

AI2016-6

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**JAPAN AIRLINES CO., LTD.
J A 8 3 6 4
NEW JAPAN AVIATION CO., LTD.
J A 8 0 C T**

December 15, 2016

The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board (and with Annex 13 to the Convention on International Civil Aviation) is to prevent future accidents and incidents. It is not the purpose of the investigation to apportion blame or liability.

Kazuhiro Nakahashi
Chairman
Japan Transport Safety Board

Note:

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

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

AIR PROXIMITY

1. JAPAN AIRLINES CO., LTD.,

BOEING 767-300, JA8364

2. NEW JAPAN AVIATION CO., LTD.,

BRITTEN-NORMAN BN-2B-20, JA80CT

ON FINAL APPROACH COURSE ABOUT 0.8NM FROM
THE THRESHOLD OF RUNWAY 34 AT KAGOSHIMA AIRPORT
AT AROUND 16:54 JST, OCTOBER 10, 2015

December 2, 2016

Adopted by the Japan Transport Safety Board

Chairman Kazuhiro Nakahashi

Member Toru Miyashita

Member Toshiyuki Ishikawa

Member Sadao Tamura

Member Keiji Tanaka



Member Miwa Nakanishi

1. PROCESS AND PROGRESS OF INVESTIGATION

1.1 Summary of the Serious Incident	On Saturday, October 10, 2015, while a Boeing 767-300, registered JA8364 and operated by Japan Airlines Co., Ltd., was making its final approach to Kagoshima Airport, a Britten-Norman BN-2B-20, registered JA80CT and operated by New Japan Aviation Co., Ltd., approached JA8364 in a way as to break into the front from left below, causing JA8364 to take evasive action by go-around.
1.2 Outline of the Serious Incident Investigation	On October 11, 2015, a Near Collision Report was submitted to the Minister of the Land Infrastructure, Transport and Tourism under the provision of Article 76-2 of Civil Aeronautics Act and Article 166-5 of Ordinance for Enforcement of the Civil Aeronautics Act. Consequently, it is classified as a serious incident. On October 11, 2015, the Japan Transport Safety Board designated an investigator-in-charge and two other investigators to investigate this serious incident. Accredited representatives of the United States of America and the United

	<p>Kingdom participated in the investigation, as the States of Design and Manufacture of the aircraft whose pilot submitted the Near Collision Report and of the other aircraft, respectively.</p> <p>Comments were invited from parties relevant to the cause of the serious incident. Comments on the draft report were invited from the relevant State.</p>
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2. FACTUAL INFORMATION

<p>2.1 History of the Flight</p>	<p>(1) Following is an outline of the Near Collision Report submitted by the pilot in command (hereinafter referred to as “PIC”) of Boeing 767-300, registered JA8364 and operated by Japan Airlines Co., Ltd., (hereinafter referred to as “Aircraft A”).</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Time and date of occurrence</td> <td style="width: 50%;">Around 16:50 Japan Standard Time(JST, UTC+9 hours) October 10, 2015</td> </tr> <tr> <td>Position at time of incident</td> <td>On the final approach path about 3 nm from the threshold of Runway 34 at Kagoshima Airport</td> </tr> <tr> <td>Phase of flight</td> <td>In descent</td> </tr> <tr> <td>Other aircraft</td> <td>JA80CT (Britten-Norman BN-2B-20)</td> </tr> <tr> <td>Position of other aircraft and distance between aircraft first sighting</td> <td>To the left below, 1 nm, altitude difference about 300 ft</td> </tr> <tr> <td>Position of other aircraft and distances between aircraft at closest proximity</td> <td>Below, 0.5 nm or less</td> </tr> <tr> <td>Evasive action:</td> <td>Aircraft making report: Yes (ascent) Other aircraft: No</td> </tr> <tr> <td>TCAS*1 operating status</td> <td>TA*2 Bearing 337°</td> </tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  <p>Same type of Aircraft A</p> </div> <div style="text-align: center;">  <p>Aircraft B</p> </div> </div> <p>(2) The history of flight by both aircraft is summarized as below, based on the records of radar track, air traffic control communications and flight recorder of Aircraft A, as well as the statements of PICs of both aircraft and air traffic controllers (hereinafter referred to as “the Controller”).</p> <p>Aircraft A took off from Tokyo International Airport at 15:16 bound for Kagoshima Airport, with the PIC as PM*3 in the left seat and the first officer (hereinafter referred to as “the F/O”) as PF*3 in the right seat.</p> <p>JA80CT (hereinafter referred to as “Aircraft B”) took off from Runway 34 of Kagoshima Airport at 16:40 with the intention of flying once along the traffic pattern and then returning to land, the purpose being to augment the recent flight experience*4 of the PIC and to inspect the ILS receiver equipment, with the PIC in the left seat and a mechanic in the right seat. At 16:43, Aircraft B</p>	Time and date of occurrence	Around 16:50 Japan Standard Time(JST, UTC+9 hours) October 10, 2015	Position at time of incident	On the final approach path about 3 nm from the threshold of Runway 34 at Kagoshima Airport	Phase of flight	In descent	Other aircraft	JA80CT (Britten-Norman BN-2B-20)	Position of other aircraft and distance between aircraft first sighting	To the left below, 1 nm, altitude difference about 300 ft	Position of other aircraft and distances between aircraft at closest proximity	Below, 0.5 nm or less	Evasive action:	Aircraft making report: Yes (ascent) Other aircraft: No	TCAS*1 operating status	TA*2 Bearing 337°
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*1 “TCAS” stands for Traffic Collision Avoidance System.

*2 “TA” refers to a Traffic Advisory issued by the TCAS. It informs the pilot that an approaching aircraft is within a range in which a collision could occur.

*3 PF (Pilot Flying) and PM (Pilot Monitoring) are terms used to identify pilots with their roles in aircraft operated by two persons. The PF is mainly responsible for maneuvering the aircraft. The PM mainly monitors the flight status of the aircraft, cross-checks operations of the PF, and undertakes other non-operational works.

*4 “Recent flight experience” refers to flight experience required for air crews as stipulated in Article 69 of the Civil Aeronautics Act and Articles 158 to 162-2 of the Civil Aeronautics Regulations of Japan.

received an instruction from the aerodrome control position of Kagoshima Airport traffic control tower (hereinafter referred to as “the Tower”) to hold on the downwind leg as the arriving aircrafts were queued, as a result of which Aircraft B circled and held. At 16:46:11, the Controller of the Tower (hereinafter referred to as “Controller A”) informed Aircraft B, which was holding, that the holding time would be about 10 minutes. Subsequently at 16:49:15, Controller A provided the traffic information as “You, following-traffic Boeing 767, 13 nm on final,” supposedly meant that the relevant-preceding aircraft to be followed by Aircraft B was a Boeing 767 at 13 nm on its final approach. In response, the PIC of Aircraft B responded, “Roger. Looking out.”

Hereafter, Aircraft A was permitted by the Tower to land on Runway 34, and was also informed at the same time that it was in second position in the landing sequence. At 16:50:52, Controller A instructed Aircraft B, which was holding on the downwind leg, as “Previous traffic 9 nm on final. Report traffic in sight.” At 16:51:34, the PIC of Aircraft B sighted a DHC-8 flying on the final approach path about 1 nm from the threshold of Runway 34, assumed it to be the relevant preceding aircraft, and reported “Final traffic in sight.” Hearing this, Controller A judged that Aircraft B had sighted Aircraft A, and instructed it to “Follow the traffic.” The PIC of Aircraft B repeated this instruction and headed to the final approach path without being noticed by Aircraft A.

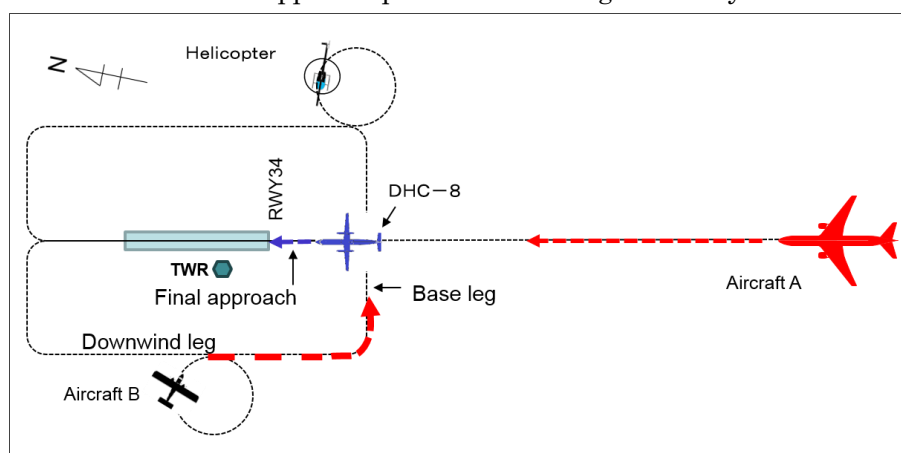


Image of positional relationship when Aircraft B reported “Final Traffic Insight” to the Tower

At around this time, another Controller who was in the control tower (hereinafter referred to as “Controller B”) noticed Aircraft B flying on the base leg just before entering the final approach path, and asked, “Will it enter in front (of Aircraft A)?” On hearing this, Controller A turned his attention to a helicopter (Robinson R22) to which he was planning to give the instruction for approach after Aircraft B, since Aircraft A appeared to be ahead of Aircraft B and he naturally thought that Aircraft B was following Aircraft A. When Controller A again turned his attention to Aircraft B, he noticed that Aircraft B had entered the final approach, and intended to give Aircraft B the instruction to go around. At this time, he received a report from Aircraft A that there was traffic ahead. The Tower then instructed Aircraft B to break to the west and to maintain the altitude.

The PIC of Aircraft A first noticed TCAS information about Aircraft B without any altitude information on HSI^{*5}, and confirmed the presence of Aircraft B near the beginning of the base leg by sight, and informed the F/O. While the PIC of Aircraft A was paying attention to the situation of Aircraft B, Aircraft B cut in to his own flight path, causing him to report to the Tower that “We have traffic ahead.” The PIC of Aircraft A was intending to decide how to

^{*5} “HSI” stands for Horizontal Situation Indicator, a single instrument showing various information necessary for navigation such as heading and current position.

	<p>avoid it after confirming the instruction issued by the Tower to Aircraft B, but since he had approached even closer to Aircraft B in the meantime, he felt the danger and decided to go around. Just as he instructed the F/O to perform the go-around, the F/O also called “Go around” at about the same time and started the operation for go-around. As soon as Aircraft A started to ascend, he felt anxious as Aircraft B was now out of sight below, but because the Tower instructed Aircraft B to break to the west and not to climb, and Aircraft B responded to that instruction, he continued to ascend on a straight path, and after confirming with the Tower, flew on the missed approach course.</p> <p>Aircraft B had not noticed the presence of Aircraft A until Aircraft A passed over it to the right, and broke to the west while maintaining altitude as instructed by the Tower.</p> <p>This serious incident occurred at 16:54 on October 10, 2015, on the final approach path about 0.8nm (about 1,500m) from the threshold of Runway 34 of Kagoshima Airport (31°46'49" N, 130°44'06" E).</p>
2.2 Injuries to Persons	None
2.3 Damage to Aircraft	None
2.4 Meteorological Information	<p>Aeronautical weather observations for Kagoshima Airport at 17:00 Wind direction: 210°, Wind velocity: 3 kt, Wind direction variation: 190°-270°, Prevailing visibility: 10 km or more, Cloud: amount 1 / 8 - 2 / 8, type cumulus, cloud base 2,500 ft, amount 5 / 8 - 7 / 8, type stratocumulus, cloud base 16,000 ft, Temperature: 20°C, Dew point: 15°C, Altimeter setting (QNH): 29.91 inHg</p>
2.5 Additional Information	<p>(1) Information on Kagoshima Airport Elevation 862 ft (about 272 m) Runway 16/34, length 3,000 m, width 45 m</p> <p>(2) Information on the flight recorder of Aircraft A Aircraft A was equipped with a flight recorder (flight data recorder and cockpit voice recorder), which retained records of this serious incident.</p> <p>(3) Operational status of the ATC transponder of Aircraft B Aircraft B was equipped with a transponder that had the function of automatically responding with information on the altitude of the aircraft. According to radar track records by the Kagoshima radar approach control facility at the time of this serious incident, the transponder was confirmed to be functioning, but altitude information was not recorded.</p> <p>(4) The instruction “FOLLOW” to arriving aircraft 1) Provisions In accordance with Air Traffic Service Procedure Handbook, Fifth Air Traffic Service Procedure Handbook, III Standard for Air Traffic Control Procedures, (III) Procedure for Aerodrome Control Service, 6 Arriving Aircraft, (3) Specifying Separation of instructions issued to arriving aircraft in order to specify the separation between relevant aircraft, the following description for the instruction to “FOLLOW” is given. (Excerpt) <i>In the case where a separation defined (part omitted), to be specified for the aircraft, instructions on flight following the leading aircraft, enlargement or reduction of the traffic circuit pattern, delayed turning or the like shall be issued.</i> NUMBER [landing sequence number]. FOLLOW [type and location of aircraft].</p> <p>2) Statements of the parties regarding the instruction to “FOLLOW” Controller A stated that in the past he had experience of the 3rd aircraft (hereinafter referred to as “the 3rd aircraft”) started to “FOLLOW” the 1st aircraft when instructing the 3rd arrived aircraft to “FOLLOW” the 2nd aircraft in a situation where there were two preceding aircraft. As a result, when issuing this instruction, he always kept in mind that the following aircraft</p>

	<p>firmly assure of the location of the 2nd aircraft. Furthermore, the controller who was watching the radar screen while monitoring the frequency of the Tower at the departure control position in Kagoshima radar approach control facility (the position mainly responsible for departing aircraft) at the time of this serious incident had also had the same experience in the past. This controller stated that, when he heard that the Tower had instructed Aircraft B to “FOLLOW the traffic” while a DHC-8 was on its final approach path near the runway on this occasion, he was concerned that Aircraft B might misunderstand Aircraft A to be the DHC-8.</p> <p>The PIC of Aircraft B stated that, in the past, he had no experience of receiving such an instruction as to “FOLLOW” the 2nd aircraft when there were two preceding aircraft.</p> <p>(5) The environment surrounding the PIC of Aircraft B</p> <p>In the morning of the day of this serious incident, the PIC was psychologically impacted by a certain event, and even thought about canceling the flight in question, but decided to fly due to the need to augment his recent flying experience, among other reasons.</p>
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3. ANALYSIS

3.1 Involvement of Weather	None
3.2 Involvement of Pilots	Yes
3.3 Involvement of the Controller	Yes
3.4 Analysis of Findings	<p>(1) History of the flight up to the aircraft proximity</p> <p>Controller A planned to land Aircraft B after Aircraft A, and provided information on the type and location of Aircraft A to Aircraft B at the point when Aircraft A, as the relevant preceding aircraft, was about 13 nm from the runway threshold, and subsequently provided another location information when Aircraft A came to about 9 nm from the runway threshold.</p> <p>It is highly probable that the PIC of Aircraft B sighted the DHC-8 flying on its final approach path about 1 nm from the threshold of Runway 34 about 40 seconds after receiving the second traffic information concerning Aircraft A from the Tower, misunderstood this to be the relevant preceding aircraft of his own aircraft, and proceeded to the final approach path without noticing the presence of Aircraft A.</p> <p>It is probable that Controller A was convinced that Aircraft B was following Aircraft A, because he could not know from the communication with the PIC of Aircraft B that the PIC had misunderstood the relevant preceding aircraft. As a result of this conviction, it is probable that he only has confirmed the location of Aircraft B by sight, even if Controller B had raised doubts over the movement of Aircraft B, and would not have confirmed by direct radio telephone with Aircraft B or confirmed the location of Aircraft B by referring to the Tower bright display*6.</p> <p>It is probable that the PIC of Aircraft A sensed danger because the slower flying Aircraft B cut in to the front of his own aircraft and suddenly came into proximity, and so decided to go around. It is probable that the PIC of Aircraft A noticed the presence of Aircraft B from when it was near the beginning of the base leg, and then continued to monitor the movement of Aircraft B closely, as a result of which he was able to take evasive action in good time by ascending while taking account of instructions issued by the Tower to Aircraft B.</p> <p>(2) Misunderstanding of the relevant preceding aircraft by the PIC of Aircraft B</p>

*6 “Tower bright display” refers to equipment that displays the position of aircraft on a screen. It is used when confirming the locations of aircraft flying in and around the air traffic control zone, and when providing information to aircraft.

Since the DHC-8 and Aircraft A are clearly different in both shape and size, it is probable that the PIC of Aircraft B misunderstood the sighted DHC-8 to be Aircraft A as the relevant preceding aircraft because he did not correctly understand the information on the type and location of Aircraft A provided from the Tower. It is somewhat likely that the following facts contributed to this.

- ① Based on his past experience, the PIC was convinced that, when instructed to “FOLLOW”, there would only be one preceding aircraft.
- ② He was not provided with information on the landing sequence number.
- ③ He continued to hold without any strong awareness because he had been informed of the holding time of about 10 minutes, and while assuming that the next instruction and others would not come for a while, he received information on the relevant aircraft about three minutes after the holding instruction, and moreover at a significant distance of 13 miles.
- ④ An event that had occurred in the morning of that day had impacted the attentiveness of the PIC and obstructed his concentration on the flight.

Information on the relevant preceding aircraft is important information that pilots must strongly recognize in order to prevent misunderstandings. In addition, when instructed to “FOLLOW”, they must confirm that the location and type of the relevant preceding aircraft they have sighted are consistent with the information received. If there is even the slightest doubt, they should also confirm this with the controller, in light of the possibility that there could be more than one preceding aircraft.

(3) The response by the Controller

Controller A issued the instruction to “FOLLOW” in a situation where there were more than one preceding aircraft, but since it is possible that the following pilot could misunderstand the relevant preceding aircraft, all due care should be taken over the content of information on the relevant preceding aircraft (landing sequence number, type and location), the timing of provision and use of the correct air traffic control terminology when issuing such an instruction, and the movements of aircraft after issuing the instruction.

It is somewhat likely that the fact that Controller A issued the instruction to “FOLLOW” without informing the landing sequence number of Aircraft B in advance as stipulated in Standard for Air Traffic Control Procedure contributed to the misunderstanding of the PIC of Aircraft B regarding the relevant preceding aircraft. It is also somewhat likely that, if the conviction that Aircraft B was following Aircraft A had been eliminated and the situation had been confirmed through communication or the tower bright display at the point when Controller B raised doubts over the movements of Aircraft B, the PIC of Aircraft B would have noticed sooner that he had misunderstood the relevant preceding aircraft and would have taken action.

(4) Closest proximity

As a result of analysis based on the flight recorder of Aircraft A, radar track records and statements of the parties, it is highly probable that the time of closest proximity between the two aircraft was around 16:54:12, the horizontal distance was about 10 m and the altitude difference was about 250 ft (about 80 m).

(5) Assessment of danger level

The PIC of Aircraft A sighted Aircraft B before it break in to the front of Aircraft A, and took evasive action by ascending in a go-around operation at the time when Aircraft B came below and in the front of Aircraft A. These are not applicable to conditions of near collision as either “a case of air proximity at the risk of air contact or midair collision with no time to take any evasive actions” or “air proximity in which midair collision or air contact was avoided by unusual avoidance actions”. Hence, it is probable that this incident is not near collision. However, since both aircraft were on a collision course before taking the evasive action, and a near collision was avoided by the ascent of Aircraft A based on the judgment of the PIC and the instruction to Aircraft B from the Tower to take

	evasive action, it is probable that this serious incident is classified as “Safety not assured.” under the classification of degree of risk stipulated in the ICAO classification. (see Attachment)
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4. PROBABLE CAUSES

It is highly probable that this serious incident occurred because the PIC of Aircraft B misunderstood the DHC-8 that was flying in front of Aircraft A to be the relevant preceding aircraft, resulting in Aircraft B entering its final approach path after the DHC-8 and coming into proximity with the following Aircraft A.

It is probable that the PIC of Aircraft B misunderstood the relevant preceding aircraft because the PIC did not correctly understand the traffic information on the type and location of the relevant preceding aircraft provided by the Tower. It is also somewhat likely that the fact that Controller A did not inform Aircraft B of the landing sequence when issuing the instruction to “FOLLOW” contributed to the occurrence of this serious incident.

5. SAFETY ACTIONS

(1) Actions taken by New Japan Aviation Co., Ltd.

- ① Held classroom lecture and flight training regarding this serious incident for the crewmembers in question.
- ② Provided safety education regarding this incident for all crewmembers, including case studies of accidents mainly caused by human error.
- ③ Discussed human error and air proximity prevention with all crewmembers, and resolved not to communicate ambiguously with air traffic controllers and to respond with specific information on the type, location and other details of relevant preceding aircraft that have been sighted.
- ④ Added subjects related to this serious incident to regular training (review of the serious incident and reconfirmation of countermeasures, one hour flight training per aircraft type). (Implemented from December 2015)

(2) Actions taken by Civil Aviation Bureau

Shared information regarding this serious incident and noticed all facilities of precautions as follows.

(Precautions in operations)

Since a similar case could occur at any time even if air traffic controllers carry out their duties appropriately, particularly with reference to control tower operations, continuous efforts should be made to watch aircraft more attentively and to rigorously enforce outside monitoring.

(3) Actions taken by the Kagoshima Airport Office

In addition to (2) above, the office reconfirmed that when issuing instructions to follow a preceding aircraft, traffic information on relevant aircraft should be added of an appropriate timing in view of the mutual positions, and information should be issued in as much detail as possible, with a view to preventing misunderstandings by pilots. In periodic checks, meanwhile, the office checked the timing with which control instructions and traffic information are issued, as well as the content.

Furthermore, lessons learned from this serious incident were incorporated in regular training held every year for air traffic controllers.

Danger Assessment Guidelines

ICAO PANS-ATM CHAPTER 1. DEFINITIONS Aircraft proximity		Examples of equivalent descriptions in investigation reports
Category	Explanation	
Risk of collision	The risk classification of an aircraft proximity in which serious risk of collision has existed.	There was an extremely imminent danger of collision or contact.
Safety not assured	The risk classification of an aircraft proximity in which the safety of the aircraft may have been compromised.	The danger of a collision or contact could have arisen, but imminent danger was avoided.
No risk of collision	The risk classification of an aircraft proximity in which no risk of collision has existed.	There was no risk of a collision or contact.
Risk not determined	The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.	It was difficult to make a clear judgment regarding the level of danger.