

AI2009-2

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**AIR CANADA
C F M W P**

**JAPAN AIRLINES INTERNATIONAL CO., LTD.
J A 8 2 3 6**

February 27, 2009

Japan Transport Safety Board

The investigation for this report was conducted by Japan Transport Safety Board, JTSB, about the aircraft serious incident to AIR CANADA, B767-300 registered CFMWP and JAPAN AIRLINES INTERNATIONAL, B767-300 registered JA8236 in accordance with the Act for Establishment of the Japan Transport Safety Board and Annex 13 to the Convention on International Civil Aviation for the purpose of investigating into the causes of the aircraft serious incident and contributing to the prevention of accidents/incidents, and to help to alleviate damages if such accidents take place. It is not the purpose of the investigation to apportion blame or liability of the serious incident.

This English version of the report has been published and translated by 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. AIR CANADA
BOEING 767-300
CFMWP**

**2. JAPAN AIRLINES INTERNATIONAL CO., LTD.
BOEING 767-300
JA8236**

AT ABOUT 18:11 JST OCTOBER 20, 2007

**ON THE FINAL APPROACH COURSE FOR
RUNWAY 24L OF KANSAI INTERNATIONAL AIRPORT**

February 13, 2009

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

Chairman	Norihiro Goto
Member	Yukio Kusuki
Member	Shinsuke Endo
Member	Noboru Toyooka
Member	Yuki Shuto
Member	Akiko Matsuo

1. PROCESS AND PROGRESS OF THE AIRCRAFT SERIOUS INCIDENT INVESTIGATION

1.1 Summary of the Serious Incident

The occurrence covered by this report 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 an aircraft serious incident.

On October 20, 2007 (Saturday), a Boeing 767-300, registered CFMWP, operated by Air Canada, was taxiing to Runway 24L of Kansai International Airport for take-off as scheduled flight 036 for Vancouver International Airport.

Meanwhile, a Boeing 767-300, registered JA8236, operated by Japan Airlines International Co., Ltd., had been given landing clearance and was approaching to the same Runway of Kansai International Airport as scheduled flight 2576.

At about 18:11 Japan Standard Time (JST), as a consequence of the runway incursion by CFMWP, JA8236 executed a go-around according to the instructions from the air traffic controllers.

A total of 216 people were on board CFMWP, consisting of the Captain, nine crewmembers, and 206 passengers. On the other hand, a total of 243 people were on board JA8236, consisting of the Captain, seven crewmembers, and 235 passengers. No one was injured, nor was any damage done to the airframes of either aircraft by this serious incident.

1.2 Outline of the Serious Incident Investigation

1.2.1 Investigation Organization

On October 21, 2007, the Aircraft and Railway Accidents Investigation Commission assigned an investigator-in-charge and two investigators with responsibility to investigate this serious incident.

In addition, another investigator was assigned on July 1, 2008.

1.2.2 Representatives from Foreign Authorities

An accredited representative and advisers from Canada, the State of Operator of one of the aircraft involved in this serious incident, participated in the investigation.

1.2.3 Implementation of the Investigation

October 21 and 22, 2007 Investigation at the serious incident site and interviews

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

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

1.2.5 Comments from the Participating State

Comments on the draft report were invited from the participating state.

2. FACTUAL INFORMATION

2.1 History of the Flight

On October 20, 2007, at about 18:01, a Boeing 767-300, registered CFMWP (hereinafter referred to as "Aircraft-A"), operated by Air Canada, started taxiing from Spot 15 toward Runway 24L (hereinafter referred to as "24L") to take off from Kansai International Airport (hereinafter referred to as "the Airport").

The flight plan of Aircraft-A submitted to the Fukuoka Area Control Center of the Ministry of Land, Infrastructure, Transport and Tourism was outlined below:

Flight rules: IFR

Departure aerodrome: Kansai International Airport

Cruising speed: 470kt

Cruising altitude: FL310

Route: TOMO5 (SID)- TME (Tomo VOR/DME)- GBE (Gobo VOR/DME)- KEC (Kushimoto VORTAC)- A1 (Airway)- MJE (Miyakejima VOR/DME)- A590 (Airway)- KAGIS (Reporting point)- A590 (Airway)- PABBA (Reporting point)- OTR5 (Oceanic transition route)- CALMA (Reporting point)- 44N160E (Reporting point)- 46N170E (Reporting point)

Destination aerodrome: Vancouver International Airport,

Total estimated elapsed time: 8h and 30min

At the time the serious incident occurred, the Captain was in the left pilot seat as the PF (pilot flying: pilot mainly in charge of flying), the First Officer was in the right pilot seat as the PNF (pilot not flying: pilot mainly in charge of services other than flying), and the Cruise Relief Pilot¹ was in the back seat as a backup crew member in the cockpit of Aircraft-A.

Meanwhile, a Boeing 767-300, JA8236 (hereinafter referred to as "Aircraft-B") operated by Japan Airlines International Co., Ltd., which had taken off from Naha Airport at 16:43, was flying towards the Airport.

The flight plan of Aircraft-B submitted to the Fukuoka Area Control Center of the Ministry of Land, Infrastructure, Transport and Tourism was outlined below.

Flight rules: IFR

Departure aerodrome: Naha Airport

Cruising speed: 464kt

Cruising altitude: FL350

Route: ALC (Amami VORTAC)- B597 (Airway)- SUC (Shimizu VORTAC)- STORK (Reporting point)- KARIN (Reporting point)- BECKY (Reporting point)- EDDIE (Reporting point)

Destination Aerodrome: Kansai International Airport,

Total estimated elapsed time: 1h and 26min

At the time the serious incident occurred, the Captain was in the left pilot seat as the PF and the First Officer was in the right pilot seat as the PM (pilot not flying: pilot mainly in charge of services other than flying).

¹ Cruise Relief Pilot (CRP) in this Investigation Report shall mean a pilot validated for co-pilot duties during cruise phase of flight only, pursuant to the regulations in Canada.

The situations of Aircraft-A and Aircraft-B, based on ATC communications records, radar track records, the records of the Digital Flight Data Recorder (hereinafter referred to as “DFDR”) of Aircraft-B, as well as on statements of the flight crewmembers and the air traffic controllers (hereinafter referred to as “the Controller”), on the occurrence of the serious incident are summarized below.

2.1.1 History of the Flight based on ATC Communications Records, Radar Track Records and the Records of DFDR

- 18h:00m:49s The Ground Controller (hereinafter referred to as “the Ground”) instructed Aircraft-A to taxi to 24L via Taxiway E2 and P.
- 04m:42s Aircraft-B initiated to contact to the Controller of aerodrome control position (hereinafter referred to as “the Tower”) at Point MAYAH.
- 04m:58s The Ground instructed Aircraft-A to contact with the Tower. Aircraft-A was making left turn from Taxiway E2 to Parallel Taxiway P.
- 05m:23s The Tower issued landing clearance to Northwest Airlines flight 69 (hereinafter referred to as “NWA69”), an aircraft preceding Aircraft-B.
- 05m:35s The Tower instructed Aircraft-B to “if feasible reduce minimum please?”, and added “Expect one departure.”
- 05m:40s Aircraft-B replied “wilco.”
- Around 08m:00s Aircraft-A entered Taxiway A1.
- 08m:36s The Tower sought confirmation from Aircraft-A on whether it was ready for departure.
- 08m:40s Aircraft-A replied, “That’s affirmative.”
- Around 08m:40s Aircraft-A stopped short of the runway holding position markings on Taxiway A1, and NWA69, which was just before touchdown for landing, passed by.
- 08m:43s The Tower instructed Aircraft-A, “Roger that. Hold short of runway 24L.” The position of Aircraft-B was about 6.5nm away from the 24L threshold at this point.
- 08m:46s Aircraft-A replied to the Tower, “To position 24L.”
- Around 08m:49s Aircraft-A started moving towards 24L.
- 08m:54s The Tower issued a landing clearance to Aircraft-B, transmitting “Revised. Runway 24L, cleared to land,” and reported “Wind 290 at 19, (Boeing) 747 (NWA69) landing roll.” The position of Aircraft-B was about 6.0nm away from the 24L threshold at this point.
- 09m:02s Aircraft-B read back the landing clearance to the Tower.
- 09m:09s The Tower reported to JAL2542, an aircraft following Aircraft-B, that one Boeing 767 (Aircraft-A) was expected to depart.
- Around 09m:30s Aircraft-A entered the runway.
- Around 10m:00s NWA69 vacated the runway.
- Around 10m:05s Aircraft-A stopped aligning to 24L.
- 10m:07s Aircraft-B confirmed landing clearance with the Tower. The position of Aircraft-B was about 3.3nm away from the 24L threshold at this point.
- 10m:11s The Tower replied “Affirm” and issued landing clearance anew to Aircraft-B.
- 10m:16s Aircraft-B repeated the landing clearance to the Tower.

- 10m:19s The Tower instructed JAL2542, the aircraft following Aircraft-B, “if feasible, reduce minimum please.”
- 10m:28s Cathay Pacific Airways flight 507 (hereinafter referred to as “CPA507”) contacted to the Tower, “taxiing for runway 24L.”
- 10m:32s The Tower tried to reply to CPA507 but then cancelled the transmission.
- 10m:36s The Tower instructed Aircraft-B to execute a go-around. The position of Aircraft-B was about 2.3nm away from the 24L threshold at this point.
- 10m:39s Aircraft-B repeated the go-around to the Tower.
- 10m:44s Aircraft-B descended to an altitude of 730ft and then climbed. The position of Aircraft-B was about 2.0nm away from the 24L threshold at this point.
- 11m:21s The Tower instructed Aircraft-A to clear the active runway.
Shortly afterward, Aircraft-A vacated the runway via Taxiway A3.

(See Figures 1, 2 and Attachment 1)

2.1.2 Statements of Crewmembers

(1) Captain of Aircraft-A

The flight was pushed back and started from Gate 15. The flight was released and we received taxi instructions such as “Cleared to holding point 24L via E2, P, A1.” There were no external distractions to increase crew workload during the event. Cockpit checks and announcements were completed and the flight had switched to the Tower frequency prior to reaching A1.

One aircraft had just landed and another one aircraft was approximately 4 nm on final. There were no lighted stop bars at the hold point and air traffic did not seem heavy.

The Tower gave us clearance as “Air Canada 036, to line up and wait runway 24L.” The line up clearance was unconditional. The landing aircraft was clearing the runway.

The flight lined up and after waiting for about 1 minute 30 seconds, Aircraft-B inquired if they had landing clearance, so we flashed our lights. The Tower then cleared Aircraft-B to make a go-around.

We were instructed to vacate 24L via Taxiway A3. Once clear, the Tower inquired if we had received clearance to enter the runway, we responded, “Absolutely affirmative” (received clearance).

The second lineup and subsequent take-off was completed without further incident.

Dispatch was advised after departure, and ASR (Aviation Safety Report) filed on arrival in Vancouver. There were no ambiguities amongst the crew as to the ATC clearances.

(2) First Officer of Aircraft-A

As we taxied we switched to the Tower frequency prior to reaching the hold line. Because the Tower asked if we were fully ready, I replied that we were fully ready, and the Tower cleared us “to position 24L and hold.”

Prior to our entering the runway, an aircraft just landed and was taxiing off the runway. One aircraft was on final approach (Aircraft-B).

We were waiting on the runway for approximately 1 minute. We were getting uncomfortable with the delay, and when we were getting ready to contact the Tower concerning the delay, the arrival Aircraft-B confirmed with the Tower that they were cleared to land. The Tower replied that Aircraft-B was cleared to land. Just after that the Captain turned the landing lights on, the

Tower ordered a go-around for Aircraft-B.

The Tower instructed us to vacate 24L. The three of us discussed the event and we were all 100% sure we were cleared to position.

(3) Cruise Relief Pilot of Aircraft-A

We weren't rushed and we were taking our time for taxiing because the flight attendant demonstration system was problematic.

The Tower asked us if we were fully ready, and the First Officer replied that we were fully ready. The Tower cleared us, "cleared to position." The Captain taxied and lined up on 24L, and since we were on the runway for at least one minute, I felt something was odd. I was ready to mention this to the Captain and the First Officer when the Tower cleared JAL to land. I could see on the Navigation Display that JAL was at 900 to 1000ft when the Captain turned the landing lights on. The Tower instructed JAL to make a go-around. The Tower told us to vacate the runway.

When we entered the taxiway, the Tower inquired if we were cleared to position, and we replied "yes." After taking off and on the climb, the Tower stated "Thanks for your help" and handed control over to the departure controller.

There is varying terminology for clearing an aircraft onto runway. My experience is such that the ATC read-backs must be exact and verbatim, otherwise the ATC will query the read-back.

(4) Captain of Aircraft-B

We were cleared for approach to 24L from the Approach Controller and made contact with the Tower before MAYAH.

When we made landing check at about 3.8nm on final, I saw lights on the runway that seemed to be an aircraft. It was clearly recognized as an aircraft when we started descending on the final approach course.

I instructed the First Officer to reconfirm landing clearance at about 1200ft. We were cleared to land by the Tower again, but because the aircraft on the runway was not moving, we were ready to mention this to the Tower when the Tower instructed us to make a go-around, at around 800ft.

I made sure that the aircraft on the runway was not moving, and carefully performed a go-around because there was enough distance and altitude for a go-around and because I was expecting a go-around.

I did not recognize that the event falls under serious incidents at that time, and I received the information thereof after the flight.

(5) First Officer of Aircraft-B

We were instructed to reduce to minimum approach speed when we contacted the tower, and the Captain changed the automatic pilot system setting from 200kt to 170kt. We could see the preceding aircraft and I recognized that there was one departure aircraft between us and the preceding arrival aircraft. When we were cleared to land, I thought that the timing of the clearance was a little early, since there was a departure aircraft waiting.

While turning at 1600ft after capturing localizer, I saw a light near the end of the runway and thought that departure aircraft was holding.

We descended to about 1200ft and it became clear that the light belonged to an aircraft, so I

thought of the possibility of a go-around. However, I also thought that if the aircraft starts moving now, it will be possible to land after its take-off.

I confirmed the landing clearance with the Tower, following the instruction of the Captain, but the Tower issued landing clearance again. I was suspicious about why the landing clearance was issued, because the aircraft on the runway did not move. And thereafter the Tower instructed us to make a go-around when I was just ready to ask the Captain whether to make a go-around.

2.1.3 Statements of Controllers

(1) The Tower

NWA69 arrived before Aircraft-B. I was thinking of letting Aircraft-A take off between the landings of NWA69 and Aircraft-B, so I instructed Aircraft-B to reduce speed so there would be a longer interval between the landings of the two aircraft.

When NWA69 landed, I asked Aircraft-A whether they were ready, and the aircraft replied they were ready. However, considering the facts that Aircraft-A taxied slowly, did not contact the Tower early and its movement was slow because of the long-distance flight, and that it would take time for the landed NWA69 to vacate the runway, I decided not to let Aircraft-A depart before the landing of Aircraft-B.

I instructed Aircraft-A to “Hold short of runway.” Although the read-back from Aircraft-A was not clear at the time, I heard “hold” before “position 24L,” so I made judgments that the aircraft would hold short (of runway), and issued Aircraft-B landing clearance. I instructed NWA69 to contact the Ground.

Aircraft-B said, “Confirm, cleared to land?” so I checked NWA69 and other aircraft on the Tower Display Subsystem² (hereinafter referred to as “TDS”), and replied “cleared to land.” I thought the confirmation of clearance was just another confirmation of the issuance of clearance.

When CPA507, to depart following Aircraft-A, called and I looked at the side of 24L, I noticed that Aircraft-A had entered the runway and I instructed Aircraft-B to make a go-around.

I instructed Aircraft-A to taxi off the runway via Taxiway A3, because it was unclear when the departure clearance would be issued to Aircraft-A based on coordination with the Radar Controller, and also because the next arrival aircraft was nearing.

I instructed Aircraft-A again to wait at 24L. I confirmed before that whether they were instructed to “Line up and wait,” and they answered that they were. Although I thought of stressing that I had instructed “Hold short of runway 24L,” I kept the subsequent communication with Aircraft-A to a minimum, because I thought it should become clear by playing back the communication record tape, and because I wanted to prioritize the flight of the aircraft. I always try to end communications as amicably as I can, and because I thought it would be better to minimize any unsafe factors within the cockpit of Aircraft-A which was on a long-duration flight, I added “Thank you for your help” at the end of the communication.

I was necessary to pay attention to the fact that the read-back from Aircraft-A was not exact phraseology, when they replied in different wording to my instruction “Hold short of runway.”

The important point to note in the air traffic control handling on 24L is to consider factors including the speed of arrival aircraft, treatment of departure aircraft by their destination, wind

² Tower Display Subsystem (TDS) is a display unit used within the control tower that is one of the components of the automated radar terminal system (ARTS-F: a system to display information necessary for ATC such as flight number, altitude and ground speed by computer-processing aircraft information obtained by radar) of the Airport.

factors, take-off distance, and whether a quick reaction can be expected or not.

I took a day off the day before the serious incident, and I did not have any troubles with my health condition.

(2) Deputy-Chief Air Traffic Controller

It was a clear day, was not particularly busy, and the flow was normal with one runway, Runway A, being used.

I first became aware of a go-around when I heard the instruction thereof. When I listened to the recording afterwards, Aircraft-A was saying "Position 24L," but I think it is difficult to distinguish this at first attempt. It would have been clear right away if Aircraft-A said "Line up and wait." The controller should have said, "Say again" if the read-back was unclear.

Controllers rotate positions roughly once per hour, and no seat is assigned to one person for longer than one hour. I also pay attention not to assign busy seats consecutively to one person.

On the following day, I told the crew members to be certain to remember and abide by the fundamentals on the hearing back of aircraft response.

This serious incident³ occurred on the final approach course for 24L of the Airport, about 2.0nm (about 3.7km) from the threshold of 24L, at around 18:11, October 20, 2007.

(See Figures 1, 2, Photo 1 and attachment 1)

2.2 Personnel Information

2.2.1 Flight Crewmembers

(1) Captain of Aircraft-A	Male, Age 56
Airline transport pilot certificate (Airplanes)	
Validity	December 20, 2007
Type rating for Boeing 767	Date unknown
Class 1 aviation medical certificate	
Validity	December 20, 2007
Total flight time	17,071 hrs and 30 min
Flight time in the last 30 days	82 hrs and 18 min
Flight time on the type of aircraft	3,051 hrs and 24 min
Flight time in the last 30 days	82 hrs and 18 min
(2) First Officer of Aircraft-A	Male, Age 44
Airline transport pilot certificate (Airplanes)	
Validity	November 23, 2007
Type rating for Boeing 767	Date unknown
Class 1 aviation medical certificate	
Validity	November 23, 2007
Total flight time	4,850 hrs and 12 min
Flight time in the last 30 days	43 hrs and 12 min
Flight time on the type of aircraft	407 hrs and 18 min
Flight time in the last 30 days	43 hrs and 12 min

³ The application of Clause 2, Article 166-4 of the Civil Aeronautics Regulations of Japan is based on the recognition that the runway was under use of Aircraft-A because Aircraft-A, while being instructed to wait before the runway, crossed the runway holding position marking and entered the runway when the arrival Aircraft-B with landing clearance first was approaching.

(3) Cruise Relief Pilot of Aircraft-A	Male, Age 43	
Airline transport pilot certificate (Airplanes)		
Validity		December 10, 2007
Type rating for Boeing 767		Date unknown
Class 1 aviation medical certificate		
Validity		December 10, 2007
Total flight time		5,723 hrs and 06 min
Flight time in the last 30 days		107 hrs and 06 min
Flight time on the type of aircraft		2,797 hrs and 06 min
Flight time in the last 30 days		107 hrs and 06 min
(4) Captain of Aircraft-B	Male, Age 56	
Airline transport pilot certificate (Airplane)		June 18, 1990
Type rating for Boeing 767		October 17, 1987
Class 1 aviation medical certificate		
Validity		November 21, 2007
Total flight time		12,014 hrs and 27 min
Flight time in the last 30 days		30 hrs and 26 min
Flight time on the type of aircraft		7,974 hrs and 56 min
Flight time in the last 30 days		30 hrs and 26 min
(5) First Officer of Aircraft-B	Male, Age 38	
Commercial pilot certificate (Airplane)		February 10, 1995
Instrument flight certificate		December 6, 1995
Type rating for Boeing 767		May 14, 1998
Class 1 aviation medical certificate		
Validity		February 4, 2008
Total flight time		3,552 hrs and 12 min
Flight time in the last 30 days		42 hrs and 18 min
Flight time on the type of aircraft		2,018 hrs and 33 min
Flight time in the last 30 days		42 hrs and 18 min

2.2.2 Air Traffic Controller

Controller in charge of aerodrome control position	Male, Age 39	
Air traffic control qualification certificate		
Aerodrome control service		October 1, 1992
New Tokyo (Narita) airport traffic control tower		October 1, 1992
Kansai airport traffic control tower		September 7, 2006
Approach control service		June 1, 1994
New Tokyo (Narita) radar approach control		June 1, 1994
Kansai radar approach control		February 10, 2007
Terminal radar control service		June 1, 1994
New Tokyo (now Narita) radar approach control		June 1, 1994
Kansai radar approach control		May 17, 2007
Medical certificate		
Validity		June 30, 2008

2.3 Meteorological Information

The aviation weather observation data at the Airport were as follows:

18:00 Wind direction... 300 degrees, Wind velocity... 19 kt, Prevailing visibility... 35 km,
Clouds: amount...FEW, type... cumulus, Ceiling... 3,500 ft,

amount... SCT, type... stratocumulus, Ceiling... 6,000 ft,

Temperature... 18 degrees C, Dew point... 1 degree C,

Altimeter setting (QNH)... 29.91 inHg

18:30 Direction of wind... 300 degrees, Velocity of wind... 19 kt, Prevailing visibility... 35
km, Clouds: amount... FEW, type... cumulus, Ceiling... 3,500 ft,

amount... SCT, type... stratocumulus, Ceiling... 6,000 ft,

Temperature... 18 degrees C, Dew point... 4 degrees C,

Altimeter setting (QNH)... 29.92 inHg

The time of sunset at the Airport on the day the serious incident occurred was 17:20.

2.4 Communications

Communication between the Tower and Aircraft-A or B was conducted well at the time of this serious incident.

The details of communication with take-off and landing aircraft involved (Aircraft-A and B, NWA69, CPA507 and JAL2542) were as specified in the attached ATC communication records. (See Attachment 1)

2.5 Information on the Aerodrome and Ground Facilities

The Airport has two runways, namely runway 06R/24L (hereinafter referred to as "Runway A") on the eastern side, which is 3,500 meters long and 60 meters wide, and runway 06L/24R (hereinafter referred to as "Runway B"), which is 4,000 meters long and 60 meters wide, on the western side of the control tower. When this serious incident occurred, take-off and landing took place by using only Runway A at the eastern side, and Runway B was unused.

Aerodrome lights were lit in compliance with the specified night luminous intensity based on the weather condition of that night. However, because runway renovation work was under way in the Airport at that time, the following aerodrome lights related to Runway A were inoperative, and aeronautical information had been issued.

- (1) Runway center line light (RCLL)
- (2) Runway touchdown zone light (RTZL)
- (3) Stop bar light (STBL)
- (4) Runway guard light (RGL)
- (5) Taxiway center line light (TWCL)

The Airport has a stop bar system (comprised of STBL, RGL, RCLL, control console, etc.) showing the holding point for taxiing aircraft. However, it was not the condition to be able to operate the stop bar system at the time of the serious incident, due to the suspended use of lights (3) to (5) above.

(See Figures 1 and 2)

2.6 Information on DFDR and Cockpit Voice Recorder

Aircraft-A and B were each equipped with a DFDR and a Cockpit Voice Recorder (hereinafter referred to as “CVR”). The data on the DFDR, which can record for 25 hours, and the CVR, which can record for 30 minutes, equipped in Aircraft-A had been overwritten because the flight continued after the occurrence of this serious incident, and so that records of the time of the occurrence was not remained. Also, although records of the time of the occurrence were remained in Aircraft-B’s DFDR, which can record for 25 hours, the data on the CVR, which can record for 2 hours, was overwritten because the flight continued after the occurrence of this incident, and so that records of the time of occurrence did not remain.

Time correction of the DFDR equipped in Aircraft-B was implemented by comparing the NTT speaking clock on the ATC communication records with the VHF transmission keying data on the DFDR’s records.

2.7 Estimation of Taxiing Routes and Taxiing Speed of Aircrafts based on Radar Track Records

In the Airport, the Automated Radar Terminal System (ARTS-F) is in operation, and the aircraft flying in the surrounding airspace of the Airport are monitored by the Airport Surveillance Radar and the Secondary Surveillance Radar. The aircraft on the ground are monitored by the Airport Surface Detection Equipment (hereinafter referred to as “ASDE”) which has high resolution ability. All aircraft data monitored by ARTS-F are recorded. According to the estimation of taxiing route and taxiing speed on Aircraft-A based on the recorded ASDE data, the average taxiing speed for six minutes from 18:02:00, while Aircraft-A was taxiing on Taxiway R, to 18:08:00, when it entered Taxiway A1, was estimated at 5-6kt (with velocity width of about 1-10kt).

Similarly, the taxi routes of NWA69 and CPA507 were also estimated on the basis of the recorded ASDE data, and the result is shown in Figure 1 together with the taxi route of Aircraft-A.

(See Figure 1)

2.8 Additional Information

2.8.1 ATC Phraseology in Japan and Canada

(1) With regard to the holding instruction, given to an aircraft on a runway, it is provided in the paragraph 4 Taxiing and Departure (10), (III) Aerodrome control procedure, III Air Traffic Control Operational Procedures (hereinafter referred to as “the ATC Procedures”), Air Traffic Control Services Regulations established by the Civil Aviation Bureau of Japan, as follows:

Holding on the runway

(10) Even when take-off clearance cannot be issued to a departure aircraft immediately, if it is confirmed to be safe, it is possible to clear the aircraft to hold on the runway providing the information of the using runway number in advance. In such a case, the traffic information shall be provided to the aircraft as necessary.

RUNWAY (number), LINE UP AND WAIT. ((traffic information))

(2) With regard to the holding instructions on the runway, as of the time of the occurrence of this serious incident, it was provided in the paragraph 336 TAKE-OFF PROCEDURES, the Air Traffic Control Manual of Operations (hereinafter referred to as “ATC MANOPS”) established by

NAV CANADA (an organization in charge of air traffic control service in Canada), as follows:

336.1

Inform an aircraft of the reason for the delay if it is taxied to position and instructed to "WAIT".

ATC phraseology (example)

TAXI TO POSITION AND WAIT, TWO MINUTE IFR DELAY.

(The rest is omitted)

(3) With regard to the instructions to let an aircraft hold short of the runway, it is provided in the paragraph 4 Taxiing and Departure (11), (III) Aerodrome control procedure, the ATC Procedures, as follows:

Holding short of the runway

(11) a. Depending on the traffic condition, aircraft should be instructed to hold short of the runway if necessary.

HOLD SHORT OF RUNWAY (number). (traffic information)

(The rest is omitted)

(4) In Canada, with regard to instructions to let an aircraft hold short of the runway, it is provided in the paragraph 334 TAXI AUTHORIZATIONS, ATC MANOPS, as follows:

334.3

Issue a taxi authorization in the following form:

A-E (Omitted)

F. (Omitted) HOLD SHORT OF (runway number or taxiway) (Omitted)

(The rest is omitted)

2.8.2 The Timing on the Issuance of the Take-Off and Landing Clearance

With regard to the timing of the issuance of take-off and landing clearance, it is provided in the paragraph 2 ATC Clearance (4), (III) Aerodrome control procedure, the ATC Procedures, as follows:

Timing of the issuance of take-off and landing clearance

(4) a. Take-off clearance shall, in principle, be issued to a departure aircraft after the aircraft comes close to the point of starting a take-off roll of the runway in use (Omitted).

b. Landing clearance shall, in principle, be issued to an arrival aircraft before the aircraft reaches the final approach (2 nautical miles from the runway threshold for straight-in approach aircraft).

c. If there are any preceding relevant aircraft, issue a take-off/landing clearance after such preceding aircraft have reached the position (wherein prescribed separation such as vacating runway can be ensured), regardless of the provision of a. and b. above. However, if it is judged that (prescribed) separation (such as vacating runway) will be established between the succeeding aircraft and the preceding aircraft before the succeeding aircraft starts a take-off roll or pass the runway threshold on the final approach course, the said clearances may be issued by providing traffic information even before the preceding aircraft reach the prescribed condition. (The rest is omitted)

2.8.3 Operations of Stop Bar System

(1) With regard to the operations of stop bar lights (synonymous with "stop bar system" in

this paragraph), it is provided in the Air Traffic Control Services Rules established by the Kansai Airport Office as follows:

(Omitted) Based on 12 (2) of the Air Traffic Control Operational Procedures III, it should be handled for each runway in accordance with the following provisions.

- 1. When visibility is 600m or less, stop bar lights of all runways shall be operated. When either RVR of each runway is 600m or less, or when judged as necessary by air traffic controllers, stop bar lights of applicable runway shall be operated.*

(The rest is omitted)

- (2) With regard to the stop bar (synonymous with “stop bar system” in this paragraph), it is provided in the paragraph 5.3.19, Chapter 5, the Annex 14 to the Convention on International Civil Aviation, as follows:

Application

Note 1. (Omitted)

Note 2. Runway incursions may take place in all visibility or weather conditions. The provision of stop bars at runway holding positions and their use at night and in visibility conditions greater than 550 m runway visual range can form part of effective runway incursion prevention measures.

(The rest is omitted)

2.8.4 Operations of Runways at the Airport

With regard to the operations of runways, it is provided in the Air Traffic Control Services Rules established by the Kansai Airport Office, as follows:

In principle, the operations of runways shall be as follows:

- 1. Categorization of use of runways*

The categorization of use of runways shall be exclusive runway system, using Runway A for departure aircraft and Runway B for arrival aircraft. However, when it does not produce any significant impact on other air traffic and when it is necessary for air traffic control, Runway A may be used for arrival aircraft also.

(The rest is omitted)

2.8.5 Display of Aircraft Information Using TDS

The ARTS-F of the Airport has TDS within the control tower, allowing for easy recognition of aircraft on the ground within the airport. However, the system also has weak points, such as that some areas could not be surveyed due to reasons such as being hidden behind a building, that ghost targets may appear due to unnecessary reflection of radio waves, and that the performance deterioration of ASDE is unavoidable during rainfall. Therefore, controllers are frequently required to manually input the aircraft data such as flight numbers for departure targets. Thus, it is difficult to say that TDS can surely display all targets of the aircraft on the ground with data on such aircraft.

3 ANALYSIS

3.1 General

3.1.1 Airman Competence Certificates, etc.

The Captains and First Officers of Aircraft-A and Aircraft-B and the Cruise Relief Pilot of Aircraft-A held both valid airman competence certificates and valid aviation medical certificates.

3.1.2 Air Traffic Controller Qualification Certificates, etc.

The controller of Kansai airport traffic control tower held the required air traffic control qualification certificates and medical certificates.

3.1.3 Weather Conditions

It is presumed that the weather condition at the time of this serious incident occurred was not related to the occurrence.

This serious incident occurred more than 50 minutes after the time of sunset (17:20) at the Airport as described in 2.3, so it is presumed that it was considerably dark.

3.2 Analysis

3.2.1 Situations of Aircraft-A

(1) Initial Contact with the Tower

The flight crewmembers of Aircraft-A reduced the taxiing speed as described in 2.1 and 2.7, due to problems with the flight attendant demonstration system as described in 2.1.2 (3), and it is presumed that the checking before take-off had been completed and the aircraft was fully ready for take-off before entering Taxiway A.

According to the ATC communications records, the flight crewmembers of Aircraft-A, being instructed by the Ground to contact the Tower at 18h:04m:58s and 18h:05:06, had not contacted the tower for about three and a half minutes, until being called from the Tower at 18h:08:36.

It was necessary for the flight crewmembers of Aircraft-A to change the frequency immediately after being instructed from the Ground to contact the Tower, and to contact the Tower at an earlier stage.

(2) Mishearing by Flight Crewmembers on the ATC Instruction

As described in 2.1.1, Aircraft-A entered Taxiway A1 around 18h:08m:00s. Aircraft-A was asked from the Tower, "Ready for departure, confirm?" and answered, "That's affirmative." Responding to the Tower's instruction of "Hold short of runway 24L," which followed "Roger that.", the First Officer of Aircraft-A read back as "To position 24L," which was different from the instruction given from the Tower.

With regard to the reason of such read-back by the First Officer of Aircraft-A, it is considered possible that the flight crewmembers of Aircraft-A had misheard to be instructed to enter the runway and wait, as they had assumed, because they believed that the take-off clearance would be issued to their aircraft in a short while, before the landing clearance would be issued for Aircraft-B. These are judged from following:

The words of "Expect one departure" were included in the communication between the Tower

and Aircraft-B at 18h:05m:35s. Therefore, it is considered possible that the flight crewmembers of Aircraft-A had been monitoring the communication, and believed that the said departure was their aircraft.

When Aircraft-A reached near the holding position marking of Taxiway A1, the Tower confirmed whether the aircraft was ready for take-off, and the First Officer of Aircraft-A responded instantly that they were fully ready. Since the Tower responded to this with, "Roger that," and considering the position of Aircraft-A, it is considered likely that the flight crewmembers of Aircraft-A believed that the clearance to enter the runway would be issued after, "Roger."

Since NWA69, just before touchdown, had crossed in front of Aircraft-A at that time, it is considered likely that the flight crewmembers of Aircraft-A reinforced their belief that the next would be issued to their aircraft as the clearance to enter the runway.

As described in 2.1.2, the flight crewmembers of Aircraft-A knew that Aircraft-B was on the final approach course, and it is considered likely that they assumed from the distance (Captain recognized it as about 4nm) that their aircraft could take off before the landing of Aircraft-B.

Although miscommunications may easily occur in such conditions as those described above, ATC communication is the foundation for ensuring the safety of air traffic, therefore the flight crewmembers should have carefully listened to ATC instructions. Also, even if they had misheard the ATC instruction, it is considered likely that the controller would have had an increased chance to notice the mistake if they had used phraseologies such as "Taxi to position and wait," without using simplified wording such as "To position 24L" when they read back.

As described in 2.1.1, at 18h:08m:54s, the Tower issued landing clearance to Aircraft-B as "Revised. Runway 24L, cleared to land." Although Aircraft-A had already started taxiing from Taxiway A1 to the take-off position of 24L, it did not yet to pass the runway holding position marking at that time. Therefore, it is considered possible that the flight crewmembers of aircraft A would have noticed the intention of the Tower to clear Aircraft-B to land before the take-off of Aircraft-A if they of Aircraft-A had been monitoring this ATC communication between the Tower and Aircraft-B.

(3) ATC Communications

According to the ATC communications records, while there was nothing particularly unclear with the voice from the Tower that gave instruction to Aircraft-A as "Hold short of runway 24L" at 18h:08m:43s. In contrast, the voice of the First Officer's read back, "To position 24L," the "To" at the beginning was not recorded so clearly.

As described in 2.6, since the record of the time of the occurrence of the serious incident was not left in the CVR of Aircraft-A, the circumstances inside the cockpit of Aircraft-A and the circumstances of Aircraft-A receiving the ATC communication could not be confirmed.

(4) Operation of Stop Bar System

As described in 2.1.2 (1), the Captain of Aircraft-A stated that the lights of the stop bar system had been turned off at the time.

As described in 2.5, it was not the condition to be able to operate the stop bar system at the time due to runway renovation work being under way, and also, as described in 2.3 and 3.1.3,

although it was considerably dark at the time, the visibility was good. Therefore, it is presumed that it had not been a condition, such as described in 2.8.3 (1), in which the stop bar system should have been operated.

3.2.2 Situations of the Tower

(1) Change of the Order of Take-off and Landing

As described in 2.1.3 (2), 2.5 and 2.8.4, at the time this serious incident occurred, it was not a period with particularly heavy air traffic. Therefore, it is estimated that the operations on take-off and landing of aircraft had been conducted only on Runway A.

According to the description in 2.1.3 (1) and the ATC communications records, it is presumed that the Tower asked Aircraft-A whether it was ready for take-off, having a plan to let Aircraft-A depart after the landing of NWA69, the arrival aircraft precedent to Aircraft-B, and before the landing of Aircraft-B. The flight crewmembers of Aircraft-A replied that they were ready. However, it is presumed that considering the facts that NWA69 would take time for vacating the runway and that Aircraft-A, a long-distance international flight, was moving slowly, the Tower decided not to let Aircraft-A depart before the landing of Aircraft-B, and changed the plan to let Aircraft-A depart after the landing of Aircraft-B.

As described in 2.1.1, this change of plan took place between 18h:08m:36s and 18h:08m:43s, and Aircraft-B was 6nm away from the 24L threshold at this time. It is presumed that it was the distance of 2.5 or 3 minutes flight from 24L at the approach speed at the time. On the other hand, it took about 1 minute 16 seconds for Aircraft-A, which was holding at Taxiway A1, to align on 24L and to stop. Therefore, although it is considered possible that it was feasible to let Aircraft-A take off before the landing of Aircraft-B, as originally planned by the Tower, it is presumed that the Tower's decision to change the order of take-off and landing to allow a longer interval between the two aircraft was reasonable, considering the time for vacating the runway on NWA69, the taxiing speed of Aircraft-A and the time for take-off roll on Aircraft-A.

Responding to the reply from Aircraft-A that it was ready for take-off, the Tower answered "Roger that," but at the same time, he instructed Aircraft-A as "Hold short of runway 24L," which was different from the assumption of the flight crewmembers of Aircraft-A as described in 3.2.1 (2). It is presumed that a discrepancy between the intention of the Tower and the assumption of the flight crewmembers of Aircraft-A had arose after this change of plan. It is considered likely that if the Tower had clearly conveyed the order of take-off and landing to Aircraft-A, and then gave an instruction to hold short of 24L together with traffic information, the mistaken belief of the flight crewmembers of Aircraft-A described in 3.2.1 (2) could have been corrected and it would have been possible to prevent mishearing.

It is presumed that the Tower, after issuing an instruction to hold short of 24L for Aircraft-A, issued the landing clearance to Aircraft-B as "Revised. Runway 24L, cleared to land." applying the standards of provisory clause on (4) c described in 2.8.2 under the condition that NWA69 was still on the runway for landing-roll.

(2) Mishearing on the Reply from Aircraft-A

As described in 2.1.3 (1), the Tower stated that, the read-backs from the flight crewmembers of Aircraft-A, responding to the instruction of "Hold short of runway 24L," had been "position 24L," with a rather unclear word of "hold" being heard before it. Therefore it is presumed that the

Tower mistakenly thought that Aircraft-A would hold short of the runway in accordance with its instruction, and issued a landing clearance to Aircraft-B.

Although the First Officer of Aircraft-A replied, "To position 24L" in response to the instruction to hold short of the runway, as described in 3.2.1 (3), the beginning part of "To" was not clearly recorded. Therefore it is considered possible that the Tower thought the read-back would be "Hold" just as the Tower was anticipating, and misheard "To" as "Hold." It is considered possible that the Tower made judgments Aircraft-A would hold short of 24L, because the words "Hold position", as well as "Hold present position", means to hold on the spot.

The controller should always confirm any unclear read-backs from aircraft, not to mention any incorrect read-backs, and should pay due attention if the read-back was different words from the instruction given and confirm if necessary.

(3) Confirmation of Landing Clearance from Aircraft-B and Re-issue of Landing Clearance to Aircraft-B

As described in 2.1.3 (1), the Tower stated that he had instructed Aircraft-B as "Cleared to land." after checking the positions of NWA69 and other aircraft on TDS when there had been a confirmation from Aircraft-B, such as "Confirm, cleared to land?" However, as described in 2.1.1, it is presumed that although NWA69 had already vacated the runway at this time, Aircraft-A was aligned and stopped on 24L.

From the following reasons, it is presumed that the Tower could not visually identify Aircraft-A on 24L, although he could check the position of NWA69, and it is presumed that the Tower did not sufficiently check take-off roll starting areas of 24L on the TDS display.

The Tower was thinking that Aircraft-A was holding short of 24L according to the ATC instruction given.

It was required to pay attention to the timing of the arriving aircraft (NWA69) preceding Aircraft-B to vacate the runway, because the Tower had already issued landing clearance to Aircraft-B by applying the standards of provisory clause on (4) c described in 2.8.2.

As described in 2.1.3 (1), the Tower regarded the confirmation of landing clearance from the flight crewmembers of Aircraft-B as a mere confirmation of whether the landing clearance had already been issued or not, and did not consider that the confirmation was made because there was an aircraft on the runway.

While it was already dark as described in 3.1.3, NWA69 was taxiing on the taxiway, about 900m away and slightly on the right side of the control tower when facing the direction of Runway A, but Aircraft-A was rather far away, about 1.9km away on the left side.

The Tower should have accurately grasped the situations of Runway A as a whole, rather than only the movements of the preceding aircraft (NWA69), when the confirmation of the landing clearance was required by Aircraft-B.

(4) Noticing Aircraft-A on the Runway

According to the ATC communications records, when the departure aircraft (CPA507) following Aircraft-A called the Tower, he canceled the transmission by himself and instructed Aircraft-B to make a go-around. From this, it is considered likely that the Tower's attention was turned to areas near the take-off roll starting point of 24L when CPA507 called, and the Tower noticed Aircraft-A waiting on the runway.

(5) Experience of Communicating with Foreign Aircraft

As described in 2.2.2, although the Tower does not have long-term experience in serving at the Airport, it is presumed that the Tower had sufficient experience in communicating with foreign aircraft at international airports, because the Tower had also engaged in aerodrome control service at the New Tokyo (now Narita) International Airport.

3.2.3 Situations of Aircraft-B

(1) Continuation of Approach

According to the ATC communications records, the flight crewmembers of Aircraft-B were notified of the traffic information concerning a departure aircraft when there was a request for speed adjustment from the Tower. Therefore it is presumed that they recognized that there was an aircraft to depart before their landing. As described in 2.1.1 and 2.1.2 (5), it is presumed that the flight crewmembers of Aircraft-B, after receiving landing clearance at the point about 6nm away from runway, thought that the aircraft waiting at 24L (Aircraft-A) would soon take off and continued the final approach checking the movement of Aircraft-A.

However, as described in 2.1.2 (4) and (5), it is presumed that the flight crewmembers of Aircraft-B confirmed the landing clearance with the Tower because Aircraft-A did not move from the starting point of take-off roll, although the landing clearance was issued once again, they were thinking of making a go around because there were no change in situation on Aircraft-A, and thereafter they executed a go-around according the Tower instruction.

(2) Communication for Confirmation

As described in 2.1.2 (4) and (5), the flight crewmembers of Aircraft-B confirmed the landing clearance with the Tower by asking, "Confirm, cleared to land?", because they were catching an aircraft in sight on 24L. However, they did not pointed out the aircraft staying on the runway.

3.2.4 ATC Phraseology

As described in 2.8.1, the ATC phraseology, "HOLD SHORT OF RUNWAY", is used in both of Japan and Canada for the instruction to let an aircraft hold short of runway. Therefore it is considered unlikely that the phraseology caused the mishearing by the flight crewmembers of Aircraft-A in this incident.

However, as described in 3.2.1 (2) and 3.2.2 (2), the wording "To position 24L", read back by the First Officer of Aircraft-A, was used as the same meaning with the ATC phraseology "Taxi to position (and wait)." that has been used in Canada, and it is considered possible that the Tower misheard this read-back as "Hold position". For these reasons, it is considered possible that the deference of the ways how to use "position" in the ATC phraseologies between Canada and Japan caused to disturb the mutual understanding between Aircraft-A and the Tower.

3.2.5 Radar System

As described in 2.8.5, the tower controllers could monitor the aircraft etc. on the runways and the taxiways by using TDS, because ARTS-F had been operated in the Airport. Although TDS does not always display all aircrafts accurately, it is presumed that Aircraft-A at Taxiway A1 and near 24L had been displayed normally, according to the analysis result of recorded ASDE data

described in 2.7.

3.3 The Severity Classification of This Serious Incident

As described in 2.1.1, the distance between Aircraft-A and Aircraft-B was about 2.0nm (about 3.7km) or more when Aircraft-B executed a go-around, and it is presumed that visibility was good although it was considerably dark.

It is recognized that the classification of the severity of this serious incident, prescribed in the ICAO Doc 9870 “Manual on the Prevention of Runway Incursions” corresponds with “C (an incident characterized by ample time and/or distance to avoid a collision)” using the calculator tool provided by the ICAO.

(See Attachment 2)

4 PROBABLE CAUSE

It is presumed that this serious incident occurred as follows: The flight crewmembers of the departure aircraft (Aircraft-A) who was instructed from the air traffic controller to hold short of the runway, read back incorrectly after mishearing the instruction as to enter the runway; and the controller also misidentifying the read-back and not confirming it; accordingly the departure aircraft kept entering into the runway; this made the arrival aircraft (Aircraft-B), which already received a landing clearance from the controller, attempt to land on the same runway as a result.

5 REFERENCES

5.1 The Aeronautical Information Circular(9/08) dated March 13, 2008 had been issued in Canada, and it was decided that ATC phraseologies to instruct the aircraft to enter the runways in preparation for take-off would be changed in accordance with the recommendations by ICAO, as described below, and this change became effective as of April 10, 2008.

CHANGE IN ATC PHRASEOLOGY – LINE UP/LINE UP AND WAIT

(Omitted)

The intention of this circular is to give operators advance notice of the change in phraseology that controllers in Canada will use when instructing aircraft to enter a runway in preparation for take off.

Current Phraseology

“TAXI TO POSITION” or “TAXI TO POSITION AND WAIT”

New Phraseology

“LINE UP” or “LINE UP AND WAIT”

United States Differences

The US Federal Aviation Administration (FAA), while studying the possibility of adopting the “LINE UP” phraseology, will not do so at this time.

(Omitted)

<i>ICAO</i>	<i>CANADA</i>	<i>United States (FAA)</i>
<i>TAXI VIA (taxiway routing) TO HOLDING POINT RUNWAY (number)</i>	<i>RUNWAY (number), TAXI VIA (taxiway routing)</i>	<i>TAXI TO RUNWAY (number) VIA</i>
<i>LINE UP</i>	<i>LINE UP</i>	<i>RUNWAY (number), POSITION AND HOLD</i>
<i>LINE UP AND WAIT</i>	<i>LINE UP AND WAIT (reason)</i>	<i>RUNWAY (number), POSITION AND HOLD</i>

5.2 The Civil Aviation Bureau of Japan, through the notice “Thorough on Confirmation of Read-Back from Pilots in Air Traffic Control” (dated October 22, 2007), instructed all ATC facilities to thoroughly inform air traffic controllers on the re-acknowledgement of the importance of confirming read-back, sufficient attention towards errors in read-back, and necessary prompt correction and reconfirmation, etc. and to have them implement these items exactly.

In addition, the Civil Aviation Bureau of Japan conducted a special safety and security inspection of the Kansai Airport Office from October 22 to 24, 2007, and summarized the “Special Safety and Security Inspection Report” including such assessment items as described below.

IV. Items Required for Improvement, etc.

i) Items to be studied and implemented immediately

Thorough on confirmation of read-back

It should be thoroughly informed the air traffic controllers to confirm the read-back exactly, because the aerodrome control position did not seek the pilot for confirmation

on the read-back to the ATC instruction, although it was unclear.

Notice to pilots on exact read-back

It should be thoroughly informed the pilots to read back exactly with the phraseology used for the ATC instruction, because it is considered that the fact that the pilot read back by the different wording from the phraseology used by the aerodrome control position was also the cause of the discrepancy in understanding each other.

Provision of information related to ATC instructions

It should be studied on the appropriate way of providing information in issuance of the ATC instruction and be informed the air traffic controllers of the results thereof, because the pilots understanding on said instruction will be improved by adding useful information on a timely basis. In particular, the instruction, "Hold short of runway" directly connects to safety problems if there are any discrepancies in understanding; therefore information such as that concerning arrival aircraft should be given proactively.

In conjunction with this, it should be instructed pilots to add reasons for confirmation as far as possible in order to help the understanding of controllers, when pilots confirm ATC instructions.

ii) Items to be studied in the mid-term future

Efforts to be made on human factors

It should be taken measures to overcome problems stemming from human factors, such as miscommunication, through efforts including the reinforcement of training programs covering issues including sharing of information such as minor incidents without damage, methods of communication to accurately convey intentions.

Support by ATC system

It should be studied about the effectiveness of introducing a system for securely grasping the conditions of airport surface traffic, such as multilateration system, because the runway incursion may less noticed during nighttime, compared to daytime.

Following the results of this inspection, the Civil Aviation Bureau of Japan instructed each ATC facility on the appropriate reactions, through the notice "Confirmation of Read-Back to ATC Instructions and the Provision of Information" (dated October 31, 2007), and at the same time issued the notice "Implementation of Clear Read-Back to Air Traffic Controller" (dated the same) to the All Japan Air Transport and Service Association Corp., and to foreign airlines flying into Japan.

Also, because similar cases occurred in succession, the Civil Aviation Bureau of Japan decided to study countermeasures in cooperation with parties involved in aircraft operations, and issued the "Summary of the Meeting on Measures to Prevent Runway Incursion," which includes the information as described below, on March 28, 2008.

3. Concrete Measures

(Omitted) Items to be implemented hereafter as measures to prevent runway incursions are as follows, and should be implemented promptly by the Civil Aviation Bureau and aircraft operators.

(1) Prevention of miscommunication

Items to be implemented immediately in FY 2008

- *Regarding the read-back by pilots to ATC instructions, necessary rules on the read-back should be made and the rules should be thoroughly made known through measures such as the formulation of a guidance manual related to ATC communications, because items to be read back or phraseology used are clearly defined.*
- *Educational materials should be prepared by compiling and analyzing information such as terms that may cause miscommunication, selected from minor incidents without damage and others, and terms that were effective when a situation called for instant reaction, and such materials should be used in education, training and e-learning for air traffic controllers and pilots.*
- *In cockpit onboard training of air traffic controllers and pilot-controller discussion meetings, which are the occasions to ensure mutual understanding between air traffic controllers and pilots, mutual understanding should be further promoted through gathering information each others on minor incidents without damage, and making case studies; at the same time, information sharing should be further reinforced through measures such as summarizing operational improvement measures at individual work sites on a regular basis.*

Items to be considered promptly

- *It should be discussed in ICAO meeting, etc, not to use, in principle and internationally, such phraseologies that may cause misunderstanding.*

(2) Implementation of visual support system

Items to be implemented or to be promoted to implement from FY 2008

- *Implementation of visual support for air traffic controllers by the ATC support system etc. (improvement of the TDS) and visual support for pilots by improvement of the signals on the runways and the taxiways (signals by lighting and holding position guidance marking) should be started from airports with particular needs of urgent countermeasures.*
- *It should be promoted steadily to implement the system to be able to grasp the ground traffic conditions securely (multilateration) and the visual support system for air traffic controllers (function to support the monitoring of runway occupancy).*

Items to be considered to be implemented in FY 2009 and after

- *Policy for implementing further visual support systems for pilots (such as RWSL, etc.) should be set based on technical feasibility, and it should be promoted to implement such systems in a well-planned manner.*

(3) Items to be considered in the mid-term future

- *Regarding to the introduction of a data link system in aerodrome control, which is used for the ATC communications by the exchange of wording and data information on behalf of the audio communications by radio telephony, although there are problems on input and output operability by air traffic controllers and pilots, data transmission time and so on, researches and studies should be further promoted. In addition, the global trend of technical innovation conducive to the prevention of runway incursions should be grasped continuously.*

4. Future framework

(1) Nationwide level

- *It should be organized the discussion panel "Team to Promote the Prevention Measures of Runway Incursion (tentative name)" consisting of members from the Civil Aviation Bureau and parties involved in aircraft operations, and it should be made continuous efforts, in order to analyze various problems comprehensively, submitted by worksite air traffic controllers and pilots, and to take necessary measures against the common issues in submitted problems through the following activities, In addition, it should be followed up by this team on the state of implementation of the specific measures described in this arrangement.*

(2) Worksite level

- *The safety management system (SMS) recommended by the International Civil Aviation Organization (ICAO), has been already introduced for the aircraft operations, and the SMS would be introduced in order for the aviation safety services, including the air traffic control service, from FY2008. It should be promoted efforts on the prevention measures of runway incursions at the worksite level, by taking advantage of this SMS.*

Figure 1 Estimated Track of Aircraft-A

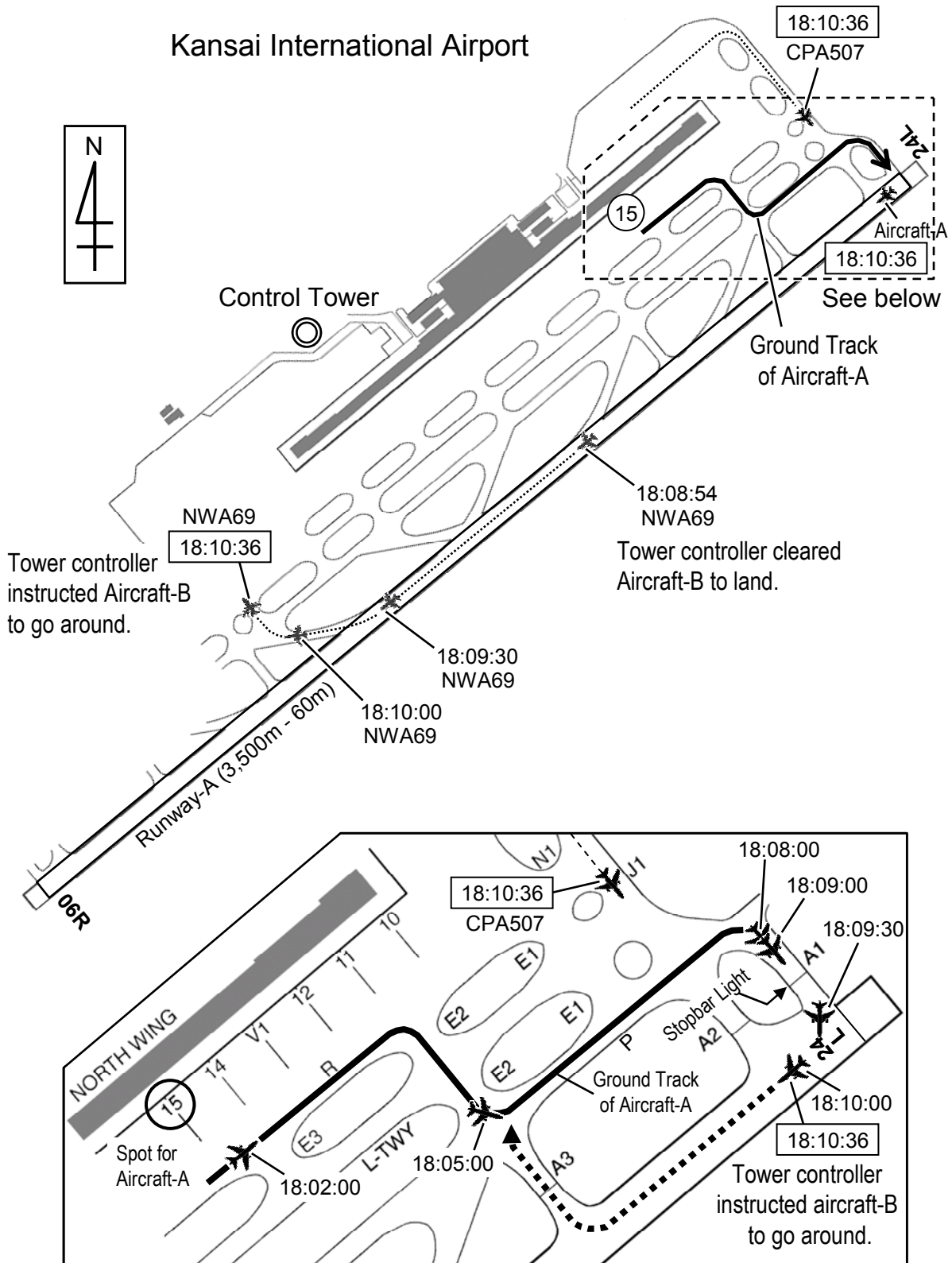
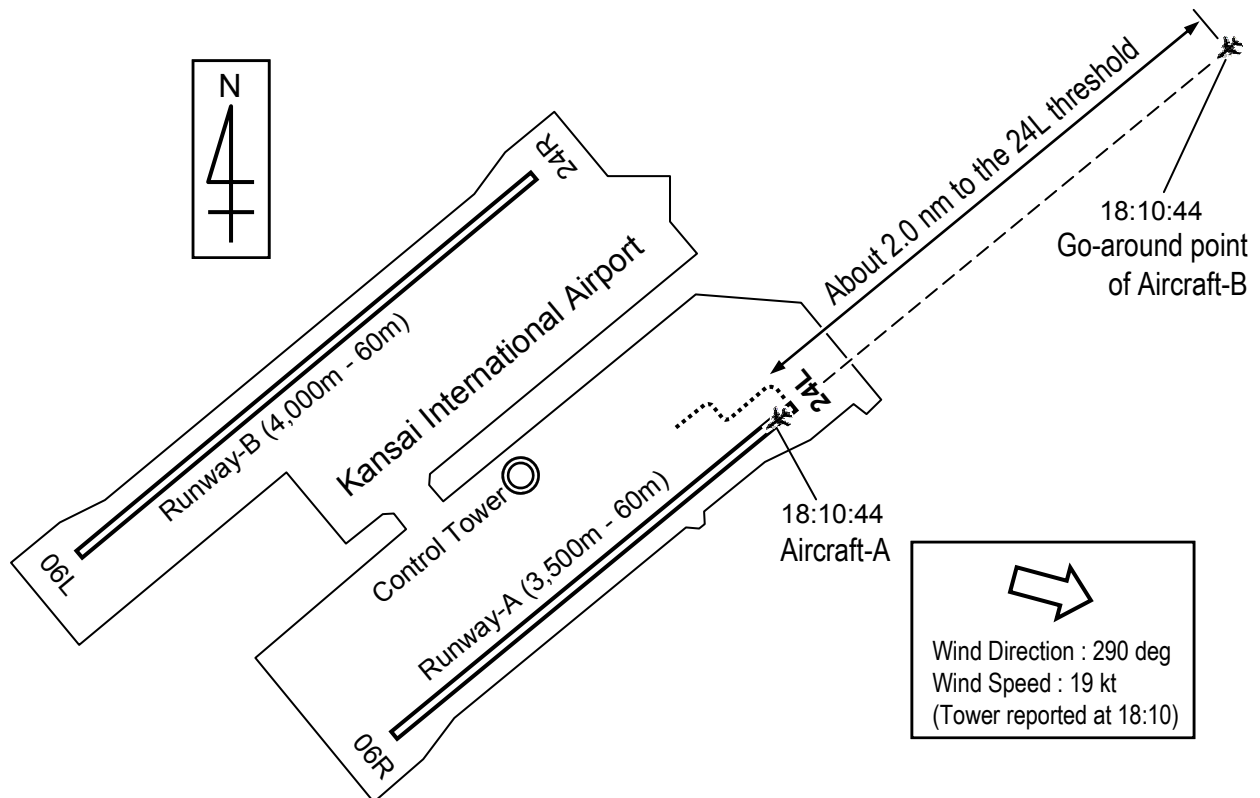
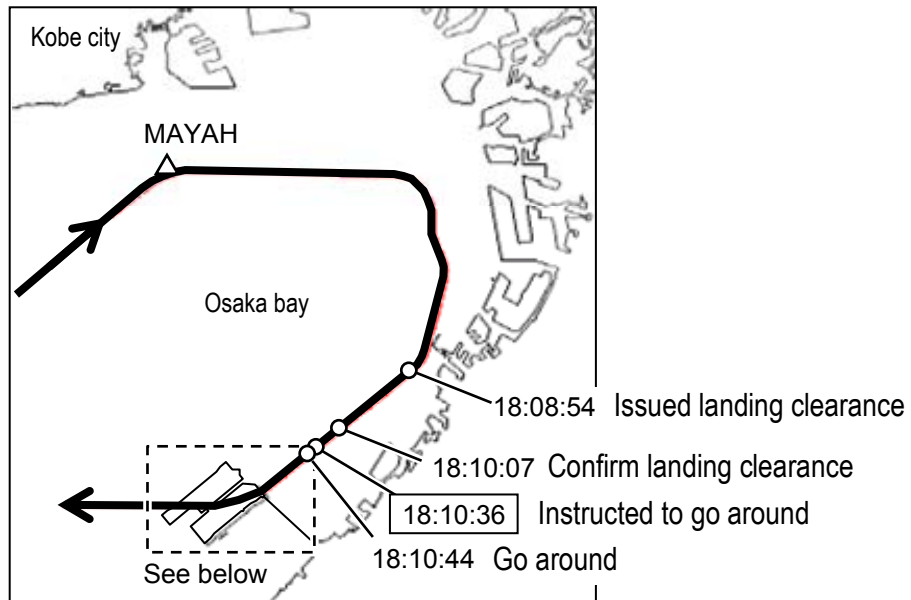


Figure 2 Estimated Flight Route of Aircraft-B



Photograph 1 Control Tower (Runway-A side)



Attachment 1

ATC Communication Records

- GND Kansai Ground (121.6MHz)
- TWR Kansai Tower (118.2MHz)
- **ACA036** Air Canada 036 (Aircraft-A)
- CPA507 Cathay 507
- **JAL2576** Japan Air 2576 (Aircraft-B)
- JAL2542 Japan Air 2542
- NWA69 Northwest 69

Note: The ATC communications involved in above five aircrafts were shown below.

Japan
Standard
Time

JST	From	Communications
17:55:00	ACA036	Kansai Ground, Air Canada 036, gate fifteen, ready to push.
17:55:05	GND	Air Canada 036, Kansai Ground, push back to runway 24L.
17:55:12	ACA036	Push back to runway 24L and contact Ground, Air Canada 036.
17:59:54	CPA507	Kansai Ground, Cathay 507, spot three, request start up and push back.
18:00:00	GND	Cathay 507, Kansai Ground, push back approved, runway 24L.
18:00:05	CPA507	Start and push back approved, runway 24L, Cathay 507.
18:00:46	ACA036	Kansai Ground, Air Canada 036, ready to taxi.
18:00:49	GND	Air Canada 036, taxi to runway 24L via Echo-two, Papa.
18:00:57	ACA036	Echo-two, Papa, Air Canada 036, thank you.
18:01:14	GND	All station, Kansai Ground, Kansai QNH 2991, Kansai QNH 2991.
18:04:42	JAL2576	Kansai Tower, Japan Air 2576, over MAYAH.
18:04:45	TWR	Japan Air 2576, Kansai Tower, continue approach, number two.
18:04:50	JAL2576	Number two, continue approach, Japan Air 2576.
18:04:58	GND	Air Canada 036, contact Kansai Tower, 118 decimal 2.
18:05:04	ACA036	Say again frequency for Air Canada?
18:05:06	GND	Air Canada 036, contact Kansai Tower, 118 decimal 2.
18:05:10	ACA036	118 decimal 2, Air Canada 036.
18:05:17	CPA507	Cathay 507, request taxi.
18:05:20	GND	Cathay 507, roger, taxi to runway 24L via November-three, Juliett-one, Alfa-one.
18:05:23	TWR	Northwest 69. runway 24L cleared to land, wind 280 at 20, seven-sixty-seven landing roll.
18:05:30	NWA69	Roger, cleared to land on 24L, Northwest 69.
18:05:35	TWR	Japan Air 2576, if feasible reduce minimum please? Expect one departure.
18:05:40	JAL2576	Japan Air 2576, wilco.
18:08:36	TWR	Air Canada 036, Tower, ready for departure, confirm?
18:08:40	ACA036	That's affirmative, Air Canada 036.
18:08:43	TWR	Roger that. Hold short of runway 24L.
18:08:46	ACA036	To position 24L, Air Canada 036.

JST	From	Communications
18:08:54	TWR	Japan Air 2576, revised. Runway 24L, cleared to land wind 290 at 19, seven-fourty-seven landing roll.
18:09:02	JAL2576	Cleared to land runway 24L, Japan Air 2576.
18:09:06	JAL2542	Kansai Tower, Japan Air 2542. Good evening.
18:09:09	TWR	Good evening, Japan Air 2542, Kansai Tower. Expect one departure Boeing seven-sixty-seven.
18:09:14	JAL2542	Roger.
18:09:16	TWR	Northwest 69, contact Kansai Ground, 121 decimal 6
18:09:20	NWA69	Northwest 69.
18:10:07	JAL2576	Tower, Japan Air 2576, confirm, cleared to land?
18:10:11	TWR	Japan Air 2576, affirm. Cleared to land, wind 290 at 19.
18:10:16	JAL2576	Thank you. Cleared to land, runway 24L, Japan Air 2576.
18:10:19	TWR	Japan Air 2542, if feasible, reduce minimum please.
18:10:23	JAL2542	Reduce minimum speed, Japan Air 2542.
18:10:28	CPA507	Kansai Tower, Cathay 507, taxiing for runway 24L.
18:10:32	TWR	Cathay 507, ..
18:10:34	TWR	.. and disregard.
18:10:36	TWR	Japan Air 2576, go around.
18:10:39	JAL2576	Japan Air 2576 go around.
18:11:07	TWR	Japan Air 2576, contact Kansai departure 119 decimal 2.
18:11:12	JAL2576	1192, Japan Air 2576. Thanks.
18:11:15	TWR	Air Canada 036, Tower, do you read?
18:11:19	ACA036	Say again for Air Canada 036.
18:11:21	TWR	Ah, roger that, clear the active, please. Via Alfa-two.
18:11:27	ACA036	You want us clear the active runway?
18:11:29	TWR	Affirm.
18:11:31	ACA036	At which position? And what's the reason?
18:11:34	TWR	Ah, .. Alfa-two.
18:11:37	ACA036	Alfa-two, roger.
18:11:38	TWR	Yeah.
18:11:54	TWR	Air Canada 036, turn right Alfa-three please.
18:11:58	ACA036	Right on Alfa-three, Air Canada 032..036.
18:12:28	TWR	And Air Canada 036, turn right Papa and hold short of runway 24L.
18:12:35	ACA036	Right on Papa short of 24L, Air Canada 036.
18:12:39	TWR	Japan Air 2542, runway 24L, cleared to land, wind 300 at 17.
18:12:45	JAL2542	Cleared to land, runway 24L, Japan Air 2542.
18:13:04	TWR	Air Canada 036, Tower.
18:13:07	ACA036	Go ahead sir, Air Canada 036.
18:13:09	TWR	Did you said, did I said line up and wait? And did I say that?
18:13:15	ACA036	That's affirmative. We read it back to you cleared to position 24L.
18:13:20	TWR	Roger, roger that. Hold short of runway 24L, expect number two.
18:13:24	ACA036	We check that hold short, number two, Air Canada 036.
18:17:40	TWR	Air Canada 036, runway 24L, line up and wait. Traffic approaching 7 miles.

JST	From	Communications
18:17:46	ACA036	Line up and wait 24L, Air Canada 036.
18:18:29	TWR	Air Canada 036, wind 300 at 17, runway 24L, cleared for take-off.
18:18:36	ACA036	Cleared for take-off, 24L, Air Canada 036.
18:20:08	TWR	Air Canada 036, thank you for your help. Contact Kansai Departure, 119 decimal 2.
18:20:14	ACA036	1192, SAYONARA, Air Canada 036.
18:20:17	TWR	SAYONARA.