

AI2010-5

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

JAL EXPRESS CO., LTD

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JAPAN AIR COMMUTER CO., LTD

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July 30, 2010

Japan Transport Safety Board

The investigation for this report was conducted by the Japan Transport Safety Board, JTSB, about the aircraft serious incident of JAL Express Co., LTD, Douglas DC-9-81 registration JA8499 and Japan Air Commuter Co., LTD, Bombardier DHC-8-402 registration JA844C in accordance with the Act for the Establishment of the Japan Transport Safety Board and Annex 13 to the Convention on International Civil Aviation for the purpose of determining causes of the aircraft serious incident and contributing to the prevention of accidents/incidents and not for the purpose of blaming responsibility of the serious incident.

This English version of this report has been published and translated by the JTSB to make its reading easier for English speaking people who are not familiar with Japanese. Although efforts are made to translate as accurately as possible, only the Japanese version is authentic. If there is any difference in the meaning of the texts between the Japanese and English versions, the text in the Japanese version prevails.

Norihiro Goto
Chairman,
Japan Transport Safety Board

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

- 1. JAL EXPRESS CO., LTD
DOUGLAS DC-9-81, JA8499**
- 2. JAPAN AIR COMMUTER CO., LTD
BOMBARDIER DHC-8-402, JA844C**

**ABOUT 1NM ON FINAL APPROACH PATH OVER BUILT-UP
AREA TO RUNWAY 32R, OSAKA INTERNATIONAL AIRPORT
AROUND 09:10, JULY 23, 2009**

June 25, 2010

Adopted by the Japan Transport Safety Board (Aircraft Sub-committee)

Chairman	Norihiro Goto
Member	Shinsuke Endoh
Member	Toshiyuki Ishikawa
Member	Yuki Shuto
Member	Toshiaki Shinagawa

1. PROCESS AND PROGRESS OF THE AIRCRAFT SERIOUS INCIDENT INVESTIGATION

1.1 Summary of the Serious Incident

This occurrence falls under the category of “Attempted landing to an engaged runway” as stipulated in Clause 2, Article 166-4 of the Civil Aeronautics Regulations of Japan, and is classified as a serious incident.

At 09:09 Japan Standard Time¹, July 23, 2009, an Douglas DC-9-81, registered JA8499, operated by JAL Express Co., Ltd., was taxiing to its parking spot after it landed on runway 32L, Osaka International Airport as scheduled flight 2200. At that time, a Bombardier DHC-8-402, registered JA844C, operated as scheduled flight 2400 by Japan Air Commuter Co., Ltd., was on a final approach path with a landing clearance to runway 32R.

Due to JA8499’s incursion into the runway 32R, JA844C made a go-around about 09:11 following the instruction by a tower controller.

A total of 74 people (a PIC, five crew members and 68 passengers) were on board JA8499, and 52 people (a PIC, three crew members and 48 passengers) were on board JA844C. Both aircraft sustained no damage and no one was injured.

1.2 Outline of the Serious Incident Investigation

1.2.1 Investigative Organization

Japan Transport Safety Board designated an investigator-in-charge and two other investigators to investigate this serious incident on July 23, 2009.

1.2.2 Representative from Foreign Authorities

A Representative from the United States of America, the State of Design and Manufacture of the aircraft involved in this serious incident, participated in the investigation.

1.2.3 Implementation of the Investigation

July 23 and 24, 2009	Site investigation and interviews
August 3, 2009	Interviews

1.2.4 Comments from the Parties Relevant to the Cause of the Serious Incident

Comments were submitted from the parties relevant to the cause of the serious incident.

¹ Unless otherwise specified all times are Japan Standard Time (UTC+9 hours).

1.2.5 Comment from the Participating State

Comment were invited from the participating State.

2. FACTUAL INFORMATION

2.1 History of the Flight

An Douglas DC-9-81, registered JA8499, operated by JAL Express Co., Ltd. (hereinafter referred to as “the Aircraft A”), took off from Sendai airport at 08:03, July 23, 2009, landed on runway 32L, Osaka International Airport (hereinafter referred to as “the Airport”) at 09:09 and was taxiing to its parking spot.

The Aircraft A’s flight plan was outlined as follows.

Flight rules: Instrument flight rules (IFR),

Departure aerodrome: Sendai airport,

Cruising speed: 458 kt,

Cruising altitude: FL280,

Route: GOC (DAIGO VORTAC) – W18 (Airway) – NAKTU (Reporting point) – V58 (airway) – XMC (Kowa VORTAC) – OHDAI (reporting point) – YAMAT (Reporting point) – KODAI (Reporting point),

Destination aerodrome: Osaka International Airport,

Total estimated elapsed time (EET): 1 hour and 03 minutes,

A pilot in command (PIC) was in the left seat as pilot-flying (PF) and a first officer (FO) was in the right seat as pilot-monitoring (PM).

A Bombardier DHC-8-402, registered JA844C, operated by Japan Air Commuter Co., Ltd. (hereinafter referred to as “the Aircraft B”) took off from Kagoshima airport at 08:02 and was on final approach path with a landing clearance to runway 32R.

The Aircraft B’s flight plan was outlined as follows.

Flight rules: Instrument flight rules (IFR),

Departure aerodrome: Kagoshima airport,

Cruising speed: 345 kt,

Cruising altitude: FL230,

Route: MIDAI (Reporting point) – M750 (RNAV route) – MADOG (Reporting point) – Y753 (RNAV route) - JAKAL (Reporting point) – MUGIE (Reporting point) – HONMA (Reporting point) – KAINA (Reporting point) – SKE (Shinoda VOR/DME),

Destination aerodrome: Osaka International Airport,

Total EET: 1 hour and 03 minutes,

A PIC was in the left seat as PF and a FO was in the right seat as PM.

The situation developed as follows judging from the ATC communication records, RADAR track records, records of both aircraft’s Flight Data Recorder (hereinafter referred to as “DFDR”) and statements of both aircraft’s crew members and air traffic controllers.

2.1.1 History of the Flight Based on the ATC Communication Records, RADAR Records and DFDR Records

09:05:25	A controller in aerodrome control position (hereinafter referred to as “the Tower”) informed the Aircraft A of possible bird strike near taxi way W6, which was reported from an aircraft landed on runway 32L three minutes before and asked for the Aircraft A’s intention to land.
09:06:37	The Aircraft A expressed the intention of continued approach to runway 32L.
09:07:17	The Tower issued a landing clearance to the Aircraft A and it read back.
09:08:42	The Aircraft B made a position report of “5 nm to the runway” and received a landing clearance to the runway 32R.
09:09:15	The Aircraft A landed on the runway 32L.
09:09:26	The Tower issued an instruction to the Aircraft A saying “TURN RIGHT W9, HOLD SHORT OF RUNWAY 32R FOR ARRIVAL TRAFFIC.”
09:09:31	The Aircraft A responded by saying “ROGER W9, CROSS RUNWAY 32R, JEX2200” and by saying in Japanese “No bird carcass was found on the runway within my view.”
09:09:38	The Tower responded by saying in Japanese “Understood, thank you very much.”
09:10:24	The Aircraft A crossed a stop line on W9 and started incursion into the runway 32R.
09:10:24	The Tower issued an instruction to the Aircraft B saying “THIS TIME GO AROUND, TRAFFIC ON THE RUNWAY.”
09:10:29	The Aircraft B read back the go-around instruction.

2.1.2 Statements of the Crewmembers

(1) The PIC, the Aircraft A

In the air about 10 nm from the runway 32L and altitude of about 3,000 ft, we received a notice of possible bird strike near W6. Being asked for our intention, I requested a runway check.

Bird strike information was conveyed to other aircraft and one of them responded to change approach runway to 32R. Soon another aircraft received the information that a bird strike near W6 wouldn’t affect runway operations. So with that information I requested to land as planned. After the landing the aircraft speed died quickly due to light aircraft weight and

head wind.

Our parking spot was 22 and I intended to get there via W9. With sufficiently reduced speed, I surveyed the area near W6 with greater attention than usual.

There was enough time before the Tower would give us a taxi instruction, and for the benefit of other aircraft concerned, I told my FO to add the bird strike information in his next communication to the Tower that there was no recognized bird carcass near W6 within our view.

Sometime later the Tower gave us an instruction on the use of W9 and the runway. Now I don't have a clear memory whether it was the instruction of the runway crossing or holding short of the runway. I tried hard to remember that, but I'm not sure about that. I only remember that when the FO responded saying "CROSS RUNWAY 32R" and added "there is no bird carcass within our view" in Japanese, the Tower responded saying "Thank you very much" in Japanese.

While taxiing on W9, we ran the set procedure to reconfirm the important clearances. I said "CROSS RUNWAY 32R" and the FO confirmed that.

As usual I confirmed the left side of the aircraft and he confirmed the right side saying "RIGHT SIDE, CLEAR," and I remember that clearly. But W9 intersects the runway 32R diagonally, confirming further to the right is not easy. He meant it was clear as far as he could see. I knew later that the Aircraft B was on final approach path to runway 32R.

Osaka International Airport has been my home base for five years. When I felt something was wrong about the frequency change instruction from the Tower to the Ground² not being given, I heard a go-around instruction to an aircraft landing to the runway 32R. I realized that I made a mistake. At that time I couldn't figure out what it was.

I don't have clear memory about that now. In the next radio communication with the Tower, it said it hadn't issued any runway crossing clearance to us. I said "I understand" in FO's stead.

There were no anomalies in radio equipment or aircraft conditions.

(2) The FO, the Aircraft A

After some information exchange on bird strike with the Tower we landed on the runway 32L.

During the taxiing after the landing, somewhere passing W6, the PIC told me that "In the next communication, tell the tower that we didn't spot a bird or anything." I think I responded by saying "Roger." At the same time the Tower's instruction came overlapping the PIC's direction and the Tower's instruction seemed to be heard like "W9, CROSS 32R." I read back "W9, CROSS RUNWAY 32R" and added what was directed by the PIC, to the effect that the area in the vicinity of W6 was non-problematic. The tower said "Thank you" in Japanese.

As for the crossing of the runway 32R after landing on the runway 32L, there are two

² Control service for aircraft and vehicles taxiing other than runway.

variations when we get clearances: the instruction of “W9, CROSS RUNWAY 32R, CONTACT GROUND” is given collectively; and the latter part of the instruction “CONTACT GROUND” is given after entering W9.

We usually receive an instruction to contact with the Ground before reaching the midpoint of W9, but this time we didn't get it and I felt something was wrong. As for the crossing the runway 32R, ratio of being given the cross-runway instruction in advance versus that of being held short of the runway seems to be almost equal.

I thought I received “CLEAR CROSS” from the Tower judging from the three reasons: I didn't spot any incoming or outgoing aircraft on both sides of the runway before we crossed it; I clearly said “CROSS RUNWAY 32R” to the Tower but its sole response was “Thank you”; the PIC said “CLEAR CROSS” when we were taxiing.

While crossing the runway I looked outside and confirmed there were no aircraft on taxiway C5 and R1. When we almost finished crossing the runway, the PIC told me to confirm the Tower about the transition of the frequency. I did so, but there was no reply.

We stopped our aircraft near the midpoint of C5 and R1, the PIC contacted the Tower. I don't clearly remember now but it said “No clearance of runway crossing was issued.” He apologized for the crossing, changed frequency to the Ground and taxied into the spot 22.

After being assigned as FO, I have accumulated 2-and-half-years of experience of this aircraft. During that time Osaka has been my home airport. I have some experience of bird strikes. When operating in Osaka airport I always pay attention to crossing the runway after landing.

At the time of occurrence of the incident, I was on my first leg of the last day of a four-consecutive-day duty same as the PIC's. I had eight-hour sleep and felt no fatigue. There were no aircraft anomalies or no communication problems with the PIC.

(3) The PIC, the Aircraft B

When we made a 5 nm position report, we received a landing clearance.

Sometime after 1,000 ft call, the Aircraft A breezed into the runway 32R. My FO also observed its movement.

I expected a cancelation of landing clearance or go-around instruction. Because there had been cases where landing clearance had come at the altitude of around 600 ft and 2 nm from the runway, I expected so. But without delay we were instructed to execute a go-around. With the development of the situation in front of our eyes, I felt no urgency or danger. It was altitude of around 700 ft and distance of no more than 2.5 nm from the runway, where we executed the go-around.

The Aircraft A was crossing the runway when I looked down during the go-around.

ATC communications at that time were congested, but were clearly heard.

2.1.3 Statements of Tower Controllers

(1) Trainee

When I informed departing JAL2081 that there was a possible bird strike, it requested to stand by for the departure. I instructed so and decided to wait for its next intention.

The Aircraft A was on final path to the runway 32L and it was, I guess, about 10 nm from the runway. When I asked its intention, it requested a runway check. I asked other controllers to make necessary coordination with responsible sections deriving from the requested runway check. It was my first experience to handle a bird strike event. Soon an air traffic services flight information officer reported that the runway use was non problematic. I relayed that information to the other aircraft. The Aircraft A was monitoring the communication and showed intention to land as it previously intended. I gave a clearance to land on the runway 32L.

After the landing the Aircraft A reported in Japanese that it didn't spot any bird carcasses. Because I had cleared the Aircraft B to land on the runway 32R, I instructed the Aircraft A to "HOLD SHORT OF RUNWAY 32R." Since I added the information of incoming aircraft as the reason for holding, this may have lead to my mental relaxation and I may have failed to reconfirm its read back. When I shifted my attention to the Aircraft A, it was crossing the runway. I instructed the Aircraft B to execute a go-around.

I was busy then fielding aircraft, prioritizing which aircraft to land or take off, being almost occupied to establish separations among them. I had some difficulty to field incoming communications. I tried to maintain mental calmness and aircraft separations, and I instructed incoming aircraft to land for the time being. Because there were many aircraft which switched their landing runway to 32R, I guess many departing aircraft were lined up to enter runway 32R.

Conveying bird strike information in Japanese and inserting them into ATC communications in English became burden to some extent.

On the day of the incident, I was not fatigued with work shifts. After finishing the first training as a Ground controller, I started my Tower training a little before 9 o'clock. When I started training at Osaka airport, training time frame was designated; now it's at my disposal so that I chose rather busy time frame to better train myself.

There were no anomalies in the functioning of ATC communications or no problems with NOTAMs.

(2) Supervisor (An air traffic controller who was supervising the trainee)

There was a possible bird strike so that I asked an air traffic services flight information officer to check the runway while it is not occupied keeping the runway operational. When we have a positive bird strike, a runway check is done by suspending incoming aircraft in the air. The trainee was informing aircraft of the bird strike frequently. Because she hadn't had such experience before she was burdened with handling the situation.

The Aircraft A gave us information with a quick wit that there was no bird carcass found. I'm not sure whether that information affected me or not, the word "runway crossing" slipped my mind when I heard "ROGER, W9." This was because the aircraft was being instructed to hold short of the runway.

When I shifted my attention to the runway 32 R when JAL2081 began to move, the Aircraft A was intruding into the runway and the Aircraft B was on final with its altitude of about 500 ft. From the timing perspective, if the Aircraft A crossed the runway with that speed it could have been possible to deliver a landing clearance to the Aircraft B before it could reach runway threshold. The only choice was to instruct the Aircraft B to go around considering the given "HOLD SHORT OF THE RUNWAY" instruction to the Aircraft A and its possible stop on the runway.

This serious incident³ occurred around 09:10 July 23, 2009, on a final approach path over built-up area to runway 32R around 1nm from its approach end. (See Figure 1 Estimated Ground Track, Figure 2 Douglas DC-9-81 (Aircraft A), Figure 3 Bombardier DHC-8-402 (Aircraft B), Attachment 1 Radio Communications (CVR Excerpts)

2.2 Personnel information

2.2.1 Crewmember

(1) PIC, the Aircraft A	Male, Age 40
Airline transport pilot certificate (Airplane)	Issued on July 15, 2004
Type rating for Douglas DC-9	Issued on April, 28, 1998
Class 1 aviation medical certificate	
Validity	December 5, 2009
Total flight time	8,449hours 10 minutes
Flight time in the last 30 days	37 hours 51 minutes
Total flight time on the type of aircraft	6,516 hours 50minutes
Flight time in the last 30 days	37 hours 51 minutes
(2) First officer, the Aircraft A	Male, Age 34
Airline transport pilot certificate (Airplane)	Issued on August 29, 2001
Type rating for Douglas DC-9	Issued on March 30, 2007
Instrument Rating (Airplane)	Issued on September 5, 2001
Class 1 aviation medical certificate	

³ While the Aircraft B was on a final approach path with a landing clearance, the Aircraft A with the instruction of HOLD SHORT OF THE RUNWAY intruded into the runway. This situation was interpreted as the Aircraft B's attempted landing to the engaged runway by the Aircraft A, causing Clause 2, Article 166-4 of the Civil Aeronautics Regulations of Japan to apply.

Validity	November 21, 2009
Total flight time	1,481 hours 10 minutes
Flight time in the last 30 days	56 hours 29 minutes
Total flight time on the type of aircraft	1,138 hours 05 minutes
Flight time in the last 30 days	56 hours 29 minutes

2.2.2 Air Traffic Controllers

(1) Trainee Female Age 39

Certificate of ATC Controller

Tower Control April 1, 1995

Kagoshima tower April 1, 1995

Aviation Medical Examination Certificate

Validity June 30, 2010

(2) Supervisor Male Age 45

Certificate of ATC Controller

Tower Control July 1, 1994

Osaka Tower July 1, 1994

Aviation Medical Examination Certificate

Validity June 30, 2010

2.3 Meteorological information

The 09:00 aviation weather observation data at the Airport was as follows:

Wind direction 070°, Wind velocity 6 kt, wind variable 010°–100°, Prevailing visibility 25 km,

Cloud amount 1/8, Cloud type Cumulus, Ceiling 2,000 ft,

Cloud amount 4/8, Cloud type Cumulus, Ceiling 2,500 ft,

Temperature 28°C, Dew point 21°C,

Altimeter setting (QNH) 29.66 inHg.

2.4 Communications

Communication status between the Tower and the Aircraft A or B was normal.

2.5 Information on the Airport and ground facilities

The Airport has two paralleled runways: the east side runway 32R (direction 14L/32R, length 1,828m, width 45m) and the west side runway 32L (direction 14R/32L, length 3,000m, width 60m).

Because two runways' length differs, runway 32R is used by propeller driven aircraft

and jet aircraft smaller than A320 (A320 inclusive), while 32L is used by larger aircraft, both for take-offs and landings. When an aircraft lands on runway 32L crosses the runway 32R, it should pay attention to departing aircraft as well as incoming aircraft.

The number of landings per day is about 370. The busiest time frames are roughly 9:00 through 10:30 and 20:00 through 21:00, the end of runway operations.

2.6 Flight Data Recorder and Cockpit Voice Recorder

Each concerning aircraft is equipped with a DFDR and a Cockpit Voice Recorder (hereinafter referred to as "CVR").

The Aircraft A's DFDR, product of Sundstrand (present Honeywell) with the serial number of 980-4100-DXUS is capable of storing 25 hours of information, and the CVR capable of storing 30 minutes of information, product of the same company with the serial number of 980-6005-076ULD. Both recorded the information at the time of occurrence.

Aircraft B's DFDR is a product of Honeywell with the serial number of 980-4700-027 capable of recording 25 hours of information, and the CVR capable of storing two hours of information is the product of the same company with the serial number of 980-6022-011. The DFDR record was able to be retrieved while the latter was over-written due to its continued flight operations after the occurrence of the incident.

Both aircrafts' DFDR and CVR time data was corrected by synchronizing VHF transmission keying signal on DFDR and corresponding CVR radio communication with the JST time signals recorded on the ATC communication records.

2.7 CVR Information

Excerpts from CVR information on and after 09:05:25 are chronicled in Attachment 1.

Voice data was analyzed in waveform on a computer screen. Two waveforms overlapped with each other: the PIC's waveform corresponding to "you add that" out of his full remark "As far as we can see there is no bird carcass, in the next communication to the Tower, you add that" and the tower's instruction "JANEX 2200" out of "JANEX 2200, TURN RIGHT W9, HOLD SHORT OF RUNWAY 32R FOR ARRIVAL TRAFFIC" which started two seconds after the PIC's direction.

(See Attachment 1 Radio Communications (CVR excerpts))

2.8 Distance between the Aircraft A and B

Aircraft in the surrounding airspace of the Airport are monitored by an Airport Surveillance Radar (ASR) and a Secondary Surveillance Radar (SSR); aircraft on the ground by high-definition Airport Surface Detection Equipment (ASDE). All aircraft location data is processed in an Automated Radar Terminal System (ARTS).

This data demonstrated the distance between the two aircraft at the time of occurrence to be around 1.6 nm; in other words, the Aircraft B was located about 1 nm from the runway threshold of 32R.

2.9 Additional information

2.9.1 ATC terms

(1) Item “(6) a.”, Section 2 “ATC clearances”, Sub-Chapter (III) “Aerodrome Control Procedures”, Chapter III “ATC Operational Procedures” of the ATC Services Regulations, stipulated by Civil Aviation Bureau (CAB), Ministry of Land, Infrastructure, Transport and Tourism (MLIT) specifies the ATC terms used for aerodrome control service as follows (excerpt) .

Holding short of a runway

(6) a. *When a traffic situation requires aircraft to remain outside of a runway, instruct the aircraft to hold short of the runway.*

- *HOLD SHORT OF RUNWAY (number) (followed by traffic information if necessary)*

The usage of symbols is defined in Section 2 “Definitions”, Sub-Chapter 1 “General” as follows (excerpts).

Explanatory note

[]: *applicable numbers, nomenclatures and the likes are inserted here.*

(): *add information if necessary.*

(2) Item “(7)”, Section 2 “General rules for preparations”, Sub-Chapter (I) “General”, ATC procedures in ATC Operational Procedures stipulates that “*Japanese or English is applicable for ATC terms, however, English is used in principle for radio communications.*”

While Section 5 “Radiotelephony” stipulates procedures for radio communication as saying that “*Standard terms shall be used for communication in principle and communication in conversational manner shall be short and brief.*”

2.9.2 Errors caused by expectations

The book titled “Human Factors⁴” carries the following statements (excerpts).

Expectations and Errors

Even if the actual response from an air traffic controller is “not approved ----”, and if a pilot is expecting “to be approved,” he hears so. With factors of clippings, distortions, noise, missed words in communications and the like, the more the contents of a speech is lost, the bigger the role of expectations (this may invite disasters) in interpreting the speech becomes.

⁴ Excerpt from the page 165. Volume information: Author, F.H. Hawkins; Editorial supervisor, Isao Kuroda; Translator, Yoshimi Ishikawa. Publisher: Seizando Shoten. Printed in 2002.

2.9.3 Runway Operations at the Airport

Runway operations procedures⁵ formulated by Osaka Airport Office, Osaka Regional Civil Aviation Bureau, MLIT carries a following description.

The runway usage is in principle as follows, however, it can be changed with a request from aircraft or at air traffic controller's discretion.

(1) Runway 32R

Propeller driven aircraft and jet aircraft of maximum takeoff weight of less than that of B737-800 or A320. Except MD-90 and MD-81

(2) Runway 32L

Jet aircraft other than above mentioned (1).

⁵ The same content is described on AIP, AD2-6 and RJOO (Osaka International Airport).

3 ANALYSIS

3.1 Airman Competence Certificate

The PIC and the FO of the Aircraft A held valid airman competence certificates and valid aviation medical certificates.

3.2 Air Traffic Controller Certificate

The trainee held valid medical certificate and the supervisor held a valid certificate of Air Traffic Controller and valid aviation medical certificate.

3.3 Influence of the Weather

It is considered highly probable that the weather conditions held no bearings on the occurrence of the serious incident.

3.4 The Situation Developed Around the Aircraft A

(1) Before landing

As described in Attachment 1, the Tower issued a clearance to land on the runway 32R to the Aircraft B at 09:08:45, but it is considered probable that this timing coincided with the Aircraft A's final phase of landing and both PIC's and FO's attention was focused on before-touch-down operations.

Judging from the PIC's statement in 2.1.2 (1) in which he said that he realized it later that the Aircraft B had been approaching to the runway 32R, it is considered highly probable that he heard the landing clearance to the Aircraft B; but he didn't pay much attention to it.

According to the FO's statement in 2.1.2(2), the Aircraft A crossed the runway while doing outside watch. If he had bear the clearance to the Aircraft B in mind, he could have spot the Aircraft B, which was located about 1 nm from the runway threshold of 32R as described in 2.8, on the background of sky. Given the fact that he didn't spot the aircraft, it is considered highly probable that both the PIC and the FO didn't have full recognition of the clearance although they heard it at the timing of the Aircraft A's touch-down.

(2) After the landing

It is considered highly probable that the PIC, as described in 2.1.2(1), directed the FO to report the runway condition in the vicinity of W6 to the tower, as he was informed of the possible bird strike and being able to monitor the runway condition after a quick deceleration of the aircraft.

As described in 2.7, the PIC's waveform corresponding to "you add that" out of his full remark "As far as we can see there is no bird carcass, in the next communication to the Tower, you add that" and the tower's instruction "JEX 2200" out of "JEX 2200, TURN RIGHT

W9, HOLD SHORT OF RUNWAY 32R FOR ARRIVAL TRAFFIC” which started two seconds after the PIC’s remark, overlapped in terms of timing.

The key portion which starts with “TURN RIGHT” didn’t overlap the PIC’s direction, but it was right after the end of the PIC’s direction, therefore it is considered possible that the FO’s attention was not fully directed to the portion which starts with “TURN RIGHT.”

On the other hand, a call-out corresponding to FO’s “RIGHT SIDE, CLEAR”, as described in 2.1.2 (1) as the PIC’s statement, was not found in the data except “RIGHT SIDE (followed by indistinct uttering) ” which started at 09:09:45 as chronicled in the Attachment 1. This call-out was done on the runway before entering W9 as shown in the Estimated Ground Track of Figure 1. In addition, judging from the area of visual coverage from the FO’s seat shown on Figure 2, he cannot spot an incoming aircraft to the runway 32R. Given the above mentioned facts, it is considered highly probable that what the FO’s call-out meant was that “the area is clear as far as I can see W9 and the runway 32R,” not meaning there was no incoming aircraft on the final. The PIC’s response to this call-out was “CROSS RUNWAY 32R.”

It is considered highly probable that the information reported on the runway condition in the vicinity of W6 was informative to air traffic controllers and the other aircraft concerned.

(3) The crewmembers’ responses to the ATC direction

As described in above (2), the situation developed as follows: upon finishing the PIC’s direction, the Tower’s instruction “TURN RIGHT” and its followed portion began to be heard. It is considered highly probable that the FO was not able to have a complete comprehension of the Tower’s instruction.

It is considered probable that the following factors contributed to the FO’s read-back contrary to the Tower’s instruction.

a. Due to the lack of recognition toward landing clearance of runway 32R given to the Aircraft B, he didn’t expect that there was an incoming aircraft to the runway, and he had an expectation that his clearance of runway crossing would be given.

b. His attention was being directed to the PIC’s direction.

On the other hand, the PIC, just after the completion of his direction to the FO on the bird strike information, the PIC was not able to have a complete comprehension of the Tower’s instruction. In addition to the FO’s read-back of runway crossing and no corrective response from the Tower, it is considered probable that the PIC interpreted that the runway crossing was granted.

It is considered probable that the following factors contributed to the situation where the FO remained unnoticed that he had made the mistake in read-back.

a. The Tower didn’t correct his read-back.

b. The PIC said “CROSS RUNWAY 32R.”

c. When they made a left-right look-out before crossing the runway, the Aircraft B was

not spotted.

The FO mentioned in his statement that “We usually receive an instruction to contact with the Ground before reaching the midpoint when we taxi on W9, but this time we didn’t and I felt something was wrong.” As the Tower instructed the Aircraft A to hold short of the runway, an instruction of frequency change to the Ground would not be issued. Conversation on the delayed frequency change was done before the Aircraft reached midpoint of W9, the aircraft had still time before reaching the stop line on W9. It is considered probable that if one of them had contacted with the Tower to make a confirmation, this severe incident might have been prevented.

3.5 The Situation Developed Around the Trainee

(1) Burden generated when Japanese is used mixed with English ATC terminologies

As described in 2.9.1(2), radio communications are supposed to be in English in principle, however, use of Japanese is permissible. Japanese is used when a situation cannot be described with English ATC terminologies only. It is considered possible that compared with the situation where prescribed English terminologies are used, the mixed language situation put information processing burden on a speaker.

(2) Handling of busy situations

As described in 2.1.3(1) and 2.5, the incident occurred during a busy time frame in the morning. It is considered highly probable that the trainee was loaded with more-than-normal amount of burden given the necessity of inserting bird strike information to her radio communication and obtaining aircraft intentions, and there were some incoming aircraft which changed landing runway from 32L to 32R.

And as the trainee had issued a runway 32R landing clearance to the Aircraft B, it is certain that she instructed the Aircraft A to hold short of the runway.

The trainee was under training session and stated that she had no experience of handling airport bird strike occurrences. It is considered possible that necessity of conveying bird strike information and confirmation of aircraft intentions made the work load in busy time frame heavier and this situation indirectly contributed to the occurrence of the serious incident.

(3) Response against the wrong read-back

Under the situation described in above (2), the trainee instructed the Aircraft A to “TURN RIGHT W9, HOLD SHORT OF RUNWAY 32R FOR ARRIVAL TRAFFIC,” with the information of incoming aircraft.

Against this instruction the Aircraft A responded saying that “ROGER W9, CROSS RUNWAY 32R” and by saying in Japanese “No bird carcass was found within my view.” The trainee responded saying in Japanese “Understood, thank you very much.” She didn’t notice the incorrect read-back until she found the Aircraft A crossing the runway.

It is considered probable that the following factors have contributed to the trainee's failure that she didn't notice the incorrect read-back from the Aircraft A.

a. The trainee thought that the reason of holding short of the runway was clear by adding the Aircraft B's incoming information, and her intention was completely understood.

b. The trainee's attention was directed to the bird information reported in Japanese, which followed the Aircraft A's response in English.

c. Because it was a bird strike handling during the busy time frame, this helped increase her burden and she had to pay additional attention to instructions for follow-on aircraft.

(4) Go-around instruction to the Aircraft B

As described in 2.1.2(3) and 2.1.3(2), it is considered highly probable that the trainee instructed the Aircraft B to execute a go-around upon seeing the Aircraft A crossing the runway 32R.

3.6 The Situation Developed Around the Supervisor

As described in 2.1.3(2), the supervisor stated that "The Aircraft A gave us information with a quick wit that there was no bird carcass found. I'm not sure whether that information affected me or not, the word "runway crossing" slipped my mind when I heard "ROGER, W9." This was because the aircraft was being instructed to hold short of the runway." And he also stated that "When I shifted my attention to the runway 32 R when JAL2081 began to move, the Aircraft A was intruding into the runway." Given these statements, it is considered highly probable that the supervisor also believed that the Aircraft A would stop short of the runway 32R.

However the supervisor knew that the trainee was experiencing the bird strike situation for the first time and it was putting burden on her. With this view point inclusive he should have supervised her whether she handled the situation properly when she delivered important instructions.

3.7 The Situation Developed Around the Aircraft B

As described in the attachment 1, the Aircraft B made a 5 nm position report and received a landing clearance. As described in 2.1.2(3), flight crewmembers on the Aircraft B were monitoring the Aircraft A's movement and the Aircraft B had enough altitude, it is considered highly probable that it had no need to execute rapid evasive maneuver.

3.8 Preventive Measures Against Recurrence

This serious incident occurred as a result of the situation development, where human factors related successive errors took place: wrong hearing of air controller's instruction followed by failed hearing of wrong read-back. These kind of human factors errors are

prevented with limited success if such counter measures targeted only for human behavior, as education for people concerned or attention attraction. It is also true that it takes time to establish circumstances with hardware integrated where less human factors related errors occur. So it is necessary while taking respective preventive measures targeted for air traffic controllers and pilots, and further developing the cooperative measures between the two parties, it should be expedited to integrate hardware into the safety system.

3.9 The Severity of the Serious Incident

At the time of the Aircraft B's go-around, the distance to the Aircraft A was about 1.6 nm as described in 2.8, and the visibility was good.

In light of the runway incursion severity classification stipulated in the ICAO Runway Incursion Prevention Manual (Doc 9870), this incident falls in the classification of C (an incident characterized by ample time and/or distance existed to avoid a collision).

(See Attachment 2 Runway Incursion Severity Classification)

4. PROBABLE CAUSE

It is highly probable that this serious incident occurred as follows:

The Aircraft A's flight crewmember made a wrong read-back as "CROSS RUNWAY" after misinterpreting the air traffic controller's instruction to hold short of the runway. The air traffic controller failed to identify the wrong read-back. The Aircraft A kept intrusion into the runway. As a result, the Aircraft B with a landing clearance encountered the situation where it attempted landing to the engaged runway.

5. REFERENTIAL MATTERS

1 Actions Taken by the CAB, MLIT

The CAB formulated “the Recurrence prevention plan in light of the occurrence of a runway incursion at Osaka International Airport (Itami)” on August 21, 2009 in order to prevent recurrence of future runway incursions and laid out practicable specific measures. The following are the summary.

(1) Measures to increase pilots’ attention

- a. Continuous operation of runway guard lights “on”
- b. Installation of new taxiway markings

Installation of holding position signs scheduled in 2010 have been accelerated by one year and new stop markings in black letters on yellow background were added.

(2) Prevention of wrong/failed hearing

- a. With some similarities existing among some of ATC terminologies for “runway crossing” and “holding short of the runway,” reassessment of terminologies has been made.
- b. Prevention of failed hearing by simplifying and clarifying f ATC instructions

ATC instructions have been simplified: when an air traffic controller issues an instruction of “runway crossing” or “holding short of the runway,” only the concerning instruction is to be issued.

c. Thorough verification of pilot’s read-back

When pilots read back against “runway crossing clearance” or “holding short of the runway” correctly, air traffic controllers respond saying “AFFIRM (meaning correct read-back)” as much as practicable.

2 Measures Taken by JAL Express Co., ltd.

On the day of the serious incident, the Company disseminated the information to all flight crewmembers and sent directives to reconfirm already issued “Guidelines for air traffic communications, Operations Manual Supplement 8-4 (Rev. No.57, Apr. 1, 2008)” and “Prevention of Runway Incursion (Dec. 09, 2008).”

For the reconfirmation of two documents, the following points (excerpts) were emphasized.

(1) PF and PM try to have a correct understanding of given ATC instructions. In case of discrepancies between each interpretation, no execution of the instruction takes place except the situation where non-execution jeopardizes the safety. If PF or PM is not certain of given ATC instruction, make sure to reconfirm it to the air traffic controller.

(2) Upon confirmation, use a term of “Say Again” or “Confirm” instead of simple read-back.

(4) Before entering the runway, reassure yourself that you're entering the critical and special AREA (on the premise that "Hold" instruction must be given for crossing of Osaka runway 32R), make sure that the given ATC instruction is authentic, and enter the runway after the mutual confirmation.

Figure 1 Estimated Ground Track

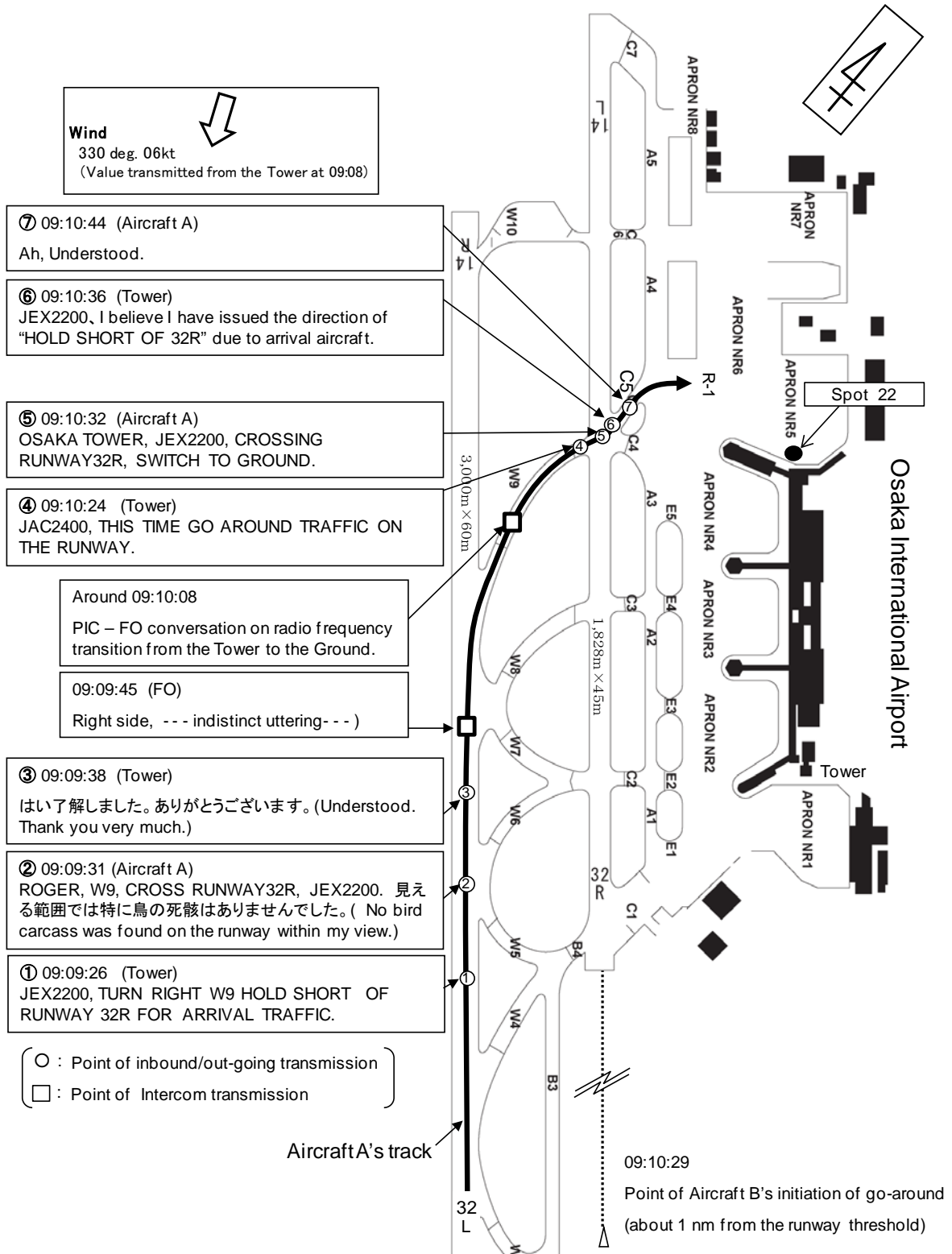


Figure 2 Douglas DC-9-81 (Aircraft A)

Unit : m

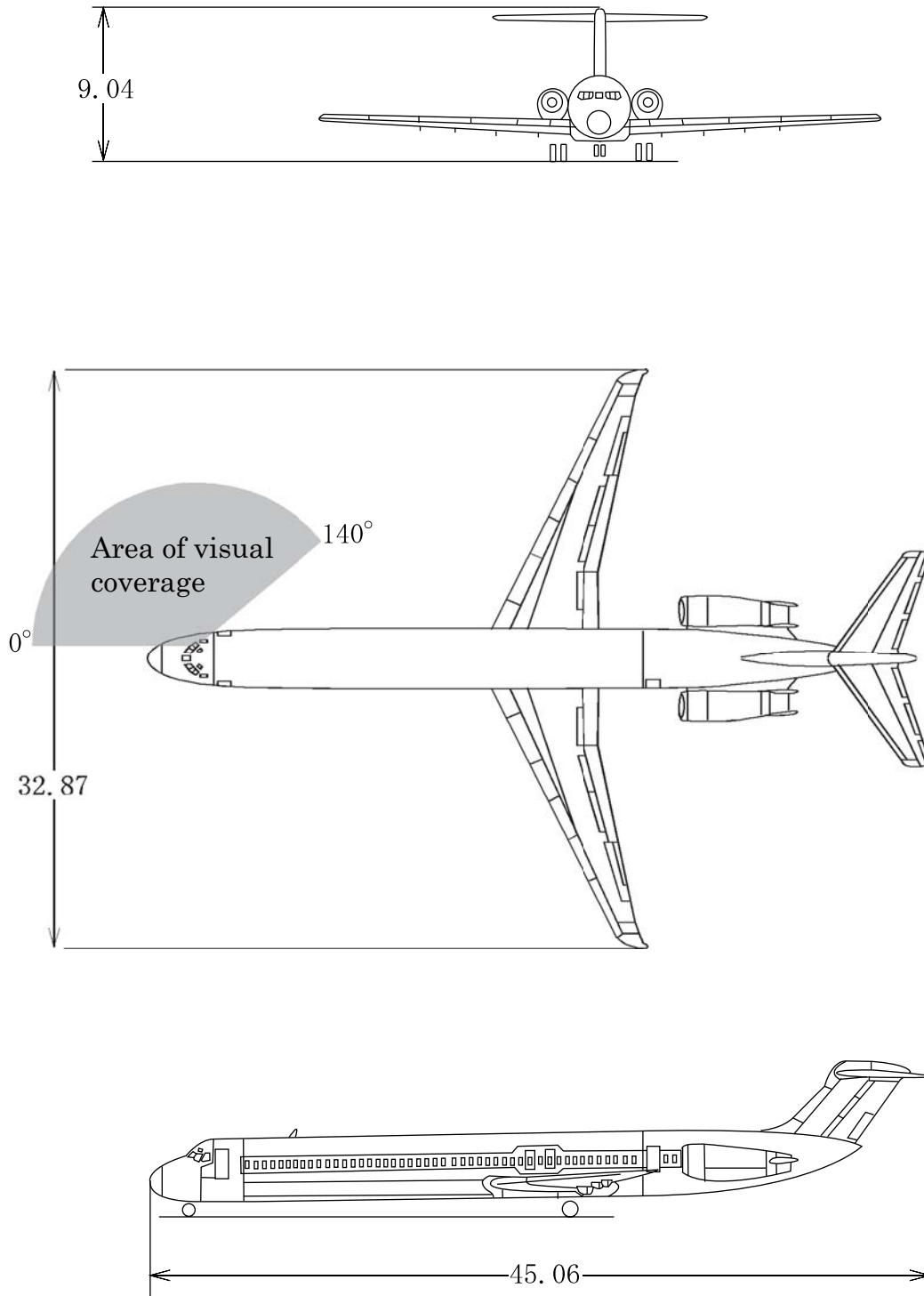
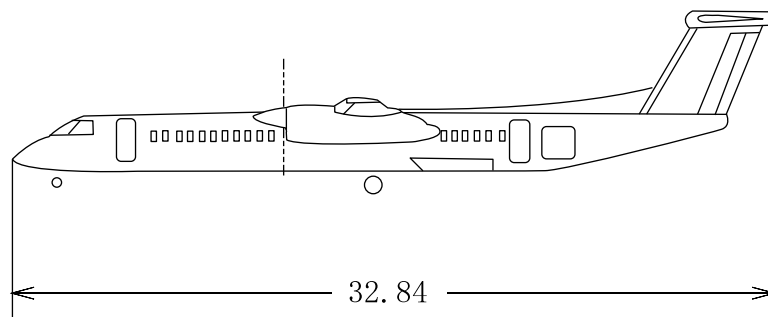
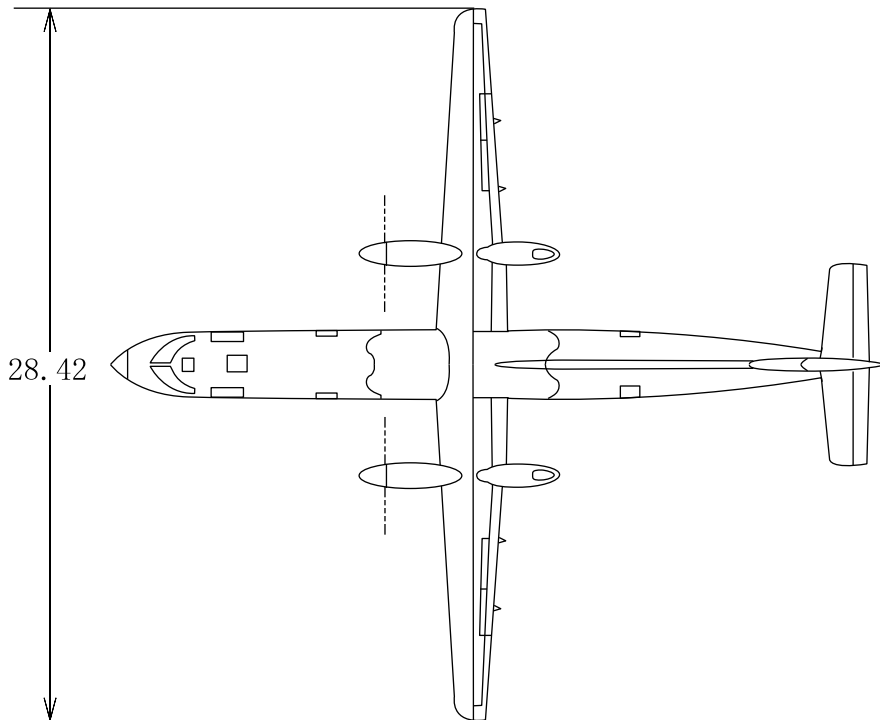
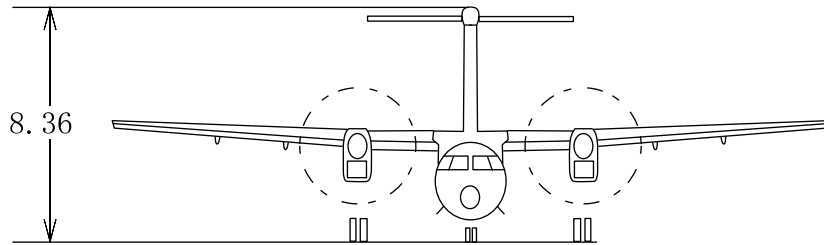


Figure 3 Bombardier DHC-8-402 (Aircraft B)

Unit:m



Attachment 1 Radio Communications (CVR Excerpts)

Time	Speaker	Contents	Intercom communications between PIC and FO
09:05:25	Tower	JEX2200, 3 minutes ago, aircraft landed on the runway 32L reported a possible bird strike. What is your intention of landing?	
09:05:42	A/C A	Runway check, please.	
09:05:46	Tower	Understood.	
09:06:37	A/C A	OSAKA TWR JEX2200, as long as the runway is operational, I'd like to continue present situation for landing.	
09:06:43	Tower	JEX2200 ROGER, CONTINUE APPROACH. BREAK BREAK, (omitted)	
09:07:17	Tower	JEX2200, RUNWAY 32L, CLEARED TO LAND WIND 040 AT 6.	
09:07:22	A/C A	RUNWAY 32L, CLEARED TO LAND JEX2200.	
09:08:42	A/C B	OSAKA TWR, JAC2400 5NM 32R.	
09:08:45	Tower	JAC2400, RUNWAY 32R, CLEARED TO LAND WIND 330 AT 6 AND DEPA - - -.	
09:08:52	A/C B	RUNWAY 32R, CLEARED TO LAND JAC2400.	
09:09:24			PIC: As far as we can see there's no bird carcass. In your next communication to the tower you add that .
09:09:26	Tower	JEX2200 , TURN RIGHT W9, HOLD SHORT OF RUNWAY 32R FOR ARRIVAL TRAFFIC.	
[Audio signal was converted to waveforms and it was confirmed that PIC's "you add that" and the Tower's "JEX 2200" overlapping.]			
09:09:31	A/C A	ROGER, W9, CROSS RUNWAY 32R JEX2200. As far as we can see there's no bird carcass.	
09:09:38	Tower	Understood. Thank you very much	
09:09:45			FO:RIGHT SIDE - - indistinct uttering - - .
09:09:47			PIC:CROSS RWY32R. FO:Yes.
09:10:00	Tower	JAL2081, DHC8 ON SHORT FINAL RUNWAY 32R. WIND 030 AT 6, RUNWAY 32L CLEARED FOR TAKE-OFF.	
09:10:08	JAL2081	THANK YOU, RUNWAY 32L, CLEARED FOR TAKE-OFF JAL2081.	PIC: No direction to change to the Ground? FO: Not yet. PIC: Are you sure, not yet? FO: No, not yet.
09:10:19			PIC:Say "CROSSING RUNWAY 32R" to the Tower. FO: Yes.
09:10:24	Tower	JAC2400, THIS TIME GO AROUND, TRAFFIC ON THE RUNWAY.	
09:10:29	A/C B	ROGER, THIS TIME GO AROUND, JAC2400.	
09:10:32	A/C A	OSAKA TWR, JEX2200, CROSSING RUNWAY 32R, SWITCH TO GROUND.	
09:10:36	Tower	JEX2200, I believe I have issued the direction of "HOLD SHORT OF 32R" due to arrival aircraft.	
09:10:42			PIC: Ah, OK.
09:10:44	A/C A	Eh, understood.	
		(Omitted)	

Attachment 2 Runway Incursion Severity Classification

Severity classification stipulated in ICAO Manual on the Prevention of Runway Incursions (Doc 9870) is as follows.

Table 6-1 Classification

<i>Severity Classification</i>	<i>Description*</i>
<i>A</i>	<i>A serious incident in which a collision is narrowly avoided.</i>
<i>B</i>	<i>An incident in which separation decreases and there is significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision.</i>
<i>C</i>	<i>An incident characterized by ample time and/or distance to avoid a collision.</i>
<i>D</i>	<i>An incident that meets the definition of runway incursion such as the incorrect presence of a single vehicle, person or aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.</i>
<i>E</i>	<i>Insufficient information or inconclusive or conflicting evidence precludes a severity assessment.</i>

** Refer to Annex 13 for the definition of "incident".*