

AI2023-5

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**Kumamoto Fire Fighting Disaster Prevention Air Corps
J A 9 0 M T
Incorporated Educational Institution Kimigafuchi gakuen
J A 4 7 U K**

July 27, 2023



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.

TAKEDA Nobuo
Chairperson
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.

《Reference》

The terms used to describe the results of the analysis in "3. ANALYSIS" of this report are as follows.

- i) In case of being able to determine, the term "certain" or "certainly" is used.
- ii) In case of being unable to determine but being almost certain, the term "highly probable" or "most likely" is used.
- iii) In case of higher possibility, the term "probable" or "more likely" is used.
- iv) In a case that there is a possibility, the term "likely" or "possible" is used.

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

AN ATTEMPT OF LANDING ON A RUNWAY BEING USED BY OTHER AIRCRAFT

KUMAMOTO AIRPORT

AROUND 09:50 JST, MARCH 7, 2022

1. KUMAMOTO FIRE FIGHTING DISASTER PREVENTION

AIR CORPS. (OPERATED BY CONTRACTED

AMAKUSA AIRLINES CO., LTD.)

AIRBUS HELICOPTERS AS365N3, JA90MT (ROTORCRAFT)

2. INCORPORATED EDUCATIONAL INSTITUTION

KIMIGAFUCHI GAKUEN

(SOJO UNIVERSITY).

TEXTRON AVIATION 172S, JA47UK

June 23, 2023

Adopted by the Japan Transport Safety Board

Chairperson TAKEDA Nobuo

Member SHIMAMURA Atsushi

Member MARUI Yuichi

Member SODA Hisako

Member NAKANISHI Miwa

Member TSUDA Hiroka

1. PROCESS AND PROGRESS OF THE AIRCRAFT SERIOUS INCIDENT INVESTIGATION

1.1 Summary of the serious incident	On March 7 (Monday), 2022, at Kumamoto Airport, when a Textron Aviation 172S, JA47UK, operated by Incorporated Educational Institution Kimigafuchi gakuen was on the approach to Runway 07 being cleared to land (touch-and-go* ¹ clearance), an Airbus Helicopters AS365N3, JA90MT, owned by the Kumamoto Fire Fighting Disaster Prevention Air Corps, entered the
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*¹ The “touch-and-go” means that after the touchdown, the aircraft takes off again without stopping or leaving the runway.

	runway without the clearance from an air traffic controller at the time of the take-off from the airport.
1.2 Outline of the serious incident investigation	<p>The occurrence covered by this report falls under the category of “An attempt of landing on a runway being used by the other aircraft” as stipulated in Article 166-4, Item (ii) of the Regulation for Enforcement of the Civil Aeronautics Act (Order of the Ministry of Transport No. 56, 1952), and is classified as a serious incident.</p> <p>On March 7, 2022, upon receiving the report of this serious incident, the Japan Transport Safety Board (JTSB) designated an investigator-in-charge and two other investigators to investigate this serious incident.</p> <p>JTSB notified the occurrence of this serious incident to the French Republic and the United States, where the aircraft involved in the incident were designed and manufactured. Neither of the two countries designated any accredited representative.</p> <p>Comments on the draft Final Report from parties relevant to the cause of the serious incident and the relevant States were invited.</p>

2. FACTUAL INFORMATION

2.1 History of the Flight	<p>According to the statements of the pilot in command (PIC) and the first officer (FO) of Airbus Helicopters AS365N3, JA90MT (hereinafter referred to as “Aircraft A”), owned by the Kumamoto Fire Fighting Disaster Prevention Air Corps (KFFDPAC), the flight instructor PIC and the flight student of Textron Aviation 172S, JA47UK (hereinafter referred to as “Aircraft B”), operated by Incorporated Educational Institution Kimigafuchigakuen, the air traffic controller who was in charge of the tower control position of the Kumamoto Airport Traffic Control Tower (hereinafter referred to as “the Tower”), and the air traffic controller who was in charge of the ground control position of the Tower (hereinafter referred to as “the Ground”), as well as the records on Aircraft A’s flight data recorder (FDR) and Aircraft B’s flight recorder, ATC communications records, and radar track records, the history of the serious incident is summarized as follows:</p> <p>At 09:15 (JST: UTC+9 hours; unless otherwise noted, all times are indicated in JST in this report on a 24-hour clock), on March 7, 2022, Aircraft B took off from Runway 07 of Kumamoto Airport, and was flying the south traffic pattern in order to conduct touch-and-go training at the Airport. In Aircraft B, the PIC, who was the flight instructor, sat in the right pilot seat, the student pilot sat in the left pilot seat, and a student sat in the aft right seat for observing the training.</p>
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Figure 1: Aircraft A



Figure 2: Aircraft B

Around 09:46, Aircraft A started to move from the apron in the Airport for a patient transport drill. In Aircraft A, the PIC sat in the right pilot seat, the FO sat in the left pilot seat, and other five members of the KFFDPAC were on board.

At this moment in the Kumamoto Airport, there were a Cessna 172S (hereinafter referred to as "Aircraft C"), which had been conducting touch-and-go prior to Aircraft B, and a Boeing 737-800 (hereinafter referred to as "Aircraft D"), which was on the final approach course. (See Figure 3)

At 09:46:50, Aircraft A's PIC established communication with the Ground short of the taxiway, and the Ground instructed Aircraft A to taxi to Taxiway T6. After that, while taxiing, Aircraft A established communication with the Tower as instructed by the Ground. At 09:48:29, as thinking of letting Aircraft A take off after Aircraft C completed the touch-and-go, the Tower instructed Aircraft A "HOLD SHORT OF RUNWAY 07 AT T6, CESSNA ON THE RUNWAY" to hold short of the runway at Taxiway T6 and provided with the traffic information on Aircraft C. Aircraft A's PIC read back to the Tower the instruction to hold short of the runway at T6. (See Figure 4 ①) At this time, Aircraft A's PIC and FO expected their own aircraft would be next to take off after Aircraft C because the Tower provided them with the traffic information on Aircraft C.

Subsequently, at the time when Aircraft C continued to take off after the touchdown, the Tower visually recognized that Aircraft B was flying the base leg, so the Tower changed the original plan and thought of letting Aircraft A take off after Aircraft B made the touch-and-go.

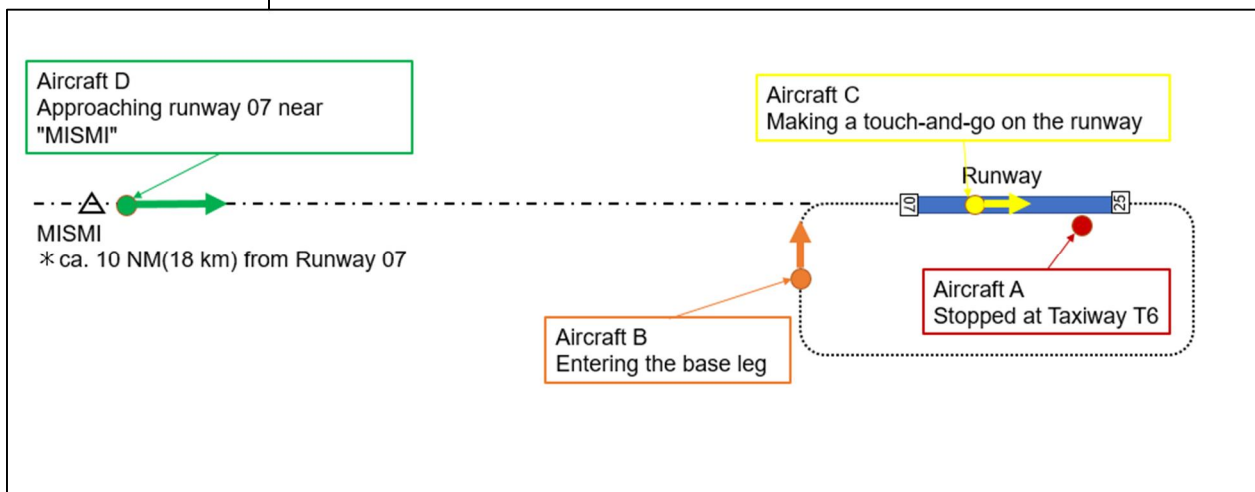


Figure 3: Positions of Aircraft B, C and D when Aircraft A stopped at Taxiway T6

At 09:49:18, the Tower started a transmission to inform Aircraft A that the Aircraft A's take-off sequence would be changed to after the Aircraft B's touch-and-go. However, when Aircraft A's call sign was called by the Tower, Aircraft D on the final approach course started transmitting and reported it passed "MISMI", thus Aircraft A was unable to hear what was transmitted afterwards, despite being able to recognize it had been called by the Tower. At

this time, as Aircraft C finished the touch-and-go and took off, Aircraft A's PIC thought that the Tower might have called to Aircraft A in order to instruct to hold on the runway or give it the take-off clearance. On the other hand, in the middle of transmitting to Aircraft A, the Tower noticed that Aircraft D started transmitting, the Tower discontinued its own transmission. The Tower thought that letting Aircraft A take off after Aircraft D would be better to secure sufficient separation, going to change the Aircraft A's take-off sequence again, and then instructed Aircraft D to continue the approach.

Aircraft A's PIC thought that as it was their turn to take off, they had to hurry in order to take off before the aircraft (Aircraft B) on the final approach, and at 09:49:33, the Aircraft A's PIC requested the Tower to send them again the instructions which they were unable to hear due to the transmission from Aircraft D. The Tower instructed Aircraft A again to hold short of runway, saying "HOLD SHORT OF RUNWAY AT T6, BOEING 737 9 MILES ON FINAL," in order to inform that the Aircraft A's take-off sequence would be after the landing of Aircraft D, and provided with the traffic information on Aircraft D. Aircraft A's PIC read back the instruction saying "ROGER, HOLDING AT T6, RUNWAY 07," and the Tower confirmed the read-back. (See Figure 4 ②)

At 09:49:47, the Tower visually confirmed Aircraft A was on Taxiway T6 and gave touch-and-go clearance to Aircraft B which had entered the final approach from the base leg. (Figure 4 ③)

Aircraft A's PIC read back to the Tower, "ROGER, HOLDING AT T6" but thought that it was instructed by the Tower to hold on the runway. So, the Aircraft A's PIC instructed the FO to release the parking brake, started to enter the runway, and requested the air corps member in the aft seat to reconfirm the fasten seat belt before the take-off. The FO thought that the Tower had instructed to "Hold short of runway", and the PIC had read back, saying, "Holding at T6", but the FO visually confirmed Aircraft B, which was on the final approach, thinking that they were able to take off before Aircraft B, and followed the PIC instruction. The PIC and the FO of Aircraft A did not hear the touch-and-go clearance the Tower had issued to Aircraft B, however, promptly entered the runway as they visually confirmed Aircraft B, which was on the final approach, was approaching the runway. And at 09:49:58, Aircraft A stopped eastward on the runway (take-off direction) and waited for the take-off clearance from the Tower. (Figure 4 ④)

The Ground recognized that Aircraft A on Taxiway T6 started to move and was entering the runway. And as the Ground had heard the touch-and-go clearance the Tower had issued to any one of aircraft, and after that, Aircraft A entered the runway and stopped. So, the Ground was convinced that Aircraft A mistakenly entered the runway, and provided advice to the Tower on the runway incursion by Aircraft A, thinking that the Tower had to let Aircraft B make a go-around. The Tower, which was making radio communication with other training aircraft while paying attention to Aircraft B on the final approach and Aircraft D, received advice from the Ground and

visually recognized Aircraft A was entering the runway. At 09:50:34, the Tower instructed Aircraft B to make a go-around, Aircraft B, which was entering near the runway threshold, made a go-around immediately. (Figure 4 ⑤)

At 09:51:25, the Tower instructed Aircraft A to return to Taxiway T6, and Aircraft A followed the instruction. After Aircraft A left the runway, Aircraft D landed.

This serious incident occurred around 09:50 on March 7, 2022 on a runway at Kumamoto Airport (32° 50' 24" N, 130° 51' 36" E).

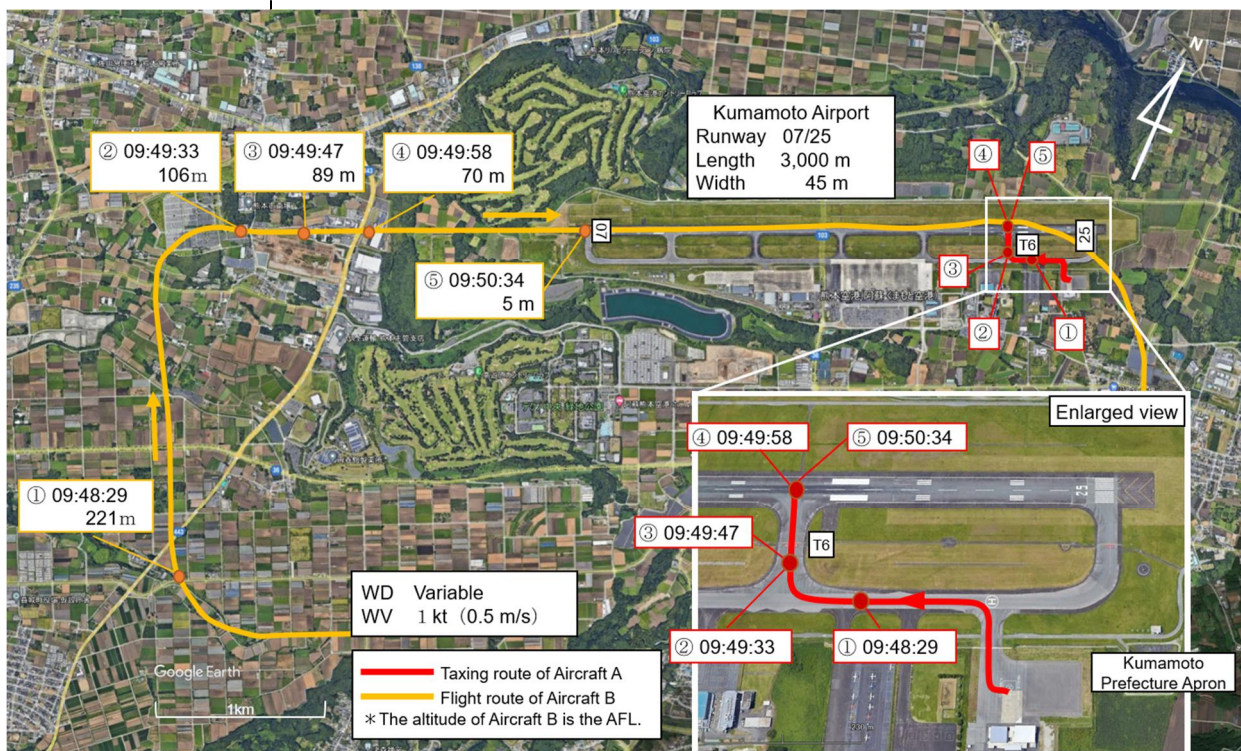


Figure 4: Taxing route of Aircraft A and flight route of Aircraft B

- ① 09:48:29 Aircraft A established communication with the Tower. The Tower instructed Aircraft A to hold short of the runway on Taxiway T6 and provided with the traffic information on Aircraft C which was on the runway. Aircraft A read back to the Tower the intention of holding short of the runway on Taxiway T6.
- ② 09:49:33 The Tower instructed Aircraft A to hold short of runway again and provided with the traffic information on Aircraft D on its final approach. Aircraft A read back to the Tower the intention of holding at T6.
- ③ 09:49:47 The Tower issued touch-and-go clearance to Aircraft B.
- ④ 09:49:58 Aircraft A entered the runway and stopped.
- ⑤ 09:50:34 The Tower visually confirmed Aircraft A was entering the runway and instructed Aircraft B to make a go-around.

2.2 Injuries to Persons

None

2.3 Damage to the

None

Aircraft	
2.4 Personnel Information	<p>(1) PIC of Aircraft A Age: 39 Commercial pilot certificate (Rotorcraft) January 27, 2006 Specific pilot competence certificate Expiry of practicable period for flight: October 29, 2023 Type rating for multi-engine turbine land Aerospatiale SA365: October 29, 2019 Class 1 aviation medical certificate Validity: April 23, 2022 Total flight time 3,272 hours 46 minutes Flight time in the last 30 days 11 hours 55 minutes Total flight time on the type of aircraft 424 hours 14 minutes Flight time in the last 30 days 11 hours 55 minutes</p> <p>(2) FO of Aircraft A Age: 44 Commercial pilot certificate (Rotorcraft) May 17, 2004 Specific pilot competence certificate Expiry of practicable period for flight: November 8, 2023 Type rating for multi-engine turbine land Aerospatiale SA365: November 8, 2021 Class 1 aviation medical certificate Validity: February 21, 2023 Total flight time 1,837 hours 45 minutes Flight time in the last 30 days 28 hours 13 minutes Total flight time on the type of aircraft 88 hours 00 minutes Flight time in the last 30 days 28 hours 13 minutes</p> <p>(3) PIC of Aircraft B Age: 58 Commercial pilot certificate (Airplane) December 24, 1985 Specific pilot competence certificate Expiry of practicable period for flight: December 3, 2023 Type rating for single-engine land multi-engine land December 24, 1985 Flight instructor certificate (Airplane) September 1, 1994 Class 1 aviation medical certificate Validity: May 15, 2022 Total flight time 9,023 hours 27 minutes Flight time in the last 30 days 17 hours 31 minutes Total flight time on the type of aircraft 646 hours 52 minutes Flight time in the last 30 days 17 hours 31 minutes</p> <p>(4) Trainee of Aircraft B Age:20 Flight training certificate (Airplane): September 14, 2021 Total flight time 16 hours 20 minutes Flight time in the last 30 days 5 hours 15 minutes Total flight time on the type of aircraft 16 hours 20 minutes Flight time in the last 30 days 5 hours 15 minutes</p>
2.5 Aircraft Information	<p>(1) Aircraft A Aircraft type: Airbus Helicopters AS365N3 Serial number:7009 Date of manufacture: June 16, 2017 Airworthiness certificate: Dai-2021-143 Validity: June 22, 2022</p>

information on Aircraft C in the first communication with Aircraft A. The JTSB concludes that it is because the Tower intended to let Aircraft A to take off after the touch-and-go by Aircraft C, and Aircraft A most likely recognized it would be next to take off after the touch-and-go by Aircraft C due to this traffic information. After the Tower discontinued the communication with Aircraft A and completed communication with Aircraft D, Aircraft A was instructed to hold short of runway by the Tower again, and though Aircraft A's PIC read back that it would hold on the taxiway, Aircraft A entered the runway. There was a difference between Aircraft A's PIC's read-back to the Tower's instruction and the subsequent actions taken by the PIC. It is most likely because Aircraft A's PIC had mistakenly recognized the holding short of runway instruction for the holding on runway instruction.

It is probable that the reasons for Aircraft A's PIC mistakenly to have recognized the holding short of runway instruction for the holding on runway instruction are as follows:

- ① Because, at first, as the traffic information on Aircraft C was provided, Aircraft A's PIC recognized that its own aircraft would take off after the touch-and-go by Aircraft C, in addition, Aircraft C completed the touch-and-go to take off.
- ② Because, since the Tower called Aircraft A when Aircraft C completed the touch-and-go and took off, Aircraft A's PIC assumed the Tower's call, which could not be heard midway through due to the transmission from Aircraft D, was the take-off clearance to its own aircraft or the holding on runway instruction.
- ③ Because the communication between the Tower with Aircraft D started, and as Aircraft A's PIC thought it was their own aircraft's turn to take off during this communication by visually confirming that Aircraft B was approaching the runway, and thought it had to promptly take off before that.

In addition, it is possible that the situation where the preparations immediately before take-off had to be made without delay more likely prevented Aircraft A's PIC from noticing his erroneous recognition.

The ATC phraseology for holding on runway instruction is "LINE UP AND WAIT", which does not use the term of "HOLD" included in the holding short of runway instruction, "HOLD SHORT OF RUNWAY". The difference between these terms is clear, but Aircraft A's PIC more likely mistakenly recognized the instruction by the Tower and Aircraft A entered the runway. It is important for flight crewmembers to be clearly aware of the difference between the two ATC phraseology such as "LINE UP AND WAIT" and "HOLD SHORT OF RUNWAY" and correctly listen to the ATC phraseology.

(2) Monitoring and advice on flight operations

Although Aircraft A was operable with one pilot, two-pilot operation is in place for the purpose of ensuring the safe and smooth operation of the aircraft. Aircraft A's FO was monitoring the ATC communications, but did not confirm with Aircraft A's PIC about the entering the runway that was inconsistent with the read-back made by the PIC. It is possible that the FO did not confirm with the PIC is because the FO left duties of flight operations and ATC communications which the PIC was in charge to the PIC, and did not sufficiently carry out proactive monitoring of flight operations such as monitoring the contents of ATC communications and the surrounding traffic conditions.

It is probable that even when the PIC is in charge of flight operations and ATC communications, the FO should monitor overall flight operations including the PIC's flight operations, ATC communications of its own aircraft and aircraft flying around and actively

provide advice to the PIC when recognizing the possible PIC's erroneous recognition of the ATC instructions, or the PIC's flight operations different from the PIC's read-back to the ATC instruction, which shall lead to more improve the safety.

In addition, it is desirable that when operating with two-pilot system to ensure the safe flight operations, the KFFDPAC should continue to consider the measures for safe flight that take advantage of the two-pilot system, such as specifying the confirmation method of the tasks requiring for mutual confirmation to ensure a smooth crew coordination between the pilots, and promoting the creation of an environment that facilitates assertions.

(3) ATC Communications

When the serious incident occurred, there were several training aircraft and passenger scheduled flights flying around the runway from which in between, Aircraft A had to take off. In this situation where there are several aircraft, it is important for flight crewmembers to assume the possibility for its own aircraft's sequence change according to ever-changing traffic conditions and try to listen to the ATC communications timely and appropriately.

Besides, as Aircraft D started transmission to the frequency the Tower was using for communication with Aircraft A, Aircraft A was unable to hear the complete Tower's instruction, which was possibly involved in Aircraft A's PIC's false assumption. In ATC communications, it is necessary for flight crewmembers to pay attention to the compliance with the basics in the operation of radio stations again, such as listening to the communications on the frequencies before sending the transmission via the frequency to make sure that there would be no other station transmitting on the frequency.

Furthermore, in the middle of the Tower's transmission to Aircraft A, Aircraft D started the transmission to the Tower, and then, the Tower probably responded to Aircraft D before giving the instruction to Aircraft A, as Aircraft A had already held short of runway and the Tower intended to let Aircraft A take off after the landing of Aircraft D. However, due to this, the instruction to Aircraft A was delayed, and during that time Aircraft B was approaching, therefore, it is possible that Aircraft A's PIC was more urged to take off promptly.

(4) Classification of Severity

The JTSB concludes that as Aircraft A's PIC mistakenly recognize the ATC instruction, Aircraft A entered the runway, but the controller visually confirmed the runway incursion by Aircraft A and immediately instructed Aircraft B to make a go-around. In addition, the distance between the two aircraft was 3,760 m when Aircraft A stopped on the runway (Figure 4 ④), and it was 2,450 m when Aircraft B started a go-around (Figure 4 ⑤). From the above, the serious incident certainly falls under the severity classification of Category C (An incident characterized by ample time and/or distance to avoid a collision) of the "Manual on the Prevention of Runway Incursions" of ICAO its classification tools provided by ICAO. (See Attachment "Severity Classifications of Runway Incursions").

4. PROBABLE CAUSES

The JTSB concludes that the probable cause of this serious incident was certainly that Aircraft A, which had been instructed to hold short of the runway, entered the runway where Aircraft B was approaching as cleared to make a touch-and-go.

It is highly probable that Aircraft A mistakenly recognized the ATC instruction as the holding on the runway instruction and entered the runway is because it failed to correct the erroneous recognition caused by a false assumption about the ATC instruction.

5. SAFETY ACTIONS

<p>5.1 Safety Actions Required</p>	<p>(1) It is important for flight crewmembers to be clearly aware of the difference between the two ATC phraseology such as “LINE UP AND WAIT” and “HOLD SHORT OF RUNWAY” and correctly listen to the ATC phraseology.</p> <p>(2) It is desirable that in order to ensure the safe flight operations with two pilots, the KFFDPAC should continue to consider the measures for safe flight that take advantage of the two-pilot system, such as clarifying the confirmation method of the tasks requiring for mutual confirmation to ensure a smooth crew coordination between the pilots, and promoting the creation of an environment that facilitates assertions.</p>
<p>5.2 Safety Actions Taken</p>	<p>(1) The KFFDPAC conducts CRM trainings for the operating crewmembers and parties involved in disaster prevention helicopter operations such as pilots, mechanics and Air Corp members, etc. as well as makes efforts to disseminate knowledge regarding the CRM by having its staff participate in the CRM trainings hosted by the related organizations.</p> <p>(2) The KFFDPAC requested that the FO should also read back in the ATC communication by issuing the following communication to each pilot and took safety actions.</p> <ul style="list-style-type: none"> ① After the PIC makes a read-back to the ATC instruction, the FO shall make a read-back to the ATC instruction with the intercom system. When the PIC forgets the content of ATC instruction, the PIC shall confirm with the ATC, and when the FO forgets the ATC instruction, the FO shall call to the PIC saying “ATC VERIFY”, and the PIC shall confirm the instruction with the ATC. ② When the PIC take action in response to the ATC instruction, the PIC shall express the intention with the intercom system. At this time, if the FO feels something is wrong, the FO shall confirm with the PIC immediately. <p>(3) The KFFDPAC conducted training in about ATC phraseology and consequently have established the system that all crew members were able to confirm the existence of the contradiction between the ATC instruction and its reaction by PIC or FO.</p>

Severity Classifications of Runway Incursions

Severity classifications described in ICAO the “Manual on the Prevention of Runway Incursions” (Doc 9870) are as described in the table below

Table 6-1 Severity classification scheme

<i>Severity classification</i>	<i>Description**1</i>
<i>A</i>	<i>A serious incident in which a collision is narrowly avoided.</i>
<i>B</i>	<i>An incident in which separation decreases and there is significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision.</i>
<i>C**2</i>	<i>An incident characterized by ample time and/or distance to avoid a collision.</i>
<i>D</i>	<i>An incident that meets the definition of runway incursion such as the incorrect presence of a single vehicle, person or aircraft on the protected area of a surface designated for the take-off and landing of aircraft but with no immediate safety consequences.</i>
<i>E</i>	<i>Insufficient information or inconclusive or conflicting evidence precludes a severity assessment.</i>

* *1 See the definition of “incident” of Annex 13.

* *2 Shaded to show the pertinent classification of the serious incident.