

AA2018-7

**AIRCRAFT ACCIDENT
INVESTIGATION REPORT**

**UNITED AIRLINES, INC.
N29968**

September 27, 2018



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.

Kazuhiro Nakahashi

Chairman

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.

AIRCRAFT ACCIDENT INVESTIGATION REPORT

INJURY TO FLIGHT ATTENDANT
BY THE JOLT OF THE AIRCRAFT
AT AN ALTITUDE OF APPROX. 15,600 FT,
APPROX. 64 KM SOUTHWEST OF FUKUSHIMA AIRPORT
AT AROUND 13:10 JST, JULY 1, 2017

UNITED AIRLINES, INC.,
BOEING 787-9, N29968

August 23, 2018

Adopted by the Japan Transport Safety Board

Chairman	Kazuhiro Nakahashi
Member	Toru Miyashita
Member	Toshiyuki Ishikawa
Member	Yuichi Marui
Member	Keiji Tanaka
Member	Miwa Nakanishi

1. PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident	On Saturday, July 1, 2017, a Boeing 787-9 registered N29968, operated by United Airlines, Inc., was flying from San Francisco International Airport as scheduled flight 875 of the company to Tokyo International Airport when the aircraft encountered jolt in flight and a flight attendant was injured.
1.2 Outline of the Accident Investigation	The Japan Transport Safety Board was notified of the accident's occurrence and designated an investigator-in-charge and an investigator on July 19, 2017 to investigate this accident. An accredited representative of the United States of America, as the State of Registry, the Operator, Design and Manufacture of the aircraft involved in the accident, participated in this investigation. Comments were invited from the parties relevant to the cause of the accident. Comments on the draft report were invited from the relevant State.

2. FACTUAL INFORMATION

2.1 History of the Flight

The history of the flight is summarized as below, based on the statements of the flight crew members and the flight attendant (FA) who was injured, as well as the records of the Continuous Parameter Logging (CPL*¹). Hereinafter, all times are indicated in Japan Standard Time (JST).

On July 1, 2017, a Boeing 787-9, registered N29968, operated by United Airlines, Inc. as scheduled flight 875 of the company was flying from San Francisco International Airport to Tokyo International Airport with a total of 261 people on board, consisting of Pilot in Command (PIC), 14 other crew members, and 246 passengers, and started a descent for landing.

In the Aircraft, the PIC sat in the left seat as the PM*² and the First Officer (FO) sat in the right seat as the PF*²

The Aircraft descended while decelerating in an airspace with several cloud layers toward Tokyo International Airport.

During its descent through clouds, the Aircraft encountered heavy rain showers. However, no information predicting a large jolt was displayed by the onboard weather radar, either in the auto mode or when the tilt angle was adjusted in the manual mode. The Aircraft jolted at an altitude of about 15,600 ft, and one FA who was working in the aft galley suffered an injury when she lost her balance and her knee struck the floor. At this time, the Aircraft's vertical acceleration became +0.82 G, followed by +1.68 G, followed 1 second later by +1.13 G, and followed 3 seconds later by +0.76 G. The Aircraft was flying with autopilot and auto-throttle engaged. The Aircraft descended to an altitude of about 14,000 ft using the speed brakes in order to get out of the clouds as soon as possible.

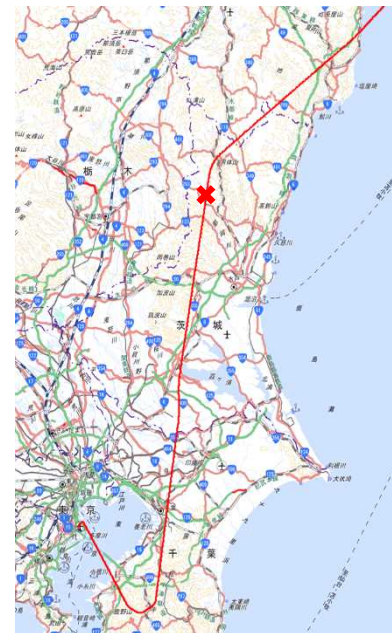


Figure 1 Estimated Flight Route

The weather information that was checked prior to the flight did not predict turbulence or other significant weather that would affect the flight on its route. Additionally, there was no information concerning significant weather during the flight as well. (See Figure 1 and Figure 2)

*¹ "CPL" (ACMF CPL : Airplane Condition Monitoring Function Continuous Parameter Logging) monitors the airplane condition and continuously records predetermined parameters.

*² "PF" (Pilot-Flying) and "PM" (Pilot-Monitoring) are the terms to identify pilots on the basis of role sharing when operating aircraft by two pilots. The PF is mainly in charge of aircraft control and the PM is mainly in charge of monitoring the flight status, cross-checking of PF's operations, and performing tasks other than flying.

Since the aircraft would be descending through clouds, the PIC turned on the seat belt sign prior to the descent, however, the PIC did not issue additional verbal instruction to be seated to the FAs because no severe turbulence was expected and jolt was also light during the descent through the clouds.

This accident occurred in the air approximately 64 km southwest of Fukushima Airport (36°37'56"N, 140°19'38"E) at an altitude of approximately 15,600 ft at around 13:10 on July 1, 2017.

The Aircraft landed at Tokyo International Airport at 13:36.

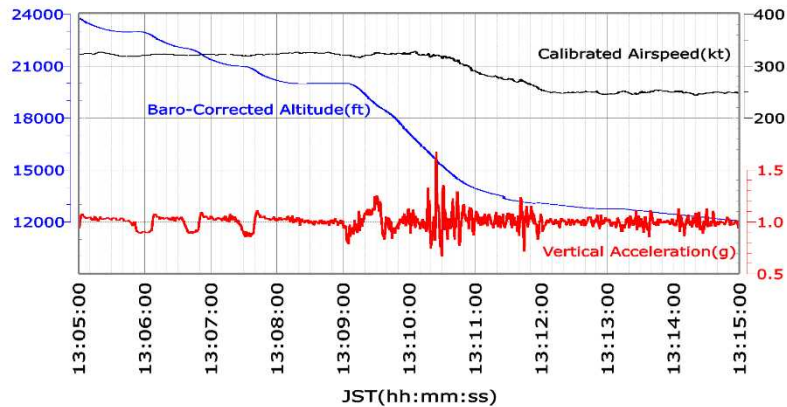


Figure 2 CPL Records

<p>2.2 Injuries to Persons</p>	<p>Serious injury: 1 FA</p>
<p>2.3 Damage to Aircraft</p>	<p>None</p>
<p>2.4 Personnel Information</p>	<p>(1) PIC: Male, Age 61 Airline transport pilot certificate (Airplane) Type rating for Boeing 787 June 27, 2012 Class 1 aviation medical certificate Validity: October 17, 2017 Total flight time 23,521 hours 53 minutes Total flight time on the type of aircraft: 2,648 hours 53 minutes</p> <p>(2) FO: Male, Age 51 Airline transport pilot certificate (Airplane) Type rating for Boeing 787 March 25, 2017 Class 1 aviation medical certificate Validity: October 31, 2017 Total flight time 11,106 hours 10 minutes Total flight time on the type of aircraft: 254 hours 52 minutes</p>
<p>2.5 Aircraft Information</p>	<p>(1) Aircraft type: Boeing 787-9 Serial number: 60141, Date of manufacture: January 17, 2017 It is highly probable that both the weight and the position of the center of gravity were within the allowable range when the accident occurred.</p> <p>(2) Although the Aircraft was equipped with the Enhanced Airborne Flight Recorder (EAFR) has flight data recorder (FDR) function and cockpit voice recorder (CVR) function, because the Aircraft's operation</p>

continued even after the accident occurred without unloading of the EAFR, their records from the time that the accident occurred were overwritten and erased.

2.6 Meteorological Information

(1) General weather conditions

According to the Analysis chart for East and Pacific issued by the Japan Meteorological Agency at 09:00 (Figure 3), a tropical depression with a central pressure of 1,008 hPa was situated over the sea south of Shikoku and moving east at 20 kt. In addition, a stationary front was extended from off the coast of the San'in Region to the Noto Peninsula and the northern Kanto Region.

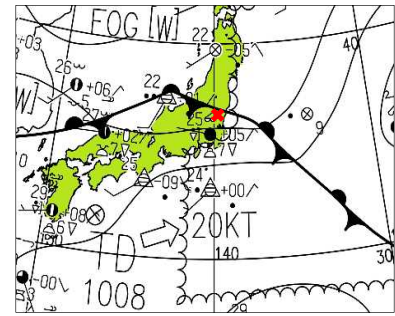


Figure 3 Asia-Pacific Analysis Chart for East and Pacific

(2) Domestic significant weather observation chart (UBJP)

According to the domestic significant weather observation chart issued by the Japan Meteorological Agency at 13:10 (Figure 4), radar echoes equivalent to hourly rainfall of between 0 and 5 mm were observed in a wide area of the northern Kanto Region. Within those echoes were scattered radar echoes equivalent to hourly rainfall of at least 5 mm but less than 10 mm.

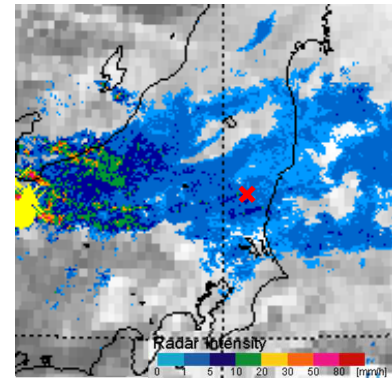


Figure 4 Domestic Significant Weather observation Chart

(3) Hourly atmosphere analysis chart

According to the hourly atmosphere analysis chart for 13:00 on July 1, 2017, in the cross-section (Figure 5), it was analyzed that vertical wind shear (VWS) indicating a change in wind direction and wind speed for an altitude difference of 6 to 9 kt/1,000 ft existed near the location where the accident occurred.

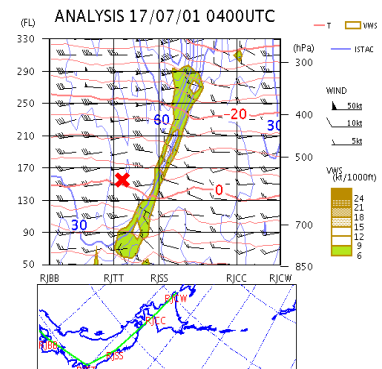
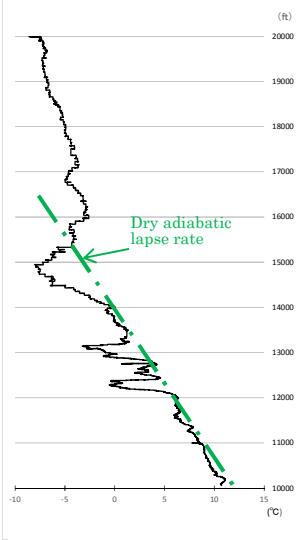
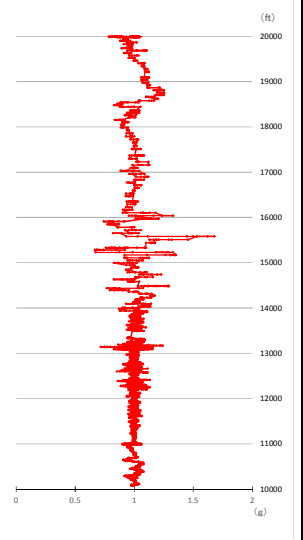


Figure 5 Hourly Atmosphere Analysis Chart (Cross-Section)

(4) Pilot report (PIREP)

There were no PIREPs in the airspace near the location where the accident occurred within one hour prior to the accident's occurrence.

<p>2.7 Additional Information</p>	<p>(1) Atmospheric stability</p> <p>Atmospheric temperature decreases as altitude increases, and when the rate of decrease in temperature from altitude (temperature lapse rate) is larger than approximately 10°C per 3,300 ft (dry adiabatic lapse rate), the atmosphere enters an unstable condition.</p>  <p>Figure 6 Altitude and Outside Air Temperature</p> <p>(2) Change in outside air temperature during descent</p> <p>According to the records of CPL, the relationships between altitude and outside air temperature, and between altitude and vertical acceleration were as shown in Figure 6 and Figure 7.</p>  <p>Figure 7 Altitude and Vertical Acceleration</p>
--	--

3. ANALYSIS

<p>3.1 Involvement of Weather</p>	<p>Yes</p>
<p>3.2 Involvement of Pilots</p>	<p>None</p>
<p>3.3 Involvement of the Equipment</p>	<p>None</p>
<p>3.4 Analysis of Findings</p>	<p>(1) From the flight history, it is probable that the Aircraft's jolt corresponded to the large change in vertical acceleration that was recorded on CPL. It is probable that there was a large fluctuation in vertical acceleration near the aft cabin as a result of this jolt and it is highly probable that the FA who was working in the aft galley lost her balance and suffered a serious injury.</p> <p>(2) It is highly probable that the Aircraft jolted at an altitude of approximately 15,600 ft while it was in a cloud area near a stationary front. Besides, according to CPL records, since the temperature lapse rate was larger than the dry adiabatic lapse rate near an altitude of 15,000 ft, it is probable that the atmosphere was unstable condition near the location where the accident occurred.</p> <p>(3) Since the weather information provided before the flight, the echo on the onboard weather radar, and no pilot report, it is probable that the</p>

	PIC and the FO would have concluded there was no turbulence and others which would affect the flight.
--	---

4. PROBABLE CAUSES

In this accident, it is highly probable that because the Aircraft jolted while descending in cloud area near a stationary front, a flight attendant who was working in the aft galley lost her balance and suffered a serious injury.
