

# JTSTB Digests

JTSTB (Japan Transport Safety Board) DIGESTS

(Issued in May,2016)

## Introduction of Events Relating to Aircraft Accident, etc.

### Close call incidents in the field of aviation

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## 1. Preface

In various situations, there are cases of people getting a fright from a mistake that did not lead to an accident, but that nearly avoided the occurrence of some type of trouble, and such events are called “close call incidents.” According to principles derived from industrial accident statistics, there are 29 small accidents in the shadow of every serious incident, as well as an additional 300 close call incidents that are also concealed.

In order to ensure transport safety, in addition to safety inspections by the Ministry of Land, Infrastructure, Transport and Tourism(MLIT) based on various business laws, the “Transport Safety Management” was introduced from October 2006, and initiatives for the establishment and improvement of safety management systems by transportation business, independent company-wide efforts from top management to the field, were implemented.

As a result, a system was established that makes it obligatory to report accidents and serious incidents (hereinafter “accidents, etc.”) and problems causing safety concerns with aircraft operation that did not lead to an accident, etc. in the field of aviation to the national government. Based on this, information related to safety issues as well as investigations on the cause of accidents, etc. and recurrence prevention measures have been shared with parties involved in aviation and used for preventive safety measures.

On the other hand, cases of close call incidents on which reports to the national government are not required have only been utilized in the respective organizations of aviation business operators.

Amidst these circumstances, VOLuntary Information Contributory to Enhancement of the Safety (VOICES) was commenced from July 2014 as an initiative in which close call incidents that do not need to be reported to the national government are collected and shared among other businesses entities and stake holders in order to contribute to safety improvements. This system has been implemented based on the “State’s Civil Aviation Safety Programme” formulated by the MLIT, and, from the viewpoint of reporter protection, the system is managed and operated by a third-party organization selected through a public offering every fiscal year. The operations for FY2015 were led by the third-party organization Association of Air Transport Engineering and Research (ATEC).

Here, we introduce the cases of “Important safety information that should be shared between operators (FEEDBACK)” from the ATEC website, to compare with those similar to the cases of accidents, etc. investigated by the JTSTB.

\*Transport Safety Management System <http://www.mlit.go.jp/unyuanzen/outline.html> (Only available in Japanese)

\*VOLuntary Information Contributory to Enhancement of the Safety(VOICES) <http://www.jihatsu.jp/index.html> (Only available in Japanese)

\*Association of Air Transport Engineering and Research <http://www.atec.or.jp/> (Only available in Japanese)



## 2. Details of close call incidents, aircraft accidents, etc.

The difference between close call incidents that don't need to be reported to the national government and accidents, etc. is that these accidents, etc. are defined by laws and regulations (Civil Aeronautics Act, Ordinance for Enforcement of the Civil Aeronautics Act, etc.). Aviation business operators, pilots, etc. are obligated to report to the MLIT whenever problems defined in these laws and regulations occur.

On the other hand, close call incidents are voluntarily reported to VOICES by individuals and organizations involved in aviation operations, and ATEC gathers information.

### (1) Conditions during which close call incidents and accidents, etc. occur

When comparing the conditions during which close call incidents and accidents, etc. occur by type of aircraft, reports on the close call incidents were most common for “when pilot of large aircraft was communicating with controller, during flight,” which accounted for 75% overall (see Figure 1).

Looking at accidents, etc. in contrast to close call incidents, reports were most common for “when pilot of small aircraft was communicating with controller, during flight,” which accounted for 38% overall (see Figure 2).

It is possible that the reason for these results is that owners, etc. of personal aircraft make very few reports to VOICES, and there is little cases related to small aircraft stated in FEEDBACK.

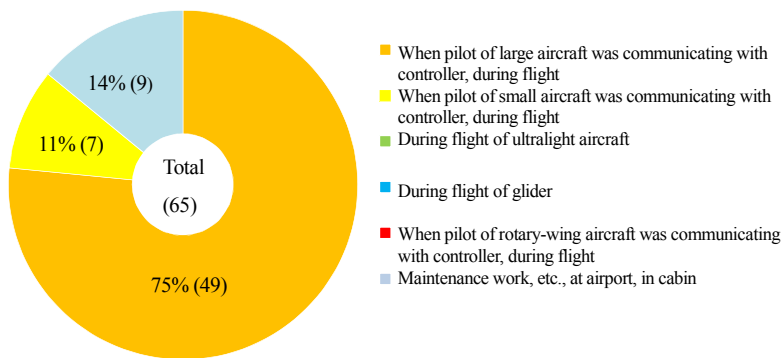


Fig.1 Conditions when close call incidents occurred

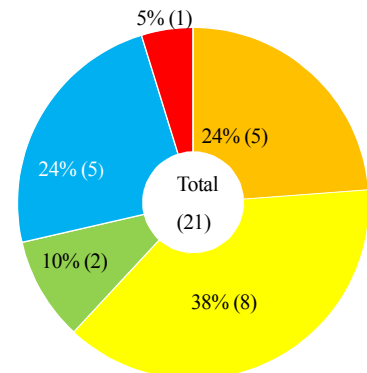


Fig.2 Conditions when accidents, etc. occurred

### (2) Flight phases during which close call incidents and accidents, etc. occur

When comparing the flight phases during which close call incidents and accidents, etc. occurred, we see that close call incidents occurred in all types of phases (see Figure 3).

Looking at accidents, etc. in contrast to close call incidents, occurrence was most common when landing, accounting for 67% overall. (See Figure 4).

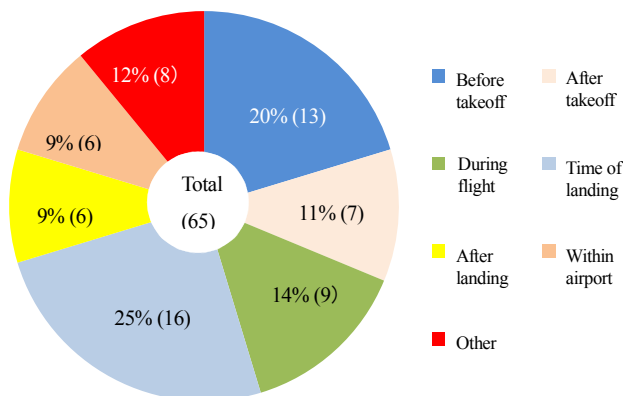


Fig.3 Flight phase when close call incidents occurred

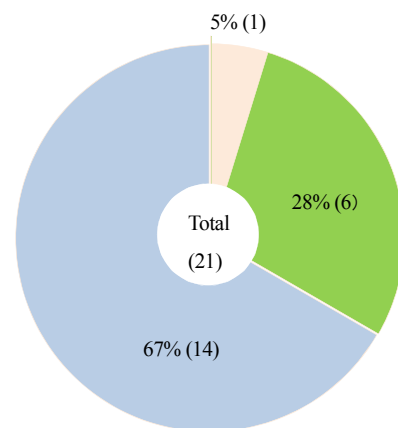


Fig.4 Flight phase when accidents, etc. occurred

\*Reference

- Figure 1 and Figure 3 were prepared based on 65 cases of FEEDBACK released on December 25, 2014 and March 30, 2015 through the ATEC website.
- Figure 2 and Figure 4 were prepared based on 21 accidents, etc. that occurred in 2014 and that were investigated by the Japan Transport Safety Board.

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**\*Close call incident cases**

Close call incident cases that were reported to VOICES include cases that occurred in broad circumstances as follows.

There are cases of close call incidents within the cockpit during aircraft operation, as well as other locations such as airports, maintenance, etc., which suggests that conducting operations following basics on a day-to-day basis could contribute to a reduction in problems, etc. related to aircraft operations.

[Flight related]

- While an aircraft encountered a group of white balloons believed to have been released from a wedding venue near the airport while making a landing approach towards the destination airport, the aircraft avoided a collision with the balloons and the balloons were not sucked into the engine.

[Airport related]

- When moving from the taxiway to the parking area after landing at the airport, caution was required because the space between operational vehicles and the aircraft at the airport is narrow.
- At an airport in an area with snowfall, a supporting vehicle got stuck in the snow, and it slipped and could not move. As office employees except for some went out to respond to this situation, aircraft lighting was lit later than the scheduled time (the regular flight was able to land without interference).

[Maintenance related]

- During maintenance on aircraft, a marking was spotted on a certain part that indicates an area that requires repeated inspection. Record revealed that the part was appropriated from another aircraft, and that despite the fact that repeated inspections were required for the source aircraft, those working instructions were not carried over for maintenance of the aircraft using the part. Because this was noticed before the inspection deadline, it was possible to conduct the required inspection.

### 3. Case of close call incidents, aircraft accidents, etc. (related to wake turbulence and wrong approach to a runway, etc.)

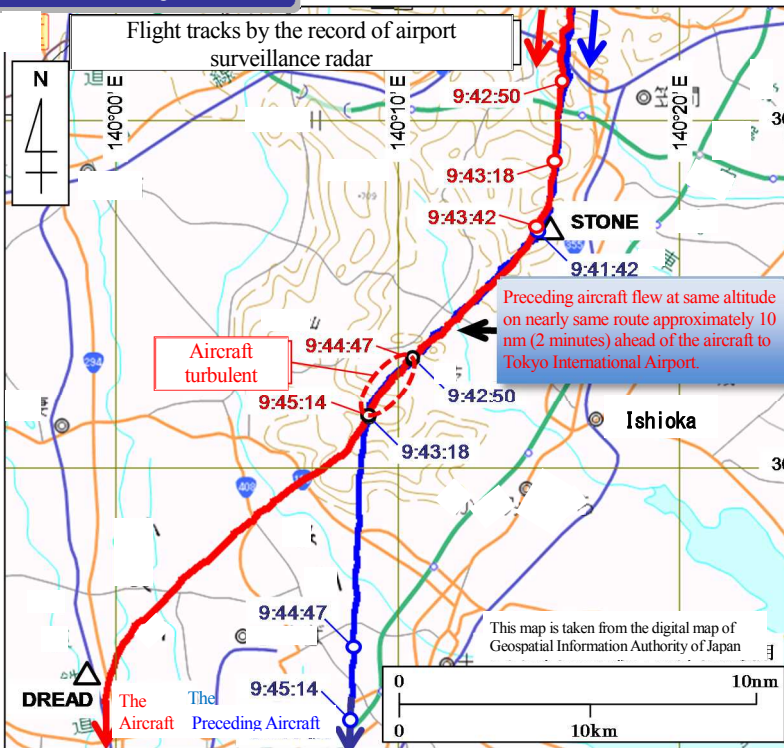
#### Case 1 of wake turbulence (aircraft accident)

**The aircraft encountered strong wake turbulence from the preceding aircraft when descending, and two cabin attendants who were in the aft galley fell over**

Summary: On Tuesday, April 29, 2014, at 09:16 Japan Standard Time (JST: unless otherwise stated, all times are indicated in JST, UTC+9h), an Embraer ERJ170-100STD, operated by Company A. took off from Yamagata Airport as the scheduled flight 1252 of code sharing with Company B. At around 09:45 when the aircraft was descending toward Tokyo International Airport, it encountered turbulence at an altitude of approximately 10,600 ft over Ishioka City, Ibaraki Prefecture. Two cabin attendants were injured who were in the aft galley.

There were 39 people on board, consisting of the pilot in command(PIC) ,three other crew members and 35 passengers. The aircraft was not damaged.

#### Estimated Flight Route



#### Progress of the flight

09:16	took off from Yamagata Airport
	The aircraft was flying at an altitude of 11,000 ft, following the standard arrival route of Tokyo International Airport by autopilot (hereinafter referred to as "A/P").
09:44:23	Tokyo radar approach control facility instructed the aircraft to descend to an altitude of 8,000 ft and to reduce the speed to 230 kt.
09:44:37	The aircraft began to descend from the altitude of 11,000 ft.
09:44:47	The vertical acceleration rate of the aircraft started to fluctuate little by little.
09:44:57	The aircraft started to roll and veer to the left, and a large fluctuation in vertical acceleration and lateral acceleration rates began.
09:44:59	Lateral acceleration rate to the left of the aircraft became approximately 0.32G (the maximum value during this flight).
09:45:03	The A/P of the aircraft was disengaged manually.
09:45:04~05	The left bank angle of the aircraft became approximately 58° (the maximum value during this flight).
09:45:04~10	The control column of the aircraft was pulled a little, and the control lever of the aircraft was push to the right intermittently.
09:45:13	The A/P of the aircraft was engaged.
09:45:15	Fluctuation of vertical acceleration rate of the aircraft almost stopped.

#### The Preceding Aircraft

Airbus A340-600  
 Maximum takeoff weight:  
 Approximately 368 tons  
 Wake turbulence classification: Heavy aircraft



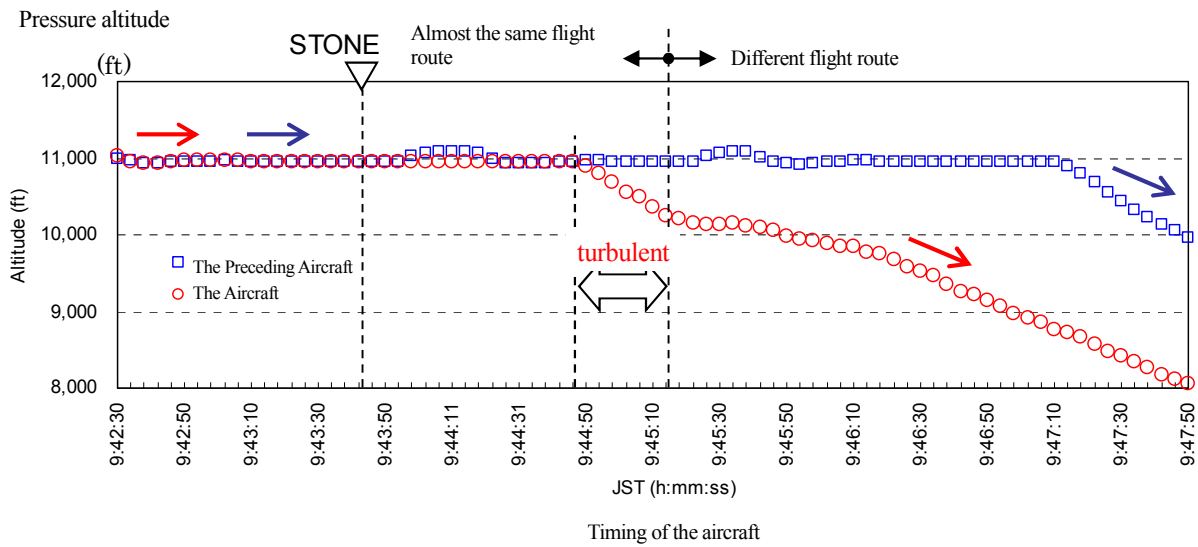
#### The Aircraft

Embraer ERJ170-100STD  
 Maximum takeoff weight:  
 Approximately 35 tons  
 Wake turbulence classification: Medium aircraft



## Timing of changes in vertical acceleration of the aircraft

### Illustration of assumed flight altitude

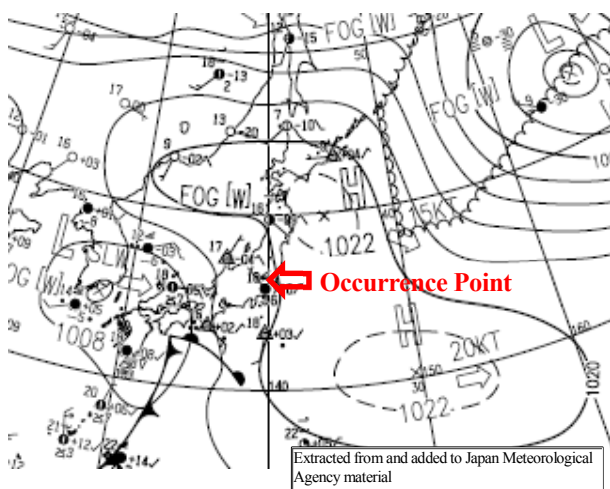


Smoothed altitude after correction of the atmospheric pressure by the record of airport surveillance radar

According to the records of the flight recorder and the radar track records of Tokyo radar approach control facility, the vertical acceleration of the aircraft started to fluctuate little by little at around 09:44:47 when it began to fly approximately 200 ft below the preceding aircraft on the same flight route as the preceding aircraft, and after the large fluctuation began at around 09:44:57, when it was flying approximately 600 ft below the preceding aircraft. After that the fluctuation almost stopped at around 09:45:15 when the aircraft began to fly on a different route from the preceding aircraft after its left turn.

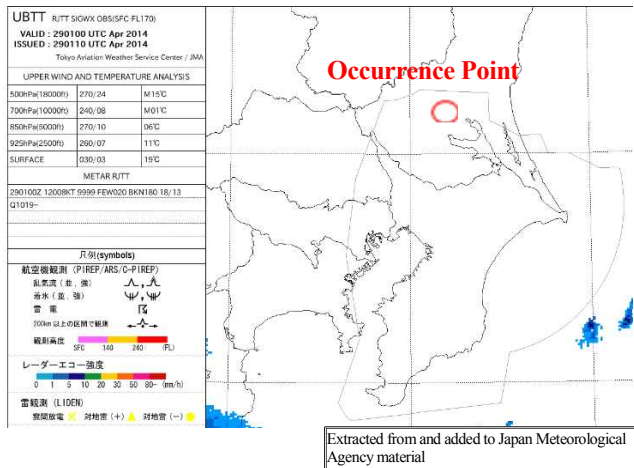
## Meteorological information

Asia Surface Synoptic Chart (09:00 on April 29)



Extracted from and added to Japan Meteorological Agency material

Regional Significant Weather Prognostic Chart (Kanto) (10:00 on April 29)



Extracted from and added to Japan Meteorological Agency material

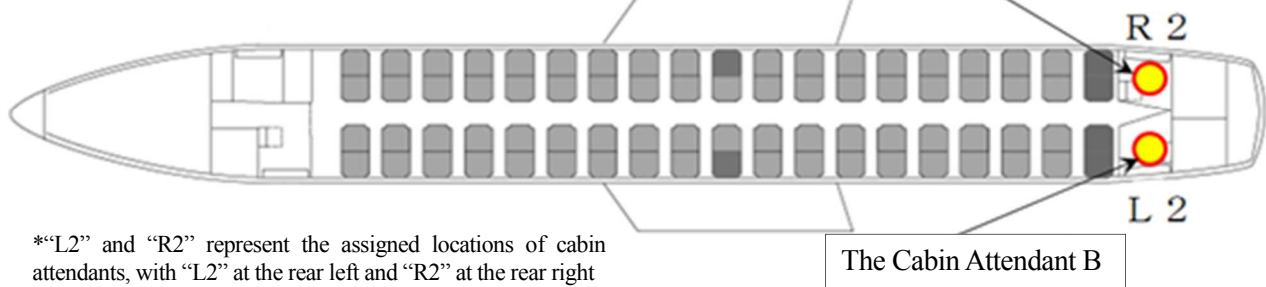
According to the Asia Surface Synoptic Chart at 09:00 and the Regional Significant Weather Prognostic Chart (Kanto) at 10:00 on the day of the accident, the airspace where the accident occurred was at the edge of a high atmospheric pressure area moving eastward at 20 kt, with no effects of a low atmospheric pressure approaching from the south coast of Shikoku island, and no bad weather was observed.

In addition, according to the Hourly Atmospheric Analysis Charts\* at 09:00 and 10:00, the wind was blowing at a low speed about 5 kt in the airspace where the accident occurred, and no vertical wind shear was observed. The temperature was stable at approximately minus two degrees. \*See the investigation report



## Status of injured persons

### Locations of the Injured when the Accident Occurred.



\*“L2” and “R2” represent the assigned locations of cabin attendants, with “L2” at the rear left and “R2” at the rear right

### The Cabin Attendant A

When the Cabin Attendant A entered the aft galley from the front side after cabin safety check, she took the R2 handset and monitored the call. After receiving the information on the estimate time of passing an altitude of 10,000 ft and instruction to carry out cabin safety checks the cockpit, and when she tried to place back the handset, the aircraft was strongly shaken and she collided with the R2 door; subsequently, collided with the Cabin Attendant B who was strongly flung from the L2 side, and fell down.

### The Cabin Attendant B

Immediately after the Cabin Attendant B received the notification from the cockpit with the L2 handset about the estimate time of passing an altitude of 10,000 ft, and when she was about to make an announcement to the passengers, the aircraft was strongly shaken and her body was strongly flung to the R2 side, and then collided with the Cabin Attendant A who was at R2.

## Analysis of cause of accident

### Relation to Meteorological Conditions

It is highly probable that the meteorological conditions around the accident airspace were that there was no cloud associated with bad weather, calm winds and no atmospheric turbulence.

### Relation to Wake Turbulence

Wake turbulence is believed to decay earlier if there is an atmospheric turbulence; however, it is probable that the strong wake turbulence that the Aircraft encountered persisted longer than usual, because of the stable meteorological condition with calm winds in the airspace.

### History of the Shaking of the Aircraft

The Aircraft started to descend upon receiving an instruction from the Tokyo radar approach control facility, and as the vertical acceleration of the Aircraft started to fluctuate little by little at an altitude of approximately 10,800 ft around 09:44:47, it is probable that the Aircraft started to be affected by the wake turbulence from the Preceding Aircraft around that time.

This big shake continued until it recorded the vertical acceleration of approximately 1.64G at 09:45:07, and then turned toward convergence. Therefore it is probable that the Aircraft encountered the strong wake turbulence from around 09:44:57 until around 09:45:07 while it was descending from an altitude of approximately 10,600 ft to approximately 10,400 ft.

### Separation behind the Preceding Aircraft

The separation between both aircraft was approximately 10 nm according to the radar track records. Therefore certain that there was enough separation exceeding 5 nm, which is the Minimum Separation by the wake turbulence control procedure\*.

\*The Wake Turbulence Control Procedure : In the case that the air traffic controller is using radar, the minimum separation when a medium aircraft follows a preceding heavy aircraft is 5 nm.

**Involvement of the Flight Crew Members**

Even though the flight crew members needed to be careful of the calm wind condition where the wake turbulence persists longer than usual, it is probable that it was difficult to predict such shaking of the Aircraft that would cause passengers or cabin attendants to fall, as there had been very few examples of report of encounter with a strong wake turbulence from an aircraft flying approximately 10 nm ahead, and it is probable that it was not a situation where they were required to change the flight route or altitude to avoid it, nor instruct the passengers and cabin attendants to fasten their seatbelts in preparation for the shaking of the Aircraft.

While it is probable that a big shake of the Aircraft caused the injuries of the cabin attendants, it is probable that the flight crew members conducted the recovery operation of the unexpected unusual attitude of the Aircraft properly.

**Probable Causes :** It is probable that this accident was caused by the shaking of the Aircraft which encountered the strong wake turbulence from the Preceding Aircraft while the Aircraft was descending; accordingly, two cabin attendants in the aft galley fell down and one of them was seriously injured.

It is probable that the strong wake turbulence that the Aircraft encountered persisted longer than usual because of the stable weather condition with calm wind.

### In order to Prevent Recurrence

➤It is probable that it would be beneficial for pilots to keep in mind the content described in guidance\* in the event wake turbulence is encountered, and review the operation continuously to appropriately recover the fuselage attitude in case of unexpected encountering with a wake turbulence.

\*Advisory Circular No.90-23G "Aircraft Wake Turbulence" published by the Federal Aviation Administration, U.S. Department of Transportation

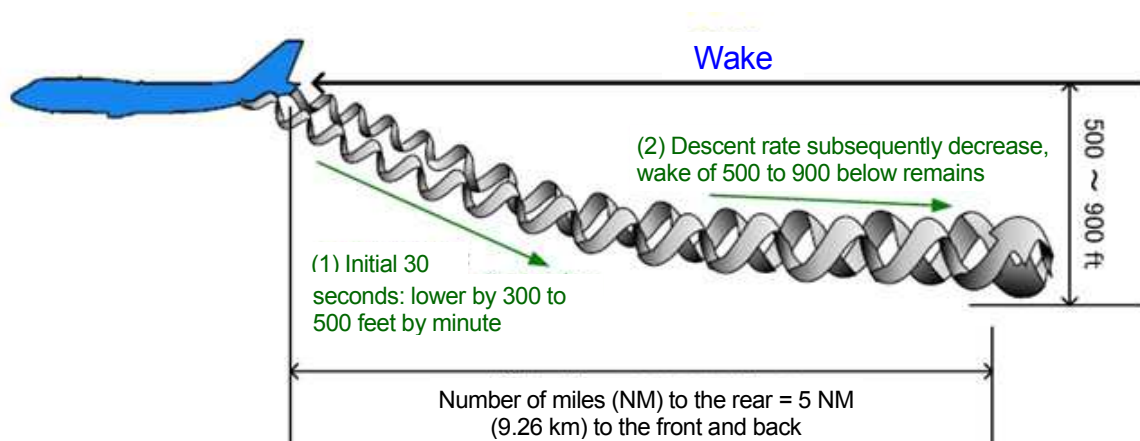
The investigation report of this case is published on the Board's website (issued on May 28, 2015)

[http://www.mlit.go.jp/jtsb/eng-air\\_report/JA211J.pdf](http://www.mlit.go.jp/jtsb/eng-air_report/JA211J.pdf)

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

### Mini explanation About wake turbulence

Wake turbulence from aircraft is the spiraling flow of air that occurs from the difference in air pressure above and below the wings. Wake turbulence is said to exist in a belt that generally has a length of 9.3km (5nm) from front to back in the case of large aircraft, and air traffic control conducts control so that aircraft do not enter a minimum interval that is stipulated based on the size of the preceding aircraft and the aircraft that follows it.



## Case 2 of wake turbulence (close call incident)

### The aircraft became engulfed by wake turbulence from the preceding aircraft immediately after takeoff

Time of takeoff

- Took off following a large aircraft when departing from Haneda Airport
- Received impact of what is believed to be wake turbulence from the preceding aircraft

Time of ascent

- Entered a significant right bank while in autopilot mode soon after takeoff
- Impression was a considerably fast roll rate (how an aircraft tilts) and the start of tilt that was larger than usual
- When an attempt to use the aircraft's monitor was made, it suddenly over banked (an excessive bank angle) and the bank angle alarm rang at the same time. It seemed that the autopilot mode fell into the roll mode through manual control.
- As the roll rate began to become controlled, the monitor was continued, and autopilot was slowly released
- HDG SEL (course selection) was ordered once more
- As autopilot went into over banking just like that, the threat of wake turbulence was recognized once more

This case was introduced on the ATEC website (Page 3, 05).

<http://www.jihatsu.jp/news/feedback/FEEDBACK%202014-02.pdf>

(Only available in Japanese)

As wake turbulence circumstances change depending on the impact of factors such as the presence and strength of wind in that airspace, it would be difficult for pilots to accurately assess wake turbulence conditions in advance.

As it is also stated in the accident investigation report that "it has been recognized that an interval sufficiently exceeding the minimum interval was secured," it is believed that there was no big difference in the operations conducted by both pilots in response to wake turbulence. Moreover, while there was a person injured as a result of the shaking of the aircraft, the pilot of the aircraft involved in the accident properly conducted recovery operations in response to the abnormal positioning.

It is believed that what can be said for these two incidents is that firstly it is important to remain faithful to the basics in operations, and to also pay attention to changes in the surrounding situation with the recognition that it's impossible to know what might happen during flight and to always respond calmly when an unexpected situation occurs.



## ※Case of small aircraft that landed becoming grounded by wake turbulence from a large aircraft

Ownership: Individual

Model: Piper PA-46-350P

Time and date of occurrence: around 12:37 on August 5, 2003

Location of occurrence: Nagoya Airport (at that time)



An privately-owned Piper PA-46-350P was boarded by a total of four people including the captain on August 5, 2003 (Tuesday) in order for personal move and took off from Yao Airport. When it landed at Runway 34 of Nagoya Airport, after touching the earth the aircraft body flew up and touched down at around 12:37, and the landing gears were broken and stopped on the ground.

There was no passenger injured, medium level damage was caused to the aircraft, and no fire occurred.

It is assumed that this accident was caused by the aircraft encountering wake turbulence upon landing occurring from the left wing of the departing aircraft that departed earlier. The aircraft touched down once, flew up, and touched down again, at which time both main landing gears were broken, the rear spar near the end of the left main wing was bent, and the body of the aircraft was damaged.

(Reference)

Regulations concerning wake turbulence in air traffic control standards (excerpt)

(1) When establishing a minimum control interval (in the case of the same runway)

a. Separation between landing aircraft:

Preceding aircraft	Following aircraft	Minimum separation
Heavy aircraft	Heavy aircraft	2 minutes
Heavy aircraft	Medium aircraft	2 minutes
Heavy aircraft/Medium aircraft	Light aircraft	3 minutes

b. Separation between departing aircraft:

Preceding aircraft	Following aircraft	Minimum separation
Heavy aircraft	Heavy aircraft/Medium aircraft/ Light aircraft	2 minutes

(2) When providing information

Preceding aircraft	Following aircraft
Heavy aircraft	Aircraft in a visual approach
Departing heavy aircraft	Aircraft landing in less than 2 minutes
Landing heavy aircraft	(1)Landing visual flight rule aircraft with less than the minimum separation in a. above
Landing medium aircraft	Landing light aircraft
Other aircraft deemed necessary the issuance of advisory information on wake turbulence, for safety reasons	

(Note) Types of aircraft wake turbulence

Aircraft	The maximum takeoff weight
Heavy aircraft	300,000lb(136t) or above
Medium aircraft	15,500lb(7t) to 300,000lb(136t)
Light aircraft	less than 15,500lb(7t)

The investigation report of this case is published on the Board's website (issued on July 30, 2004)  
<http://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2004-2-1-JA4200.pdf>  
 (Only available in Japanese)

# Case 1 of wrong approach to a runway, etc. (Aircraft serious incident)

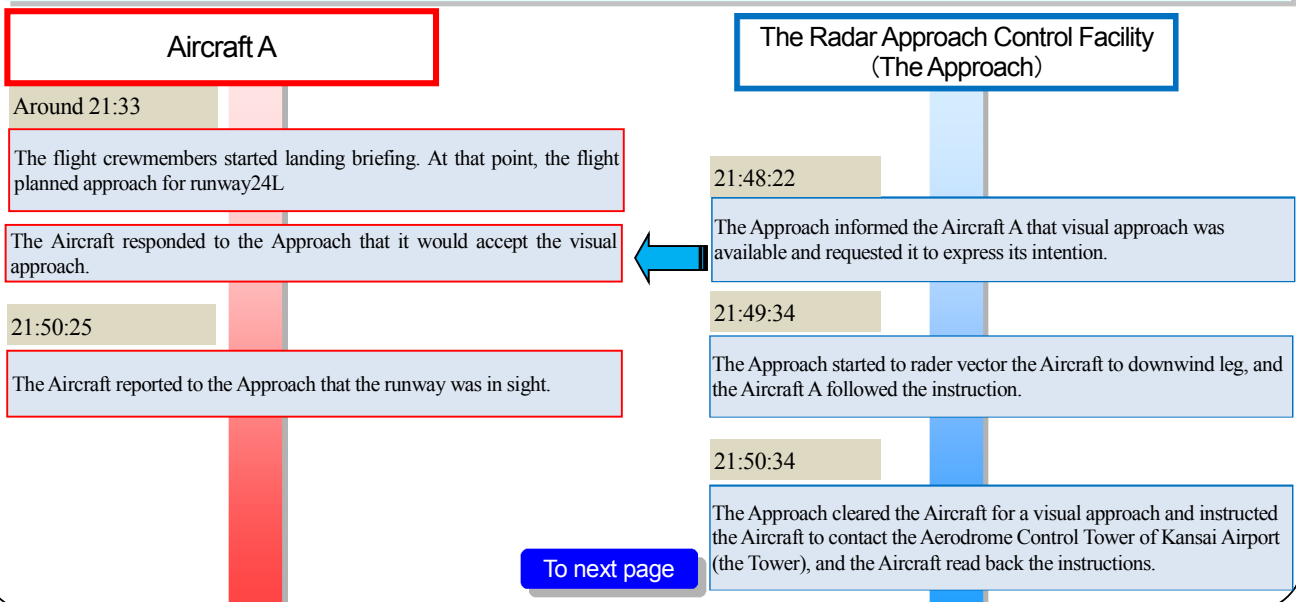
The aircraft made an attempt to land on a closed runway while approaching Kansai International Airport, and then made go-around

Summary : On August 30 (Monday), 2010, a Boeing 777-300, operated by Company A, took off from Narita International Airport at 20:59 Japan Standard Time (JST: UTC+ 9hr, unless otherwise stated all times are indicated in JST using a 24-hour clock). At about 21:55, when the aircraft was approaching Kansai International Airport, it attempted to land on runway 24R, which was closed. Thereafter, the aircraft made a go-around and touched down on runway 24L at 22:07. There were 124 people on board, including the captain, 16 crewmembers, and 107 passengers but no one was injured.

## Estimated Flight Route



## Background of events up until the serious incident



21:51:19

From the previous page

The First Officer suggested a traffic pattern would be width of 4 to 5 nm from the runway to the Captain, and the Captain accepted the suggestion.

The Aerodrome Control Tower (The Tower)

21:52:20

The Aircraft A reported to the Tower that it had entered the downwind leg.

\*Communication transfer from terminal radar control seat (the approach) to airfield control seat (the tower)

21:52:37

### Status of airfield lighting

The precision approach lighting system (PALS), the sequenced flashing lights (SFL), and the precision approach path indicator (PAPI) of runway 24R were turned on.  
\*The explanation of each lights are the next page.

21:53:11

The SFL of 24R was turned off.

21:54:33

The Captain said, "Three reds, one white."\*1

The Aircraft A read back the clearance to land on 24L.

21:54:42

The Tower cleared the Aircraft to land on 24L

21:55:11

The Tower pointed out that the Aircraft was approaching 24R, and asked whether it was possible to make a left turn to approach 24L.

The Aircraft A reported to the Tower that the Aircraft would make a go-around because the Aircraft was unable to approach 24L.

21:56:14

The PALS and PAPI on 24R were turned off.

\*1 It is considered highly probable the Precision Approach Path Indicator (PAPI) was seen as "red, red, red, white" (a slightly low entry altitude)

## Analysis of cause of serious incident

### Analysis of pilot and roles and cooperation of flight crew

#### (Statements of Captain)

- The Captain learned from the Automatic Terminal Information Service (ATIS) that the runway to be used was 24L and that 24R was closed.
- He was perfectly familiar with the Airport, but he had never previously made a visual approach at night, and he was not able to give proper instructions to the First Officer.
- When he looked outside after the First Officer turned off the Autopilot, it was dark, and there were no visual references to the surface landmarks
- He did not see the two runways and the approach lights for 24L during the final approach course.

#### (Statements of First Officer)

- The First Officer had approached the Airport in the afternoon of the previous day for the first time as PM. He was unfamiliar with the Airport.
- While the Aircraft was turning right, the outside was dark, which confused him, but he saw the runway and the PAPI. At that point, the Aircraft seemed to be overshooting so he turned off the autopilot before starting the approach.
- When the Aircraft was stabilized, the controller pointed out them that the Aircraft was approaching the wrong runway.
- approximately 3 nm of the final approach remained. However, it would have been difficult to touch down on 24L, and so he made a go-around.

The traffic pattern was made above the sea, the visual approach was made at night with limited visual reference objects visible, the First Officer saw a runway and a PAPI close to the position where it is normally seen, assumed it was the right runway, and entered 24R mistakenly.

It is considered somewhat likely that the Captain was distracted by the First Officer's maneuvering which he felt unsure about, and could not play the role as PM sufficiently well, and that his checking did not function properly.

The Captain and the First Officer were aware that 24R, which is one of the two runways of the Airport, was closed, there was a good visibility, it is considered probable that the false recognition of the runway would have been avoided if the Captain and the First Officer had recognized the two runways with a wider eyesight.

And it was the first visual approach to the Airport at night for both the Captain and the First Officer. It would have been desirable for them to or make an ILS approach as originally planned instead of the visual approach.

## Analysis of operations of airfield lighting

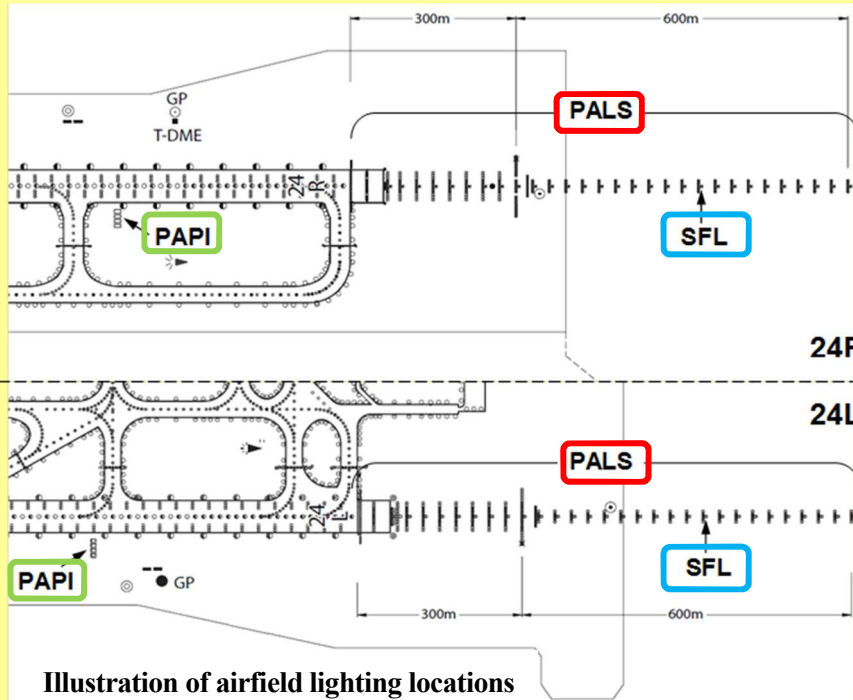


Illustration of airfield lighting locations

### PALS Precision Approach Lighting System

A lighting system installed on the approach end of an airport runway that accommodates precision approaches for instrument landing.

### SFL Sequenced Flashing Lights

A series of flashing lights that flash twice a second in sequence in the approach direction of an airport runway to the runway end.

### PAPI Precision Approach Path Indicator

A visual aid that provides guidance information to help a pilot acquire and maintain the correct approach to an aerodrome. It is generally located on one side of the runway.

The lighting staff shall notify controller before turning on the PALS and PAPI.

The rights to control the lighting console including the operation of the PALS and PAPI had been transferred from the Tower to the lighting staff at the time of this serious incident. Furthermore, the lighting staff was allowed to omit the prior notification to controllers. Therefore, it is considered highly probable that the lighting staff turned on the lights without notifying controllers in advance.

The PALS and PAPI on 24R were turned on when the aircraft was flying on the downwind leg in the traffic pattern

It is considered probable that the fact that the PAPI was on while there were no visual references on the sea was a contributing factor that the Captain and the First Officer to believe 24R as 24L.

**PROBABLE CAUSES :** It is considered highly probable that this serious incident occurred because while the aircraft was conducting visual approach to the airport the Captain and the First Officer assumed 24R to be 24L, and approached 24R by mistake after the aircraft received a landing clearance to 24L.

It is considered probable that the Captain and the First Officer assumed 24R to be 24L because their visual recognition of the runway was insufficient and the PALS and PAPI on 24R were turned on. It is considered probable that the traffic pattern they flew was close to the standard traffic pattern for 24R contributed to the occurrence.

## In order to Prevent Recurrence

- Kansai Airport Office: In regard to the Extinction of the approach lighting system and the precision approach path indicator on closed runways” and “Thoroughgoing observance of the Agreement with the lighting staff”, thoroughgoing observance of the Agreement with the Aerodrome Lighting Department was re-confirmed.
- Arrangements of Air Traffic Control Division, Air Traffic Services Department of Civil Aviation Bureau (at that time): Regarding the lighting control of closed runways, the controller in charge should determine the timing of the lighting of the precision approach path indicator and approach lighting systems on closed runways for a proper period with consideration of the air traffic condition of the airport.

The investigation report of this case is published on the Board's website (issued on September 30, 2011)

[http://www.mlit.go.jp/jtsb/eng-air\\_report/A7BAE.pdf](http://www.mlit.go.jp/jtsb/eng-air_report/A7BAE.pdf)

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

Aircraft used wrong route for approaching airport when landing

During flight

- When descending to an airport, approval was received from the control tower for approach to BACON ARR (landing route for Haneda Airport)
- An approach was made to ADDUM (an air route point) using autopilot in accordance with the instrument landing course
- As we saw that the preceding aircraft was guided by radar to BLITZ (an air route point), we thought that we were also being guided by radar based on that course
- In addition, flying based on LNAV (instrument landing) was thoroughly forgotten for being guided by radar
- Direct (instrument entry for advancing on a direct route) to BLITZ were put in the CDU (input-output device)
- Immediately after that, the mistake was pointed out by the PM (pilot that is mainly responsible for tasks other than flying) who was the captain at that time
- Subsequently, the captain corrected the input to the ADDUM direct and STAR (re-input of the standard instrument arrival route)
- Thanks to the guidance by the captain, there was no deviation from the route

This case was introduced on the ATEC website (Page 2, 03).

<http://www.jihatsu.jp/news/feedback/FEEDBACK%202014-02.pdf>

(Only available in Japanese)

One point that differs from the previous case of wrong approaches is whether the check function of the flight crew members functioned during the flight.

In Case 1, the captain who is in a position that should provide guidance to the copilot with less experience was not able to continue providing correct guidance to the First Officer, and they were slow to notice that their aircraft had approached the wrong runway.

In contrast, in Case 2, when the First Officer made a mistake with the course of their aircraft, the check function by the captain was fulfilled, and it was possible to continue the flight without problem as a result of the error of the copilot being pointed out.

These cases of a wrong approach suggest that it is also necessary to always have mutual checks of operations and to make it easy for the captain and copilot to communicate each other.

## 4. Questionnaire and pilot interviews on close call incidents

In order to ask the opinions of pilots on the close call incident cases including wake turbulence and wrong approaches introduced here, questionnaires and interviews were conducted with the cooperation of the Japan Aircraft Pilot Association.

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- **Questionnaire on cases of close call incidents**  
126 people responded to the questionnaire.

### **Question 1. Have you ever experienced being engulfed by wake turbulence during operations?**

**Yes 53.9% (68 respondents)**  
**No 46.1% (58 respondents)**

### **Question 2. How did you respond in order to avoid an accident when being engulfed by wake turbulence?**

- **Take control, maintain posture, and confirm the altitude and speed.** (13 similar response)
- **I changed the flight path.** (9 similar response)
- **I broke the approach because I was making an approach, and changed the course to a direction where I believed there was no wake turbulence.** (4 similar response)
- **Honestly, I was not able to respond because it was a sudden encounter.** (3 similar response)
- **I encountered it when descending following Haneda STAR (standard landing route) through the VNAV (instrument landing method). I avoided it by turning off autopilot and lowering the descent rate.** (3 responses including the change in the ascent rate)
- **I didn't respond in any particular manner because I was able to escape from the wake turbulence soon.** (3 similar response)
- **I turned on the seat belt sign.** (2 similar response)
- **I kept my hand on the control and monitored it to ensure that banking did not exceed 30 degrees with autopilot kept being engaged.** (1 similar response)
- **Because it was a low altitude during the final approach, I conducted a go around by using more power.** (1 similar response)

### **Question 3. Have you ever nearly made a runway incursion during taking off or landing or wrongly entered in a taxiway in the past?**

**Yes 31.7% (40 respondents)**  
**No 68.3% (86 respondents)**



**Question 4. How did you respond in order to avoid an accident when nearly making a runway incursion during taking off or landing or a wrong entry to a taxiway?**

- **I stopped temporarily and confirmed. We confirmed it together (two persons).** (9 similar response)
- **I prevented a wrong entry by confirming with the control tower “Confirm RWY XX ?” while taxiing.** (8 similar response)
- **There were no problems because it was pointed out by another crew member.** (6 similar response)
- **I conducted a go around when the mistake was recognized and made an approach once again.** (4 similar response)
- **I thoroughly ensured confirmation with the controller and visual confirmation.** (2 similar response)
- **Because there was a sufficient distance with related traffic, it was possible to avoid the risk of an accident.** (2 similar response)
- **I immediately noticed that we were about to take the wrong entry to the taxiway, so I asked for permission to taxi from the grand controller and checked that there was no other aircraft nearby.** (2 similar response)

**Question 5. Have you experienced any other close call incident during operations in the past?**

**Yes 59.5% (75 respondents)**

**No 40.5% (51 respondents)**

**Question 6. How do you act in order to avoid accidents when you sense a close call incident?**

- **First, I stay calm and find out why that situation occurred.** (7 similar response)
- **I experienced a settling-with-power on a helicopter. As there was not much leeway in terms of altitude, I avoided the situation by increasing forward speed.** (5 similar response)
- **I responded by staying calm and communicating between the two of us.** (4 similar response)
- **While taxiing after landing, I discovered another aircraft at an intersection of taxiways to the right and immediately stopped. As the aircraft also stopped, there was no major accident. There was a distance of 20m to 30m between my aircraft and the other aircraft.** (4 similar response)
- **After I had entered into an unexpected control zone after misunderstanding the landing AD (airfield), I exited the control zone after communicating with control to reconfirm and receive clearance.** (3 similar response)
- **Go around when landing and brake while taxiing.** (2 similar response)
- **As there was a sudden appearance of cumulonimbus clouds in the flight course, I turned back and changed the course to the destination mid-flight.** (2 similar response)

○ **Interview on cases of close call incidents**

**We talked with incumbent Pilot A and former Pilot B about close call incidents involving wake turbulence and wrong approaches.**

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**About wake turbulence**

**—Have you ever experienced wake turbulence?**

A: Small aircraft are susceptible to wake turbulence. This is especially the case when they follow large aircraft. I have also experienced wake turbulence, and I think the degree of impact differs depending on the size of the aircraft.

**—Have you ever noticed that wake turbulence occurs in certain circumstances?**

A: Depending on the wind direction, there are times when wake turbulence is felt and times when not, under the same conditions.

**—Is an impact caused by the meteorological conditions and the preceding aircraft?**

A: When a control officers leads my aircraft on the same route as the preceding aircraft, as aircraft are susceptible to turbulence when flying lower than the preceding aircraft, I prevent turbulence by flying at a high altitude.

**—So, altitude also affects the chance of wake turbulence, right?**

A: While one is more susceptible to wake turbulence if you pass underneath a flight path, as the turbulence spiral can be avoided if the wind is blowing strongly, whether or not wake turbulence is experienced can also depend on the wind.

**—Do pilots know if they are experiencing wake turbulence or not?**

A: I think that most pilots have experienced wake turbulence.

B: If there is a preceding aircraft and you are a pilot, you usually keep wake turbulence in mind. However, it is difficult to know how to respond when you actually experience wake turbulence. Even if you are told to be careful of wake turbulence at the time of takeoff, we cannot say “OK, I’ll wait for one minute.” There seems to be something we can do but doesn’t really much you can do when it comes to the wake turbulence.

**- When a small aircraft takes off following a large aircraft, a wait of three minutes is current guideline for takeoff, or two minutes for cases other cases. What kind of a wait should there actually be?**

B: That depends on the weather conditions. The chance of wake turbulence is low if the wind is blowing. I believe that changing takeoff intervals in line with weather conditions could be an effective preventive measure.

**—Do you ever redo landing in order to avoid wake turbulence?**

B: I don’t know of any pilots brave enough to redo landing when the aircraft isn’t even shaking.

**Unintended entry to runways and taxiways**

**—I would like to talk about unintended entry to runways and taxiways.**

A: It is more likely to make a unintended entry at airports with complex taxiways.

B: While there are some airports where lighting is used to provide guidance on your route, it is more likely to make unintended entry to taxiways at airports that are not like that.

A: In order to prevent unintended entry to taxiways, the latest aircraft models have been equipped with aircraft navigation systems called EFB. If you use these systems, you won't get lost even at night.<sup>(\*1)</sup>

B: As it has become normal to land using instruments, I don't think it would be normal to make a wrong approach if there are no problems with instrument input. On the other hand, there could be mistakes when landing based on visual inspection at times.

#### — Does the experience of the pilot affect whether or not there are mistakes?

A: Experience is not the only thing that matters. Conversely, in some cases it is experienced pilots that are overconfident and go too fast, which leads to mistakes.

B: Just because you are a veteran does not mean that you do not make mistakes. It is said that the ultimate way of avoiding mistakes is for a person who is not piloting to calmly confirm.

#### — Are there many cases of unintended entry at airports overseas?

B: If it's the first time that you have been to an airport in a while, you may make a mistake even if you have the layout in your mind. For this reason, I have been told to confirm the number of the runway.

A: Once a pilot makes an assumption, it can be difficult for them to escape from these assumptions. If this happens to the pilot, the only person who can assist is the first officer. A means of preventing unintended entry would be for the first officer to serve as the person to say "Captain, that is wrong" as the final gate. In such a case, team ability as the crew would prevent mistakes rather than individual ability. This is because there are limitations in individual abilities.

#### — What do you do in order to respond as a crew?

A: One of the things is education as a company. Regularly gathering together pilots and considering past cases of close call incident in order to raise awareness more and more encourages the First Officer to have the awareness that "I must make suggestions to the captain as a member of the crew in cases like this." At the same time, education is also provided to captains in order to create a positive workplace environment that makes it easy for the First Officer to speak.

### Other cases of close call incidents

#### — Do you remember any close call incidents other than wake turbulence or unintended entry to runways and taxiways?

A: When landing by visual inspection overseas, the control officer asked whether we could see the preceding aircraft that was in front of our aircraft during approach, and the captain said "I could see it" because shadow of the aircraft could be seen in front. As we followed because we thought that we would land after that aircraft, we made a mistake on the aircraft we should have followed.

B: I have a story about communications with ATC (air traffic control). When flying with foreign crew members,

there was a case in which it was difficult to hear the difference between left and right, and the crew and I heard something different. After confirming once again with ATC, it turned out that the native crew heard it incorrectly.

As a case related to confirming the things you hear with your ears, at one airport there was a captain who tried to make a quick takeoff after being given takeoff permission from a takeoff position and then being told something else by ATC. While what the ATC had said was that takeoff permission had been canceled, it seems that the captain misheard that as “go quickly” after our aircraft number had been read again.

— **In the serious incidents introduced by the Japan Transport Safety Board, there were also cases of mishearing what air traffic control had said.**

A: The most common incidents related to air traffic control involved similar flight names. For every airline there are many similar flight names during about the same time period. As everyone makes communication mistakes in these cases, recently they have added letters to the end of flight names like “xxxx alpha” as a countermeasure.

### **Cases of close call incidents not involving pilots**

— **Have you heard of cases of close call incidents not involving pilots?**

A: I have heard a case involving printer paper in a computer. While this paper differs by model, in one case it wasn't possible to print, and after checking it seemed that the paper for a different model was being used.

B: In the past, there were cases of the gear pins being removed from the gears (wheels) of parked aircraft and then forgotten, and gears could not fit in the cabin after takeoff as a result. In response to this, so that removed gear pins would not be forgotten, mechanics must show the gear pin at the time of taxiing out for confirmation by the pilot in the aircraft.

A: Most human errors are a result of there not being enough time. While we properly check things if there is time, when there is time pressure we may not really look at the things that should be confirmed despite our intentions. As the pressure caused by time is the thing that most affects human error, I make sure to confirm things even when I know that I don't have much time.

B: The biggest source of time pressure is the “curfews”<sup>(\*)2</sup> that airports have. When an airport has a curfew this means that if you don't complete preparations for takeoff by that time, you will have to take off the next day, and all the work you have done up until then will go to waste. This means that you have to be careful when you are hurrying in order to be on time.

\*1. However, because taxiing relying only on EFB is prohibited in regulations, the use of EFB is only for reference purposes.

\*2. What “curfew” means here is the start of the time period when the arrival and departure of aircrafts is prohibited at specific airports.

## 5. Column

### Personal experiences of pilots involving close call incidents (contributors)

I would like to write about close call incidents that I have experienced.

Pilots conduct an external check of aircraft before flights. When conducting an external check on large aircrafts, you tend to walk while looking upwards often. As you may know, there are many vehicles in parking areas around aircraft, and they move about busily to do their own work.

In addition, there are also freight containers laying around. Because you have to conduct external checks within such an environment, I always tried to remain vigilant while conducting external checks. Nevertheless, I nearly collided with vehicles on many occasions. Because I did not wear a fluorescent vest at that time, working at night was particularly dangerous.

While it was not caused by my experiences, subsequently it became obligatory to wear fluorescent vests at the time of external inspections.

The operation of aircraft is supported by communication by wireless telephones with air traffic control organizations. Large aircraft are normally equipped with three radios, one of which is used for communication with the control organization. Individual radios can be set with two differing frequencies. They can be switched by selecting the switch and used for communications with the control organization. It was ordinary for the frequency set not used to be preset with the frequency believed to be used for communication with the next control organization. One time, as a frequency was preset, for some reason I simultaneously operated the selection switch. I felt that the feeling in my hands was somehow different. As I felt that something was strange after listening to the communication, noticed that the frequency had changed despite there being no instructions to change the frequency when I confirmed the frequency. While no problems occurred as I immediately changed in back to the original frequency, it was a chilling experience. After telling one of my seniors about this, I remember being told "Rather than slick operations that seem clever at first, you should try to conduct steady operations even if they seem unsophisticated."

Clouds can be a bother when operating a flight. If you enter a cumulonimbus cloud that develops, some passengers may become injured, and the aircraft may become damaged. Aircraft are equipped with airborne radar in order to detect these clouds early and avoid them. In an aircraft I crewed, the rotary switch to change the reflection intensity of this radar was located on the radar operations panel. Usually we fly with this set in the auto position (position with the switch turned fully to the left where it is snapped into position). The switch falling out of this position results in a position where the minimum reflection intensity can be gained, and the reflection intensity increases as the switch is turned to the right, ultimately enabling maximum reflection intensity. The radar display is displayed as red, yellow, and green, in descending order of intensity. When flying in a location where there are some cumulonimbus clouds, the radar display can become covered in red. During these times, pilots change the reflection intensity to scrutinize the cloud conditions and find a location that will have less of an impact on the flight. In one case I moved the switch that changes intensity with the intention of returning it to the auto position, but without fully returning it back. That position is the position where reflection intensity is its weakest. The front looked like lighting when I conducted external monitoring. When I checked the radar display, no clouds like that were displayed. When operating the switch for adjusting the reflection intensity on the radar operation panel, I noticed that it had not been returned to the auto position. When moved back to the auto position, the display properly appeared red. While I normally announce when operating this switch so that other pilots have a common awareness, I remember that I did not do that at that time.

Although I have written about my own experiences, they were all things that I had known about by hearing about experiences and media issued by the company. I think that it was this information that made it possible for me to notice the mistakes I had made at an early stage.

I hope that it is possible to further foster a culture that makes it possible to talk or report freely and frankly when close call incidents are encountered, and for the people involved to share and utilize information.

## 6. Conclusion

This JTSB Digests featured close call incidents, mainly focusing on wake turbulence and wrong approach to runways, etc.

While a comparison of the close call incidents and similar accidents, etc. introduced did not lead to any absolute solutions that would lead to a drastic reduction in accidents, etc. if achieved or cause accidents, etc. to no longer exist if something were fixed, we learned that the following points were important for controlling the occurrence of accidents, etc.

- **Everyone involved in aviation should give consideration to safety and always remain faithful to the basics in operations.**
- **When operating aircraft, pilots should pay attention to information that could have an impact on the flight.**
- **Always assume unexpected events and maintain an attitude of calmly responding.**
- **Establish a system that enables flight crew members to check on each other as a team and immediately correct mistakes.**
- **Improve the safety awareness of each and everyone and thoroughly ensure the basic operations through regular education and training.**

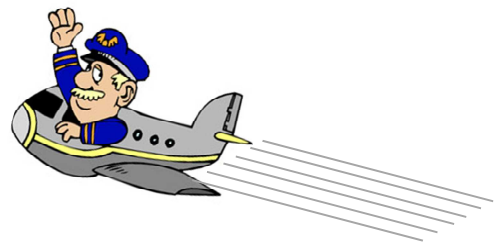
Through the responses to the questionnaire and interviews, we also learned that such points were valued in the field, and that various measures and initiatives were being implemented related to these points.

We would like to thank everyone for their cooperation in the issuing of this Japan Transport Safety Board Digest, namely the Association of Air Transport Engineering and Research, Japan Aircraft Pilot Association, the members of the association who responded to the questionnaire, the two people who participated in the interview, and the pilot who submitted the column.

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### A tip from Director for Analysis, Recommendation and Opinion

This year marks the 31st year since the JAL123 flight accident, and in the United States, there was also an accident at John F. Kennedy International Airport in November 12, 2001 in which the vertical tail of an A300 broke during takeoff and the aircraft crashed. This accident led to the death of all 260 passengers and crew members and 5 residents in a residential district where the aircraft crashed. It is said that this accident was caused by excessive ladder operations in response to the wake turbulence of the preceding B747 aircraft that caused the vertical tail to break. We have looked at wake turbulence, etc. on this occasion and found that close call incidents can easily develop into accidents, etc. Remaining faithful to the basics through means such as calmly responding and not neglecting confirmation, not being over confident in oneself and responding as an organization, and stopping the roots of accidents through maintenance, etc. leads to accident prevention.



We welcome your comments on "JTSB Digests", and requests of dispatching lecturers

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