AI2021-1

AIRCRAFT SERIOUS INCIDENT

INVESTIGATION REPORT

ASIANA AIRLINES INC.
H L 8 2 5 6

JAPAN TRANSOCEAN AIR CO., LTD.
J A 0 1 R K

January 21, 2021

JTSB Japan Transport Safety Board

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.

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

RUNWAY INCURSION
1. ASIANA AIRLINES INC.
AIRBUS A321-231, HL8256
2. JAPAN TRANSOCEAN AIR CO., LTD.
BOEING 737-800, JA01RK
ON RUNWAY 18 AT NAHA AIRPORT
AROUND 13:14 JST, JULY 21, 2019

December 18, 2020
Adopted by the Japan Transport Safety Board

Chairperson	TAKEDA Nobuo
Member	MIYASHITA Toru
Member	KAKISHIMA Yoshiko
Member	MARUI Yuichi
Member	NAKANISHI Miwa
Member	TSUDA Hiroka

1. PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Serious Incident	On Sunday, July 21, 2019, an Airbus A321-231, registered HL8256, operated by Asiana Airlines Inc., made incursion into Runway 18 at Naha Airport without obtaining ATC clearance when a Boeing 737-800, registered JA01RK, operated by Japan Transocean Air Co., Ltd., was on the final approach to the runway after obtaining landing clearance.
1.2 Outline of the Serious Incident Investigation	The occurrence covered by this serious incident report falls under the category of "Attempt of landing on a runway being used by other aircraft" as stipulated in Article 166-4, item (ii) of the Ordinance for Enforcement of the Civil Aeronautics Act (Ordinance of Ministry of Transport No. 56 of 1952) prior to revision by the Ministerial Ordinance on Partial Revision of the Ordinance for Enforcement of Civil Aeronautics Act (Ordinance of Ministry of Land, Infrastructure, Transport and Tourism No. 88 of 2020), and is classified as a serious incident. On July 22, 2019, the Japan Transport Safety Board (JTSB), upon receipt of the information of the serious incident, designated an investigator-in-charge and other two investigators to investigate the serious incident. An accredited representative of the Republic of Korea, as the State of Registry and Operator of the aircraft involved in this serious incident, participated in the investigation. Although this serious incident was notified to the French Republic and the United States of America, as the States of Design and Manufacture of the aircrafts involved in the serious incident, the States did not designate their

	accredited representatives. Comments were invited from parties relevant to the cause of this serious incident and the Relevant States.

2. FACTUAL INFORMATION

2.1 History of the Serious Incident Occurrence	According to the statements of the Pilot in Command (hereinafter referred to as "the PIC A") of the Airbus A321-231, registered HL8256 (hereinafter referred to as "Aircraft A"), operated by Asiana Airlines Inc. (hereinafter referred to as "the Company A"), the First Officer of Aircraft A (hereinafter referred to as "the FO A"), the PIC of the Boeing 737-800, registered JA01RK (hereinafter referred to as "Aircraft B"), operated by Japan Transocean Air Co., Ltd., the FO of Aircraft B, the air traffic controller at the ground control (hereinafter referred to as "the Ground") of the aerodrome control facility of Naha Airport (hereinafter referred to as "the Control Facility"), and the air traffic controller at the aerodrome control tower of the Control Facility (hereinafter referred to as "the Tower"), records of the Flight Data Recorder (hereinafter referred to as "FDR") of Aircraft A and the FDR of Aircraft B, the air traffic communications records, the radar track records, the runway occupancy information, and records of the ITV (airport monitoring camera)*1, the history of the serious incident occurence is summarized as follows. On July 21, 2019, Aircraft A was scheduled to take off from Naha Airport and bound for Inchon International Airport as the schedule flight 171 of the Company A, with a total of 151 people, including the PIC A, seven crewmembers and 143 passengers. In the cockpit of Aircraft A, the PIC A sat in the left seat as the PF*2 and the FO A in the right as the PM*2.  Figure 1: Aircraft A After obtaining ATC clearance through communication with the Ground and completing the pushback to the Pushback Line D1 (hereinafter referred to as D1) (see Figure 3), Aircraft A, which had parked at Spot 44R, started the right engine. Immediately after this, as the APU*3 was automatically shut down, Aircraft A informed the Ground that it had intention to stand by for five minutes at the current position. The PIC A decided to continue the operation after consultation about this issue with the Company A's mechanic based in the Airport. After starting the left

*1 In Naha Airport, there are some apron areas out of sight from the Tower, where the ITV monitor these areas.
*2 "PF" and "PM" are the terms to identify roles of the pilots for an aircraft operated by two pilots. PF stands for the Pilot Flying, the pilot primarily responsible for aircraft maneuvering. The PM stands for the Pilot Monitoring, the pilot primarily responsible for cross-checking the PF's operations and conducting duties other than flying.
*3 APU stands for the Auxiliary Power Unit installed separately from the propulsion engines to supply the aircraft with pneumatic pressure, oil pressure and electricity.

	engine in accordance with the engine start without APU available (CROSSBLEED ENGINE START PROCEDURE), Aircraft A completed the preparation for taxing and requested a taxi clearance from the Ground. The Ground instructed Aircraft A to taxi to Taxiway E1 (hereinafter referred to as "E1") (see Figure 3) via Aircraft Stand Taxilane D (see Figure 3), and Aircraft A read it back (around 13:10:37). The departure of Aircraft A was 10 minutes behind the schedule. As the taxing distance from D1 to E1 is short and the take-off preparation should be made during the taxiing at this short distance, the PIC A taxied at low speed. On Taxiway A1 (see Figure 3), there was a departure aircraft heading to Taxiway E0 (hereinafter referred to as "E0") (see Figure 3) for take-off, but the Ground informed that Aircraft A would taxi firstly and instructed Aircraft A to communicate with the Tower. Aircraft A communicated with the Tower. The take-off from E1 is an intersection departure (see 2.7 (1)), but Aircraft A was not asked to provide the consent on the intersection departure from the Tower, therefore, the PIC A checked the chart regarding the taxiway in use. However, there was no listed information on the intersection departure at Naha Airport. Therefore, the PIC A double-checked the chart, thinking that E1 might be eventually connected to E0, and Aircraft A would probably take off from the end of the runway. To Aircraft A approaching E1, the Tower issued at once the two instructions of "HOLD SHORT OF RUNWAY" and "REVISED CLEARANCE, MAINTAIN FLIGHT LEVEL 250 ALTITUDE RESTRICTIONS CANCELLED" related to the Standard Instrument Departure (SID)*4 (around 13:13:00). The FO A stopped conducting the procedures for take-off, and responded by saying "REVISED MAINTAIN FLIGHT LEVEL 250 ALL ALTITUDE CANCELLED, CONFIRM E1 THEN HOLDING POINT RWY 18," and read back with the term "E1 HOLDING SIHORT OF RWY 18, MAINTAIN FLIHGT LEVEL 250 ALL ALTITUDE RESTRICTIONS CANCELLED" after receiving a response from the Tower saying "AFFIRM E1 HOLD SHORT OF RWY." At this time, the PIC A mistakenly perceived that he was instructed to "LINE UP AND WAIT". On the other hand, the FO A resumed the procedures for take-off, and after the completion of the procedures, he was changing the setting of the FMS*5 related to the cancelled altitude restrictions in accordance with ATC instructions. Seeing what the FO A was doing, the PIC A continued taxing at further reduced speed. They did not cross-check the ATC clearance that should be done by flight crew, as specified in the Company A's manual (see 2.7 (2)).

*4 "Standard Instrument Departure (SID)" refers to a flight procedure for an IFR departing aircraft in which route, turning directions, altitude restrictions and other pertinent elements are prescribed.
*5 "FMS" stands for the Flight Management System to assist flight crew with respect to the navigation, performance, fuel monitoring and indication in the cockpit.

On the other hand, the Tower issued the landing clearance to the Aircraft B on the final approach (around 13:13:29).

Figure 2: Aircraft B

The PIC A did not listen to the landing clearance issued to the Aircraft B on the final approach.

Aircraft A made incursion into Runway 18 from E1 without receiving ATC instruction (around 13:13:59)

At this time, the position of the Aircraft B was about 1.8 nm from the threshold of Runway 18 and at an altitude of about 600 ft.

The PIC A saw the final approach course when entering the runway, but was not able to find the Aircraft B. The FO A did not monitor the location of the aircraft and external environment as he was changing the setting of the FMS.

Aircraft B was ready to execute a go-around as seeing Aircraft A entering the runway from E1.

Before the runway occupancy monitoring function of the ARTS[*6] (Automated radar terminal system) works, the Tower instructed Aircraft B to execute a go-around (around 13:14:04) as noticing that Aircraft A was entering the runway, and the Aircraft B executed a go-around. The Tower instructed Aircraft A to wait at the current position (around 13:14:07).

At this time, the Runway Entrance Lights (REL) (see 2.7 (4)) turned on.

"We did not receive instruction to enter the runway," the FO A said to the PIC A after reading back the instruction from the Tower. The PIC A confirmed with the Tower about whether the instruction obtained by Aircraft A was to "LINE UP AND WAIT." The Tower responded that it was the instruction of "HOLD SHORT OF RUNWAY" and Aircraft A read back the same content as this instruction. "OH, SORRY ABOUT THAT," the PIC A informed the Tower after hearing this response.

As there was some time interval until the next aircraft would arrive, the Tower issued the take-off clearance to Aircraft A. Aircraft A read it back and commenced its take-off.

After that, Aircraft B, which had executed a go-around, landed at Runway 18 by radar vectoring.

*6 ARTS is a flight number that matches the information of the airport surveillance radar with the flight plan information from the FDP, and in addition to the symbol indicating the position of the aircraft on the display device installed on the control table of the terminal control center. It is a system that displays information such as names.

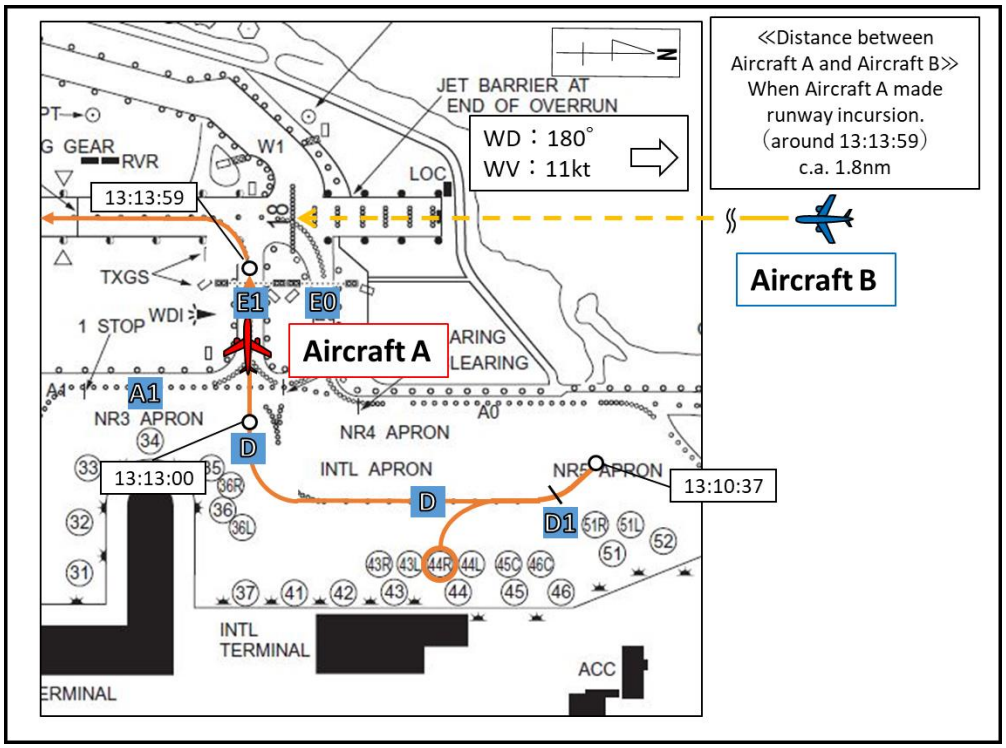

Figure 3: Estimated taxing route

This serious incident occurred on Runway 18 at Naha Airport (26°12' 32" N, 127°38' 44" E) around 13:14 on July 21, 2019.

2.2 Injuries to Persons	None
2.3 Damage to the Aircraft	None
2.4 Personnel Information	(1) PIC of Aircraft A: Male, age 38 Airline Transport Pilot Certificate (Airplane) April 6, 2018 Type rating for Airbus A320*7 October 13, 2016 Aviation English Proficiency Certification Level 4 Validity date: May 2, 2020 Total flight time 6,178 hours 00 minutes Total flight time on the same type of aircraft 4,561 hours 00 minutes (2) FO of Aircraft A: Male, age 35 Commercial pilot certificate (Airplane) October 31, 2016 Type rating for Airbus A320 February 21, 2019 Aviation English Proficiency Certification Level 4 Validity date: June 8, 2020 Total flight time 504 hours 00 minutes Total flight time on the same type of aircraft 200 hours 00 minutes (3) PIC of Aircraft B: Male, age 51 Airline Transport Pilot Certificate (Airplane) June 24, 2003 Type rating for Boeing 737 February 7, 1994

*7 Airbus A320 and Airbus A321 are rated as the same aircraft type and listed as A320 under the competence certification of the Korea Transportation Safety Authority.

	Total flight time 15,382 hours 14 minutes Total flight time on the same type of aircraft 13,827 hours 20 minutes (4) FO of Aircraft B: Male, age 32 Commercial pilot certificate (Airplane) May 15, 2013 Type rating for Boeing 737 April 22, 2016 Total flight time 2,413 hours 57 minutes Total flight time on the same type of aircraft 2,176 hours 47 minutes
2.5 Aircraft Information	(1) Aircraft A Aircraft type: Airbus A321-231 Serial number: 5169 Date of manufacture: May 18, 2012 Total flight time 24,521 hours 58 minutes (2) Aircraft B Aircraft type: Boeing 737-800 Serial number: 61475 Date of manufacture: December 14, 2015 Total flight time 9,464 hours 11 minutes (3) Information on the flight recorder: Aircraft A and Aircraft B were equipped with FDR and cockpit voice recorder (hereinafter referred to "CVR"). Both Aircraft A and Aircraft B continued flight operation after the serious incident and both of their FDRs retained data relevant to the serious incident, but as the data of the CVRs, capable of recording a period of two hours, were clearly overwritten, they were not dismounted.
2.6 Meteorological Information	The regular aerodrome meteorological report at the Airport around the time of the serious incident was as follows: 13:00 Wind direction; 180°, Wind velocity; 11 kt, Prevailing visibility; More than 10 km Cloud: Amount 2/8; Type Cumulus; Cloud base 2,200 ft Temperature 32℃, Dew point 25℃ Altimeter setting (QNH) 29.82 inHg
2.7 Additional Information	(1) Intersection departure at the Airport The intersection departure denotes a take-off procedure in which an aircraft starts a take-off from any intersection with taxiway or another runway except the end of a runway without using the whole runway length. When an air traffic controller instructs the intersection departure, an agreement should be obtained from the pilot. However, it shall not apply in the case of an aircraft take-off with the given procedure described on AIP and other documents. The ROAH AD 2.20 LOCAL TRAFFIC REBULATIONS of AIP includes the following description about the intersection departure at the Airport. (Excerpt) *When RWY18 is in use, departing aircraft may be instructed intersection departure from TWY E1 without pilot's consent.* (omitted) (2) Company A's manual related to the procedure for checking ATC instructions

The FOM*[8] of the Company A includes the following description. (Excerpt)

Flight crew shall cross-check all clearance issued by ATC.

(3) ICAO Manual on the Prevention of Runway Incursions

There is the following description in "ICAO Doc 9870 Manual on the Prevention of Runway Incursions", (hereinafter referred to as ICAO Manual

7.4 Both the pilot flying (PF) and the pilot not flying (PNF)[9] should monitor the frequency and agree upon the acceptance of a clearance to taxi, cross a runway, take-off or land on a runway.*

(4) Runway Entrance Lights (REL)

The Runway Entrance Lights (REL) are installed on the side of Runway 18 in the Airport in order to avoid runway incursions and warn an aircraft approaching the runway from the taxiway when the runway is occupied by other aircraft taking off or landing. However, Aircraft B on the final approach had not yet entered the area where RELs function, therefore, the RELs in the proximity did not turn on when Aircraft A started entering the runway.

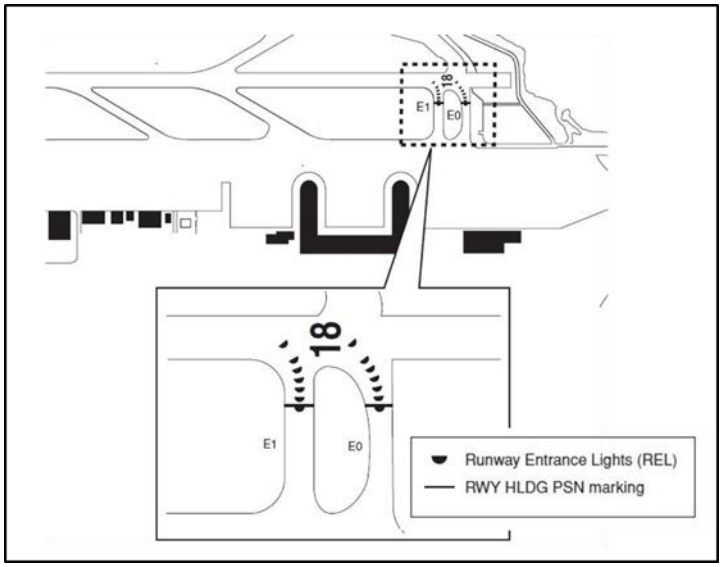

Figure 4: Runway Entrance Lights (REL)

3. ANALYSIS

3.1 Involvement of Weather	None
3.2 Involvement of Pilots	Yes
3.3 Involvement of Aircraft	None

*8 "FOM" stands for Flight Operations Manual that stipulates the basic policy, procedures, standards and others for the employees to fulfill their duties in the Company A's air transport services, and that shall be prioritized when it is applied.

*9 "PNF" stands for the Pilot Not Flying, a pilot responsible for non-maneuvering tasks. Currently, many airline companies use the term, PM instead of PNF based on the concept that PNF should always monitor flight conditions even without flying tasks.

3.4 Analysis of Findings	(1) The time of Aircraft A's runway incursion It is highly probable that Aircraft A made incursion into Runway 18 around 13:14 while taxing after receiving the Tower's instruction to hold short of Runway 18. (2) Aircraft A's situation at the time of runway incursion ① The PIC A's situation immediately before the runway incursion It is probable that because in addition to the fact that the aircraft had a malfunction, their aircraft was to taxi firstly, the PIC A was paying too much attention to changing the flight plan entailed in the reconfirmation of the taxiway and the cancelled altitude restrictions while taxing in the short distance to the runway. During this time, it is somewhat likely that the PIC A mistook the Tower's instruction to "HOLD SHORT OF RUNWAY" as the instruction to "LINE UP AND WAIT." ② The FO A's situation immediately before the runway incursion It is probable that the FO A correctly understood the ATC instruction from the Tower since he rightly read back the Tower's instruction to "HOLD SHORT OF RUNWAY." However, it is probable that because the FO A had a lot of works to do such as conducting remained take-off procedures and changing the FMS settings entailed in the cancelled altitude restrictions after his read-back, he was not able to cross-check the ATC instruction and did not notice their making incursion into Runway 18. ③ Aircraft A's situation at the time of runway incursion It is probable that not cross-checking the ATC instruction, the misunderstanding made by the PIC A could not be corrected before Aircraft A entered the runway. It is also probable that because the PIC A's misunderstanding was not corrected, Aircraft A made incursion into Runway 18. It is imperative that no matter what the circumstances, flight crew should cross-check ATC instructions, it is all the more so without fail when their workload is at a high level. The PIC A should not have entered the runway until he had finished cross-checking the ATC instruction. In recognition of the role as the PM, the FO A should have always monitored the aircraft condition even while conducting the procedures he was responsible for. In addition, if the take-off preparation has not completed when the aircraft gets at the runway holding position, flight crew should have informed the Tower as soon as possible. ④ Response of Aircraft B It is certain that Aircraft B found Aircraft A entering Runway 18 during approach after receiving landing clearance, and executed a go-around in accordance with the Tower's instruction, after that. ⑤ Response of the Tower

	It is highly probable that the Tower recognized visually that Aircraft A was beyond the hold line on E1, and therefore instructed Aircraft B, which had already approached around 1.8 nm from the threshold of Runway 18, to execute a go-around. (3) ICAO Manual on the Prevention of Runway Incursions. It is important that both the PF and the PM (PNF) should agree upon the acceptance of ATC clearances as described in the ICAO manual on the prevention of runway incursions, in multi-crew flight operation. (4) Intersection departure at the Airport At the Airport, when Runway 18 is in use, departing aircraft may be instructed intersection departure from E1 without pilot's consent, however, it is probable that because the PIC A did not know about the procedures, he was required to reconfirm the taxiway. (5) Classification of Severity in this serious incident When Aircraft A made incursion into Runway 18 and Aircraft B executed a go-around according to the Tower's instruction, the distance between Aircraft A and Aircraft B was approximately 3,334 m. The serious incident comes 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 with classification tools provided by ICAO. (See Attachment: Severity Classifications of Runway Incursions).

4. PROBABLE CAUSES

It is highly probable that this serious incident occurred because Aircraft A entered the runway despite of being instructed to hold short of Runway 18, when Aircraft B, which were cleared to land by the Tower, attempted to land at the same runway.

Regarding the fact that Aircraft A entered the runway, it is probable that when the PIC A received the ATC instruction, he mistook the Tower's instruction to hold short of runway as the instruction to line up and wait, and his misunderstanding was not corrected.

It is probable that the reason why the PIC A's misunderstanding was not corrected is because the PIC A and the FO A did not cross-check the ATC clearance, as specified in the Company A's manual.

5. SAFETY ACTIONS

The Company A took the following safety actions to prevent a recurrence.

- Updating the Airport Information and notifying all the flight crew for flight safety.
- Changed in Standard Callouts*10 during taxi.
- Company campaign for the prevention of runway/taxiway incursion.
- Strengthening evaluation standards and line audit procedures for all the flight crew.
- Remedial education and training to the flight crew involved in this serious incident.

*10 "Standard Callouts" means callouts excluding orders for specific operations like "FLAP UP" from the various callouts for normal operations.

Attachment

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

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

**1 See the definition of "incident" of Annex 13.

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