promptly to any anomalies is critical for ensuring safe and efficient flight operations”

Based on these recommendations, the operator instructed pilots to remain vigilant, adhere to company procedures and relevant documentation, stay alert to abnormalities, communicate promptly, follow prescribed procedures, and prioritise safety to prevent accidents and incidents.

4.1.2 The Preliminary Report also included the following recommendations for the aircraft operator:

“Continual Improvement Culture: Foster a culture of continual improvement within the organization, encouraging pilots and maintenance personnel to actively participate in identifying areas for enhancement related to aircraft systems and operational procedures”

In response, the operator gathered feedback from staff and revised the Operational Manual (OM) to ensure alignment with correct operational procedures, while also seeking assistance from Boeing to provide troubleshooting recommendations and preventive measures to mitigate the risk of similar incidents in the future.

4.2 Safety Recommendations of this Report

The following safety recommendations are issued to the respective organisations to address the safety concerns identified in this investigation:

4.2.1 Aircraft Operator

It is recommended that the aircraft operator:

4.2.1.1 Establish a standardised procedure for conducting comprehensive aircraft acceptance assessments. These assessments should involve representatives from relevant departments to thoroughly evaluate all aspects of the aircraft's airworthiness. Any identified issues must be promptly documented and addressed to maintain operational safety.

4.2.1.2 Implement measures to ensure the accurate transfer of maintenance records during system transitions, such as from TRAX to eMRO. This should include establishing a regular auditing process to protect data integrity, particularly for cannibalised parts, ensuring compliance with airworthiness requirements.

4.2.1.3 Develop a strategy to enhance the availability of serviceable HSV and HSR components by expediting the repair process and improving spare parts inventory management in line with minimum stock level (MSL) requirements.

4.2.1 CAAM

It is recommended that CAAM:

4.2.2.1 Ensure operators' compliance with the provisions of CAD 8301, before issuing a Certificate of Airworthiness (CoA).

5.0 COMMENTS TO DRAFT FINAL REPORT AS REQUIRED BY ICAO ANNEX 13 PARAGRAPH 6.3

In accordance with ICAO Annex 13 paragraph 6.3, the Draft Final Report was sent to the State of Registry (CAAM), the State of Manufacture (NTSB), the Aircraft Operator and Maintenance (Batik Air Malaysia) inviting their significant and substantiated

comments on the report. The following are the status of the comments received:

Organisations	Status of Significant and Substantiated Comments
Civil Aviation Authority of Malaysia	Report accepted and no comments
NTSB	Report accepted and no comments
Batik Air Malaysia	Paragraph 1.6.2.12 – Comments accepted and amended accordingly

6.0 AAIB'S FEEDBACK AFTER COMMENTS RECEIVED FROM ORGANISATION ON THE DRAFT FINAL REPORT

6.1 AAIB'S Feedback

AAIB would like to thank all respective organisations that have provided responses and comments to the Draft Final Report. The concerted effort by all organisations in meeting the standard required in ICAO Annex 13, paragraph 6.3 is much appreciated.

To improve the standard of future comments to any Draft Final Report, AAIB would like to highlight and impress upon the organisation's concern (Batik Air Malaysia) on the importance of meeting the standard stated in paragraph 6.3, which is to provide significant and substantiated comments. Organisations are welcome to highlight and point out if the facts, analysis, or evidence in the investigation report are incorrect or inaccurate, by providing the correct factual statement and substantiating it with the proper evidence.

To further improve the process action after receiving the Final Report from AAIB and in accordance with ICAO Annex 13, paragraph 6.10, **organisations are to inform AAIB within ninety days of the date of transmittal correspondence of this Final Report, of the preventive action taken or under consideration, or reasons why no action will be taken on the safety recommendations received.** Organisations are also required to implement procedures to monitor the progress of the action taken in response to the safety recommendations received in accordance with ICAO Annex

13, paragraph 6.12.

CONCLUDING STATEMENT

This report presents the findings of the investigation into the serious incident involving 9M-LCM, with a primary focus on identifying safety factors and areas for improvement. It is emphasised that these findings and recommendations are not intended to assign blame or liability to any individual or organisation but to enhance safety and prevent recurrence. By addressing the identified issues and implementing the proposed recommendations, stakeholders can strengthen operational safety, improve system reliability, and uphold the highest standards of aviation safety.

Investigator-in-charge
Air Accident Investigation Bureau (AAIB)
Ministry of Transport Malaysia

Appendix A

CAAM/AW/8301-00 010719

PIHAK BERKUASA PENERBANGAN AWAM MALAYSIA
CIVIL AVIATION AUTHORITY OF MALAYSIA

PERAKUAN KESELAMATAN TERBANG
CERTIFICATE OF AIRWORTHINESS

Tanda-Tanda Kenegaraan dan Pendaftaran *Nationality and Registration Marks*	**Pembuat dan Nama Sebutan Kapal Udara** *Manufacturer and Manufacturer's Designation of Aircraft*	**Nombor Siri Kapal Udara** *Aircraft Serial Number*
9M-LCM	**THE BOEING COMPANY** **737-800**	**39840**

Kategori *Category* — **14 CFR PART 25 TRANSPORT CATEGORY AIRPLANES**

Perakuan Keselamatan Terbang ini dikeluarkan menurut Konvensyen Penerbangan Awam Antarabangsa bertarikh 7 Disember 1944 dan Akta Penerbangan Awam 1969 dan peraturan-peraturan yang dikeluarkan di bawahnya, untuk kapal udara yang tersebut di atas yang didapati layak untuk terbang jika disenggarai dan dikendalikan menurut peraturan peraturan yang tersebut, dan had-had penerbangan yang bersabit.

This Certificate of Airworthiness is issued pursuant to the Convention on International Civil Aviation dated 7 December 1944 and with the Civil Aviation Act 1969 and regulations issued thereunder, in respect of the above-mentioned aircraft, which is considered to be airworthy if maintained and operated in accordance with foregoing regulations and pertinent operating limitations.

Tarikh dikeluarkan *Date of issue* **09-Feb-2024**

Tarikh tamat tempoh *Date of expiry* **08-Feb-2025**

AIR 33
DATO' CAPT. NORAZMAN BIN MAHMUD
Pihak Berkuasa Penerbangan Awam Malaysia
Civil Aviation Authority of Malaysia

CIVIL AVIATION AUTHORITY OF MALAYSIA Airworthiness CAAM

Tiada apa-apa jua tulisan atau catatan boleh dibuat dalam Perakuan ini kecuali oleh Pihak Berkuasa Penerbangan Awam Malaysia.
No entries or endorsement may be made in this Certificate except by Civil Aviation Authority of Malaysia.

Appendix B

CAAM/AW/7101-00 250423

PIHAK BERKUASA PENERBANGAN AWAM MALAYSIA
CIVIL AVIATION AUTHORITY OF MALAYSIA

No. Perakuan *Certificate No.*
AR/2023/066

PERAKUAN PENDAFTARAN
CERTIFICATE OF REGISTRATION

1. **Tanda-Tanda Kenegaraan dan Pendaftaran** *Nationality and Registration Marks*	2. **Pembuat dan Nama Sebutan Kapal Udara** *Manufacturer and Manufacturer's Designation of Aircraft*	3. **Nombor Siri Kapal Udara** *Aircraft Serial Number*
9M-LCM	**THE BOEING COMPANY 737-800**	**39840**

4a. **Dikeluarkan Kepada:** *Issued To:* **MALINDO AIRWAYS SDN. BHD. DBA BATIK AIR**

Asas Pendaftaran: *Basis of Registration:*

- ☒ **Pemilikan Kapal Udara** *Ownership of Aircraft*
- ☐ **Pengendali Kapal Udara** *Operator of Aircraft*
- ☐ **Lain-lain (Nyatakan):** *Other (Explain):*

4b. **Alamat Pemegang Perakuan:** *Address of Certificate Holder:*
10TH FLOOR, MENARA HAP SENG
NO. 1 & 3, JALAN P. RAMLEE
50250
W.P. KUALA LUMPUR
MALAYSIA

5. **Nama dan Alamat Pemunya, Jika Berbeza dengan Pemegang Perakuan:** *Name and Address of Owner, If Different from Certificate Holder:*
BOC AVIATION LIMITED
79, ROBINSON ROAD,
#15-01
CAPITASKY
0688971
SINGAPORE

6. **Adalah dengan ini diperakui bahawa kapal udara yang diperihalkan di atas telah dimasukkan ke dalam Daftar Kapal Udara menurut Konvensyen Penerbangan Awam Antarabangsa bertarikh 7 Disember 1944 dan Akta Penerbangan Awam 1969, dan peraturan-peraturan yang dikeluarkan di bawahnya.**

It is hereby certified that the above described aircraft has been duly entered on the Aircraft Register in accordance with the Convention on International Civil Aviation dated 7 December 1944 and with the Civil Aviation Act 1969 and regulations issued thereunder.

AIR 10

DATO' CAPTAIN NORAZMAN BIN MAHMUD
b/p Pihak Berkuasa Penerbangan Awam Malaysia
for Civil Aviation Authority of Malaysia

Tarikh Dikeluarkan: *Date of Issue:* 07-DEC-2023

Tempoh Sah Laku: *Validity Period:* 07-DEC-2023 — 06-DEC-2026

7. **Catatan:** *Remarks:*
AIRCRAFT REGISTERED PURSUANT TO REGULATION 6(4) OF CIVIL AVIATION REGULATIONS 2016.
AIRCRAFT LEASE EXPIRES ON 28-FEB-2035.

Tiada apa-apa jua tulisan atau catatan boleh dibuat dalam Perakuan ini kecuali oleh Pihak Berkuasa Penerbangan Awam Malaysia
No entries or endorsement may be made in this Certificate except by Civil Aviation Authority of Malaysia

Appendix C

SEQUENCES OF BLEED TRIP EVENT

No	Date	AJL	Aircraft Status	Defect	Action
1.	8 Feb 24	A670321	Maintenance	During EGR for Active Storage maintenance Step G, found No 2 “Bleed Trip off Light Illuminated" Hard On.	Carried out closed troubleshooting as per FIM 36-10 Task 801 Rev 82 15 Oct 2023. Faulted Bleed Air Regulator. Component replaced as per AMM 36-11-03 Rev 82 15 Oct 2023. Operational test carried out found satisfactory. Nil bleed trip off light illuminate
2.	10 Feb 24	A670326	Maintenance	Airplane back to serviceable condition after Active Storage	Task carried out as per EO-2020-B737-MLI-038 Rev 09 satisfactory
3.	13 Feb 24	A670328	PIREP (KUL-KCH)	Right Bleed Trip Off Illuminate on Climb	Write AJL A670337 (1&2) 450F KUL DMI B66716 close thermostat and 390F Precooler valve Sensor replaced. EGR carried out at various thrust setting found satisfactory with nil Bleed trip condition. Engine Bleed Air Crossover operational test performed found satisfactory. All bleed system components tested found satisfactory. Ref: FIM 36-10 Task 809, AMM 36-11-00, AMM 36-11-05, AMM 36-12-03 Rev 82 Oct 23.
4.	14 Feb 24	A670329	PIREP (KUL-KCH)	Rapid decompression event. Emergency descent event and oxygen passenger deployed	Cabin pressurisation KCH closed conditional inspection carried out as per AMM 05-51-81 Rev 82 dated 15 Oct 2023 found nil abnormalities. EGR carried out as per AMM 71-00-00 Rev 82 for confidence check on the bleed system found #1 engine bleed low on idle power. Refer to AJL A670331 (1) for troubleshooting. Refer to AJL A670331 (2) for oxygen passenger deployed.

5.	15 Feb 24	A670331	KCH	Continue troubleshooting refer A670329, Eng #1 bleed low on idle	Health check valve carried out as per AMM 36-11-00-710-803 Rev 82, dated 15 Oct 2023, found valve does not return to closed position when operated manually. HSV replaced as per AMM-36-11-06 Rev 82 and EGR carried out as per AMM 71-00-00 Rev 82 found Engine No 1 bleed satisfactory on idle power
6.	15 Feb 24	A670333	KCH	Continue troubleshooting refer A670329, Eng #1 bleed low on idle	Troubleshooting carried out as per FIM Task 36-10 Task 809 Rev 82 dated 15 Oct 23 found PCCV does not full open. PCCV replaced as per AMM 36-12-02 Rev 82. DMI updated crew to monitor further.
7.	16 Feb 24	A670335	PIREP (KCH-KUL)	Right bleed trip off during cruise	Info noted. DMI B66716 closed updated
8.	16 Feb 24	A670336	Maintenance	Write DMI B66716, to troubleshoot right bleed trip off illuminated on climb	Troubleshooting carried out and closed out as per FIM 36-10 Task 809 Rev 82 Oct 23. DMI updated. Suspected 390F and 450F sensor faulty
9.	17 Feb 24	A670337	Maintenance	Write DMI B66716 to carry out troubleshooting for right bleed trip off illuminate on climb	Troubleshooting carried out on bleed health check found bleed air regulator, PRSOV, PCCV found normal operation. HSR and HSV found with failed operational test. DMI updated due to nil spare
10.	17 Feb 24	A670337	Maintenance	To continue troubleshooting from DMI A670337 No 1.	Troubleshooting carried out found 450F thermostat replaced as per AMM 36-11-05 Rev 82 15 Oct 23 and PCCV sensor replaced as per AMM 36-12-03 Rev 92 15 Oct 23. Leak check carried out found satisfactory
11.	18 Feb 24	A670340	Maintenance	Right bleed trip off light illuminate after take-off (KUL-PEN)	Troubleshooting carried out as per FIM 36-10 Task 801 Rev 82. Right bleed trip off light able to reset and extinguished and found satisfactory

12.	18 Feb 24	A670341	PIREP	Right hand bleed trip off light illuminate after take-off (PEN-KUL)	DMI raised B66720
13.	18 Feb 24	A670341	PIREP	Flight deck and cabin extremely hot at temperature control selected max cold supply duct temp for control cabin 18C, Forward 34C,Aft 34, passenger cabin forward 34.	Bite test carried out found nil fault. Air conditioning operational test carried out satisfactory and able to control temperature refer AMM 21-00-00 and AMM 21-61-00
14.	18 Feb 24	A670343	Maintenance	Refer DMI B66720. To carried out the Engine No 2 PRSOV bleed health check	Performed Engine No 2 PRSOV bleed health check found PRSOV move to open with the control pressure 5 PSI, perform measurement of the control pressure of the BAR. Found control pressure from BAR 28 PSI with supply pressure at 70 PSI found satisfactory. Refer FIM 36-11-00 rev 82.
15.	18 Feb 24	A670343	Maintenance	Refer DMI B66720, to carry out the Engine No 2 HSR and HSV bleed health check	Performed Engine No 2 HSV bleed health check found HSV move to open with the control pressure 8 PSI, perform measurement of the control pressure of the HSR found control pressure from HSR 28 PSI with supply pressure at 75 PSI found satisfactory. Refer FIM 36-11-00 Rev 82
16.	18 Feb 24	A670344	Maintenance	During carried out the reverse flow diagram in the HSR, found air bubbles present around sense line at the downstream pressure port	Perform bleed health check on HSR suspect HSR faulty. HSV lock to closed position. Refer AMM 36-11-00 Rev 82.

17.	18 Feb 24	A670344	Maintenance	Refer AJL 670344 item no 1, to carry out high engine run on engine no 2 for defect rectification	Performed high engine run on engine no 2 as per AMM 71-00-00 Rev 82 found bleed trip off illuminate with N1 95% defect persist.
18.	19 Feb 24	A670345	Maintenance	Write DMI b66720 to remove #2 engine high stage valve for butterfly valve inspection	#2 engine high stage valve K102 closed removed. Butterfly valve inspected found dirty with debris. Butterfly valve cleaned and manually cycled found satisfactory
19.	19 Feb 24	A670345	Maintenance	To reinstall # engine high stage valve	#2 Engine HSV K102 closed reinstalled as per AMM 36-11-00 Rev 82. Post installation operational test found satisfactory and HSV working normally.
20.	19 Feb 24	A670346	Maintenance	Refer DMI b66720 right hand bleed trip off illuminate after take off	Engine #1 490F overtemperature switch swapped for evaluation both switches cleaned refer AMM 36-11-08 Rev 82 dated 15 Oct 23. Installation check found satisfactory. Please refer to DMI B66720 for further action.
21.	20 Feb 24	A670347	TEST FLIGHT	Duct pressure bleed: Climb: 30PSI, cruise: 40PSI, Descent: 20 PSI	Duct pressure issue closed as per AMM 36-11-00 Rev 82 dated 15 Oct 23 and found satisfactory.
22.	21 Feb 24	A683702	PIREP (KCH-KUL)	Right bleed trip off light illuminated after take-off. Manage to Reset.	Write AJL A683703 (1). EGR carried out with ACAU in swapped position. Nil bleed light observed. System working accordingly
23.	22 Feb 24	A683703	Maintenance	Write AJLA683702 item no 1. To continue troubleshooting on high stage valve	Performed as per FIM 36-10 Task 801 Rev 82 dated 15 Oct 23. Found HSV sticky. HSV replacement carried out as per AMM36-11-06 Rev 82 dated 15 Oct 23. Operational test carried out found satisfactory. Leak check carried out found satisfactory.

24.	22 Feb 24	A683705	Maintenance	Write AJL 683702 item No 1, to continue troubleshooting on HSV	Perform as per FIM 36-11 Task 801 rev 82 dated 15 Oct 23 found HSV regulator faulty. High stage valve regulator replaced as per AMM 36-11-07 Rev 82 dated 15 Oct 23. Operational test found satisfactory. Leak check carried out found satisfactory.

Appendix D

1. Approving Civil Aviation Authority/Country: **FAA/United States**

2. **AUTHORIZED RELEASE CERTIFICATE**
FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG

3. Form Tracking Number:
20240014777059Y15
349635635

4. Organization Name and Address: Honeywell International Inc
1944 E Sky Harbor Circle
PHOENIX AZ 85034
Repair Station
ZN3R030M

5. Work Order/Contract/Invoice Number:
RO 1838684
349560155
Page 1 of 1

6.Item:	7. Description:	8. Part Number:	9. Quantity:	10. Serial Number:	11. Status / Work:
001	VALVE OUTLINE, PRECOOLER CONTROL, 4.0 IN	63292146-1	1	9262	REPAIRED

12. Remarks:

THE SERVICE SPECIFIED HAS BEEN ACCOMPLISHED IN ACCORDANCE WITH:
CMM 36-00-01 Rev 3, OCT/07/2019

	HH.DD	(HH:MM)
CSN	3161.00	
CSO	3161.00	
CSR	0.00	
TSN	5253.68	(5253:41)
TSO	5253.68	(5253:41)

TEXT CONTINUED ON RIGHT SIDE

CONTINUED:

	HH.DD	(HH:MM)
TSR	0.00	(0:00)

SEE ATTACHED DOCUMENTS AS APPLICABLE FOR WORK PERFORMED
CERTIFIES THAT THE WORK SPECIFIED IN BLOCK 11/12 WAS CARRIED OUT IN ACCORDANCE WITH EASA PART 145 AND IN RESPECT TO THAT WORK THE COMPONENT IS CONSIDERED READY FOR RELEASE TO SERVICE UNDER EASA PART 145 APPROVAL NO. EASA 145.4136

13a. Certifies the items identified above were manufactured in conformity to:
☐ Approved design data and are in a condition for safe operation.
☐ Non-approved design data specified in Block 12.

14a. ☒ 14 CFR 43.9 Return to Service ☒ Other regulation specified in Block 12
Certifies that unless otherwise specified in Block 12, the work identified in Block 11 and described in Block 12 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

13b. Authorized Signature:	13c. Approval/Authorization No.:	14b. Authorized Signature:	14c. Approval/Certificate No.:
		GLH	ZN3R030M
13d. Name (Typed or Printed):	**13e. Date(dd/mmm/yyyy):**	**14d. Name (Typed or Printed):**	**14e. Date(dd/mmm/yyyy):**
		Grover L. Heath Jr.	27/APR/2024

User / Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the aircraft engine/propeller/article. Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block1, it is essential that the user/installer ensures that his/her airworthiness authority accepts aircraft engine(s)/propeller(s)/article(s) from the airworthiness authority of the country specified in Block1. Statements in Blocks 13a and 14a do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

FAA FORM 8130 - 3 (02-14) NSN : 0052 - 00 - 012 - 9005

Tempe - West Warner Road
Honeywell International Inc
Ph: 602-365-3099
1300 West Warner Road
Date:27 APR 2024

Commercial

Honeywell

Repair Station # ZN3R030M

Initial Findings Report

Repair Order: 2024-349560155-001
349635635
Customer: 61013 MALINDO AIRWAYS SDN BHD
Customer P/O: RO 1838684

Orig Cust:
Part Number: 63292146-1
Part Desc: VALVE OUTLINE, PRECOOLER CONTROL, 4.0 IN
Serial No: 9262
Mods: N/A
Series/Issue/Amdts: 2
Quantity: 1
Aircraft tail#: 9M-LCM
Aircraft S/N#: UNK
Date on:
Received Date: 11 MAR 2024
Date off:
Model #:
Engine S/N:
Alternate S/N:

TIMES/CYCLES	*HH.DD*	*(HH:MM)*		
Time Since New:	5253.68	(5253:41)	Cycles Since New:	3161.00
Time Since Overhaul:	5253.68	(5253:41)	Cycles Since Overhaul:	3161.00
Time Since Repair:			Cycles Since Repair:	
Time Since Installation:			Cycles Since Installation:	

CUSTOMER REASON FOR RETURN

VALVE DOES NOT FULL OPEN DURING INSPECTION

GENERAL CONDITION AS RECEIVED (HIDDEN DAMAGE)

Condition Received Text
UNIT RECIEVED WITH MINOR DINGS AND SCRATCHES. DEEP INDENTATION ON VALVE BODY MOUNING HOLE. PREVIOUS FT DATE IS NOV/22/2019. P. JONES MAR/20/2024. UNIT CHECK BY MIGUEL AGUILAR 03/21/2024

Reason for return code FAILED TO FULLY OPEN

Removal Type Unscheduled

DETAIL DISASSEMBLY / EVALUATION FINDINGS

Failure Description:

Findings:
DIAPHRAGM LEAKAGE

Related Area:
Non-conformance: NO CODE AVAILABLE, SEE COMMENTS:
Recurrent Failure:

Failed Part	Part Name	Condition:	Primary Failure
63002821-5	ASSEMBLY, DIAPHRAGM	100% upon Removal	Yes
880500-32	SEAL, SHAFT	100% upon Removal	No - but contributing
858886-42	DIAPHRAGM ASSEMBLY	100% upon Removal	No - but contributing
118824	BEARING, BALL, ANNULAR	100% upon Removal	No - but contributing
118824	BEARING, BALL, ANNULAR	100% upon Removal	No - but contributing
63002777-3	BODY, VALVE, 4.0 INCH DIAMETER	Chaffing	No - but contributing
63003524-1	GUIDE, SPRING, OUTER	Grooved	No - but contributing
63002983-2	POPPET	Worn	No - but contributing
63002263-1	PROBE, VALVE	Worn	No - but contributing

SERVICE BULLETINS / AUTHORIZING DOCUMENTS

Authorizing Technical Document

Complied With:
Doc#: OSI CATMP/21/0178 Rev: - Date: 07/30/2021
Doc#: EQUIVALENT TOOLING INDEX Rev: - Date: 05/01/2022
Doc#: CMM 36-00-01 Rev: 3 Date: 10/07/2019

Page : 1 of 2

Tempe - West Warner Road
Honeywell International Inc
Ph: 602-365-3099
1300 West Warner Road
Date:27 APR 2024

Honeywell

Commercial

Repair Station # ZN3R030M

Configuration And Findings Evaluation

Repair Order: 2024-349560155-001
349635635
Customer: 61013 MALINDO AIRWAYS SDN BHD
Customer P/O: RO 1838684
Orig Cust:
Part Number: 63292146-1
Part Desc: VALVE OUTLINE, PRECOOLER CONTROL, 4.0 IN
Serial No: 9262
Mods: N/A
Series/Issue/Amdts: 2
Quantity 1
Ship Date:
Received Date: 11 MAR 2024

Previously Complied With:
Doc#: SB 63292146-36-0001 Rev: 2 Date: 09/18/2019

WORK PERFORMED / COMMENTS TO CUSTOMER

Workscope Performed / Summary of Actions Taken

UNIT DISASSEMBLED AND CLEANED. ALL WORK PERFORMED PER THE AUTHORIZING DOCUMENTS. P. JONES MAR/21/2024. UNIT CHECK BY MIGUEL AGUILAR 03/21/2024
63292146-36-0001 PREVIOUSLY COMPLIED WITH. BODY VALVE CHAFFING. DIAPHRAGM ASSEMBLY DAMAGE. PROBE, POPPET WORN. BEARING OUT OF LIMITS. SPRING GUIDE GROOVED.PARTS ANALYZED AND ORDERED FOR REPAIR IAW AUTH DOCS. C. MADSEN. MAR/28/2024.
UNIT ASSEMBLED I.A.W. AUTHORIZING DOCUMENTS. OVERINSPECTED - J.DUFERN 4/2/2024
PASSED FINAL TEST PER AUTH DOCS WAYNE BIGBEE 04/03/2024
PREP PER AUTH DOCS R. TUBADEZA 4/3/2024
FINAL INSPECTION COMPLETE. G.HEATH E078594 DTD APR/27/2024.

Action Taken Code	Repaired
Customer Confirmed Removal Reason:	Yes
Evaluation Type	Evaluated - Minor Fault Found

FINAL CONFIGURATION
Part No: 63292146-1
S/N: 9262
Series/Issues/Amdts: 2
Mods: N/A

MECHANIC/ANALYST Connor Madsen

DATE: 29 MAR 2024

Page : 2 of 2

APR 03 2024

Honeywell

COMPONENT MAINTENANCE MANUAL
63292146

UNIT SERIAL NUMBER 9262
TEST DATE 4/3/24
INSTRUMENTATION ACCEPT ✓
AMBIENT PRESSURE 28.9 inHg ABS
RELATIVE HUMIDITY 32.0 %

PART 63292146-1
TECHNICIAN(S) W Bigbee
AMBIENT TEMPERATURE 74.0 °F

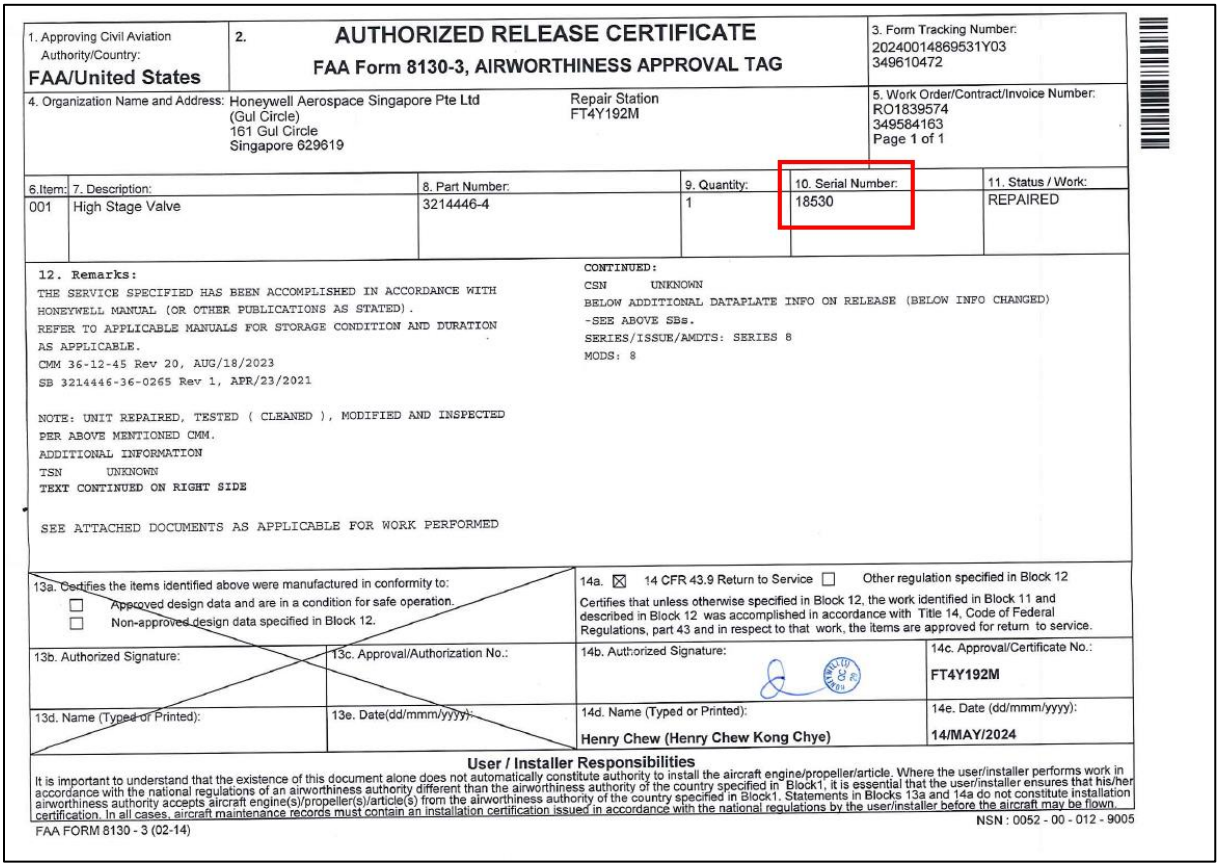
Test	Requirement	Actual Value (Units of measure indicated in Requirement box)	Accept (✓)
Proof Pressure			
Servo and flowbody	No evidence of deformation or deterioration.		✓
Butterfly	No evidence of deformation or deterioration.		✓
Port Leakage			
Port Leakage	9.5 to 10.5 LBMIN	NA	
Alternate Port Leakage	0.045 IN. (1.14 MM) MAX	0.045	✓
Functional (Bench Check)			
Valve 1: Supply pressure 95±2 PSIG, orifice size 0.035 IN.	Butterfly plate position from the closed position 5 to 15 degree	10.8	
Valve 2: Supply pressure 95±2 PSIG, orifice size 0.063 IN.	Butterfly plate position from the closed position 30 to 50 degree	H = 36.0	
Valve 3: Supply pressure 95±2 PSIG, orifice size 0.092 IN.	Butterfly plate position from the closed position greater than 70 degree	72.0	
Valve 4: Supply pressure 95±2 PSIG, orifice size 0.110 IN.	Butterfly plate position from full closed position greater than 70 degree		✓
Valve 2: Supply pressure 95±2 PSIG, orifice size 0.063 IN.	Record Only - degree	J = 42.0	
Butterfly Plate Position: J-H	11° MAX	K = 6.0	
Supply port pressure of 12±2 PSIG, no inlet pressure	Butterfly plate position from the closed position is 2 degree from full closed		✓
Case Leakage (including cooling flow)			
With cooling flow	0.65 LBMIN MAX	0.45	✓
Without cooling flow	0.18 LBMIN MAX	0.03	✓
Manual Override Wrenching (Bench Check)			
Hex rotated CW approx. 90°	Butterfly closes fully	closes @ 90°	✓
Hex rotated CCW approx. 90°	Butterfly opens fully	opens @ 90°	✓
Pneumatic Lockout Bench Check			
Pneumatic Lock Engaged: Valve position	Valve remains in Full Open Position		✓
Pneumatic Lock Disengaged (Normal Operating Condition: Valve position	Valve moves to and remains in Full Closed Position		✓

UNIT ACCEPT (FT Stamp) _____

ICN-59364-0000726126-001-01

Figure 1003. (Sheet 1 of 1) Test Data Sheet (GRAPHIC 36-00-01-99B-807-A01)

Appendix E



1. Approving Civil Aviation Authority/Country: **FAA/United States**

2. **AUTHORIZED RELEASE CERTIFICATE**
FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG

3. Form Tracking Number:
20240014869531Y03
349610472

4. Organization Name and Address: Honeywell Aerospace Singapore Pte Ltd
(Gul Circle)
161 Gul Circle
Singapore 629619

Repair Station
FT4Y192M

5. Work Order/Contract/Invoice Number:
RO1839574
349584163
Page 1 of 1

6.Item:	7. Description:	8. Part Number:	9. Quantity:	10. Serial Number:	11. Status / Work:
001	High Stage Valve	3214446-4	1	18530	REPAIRED

12. Remarks:
THE SERVICE SPECIFIED HAS BEEN ACCOMPLISHED IN ACCORDANCE WITH HONEYWELL MANUAL (OR OTHER PUBLICATIONS AS STATED).
REFER TO APPLICABLE MANUALS FOR STORAGE CONDITION AND DURATION AS APPLICABLE.
CMM 36-12-45 Rev 20, AUG/18/2023
SB 3214446-36-0265 Rev 1, APR/23/2021

NOTE: UNIT REPAIRED, TESTED (CLEANED), MODIFIED AND INSPECTED PER ABOVE MENTIONED CMM.
ADDITIONAL INFORMATION
TSN UNKNOWN
TEXT CONTINUED ON RIGHT SIDE

SEE ATTACHED DOCUMENTS AS APPLICABLE FOR WORK PERFORMED

CONTINUED:
CSN UNKNOWN
BELOW ADDITIONAL DATAPLATE INFO ON RELEASE (BELOW INFO CHANGED)
-SEE ABOVE SBs.
SERIES/ISSUE/AMDTS: SERIES 8
MODS: 8

13a. Certifies the items identified above were manufactured in conformity to:
☐ Approved design data and are in a condition for safe operation.
☐ Non-approved design data specified in Block 12.

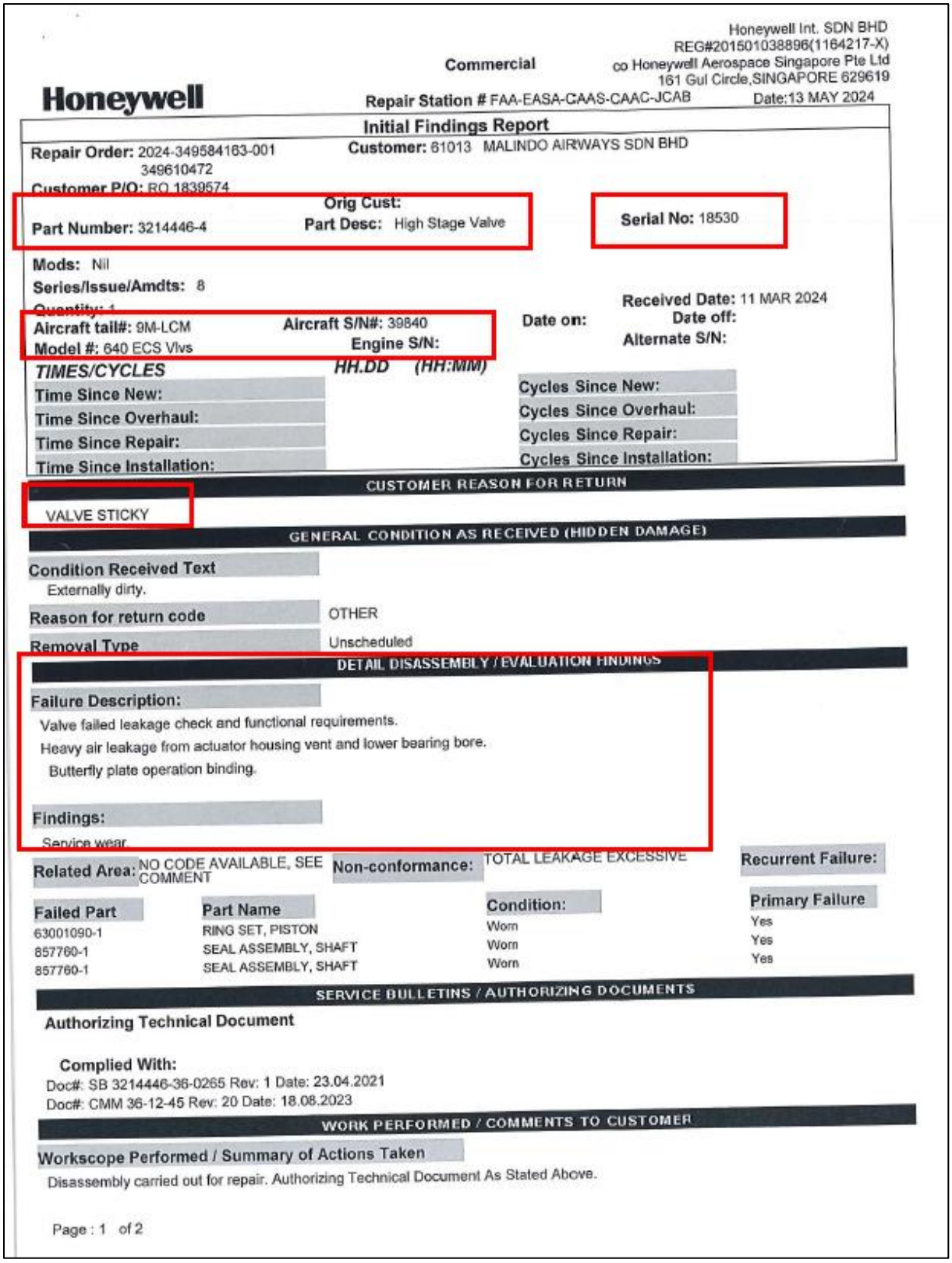
14a. ☒ 14 CFR 43.9 Return to Service ☐ Other regulation specified in Block 12
Certifies that unless otherwise specified in Block 12, the work identified in Block 11 and described in Block 12 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

13b. Authorized Signature:	13c. Approval/Authorization No.:	14b. Authorized Signature:	14c. Approval/Certificate No.:
			FT4Y192M
13d. Name (Typed or Printed):	13e. Date(dd/mmm/yyyy):	14d. Name (Typed or Printed):	14e. Date (dd/mmm/yyyy):
		Henry Chew (Henry Chew Kong Chye)	14/MAY/2024

User / Installer Responsibilities
It is important to understand that the existence of this document alone does not automatically constitute authority to install the aircraft engine/propeller/article. Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block1, it is essential that the user/installer ensures that his/her airworthiness authority accepts aircraft engine(s)/propeller(s)/article(s) from the airworthiness authority of the country specified in Block1. Statements in Blocks 13a and 14a do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

FAA FORM 8130 - 3 (02-14)

NSN : 0052 - 00 - 012 - 9005



Honeywell Int. SDN BHD
REG#201501038896(1164217-X)
c/o Honeywell Aerospace Singapore Pte Ltd
161 Gul Circle,SINGAPORE 629619

Commercial

Honeywell

Repair Station # FAA-EASA-CAAS-CAAC-JCAB Date:13 MAY 2024

Initial Findings Report

Repair Order: 2024-349584163-001
349610472
Customer P/O: RO 1839574

Customer: 61013 MALINDO AIRWAYS SDN BHD

Orig Cust:
Part Number: 3214446-4 **Part Desc:** High Stage Valve

Serial No: 18530

Mods: Nil
Series/Issue/Amdts: 8
Quantity: 1

Aircraft tail#: 9M-LCM **Aircraft S/N#:** 39840
Model #: 640 ECS Vlvs **Engine S/N:**

Date on: **Received Date:** 11 MAR 2024
Date off:
Alternate S/N:

TIMES/CYCLES	*HH.DD (HH:MM)*		
Time Since New:		Cycles Since New:	
Time Since Overhaul:		Cycles Since Overhaul:	
Time Since Repair:		Cycles Since Repair:	
Time Since Installation:		Cycles Since Installation:	

CUSTOMER REASON FOR RETURN

VALVE STICKY

GENERAL CONDITION AS RECEIVED (HIDDEN DAMAGE)

Condition Received Text
Externally dirty.

Reason for return code OTHER

Removal Type Unscheduled

DETAIL DISASSEMBLY / EVALUATION FINDINGS

Failure Description:
Valve failed leakage check and functional requirements.
Heavy air leakage from actuator housing vent and lower bearing bore.
Butterfly plate operation binding.

Findings:
Service wear.

Related Area: NO CODE AVAILABLE, SEE COMMENT **Non-conformance:** TOTAL LEAKAGE EXCESSIVE **Recurrent Failure:**

Failed Part	Part Name	Condition:	Primary Failure
63001090-1	RING SET, PISTON	Worn	Yes
857760-1	SEAL ASSEMBLY, SHAFT	Worn	Yes
857760-1	SEAL ASSEMBLY, SHAFT	Worn	Yes

SERVICE BULLETINS / AUTHORIZING DOCUMENTS

Authorizing Technical Document

Complied With:
Doc#: SB 3214446-36-0265 Rev: 1 Date: 23.04.2021
Doc#: CMM 36-12-45 Rev: 20 Date: 18.08.2023

WORK PERFORMED / COMMENTS TO CUSTOMER

Workscope Performed / Summary of Actions Taken
Disassembly carried out for repair. Authorizing Technical Document As Stated Above.

Page : 1 of 2

Honeywell Int. SDN BHD
REG#201501038896(1164217-X)
c/o Honeywell Aerospace Singapore Pte Ltd
161 Gul Circle,SINGAPORE 629619

Honeywell

Commercial

Repair Station # FAA-EASA-CAAS-CAAC-JCAB Date:13 MAY 2024

Configuration And Findings Evaluation

Repair Order: 2024-349584163-001
349610472
Customer P/O: RO 1839574

Customer: 61013 MALINDO AIRWAYS SDN BHD

Orig Cust:

Part Number: 3214446-4 **Part Desc:** High Stage Valve **Serial No:** 18530

Mods: Nil
Series/Issue/Amdts: 8
Quantity 1 **Ship Date:** **Received Date:** 11 MAR 2024

Comply SB 3214446-36-0265 on attrition basis. Add '8' adjacent to Mod Record.

Action Taken Code	Repaired
Customer Confirmed Removal Reason:	Yes
Evaluation Type	Evaluated - Significant Fault Found

FINAL CONFIGURATION
Part No: 3214446-4

S/N: 18530

Series/Issues/Amdts: SERIES 8

Mods: 8

MECHANIC/ANALYST Tah Wing Yong **DATE: 09 APR 2024**

Page : 2 of 2

ANALYTICAL CHECK SHEET FORM

Honeywell

Repair Facility :Honeywell Int. SDN BHD
REG#201501038896(1164217-X)
c/o Honeywell Aerospace S ngapore Pte Ltd
161 Gul Circle,SINGAPORE 629619

Customer PO : RO 1839574
Notification No: 000349584163
Outline No : 3214446-4
Mod To Outline. :3214446-4

Customer : 61013 MALINDO AIRWAYS SDN BHD
Service Order No : 5018370532 **Sales Order No :** 551947206
Serial No: 18530
Mod to S/N : 18530 **Model No. :** 640 ECS Vlvs

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	3214446-4	18530	M	0	High Stage Valve	5018370532
OUT	3214446-4	18530	M			

REWORK CODE : 200
CONDITION CODE : ABH TOTAL LEAKAGE EXCESSIVE **ACCT IND :**

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.3172186-1		N	1	TUBE ASSY, METAL	
OUT	3172186-1		N			

REWORK CODE :
CONDITION CODE : 3600 Deformed **ACCT IND :**

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.3172185-1		R	1	COVER, ACTUATOR	5018437267
OUT	3172185-1		R			

REWORK CODE : 401
CONDITION CODE : 1020 Surface finish **ACCT IND :**

ANALYST REMARKS :
401,,1_CLN UP PISTON BORE DIA B,,,,

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.3171540-2		R	1	COVER, ACTUATOR	5018437268
OUT	3171540-2		R			

REWORK CODE : 417
CONDITION CODE : 1020 Surface finish **ACCT IND :**

ANALYST REMARKS :
417,,2_CLN UP PISTON BORE,,,,

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.3176987-1		N	1	RING SET, GUIDE	
OUT	3176987-1		N			

REWORK CODE :
CONDITION CODE : 6780 Worn **ACCT IND :**

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.63001090-1		N	1	RING SET, PISTON	
OUT	3176986-2		N			

REWORK CODE :
CONDITION CODE : 6780 Worn **ACCT IND :** 47 Service Bulletin Part

ANALYST REMARKS :

Print Date : 13.05.2024

ANALYTICAL CHECK SHEET FORM

Honeywell

Repair Facility :Honeywell Int. SDN BHD
REG#201501038896(1164217-X)
co Honeywell Aerospace S ngapore Pte Ltd
161 Gul Circle,SINGAPORE 629619

Customer PO : RO 1839574
Notification No: 000349584163
Outline No : 3214446-4
Mod To Outline. :3214446-4

Customer : 61013 MALINDO AIRWAYS SDN BHD
Service Order No : 5018370532 **Sales Order No :** 551947206
Serial No: 18530
Mod to S/N : 18530 **Model No. :** 640 ECS Vlvs

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.3174547-3		R	1	PISTON ASSY, ACTUATOR	5018437269
OUT	3174547-3		R			

REWORK CODE : 422
CONDITION CODE : 1020 Surface finish ACCT IND :

ANALYST REMARKS :
422,,1/2/3_PISTON GROOVE,,,,

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.3177253-1		N	1	RING SET,GUIDE	
OUT	3177253-1		N			

REWORK CODE :
CONDITION CODE : 6780 Worn ACCT IND :

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.3176985-1		N	1	RING SET, PISTON	
OUT	3176985-1		N			

REWORK CODE :
CONDITION CODE : 6780 Worn ACCT IND :

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.MS20427F4-4		N	1	RIVET, SOLID, 100 DEGREE COUNTERSUNK HEA	
OUT	MS20427F4-4		N			

REWORK CODE :
CONDITION CODE : 100% Replacement as Required ACCT IND :

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.857760-1		N	1	SEAL ASSEMBLY, SHAFT	
OUT	857760-1		N			

REWORK CODE :
CONDITION CODE : 6780 Worn ACCT IND :

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.358474-1		N	1	BEARING, BALL, ANNULAR	
OUT	358474-1		N			

REWORK CODE :
CONDITION CODE : 3550 Corrosion/Corroded ACCT IND :

ANALYST REMARKS :

Print Date : 13.05.2024

ANALYTICAL CHECK SHEET FORM

Honeywell

Repair Facility :Honeywell Int. SDN BHD
REG#201501038896(1164217-X)
co Honeywell Aerospace Singapore Pte Ltd
161 Gul Circle,SINGAPORE 629619

Customer PO : RO 1839574
Notification No: 000349584163
Outline No : 3214446-4
Mod To Outline. :3214446-4

Customer : 61013 MALINDO AIRWAYS SDN BHD
Service Order No : 5018370532 **Sales Order No :** 551947206
Serial No: 18530
Mod to S/N : 18530 **Model No. :** 640 ECS Vlvs

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.857760-1		N	1	SEAL ASSEMBLY, SHAFT	
OUT	857760-1		N			

REWORK CODE :
CONDITION CODE : 6780 Worn ACCT IND :

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.362-580-9006		N	1	GASKET MTLC	
OUT	362-580-9006		N			

REWORK CODE :
CONDITION CODE : 6780 Worn ACCT IND :

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.967070-23		N	1	VALVE ASSY, RELIEF	
OUT	967070-23		N			

REWORK CODE :
CONDITION CODE : 2500 Leaking ACCT IND :

ANALYST REMARKS :

	Material	Serial No.	Disp	Qty	Description	Service Order #
IN	.859989-76		N	1	RING, PISTON	
OUT	859989-76		N			

REWORK CODE :
CONDITION CODE : 6780 Worn ACCT IND :

ANALYST REMARKS :

Print Date : 13.05.2024

Appendix F

FROM: THE BOEING COMPANY
TO: Batik Air Malaysia (MLO)
[MESSAGE NUMBER:MLO-MLO-24-0134-02B] Boeing Response
MESSAGE DATE: 14-Feb-2024 00:30 (GMT-08:00) Pacific Standard Time (America/Los_Angeles) / 14-Feb-2024 08:30 (GMT)

==========

This message is sent to the following:
Mohamad Nizam Rahmat, Batik Air Malaysia
Shathasivam Parumasivam, Batik Air Malaysia
Muhammad Safuan Kamaruzzaman, Batik Air Malaysia
Afif Azhar, Batik Air Malaysia
Nur Azlina Rasdi, Batik Air Malaysia

PRIORITY: AOG
ACCOUNT: Batik Air Malaysia (MLO)
DUE DATE: No Action Required
FIELD BASE: BFSKUL-MLO-Kuala Lumpur-Malaysia
PRODUCT TYPE: Airplane
PRODUCT LINE: 737
PRODUCT: 737-800
ATA: 2100
SERVICE CATEGORY: Airplane Repair
REPAIR APPROVAL: No

AIRPLANE(S):

Airplane - 1
REGISTRY NUMBER: 9M-LCM
VARIABLE NUMBER: YV311
SERIAL NUMBER: 39840
HOURS/CYCLES: 18151/9013
WINGLETS: Blended

SUBJECT: MSN 39840 - AIRCRAFT CABIN DECOMPRESSION

REFERENCES:
/A/ MLO-MLO-24-0134-01C
/B/ 737-SL-21-045-G

/C/ 737 MT 36-005
/D/ 737 MT 36-006 R1

DESCRIPTION:

Dear BOE Team,

I hope this message finds you well. I am writing to report an incident involving an MLO aircraft with MSN 39840, and to seek your guidance and support in investigating and addressing the issues encountered.

On 13 February 2024, during descent from 19,000 feet to 10,000 feet, the aircraft experienced a rapid decompression, prompting the deployment of oxygen masks. The flight crew promptly initiated emergency procedures and diverted the aircraft to KCH without any reported injuries to passengers or crew.

Upon arrival, our maintenance team conducted a preliminary assessment, during which the pilot reported that the #2 bleed system tripped off and the engine anti-ice valve was stuck closed.

However, no troubleshooting has been performed thus far after the aircraft landed at KCH.

Additionally, please be informed that the QAR and FDR data will be provided by MLO via message courier once available.

Pertaining to this issue, MLO would like to inquire as below details:

/1/ MLO would like to request troubleshoot procedure to encounter this issue.

/2/ Please advise if there is any preventive action or any recommendation by BOE to prevent this issue in the future.

RESPONSE:

Boeing has reviewed the Ref /A/ message from Batik Air Malaysia (MLO) and provides the following response:

Boeing notes that MSN 39840 experienced rapid decompression with #2 Bleed System tripped off and the Engine Anti-Ice valve was stuck closed, during descent from 19,000 feet to 10,000 feet.

Boeing has following troubleshooting recommendations to the below queries:

Q1. MLO would like to request troubleshoot procedure to encounter this issue.

A1) 1. Carry out FIM 36-10 Task 809 "QUICK FIM TASK - Bleed Trip, the Engine is the Bleed Source - Fault Isolation" step by step in entirety.

2. If fault persists, perform FIM 36-10 Task 801 "Bleed Trip OFF Light ON – Fault Isolation".

3. Perform AMM 21-00-05 Single Pack Confidence Check. (The function of this procedure is to ground check the air conditioning pack(s) to test their capability to pressurize the airplane when it is in flight. The ability of the airplane structure to maintain cabin pressure is also checked).

4. Perform AMM Task 36-11-00-700-801 Engine Bleed Air System Health Check.

5. Ensure there are no obstructions in the fan air side of the precooler, and the precooler kiss seal is not damaged/distorted and is properly seated.

Q2. Please advise if there is any preventive action or any recommendation by BOE to prevent this issue in the future.

A2) We also recommend MLO review the Ref /B/ service letter 737-SL-21-045-G. The purpose of this procedure is to test, while on the ground, the ability of the single pack to pressurize the cabin while in flight. This test is intended to be used prior to dispatch or accomplished at intervals best determined by the operator as a preventive action.

Boeing has published the Maintenance Tips to troubleshoot the Bleed snags component by flight phase wise. Kindly refer Ref /C/ (737-MT-36-005) and Ref /D/ (737-MT-36-006 R1).

Please advise if we can be of further assistance.

The following files are attached to this message:
737 MT 36-006 R1.pdf
737-SL-21-045-G.pdf
737 MT 36-005.pdf

If attachments are referred to and are not present, please access them by logging into the Boeing Communication System on MyBoeingFleet or contact your Boeing Field Service Representative.

Hiren Tailor - BCA Operations Center
Basavakumar Mudda (Manager)
Vishal Kapoor (Senior Manager)
Customer Support

The Boeing Company

BCA Operations Centers 24-Hour Contact Numbers
787: +1 (206) 544 - 7787
All Other Models: +1 (206) 544 - 7500

Link to the Boeing Communication System: https://boeinginservice.my.site.com/a2F6g000002ppLDEAY

(Note: MyBoeingFleet portal login is required to access link in the Boeing Communication System)