

AA2023-8

**AIRCRAFT ACCIDENT
INVESTIGATION REPORT**

**Japan Airlines Co., Ltd.
J A 3 0 7 J**

November 30, 2023

The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board and with Annex 13 to the Convention on International Civil Aviation is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

TAKEDA Nobuo
Chairperson
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

《Reference》

The terms used to describe the results of the analysis in "3. ANALYSIS" of this report are as follows.

- i) In case of being able to determine, the term "certain" or "certainly" is used.
- ii) In case of being unable to determine but being almost certain, the term "highly probable" or "most likely" is used.
- iii) In case of higher possibility, the term "probable" or "more likely" is used.
- iv) In a case that there is a possibility, the term "likely" or "possible" is used.

AIRCRAFT ACCIDENT INVESTIGATION REPORT

November 10, 2023

Adopted by the Japan Transport Safety Board

Chairperson TAKEDA Nobuo
Member SHIMAMURA Atsushi
Member MARUI Yuichi
Member SODA Hisako
Member NAKANISHI Miwa
Member TSUDA Hiroka



Company	Japan Airlines Co., Ltd.
Type, Registration Mark	Boeing 737-800, JA307J
Accident Class	Passenger injury by shaking of the aircraft
Date and Time of the Occurrence	At about 09:51 Japan Standard Time (JST: UTC+9 hours), January 7, 2023
Site of the Accident	Over near the sea about 80 km east-northeast of Miyazaki Airport (Latitude 32°11'07"N, Longitude 132°12'14"E)

1. PROCESS AND PROGRESS OF THE ACCIDENT INVESTIGATION

Summary of the Accident	On Saturday, January 7, 2023, the aircraft took off from Tokyo International Airport on a scheduled Flight 687 of the company. While the aircraft was making approach for landing at Miyazaki Airport, it was shaken, causing the side of a passenger to hit hard against the armrest of the seat, resulting in injury to the passenger.
Outline of the Accident Investigation	An investigator-in-charge and two other investigators were designated on January 23, 2023. Comments on the draft Final Report were invited from the parties relevant to the cause of the accident and the Relevant State.

2. FACTUAL INFORMATION

Aircraft Information	
Aircraft type:	Boeing 737-800
Serial number: 35336	Date of manufacture: November 14, 2007
Airworthiness certificate: No. 2009-036	
Validity: Period since October 1, 2009, the Maintenance Management Manual (JAL Engineering Co., Ltd.) approved based on the permission of Article 113-2 of the Civil Aeronautics Act has been effective.	

Personnel Information

Pilot in command (PIC) : Age: 51	
Airline transport pilot certificate (Airplane)	March 16, 2006
Rating for Boeing 737	August 9, 2010
Class 1 aviation medical certificate	
Validity	September 4, 2023
Total flight time	14,389 hours 06 minutes
Flight time in the last 30 days	35 hours 45 minutes
Total flight time on the type of the aircraft	7,701 hours 49 minutes
Flight time in the last 30 days	35 hours 45 minutes
First officer (FO) : Age: 30	
Multi-crew pilot certificate (Airplane)	September 29, 2021
Rating for Boeing 737	September 29, 2021
Class 1 aviation medical certificate	
Validity	October 18, 2023
Total flight time	699 hours 37 minutes
Flight time in the last 30 days	57 hours 30 minutes
Total flight time on the type of the aircraft	545 hours 31 minutes
Flight time in the last 30 days	57 hours 30 minutes

Meteorological Information

According to the meteorological satellite image (Figure 1) and the radar composite chart (Figure 2) by Japan Meteorological Agency, on the flight route the aircraft descended to make an approach toward Miyazaki Airport, there were cumulus-like clouds spreading zonally and weak radar echoes*¹ were slightly scattered.

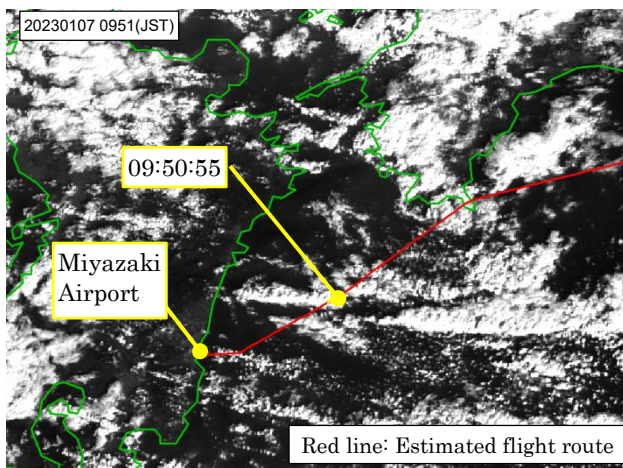


Figure 1: Meteorological Satellite Image (Visible)

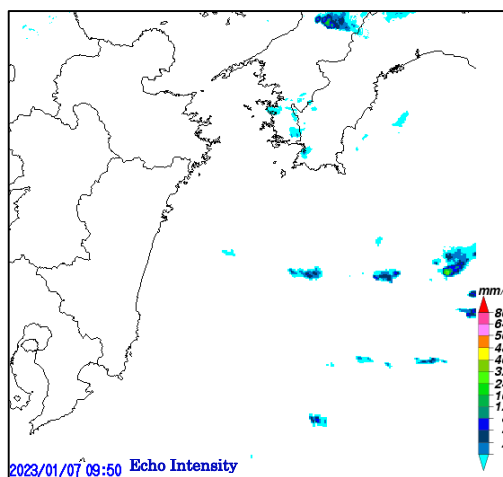


Figure 2: Radar Composite Chart

*¹”Echoes” refers to the reflected waves captured on the radar as radio waves emitted from a metrological radar are reflected by raindrops and ice particles, etc. The reflective waves allow to observe the distribution of precipitation area and the intensity, and this precipitation area may be also called “Echoes”.

Event Occurred and Relevant Information

(1) History of the Flight

When confirming the latest weather information about Miyazaki Airport during cruising flight, the PIC obtained the information that other arrival aircraft had encountered turbulence in the clouds, therefore, the PIC decided to turn the seat belt sign on earlier during its approach just in case for turbulence.

When the aircraft commenced to descend for approaching, the PIC visually recognized ahead zonally spreading cumulus clouds with a top height of about 10,000 ft, but there was neither space to avoid it and nor echo images confirmed on the airborne weather radar. The PIC decided to descend through the thin cloud area, turned on the seat belt sign, and had the cabin crew members to carry out safety confirmation in the cabin. The cabin crew members conducted the safety confirmation such as checking that all the passengers were seated and wearing their seat belts properly and the reclined seats and tables were put back to their original position. The safety confirmation finished before the aircraft approached the cumulus clouds, and the senior cabin crew member reported to the PIC that all the passengers and crew members were seated and wearing their seat belts.

The aircraft continued to descend and was suddenly shaken strongly when closely skimming the cloud top at about 11,000 ft. Subsequently, the aircraft continued to be shaken intermittently even flying in clouds. The strong shake was subdued after the aircraft passed through the clouds, and the aircraft landed Miyazaki Airport at 10:04.

When the aircraft was shaken strongly, the passenger, who was seated on Seat 39H, felt pain as the passenger's left side had hit hard against the armrest of the seat but wasn't aware of any broken bones, and thus disembarked from the aircraft without report about the pain after the aircraft landed. After that, as continuing to feel pain in the side, the passenger went to see a doctor later and was diagnosed with fractures of the left eighth and ninth ribs.

(2) Information on Passenger Seat Location

Seat 39H was the rearmost seat in the cabin and located on the aisle side of a two-row seat. When the accident occurred, the aircraft's center of gravity was estimated to be 23.0%MAC*², and the distance from the center of gravity to the passenger was approximately 12 m.

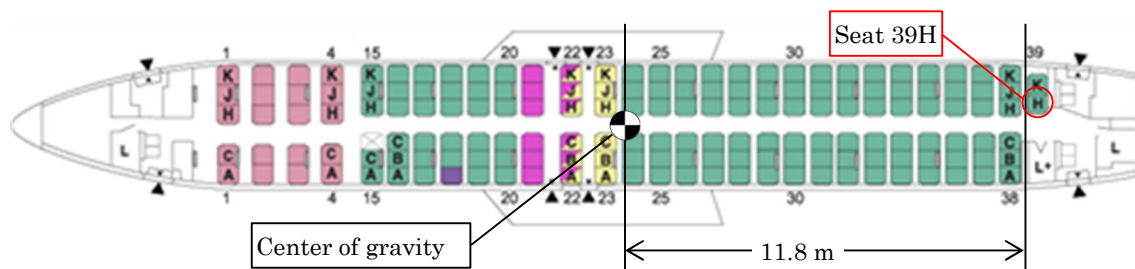


Figure 3: Seat Location of the Injured Passenger

*2 "MAC" stands for Mean Aerodynamic Chord. It is a chord that represents the aerodynamic characteristics of the wing, and when the chords such as the sweptwing are not constant, they represent the typical chord length. 23.0% MAC indicates a position 23.0% behind the front of this mean aerodynamic chord.

(3) Information on Armrest and Injured Regions

The passenger's fractured regions were the eighth and ninth ribs from the top on the left side. The armrest of the seat is approximately 20 cm above the seat surface and is made of metallic components with a plastic cover installed.

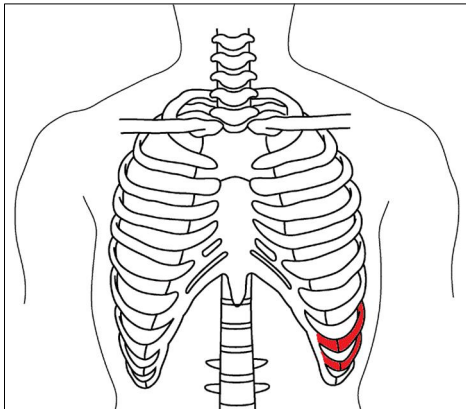


Figure 4: Injured Regions



Figure 5: Seat Armrest

(4) Information from Quick Access Recorder (QAR)

For one second from 09:50:55 to 09:50:56, the heading of the aircraft suddenly changed by 4° to the left, and for two seconds from 09:50:55 to 09:50:57, the lateral acceleration was also fluctuating between 0.27G to the right and 0.20 G to the left.

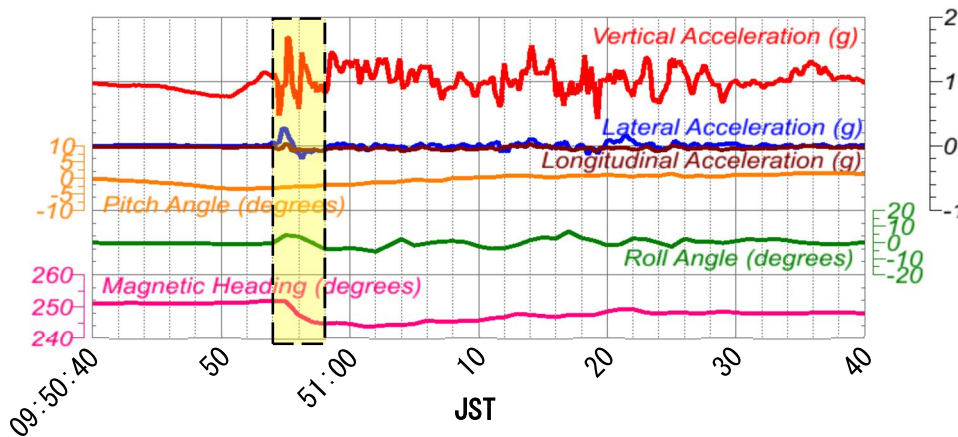


Figure 6: QAR Data

3. ANALYSIS

The JTSCB concludes that as a significant yawing of the aircraft occurred at about 09:51 when the aircraft just skimmed the cumulus cloud top, the passenger was highly probable injured due to shaking of the aircraft at this time. It is most likely that because the shaking occurred while flying near the cloud top and in the clouds, it is caused by turbulence involved in convection within cumulus clouds.

It is highly probable that when the aircraft was shaken, the heading also changed momentarily by 4° to the left, in addition to change in lateral acceleration due to translational movement oscillating from side to side, therefore, the tail side rotated by 4° to the right around the center of gravity, and change in lateral acceleration occurred near Seat 39H due to yawing. Therefore, it is most likely that the body of the passenger seated and wearing a seat belt was affected by the rightward lateral acceleration due to the translational movement and yawing of the aircraft, but the upper body was swung to the left due to the inertial law as an inertial force acted

on it to keep it in its original position.

It is most likely that the upper body was swung to the left due to momentary change in lateral acceleration of the aircraft, the left side of the passenger hit hard against the armrest of the seat, resulting in injury.

4. PROBABLE CAUSES

The JTSCB concludes that the probable cause of this accident was that the left side of the passenger most likely hit hard against the armrest of the seat, resulting in injury as the upper body of the passenger was swung to the left because the lateral acceleration changed due to the translational movement and yawing of the aircraft when the aircraft skimmed the cumulus clouds after the seat belt sign was turned on.

5. SAFETY ACTIONS

Safety Actions Taken after the Accident

Safety actions taken by the company

- (1) The company made it known to all employees about the overview of the accident, and in order to refer to them for each safety action, they shared the accident cases in meetings about the safety in each internal department.
- (2) In a variety of safety activities that the company carries out, the company disseminated thoroughly again each safety action to prevent injuries involving shaking.