



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA**

PRELIMINARY

KNKT.21.12.18.04

Aircraft Serious Incident Investigation Report

PT Lion Mentari Airlines

Boeing 737-900ER; PK-LQR

Enroute from Padang to Batam

Republic of Indonesia

13 December 2021

2022

This Preliminary Report was published by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the initial investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

The preliminary report consists of factual information collected until the preliminary report published. This report will not include analysis and conclusion.

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Jakarta, 21 March 2022
**KOMITE NASIONAL
KESELAMATAN TRANSPORTASI
CHAIRMAN**



SOERJANTO TJAHHONO

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ABBREVIATIONS AND DEFINITIONS

| | | |
|--------|---|---|
| AFML | : | Aircraft Flight and Maintenance Log |
| AOC | : | Air Operator Certificate |
| ATC | : | Air Traffic Controller |
| ATS | : | Air Traffic Services |
| BITE | : | Build in Test Equipment |
| BMKG | : | <i>Badan Meteorologi, Klimatologi, dan Geofisika</i> . The Agency of Meteorology, Climatology and Geophysics of Indonesia |
| °C | : | Degree Celsius |
| C of A | : | Certificate of Airworthiness |
| C of R | : | Certificate of Registration |
| CVR | : | Cockpit Voice Recorder |
| DCPC | : | Digital Cabin Pressure Controller |
| DGCA | : | Directorate General on Civil Aviation |
| DMI | : | Deferred Maintenance Items |
| FDR | : | Flight Data Recorder |
| hPa | : | Hectopascal |
| KM | : | Kilometer |
| KNKT | : | <i>Komite Nasional Keselamatan Transportasi</i> is the transportation safety investigation authority of Indonesia |
| LT | : | Local Time |
| MEL | : | Minimum Equipment List |
| PF | : | Pilot Flying |
| PIC | : | Pilot in Command |
| PM | : | Pilot Monitoring |
| PZTC | : | Pack/Zone Temperature Controller |
| SIC | : | Second in Command |
| SID | : | Standard Instrument Departure |
| QRH | : | Quick Reference Handbook |
| UTC | : | Universal Time Coordinate |

SYNOPSIS

On 13 December 2021, Boeing 737-900ER aircraft registered PK-LQR was being operated by PT. Lion Mentari Airlines for scheduled flight from Minangkabau International Airport of Padang (WIPT) to Hang Nadim International Airport of Batam (WIDD).

At 0651 UTC (1351 LT) the aircraft departed using runway 15. On board the aircraft was two pilots, six flight attendants and 196 passengers. The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM).

After the aircraft passed altitude of 10,000 feet, the SIC noticed and informed the PIC an unusual cabin altitude indication. The cabin altitude indicated about 4,000 feet when the aircraft passing altitude about 10,000 feet. The aircraft continued climbing toward the intended altitude. The PIC requested to the SIC to select the pressurization system from automatic to alternate mode. The pilots did not see any effect after the changing of the pressurization mode selection and the PIC requested to the SIC to change the pressurization system to manual mode and to select the outflow valve to fully closed position. After selecting the outflow valve to fully close, the cabin rate of climb indication was reduced from about 1,000 feet/minute to about 300 feet/minute.

Both pilots considered that this situation was not normal and agreed to returned to Padang. The PIC handed over the aircraft control to the SIC. The SIC started turning the aircraft to Padang and descended to 9,000 feet as instructed by Air Traffic Controller (ATC).

The PIC evaluating the actions that had been taken by SIC on the pressurization panel thereafter, the PIC selected the outflow valve selector manually to open position. Immediately, the cabin altitude and cabin rate of climb increased rapidly and the Cabin Altitude Warning sound activated. The pilots conducted the procedure of “Cabin Altitude Warning or Rapid Depressurization”.

During the descent, the PIC requested to hold at holding point BINIB to complete the procedures. The ATC offered assistance to the pilots and responded that there was no assistance required after landing.

After the aircraft passed altitude of 10,000 feet, the pilot announced “mask off” which means that flight attendant and passengers may take off the oxygen mask as the aircraft was on safe altitude without mask. Thereafter, the pilot coordinated with the flight attendant regarding the condition in the cabin which was informed by the flight attendant that there was no injury.

After all procedures were completed, the pilot commenced the approach landing runway 15.

At 0734 UTC, the aircraft landed on runway 15 and taxied to the apron. After completing the park at the gate, passengers disembarked normally with no injury reported on this occurrence.

The KNKT issued safety recommendations addressed to the aircraft operator. The investigation is ongoing, should further safety issues emerge during the course of the investigation, KNKT will bring the issues to the attention of the relevant parties and issue safety recommendation(s) as required.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 13 December 2021, a Boeing 737-900ER aircraft, registered PK-LQR was being operated by PT Lion Mentari Airlines (Lion Air), as scheduled passenger flight from Minangkabau International Airport of Padang (WIPT)¹ to Hang Nadim International Airport of Batam (WIDD)². Onboard the aircraft was two pilots, six flight attendants and 196 passengers.

The aircraft dispatched with Deferred Maintenance Items (DMI) of Right Pack³ Inoperative. Related to the DMI, the engineer conducted maintenance action referring to the Minimum Equipment List (MEL) number 21-02-01-03. The pilots conducted operation procedure including the supplementary procedure of No Engine Bleed Takeoff and Landing. The procedure was divided into three parts: takeoff, after takeoff, and landing. The take off part was conducted after the engine starting.

At 0651 UTC⁴ (1351 LT), the aircraft departed using runway 15. After takeoff, the pilot used the autopilot heading selector to adjust the flight path to meet the Standard Instrument Departure (SID) target altitude of 7,000 feet or above by flying overhead Padang before joining the airways, due to terrain condition. The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM).

During the initial climb, the pilots performed the supplementary procedure of the No Engine Bleed Takeoff and Landing. The aircraft continued to climb to the intended altitude of 23,000 feet.

After the aircraft passed altitude of 10,000 feet, the SIC noticed and informed to the PIC of an unusual cabin altitude⁵ indication. The cabin altitude indicated about 4,000 feet when the aircraft passing altitude about 10,000 feet. The PIC requested the SIC to change the pressurization system from automatic to alternate mode. The pilots did not see any effect after the changing of the pressurization mode selection. The PIC requested to the SIC to change the pressurization system to manual mode and to select the outflow valve to fully closed position. After selecting the outflow valve to fully close, the cabin rate of climb indication was reduced from about 1,000 feet/minute to about 300 feet/minute.

1 Minangkabau International Airport of Padang (WIPT) will be named as Padang for the purpose of this report.

2 Hang Nadim International Airport of Batam (WIDD) will be named as Batam for the purpose of this report.

3 The air conditioning system is often called the air conditioning package or 'pack'. PACK caution light is the light indicating the possible of pack temp has exceeded limit or failure of pack controls.

4 The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occurred. Local time is UTC+7 hours

5 Cabin altitude is the altitude of the cabin above sea level. This achieves by regulating the air pressure in the cabin equal to the atmospheric pressure to the describe altitude.

While adjusting the outflow valve to close position, the PIC reduced the aircraft rate of climb by selecting the vertical speed to 1,000 feet/minute with the intention ease the adjustment of the pressurization system. With the advice from the SIC, the PIC stopped the climbing and maintained at altitude of 21,000 feet. At this altitude, the cabin altitude indicated between 7,000 feet to 8,000 feet while the cabin rate of climb indicated 200 feet/minute.

Both pilots considered that this situation was not normal and agreed to return to Padang. The PIC handed over the aircraft control to the SIC. The PIC made announcement to the passengers to inform that the aircraft was returning to Padang. Thereafter the PIC started to review the procedure of “AUTO FAIL or Unscheduled Pressurization Change” in the Quick Reference Handbook (QRH). The SIC started turning the aircraft to Padang and descended to 9,000 feet as instructed by Air Traffic Controller (ATC). The SIC controlled the aircraft rate of descend to 500 feet/minute.

The PIC evaluating the actions that had been taken by SIC on the pressurization panel thereafter, the PIC selected the outflow valve selector manually to open position. Immediately, the cabin altitude and cabin rate of climb increased rapidly and the Cabin Altitude Warning sound active. The pilots conducted the procedure of “Cabin Altitude Warning or Rapid Depressurization”.

The PIC requested to hold at holding point BINIB to complete the procedures. The ATC offered assistance to the pilots and responded that there was no assistance required after landing.

After the aircraft passed altitude of 10,000 feet, the pilot announced “mask off” which means that flight attendant and passengers may take off the oxygen masks as the aircraft was on safe altitude without mask. Thereafter, the pilot coordinated with the flight attendant regarding the condition in the cabin which was informed by the flight attendant that there was no injury.

After all procedures were completed, the pilot commenced the approach landing runway 15.

At 0734 UTC, the aircraft landed on runway 15 and taxied to the apron. After completing the park at the gate, passengers disembarked normally with no injury reported on this occurrence.

1.2 Injuries to Persons

There were no injuries to persons as a result of this occurrence.

1.3 Damage to Aircraft

The aircraft was undamaged.

1.4 Other Damage

There was no other damage to property and/or the environment.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender : Male
Age : 34 years
Nationality : Indonesian
Marital status : Married
Date of joining company : July 2011
License : Airline Transport Pilot Licence
 Date of issue : 1 November 2017
 Aircraft type rating : Boeing 737
Instrument rating validity : 31 January 2022
Medical certificate : First Class
 Last of medical : 7 June 2021
 Validity : 14 December 2021
 Medical limitation : None
Last line check : 23 June 2021
Last proficiency check : 24 July 2021

Flying experience

Total hours : 5,910 hours 20 minutes
Total on type : 4,005 hours 32 minutes
Last 90 days : 101 hours 12 minutes
Last 30 days : 66 hours 26 minutes
Last 7 days : 12 hours 20 minutes
Last 24 hours : 1 hours 50 minutes
This flight : 40 minutes

1.5.2 Second in Command

Gender : Male
Age : 26 years
Nationality : Indonesia
Marital status : Single
Date of joining company : 17 September 2014
License : Commercial Pilot Licence
 Date of issue : 26 September 2015

Aircraft type rating : Boeing 737
Instrument rating validity : 31 May 2021
Medical certificate : First Class
Last of medical : 21 June 2021
Validity : 4 January 2021
Medical limitation : Holder shall wear corrective lenses
Last line check : 17 September 2021
Last proficiency check : 1 November 2021

Flying experience

Total hours : 3,050 hours
Total on type : 3,050 hours
Last 90 days : 159 hours
Last 30 days : 34 hours
Last 7 days : 15 Hours
Last 24 hours : 1 Hours 37 Minutes
This flight : 40 minutes

1.6 Aircraft Information

1.6.1 General

Registration Mark : PK-LQR
Manufacturer : Boeing
Country of Manufacturer : United State of America
Type/Model : 737-900ER
Serial Number : 38738
Year of Manufacture : 18 October 2013
Certificate of Airworthiness
Issued : 19 May 2021
Validity : 18 May 2022
Category : Transport
Limitations : None
Certificate of Registration
Number : 4213
Issued : 25 March 2020
Validity : 24 March 2023

Time Since New : 18847: 24 hours
Cycles Since New : 12891 cycles
Last Major Check : C02 (phase 24)
Last Minor Check : Phase 24

1.6.2 Previous Flight Event

The flight crew started performing the duty at the day from Batam. While conducted the flight preparation, the pilots noticed that the right PACK caution light illuminated when MASTER CAUTION recall⁶ performed. The pilot informed to the engineer in Batam and reported the aircraft system abnormality in the Aircraft Flight and Maintenance Log (AFML). The engineer rectified the problem by perform Build in Test Equipment (BITE) test to the Pack/Zone Temperature Controller (PZTC) number 2 and found message SRADA INLET (SRADA INLET red light illuminates). The engineer continued the BITE test instructions then found GO (green light) illuminates. When the MASTER CAUTION recall performed, the PACK light still illuminated. The engineer inserted the problem to DMI referring to the Minimum Equipment List (MEL) of the Boeing 737 revision number 24, sequence number 21-17-04, system PACK which was under category C⁷. According to the MEL, there was no maintenance action or operation procedure required. The problem has not been rectified, however the aircraft was allowed to be dispatched.

During the flight from Batam to Padang, the pilot noticed that the Right PACK light illuminated then performed Non-Normal Checklist. After the checklist has been performed completely the right PACK light still illuminated, the pilot decided to continue to Padang. During initial descent the pilot noticed that the cabin climb indicator momentarily indicated climb up to 1,000 feet/minute. The cabin altitude was able to be controlled and the flight continued. The aircraft landed safely in Padang and the pilot filed in the AFML of the aircraft problem.

The engineer in Padang perform BITE test PZTC number 2 and found message SRADA INLET (SRADA INLET red light illuminates). The engineer continued the BITE test instructions then found GO (green light) illuminated.

The engineer also performed BITE test on the Digital Cabin Pressure Controller (DCPC) number 2 and found no fault. The engineer then checked the cabin doors seal and cargo doors seal and found all were in good condition.

The engineer observed that the right PACK light still illuminated, then the engineer decided to deferred the rectification and inserted the problem to DMI referring to MEL 21-01-01-03 chapter Air Conditioning Pack under Category C, then perform maintenance action as required by the MEL. The aircraft then dispatched.

⁶ Master Caution recall is an action perform by push the MASTER CAUTION SWITCH to receive the information of the aircraft condition regarding the dispatch or directs toward the problem area concerned.

⁷ Category C of the Minimum Equipment List (MEL) means that the aircraft is allowed to fly and the problem shall be rectified within 10 days.

1.7 Meteorological Information

The weather report for Padang, issued 13 December 2021 by the *Badan Meteorologi, Klimatologi, dan Geofisika* (BMKG - the Agency of Meteorology, Climatology and Geophysics of Indonesia), at 0730 UTC was as follows:

Wind : 220 / 06 knots
Visibility : More than 10 km
Temperature : 31°C
Dew point : 26°C
Pressure : 1007 hPa
Clouds⁸ : FEW with the cloud base of 2,000 feet

1.8 Aids to Navigation

Ground-based navigation aids / onboard navigation aids / aerodrome visual ground aids and their serviceability were not a factor in this occurrence.

1.9 Communications

All communications between Air Traffic Services (ATS) and the crew were recorded by ground based automatic voice recording equipment and the Cockpit Voice Recorder (CVR) for the duration of the flight. The quality of the aircraft's recorded transmissions was good. The excerpt of the communication will be included in the final report.

1.10 Aerodrome Information

Airport Name : Minangkabau International Airport
Airport Identification : WIEE
Airport Operator : PT. Angkasa Pura II (Persero)
Airport Certificate : 009/SBU-DBU/I/2021
Validity : 7 July 2025
Coordinate : 00°47'18" S; 100° 17' 11" E
Elevation : 18 Feet
Runway Direction : 335.06° - 155.06°
Runway Length : 2,750 meters
Runway Width : 45 meters
Surface : Asphalt

⁸ Amount of cloud are assesses based on the part of the sky that are covers by the cloud. Few is when the 1/8 up to 2/8 of sky ore covers by clouds.

1.11 Flight Recorders

1.11.1 Flight Data Recorder

The aircraft was fitted with Flight Data Recorder (FDR) manufactured by Honeywell with part number 980-4750-009, and serial number 02569. The FDR transported to KNKT recorder facility for data download process. The FDR data successfully downloaded and found recorded 1,265 parameters of approximately 53 hours aircraft operation, which was containing 34 flights including the incident flight.

The detail FDR information will be included in the Final Report.

1.11.2 Cockpit Voice Recorder

The aircraft was fitted with Cockpit Voice Recorder (CVR) manufactured by Honeywell with part number 980-4750-009, and serial number 02569. The CVR transported to KNKT recorder facility for data download process. The CVR data successfully downloaded and contained approximately 2 hours of aircraft operation.

1.12 Wreckage and Impact Information

The aircraft was undamaged.

1.13 Medical and Pathological Information

No medical or pathological investigations were conducted as a result of this occurrence, nor were they required.

1.14 Fire

There was no evidence of fire.

1.15 Survival Aspects

Despite the oxygen mask was dropped during the flight, there was no reported of any panic to the passenger. After the aircraft parked on the gate, the passengers were disembark normally.

1.16 Tests and Research

The test and research will be included in the Final Report.

1.17 Organizational and Management Information

Aircraft Owner : Jetair 18 Limited
Address : 70 Sir John Rogerson's Quay, Dublin 2, Ireland
Aircraft Operator : PT Lion Mentari Airlines
Address : Jl. Gajah Mada No. 7, Kelurahan Petojo Utara
Kecamatan Gambir, Jakarta Pusat

Lion Mentari Airline (Lion Air) had valid Air Operator Certificate (AOC) number 121-010 issued by Directorate General on Civil Aviation (DGCA) of Indonesia. Lion Air operated 115 Boeing 737 and 12 Airbus A330 aircraft.

1.18 Additional Information

The investigation is continuing and KNKT plans to complete the investigation within 12 months since the day of the occurrence. Should any further relevant safety issues emerge during the course of the investigation, KNKT will immediately bring the issues to the attention of the relevant parties and publish as required.

1.19 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the KNKT approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 FINDINGS⁹

According to factual information during the investigation, the KNKT identified initial findings as follows:

1. The aircraft had a valid Certificate of Airworthiness and Certificate of Registration.
2. The pilots held valid license and medical certificates.
3. The right PACK caution light illuminated when MASTER CAUTION recall performed during flight preparation on the previous flight from Batam to Padang.
4. The Build in Test Equipment (BITE) test on the Pack/Zone Temperature Controller (PZTC) number 2 and found message SRADA INLET (SRADA INLET red light illuminates). Further BITE test found GO (green light) illuminates, which means that the aircraft was allowed to be dispatched. When the MASTER CAUTION recall performed, the PACK light still illuminated.
5. The problem was inserted to DMI referring to the Minimum Equipment List (MEL) of the Boeing 737 revision number 24, sequence number 21-17-04, system PACK which was under category C. According to the MEL, there was no maintenance action or operation procedure required.
6. During the flight from Batam to Padang, the pilot noticed that Right PACK light illuminated then the pilot performed Non-Normal Checklist. After the checklist has been completed, the right PACK light still illuminated. The cabin altitude was able to be controlled and the flight continued to Padang.
7. The aircraft landed safely in Padang and the pilot filed in the AFML of the problem.
8. The engineer in Padang perform BITE test PZTC number 2 and found message SRADA INLET (SRADA INLET red light illuminates). The engineer continued the BITE test instructions then found GO (green light) illuminated. The engineer observed that the right PACK light still illuminated.
9. The engineer also performed BITE test on the Digital Cabin Pressure Controller (DCPC) number 2 and found no fault. The engineer then checked the cabin doors seal and cargo doors seal and found all were in good condition.
10. The aircraft dispatched with Deferred Maintenance Items (DMI) which was Right Pack Inoperative. The engineer had conducted maintenance action referring to the Minimum Equipment List (MEL) number 21-02-01-03.
11. The aircraft dispatched from Padang, while during climbing the pilots noticed an unusual cabin altitude indication.
12. The aircraft stopped climbing and maintained altitude of 21,000 feet. The cabin altitude indicated between 7,000 feet to 8,000 feet, while the cabin rate of climb indicated 200 feet/minute. Both pilots considered that this situation was not normal and agreed to return to Padang.

⁹ Findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

13. While the PIC evaluating the action that had been taken by SIC on the pressurization panel, the PIC selected the outflow valve selector manually to OPEN position. Immediately the cabin altitude and cabin rate of climb increased rapidly and the Cabin Altitude Warning sound activated. The pilots conducted the procedure of Cabin Altitude warning or Rapid Depressurization.
14. After passing 10,000 feet, the pilot announced “mask off” and coordinated with the flight attendant 1 regarding the condition in the cabin which was informed by the flight attendant 1 that there was no injury.
15. After all procedures were completed, the pilot commenced the approach landing runway 15. The aircraft landed on runway 15 and taxied to the apron.

3 SAFETY ACTION

At the time of issuing this Preliminary Report, the KNKT had been informed of any safety actions resulting from this occurrence.

- On 17 December 2021, the flight crew perform corrective simulator training and safety briefing. The training was highlighted the Cabin Altitude Warning or Rapid Depressurization, Auto fail or Unschedules Pressurization Changes, Emergency Descent and Supplement Procedures on Manual mode operation exercise. The result of the training were satisfactory.

4 SAFETY RECOMMENDATIONS

The KNKT issued safety recommendations to address safety issues identified in this report.

4.1 Lion Mentari Airlines

- **04.O-2022-18.01**

While evaluating the action that had been taken by SIC on the pressurization panel, the PIC selected the outflow valve selector to OPEN position with intention to reduce the cabin rate of climb, subsequently the cabin altitude and cabin rate of climb increased rapidly and the Cabin Altitude Warning sound activated. The action resulted in the cabin pressure uncontrollable. Therefore KNKT recommends to improve the understanding of the aircraft air conditioning and cabin pressurization systems to all flight crew to ensure safe aircraft operation.

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