Chapter 3 Aircraft accident and serious incident investigations

1 Aircraft accidents and serious incidents to be investigated

<Aircraft accidents to be investigated>

◎Paragraph 1, Article 2 of the Act for Establishment of the Japan Transport Safety Board (Definition of aircraft accident)

The term "Aircraft Accident" as used in this Act shall mean the accident listed in each of the items in paragraph 1 of Article 76 of the Civil Aeronautics Act.

◎Paragraph 1, Article 76 of the Civil Aeronautics Act (Obligation to report)

1 Crash, collision or fire of aircraft;
2 Injury or death of any person, or destruction of any object caused by aircraft;
3 Death (except those specified in Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism) or disappearance of any person on board the aircraft;
4 Contact with other aircraft; and
5 Other accidents relating to aircraft specified in Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism.

◎Article 165-3 of the Ordinance for Enforcement of the Civil Aeronautics Act

(Accidents related to aircraft prescribed in the Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism under item 5 of the paragraph1 of the Article 76 of the Act)

The cases (excluding cases where the repair of a subject aircraft does not correspond to the major repair work) where navigating aircraft is damaged (except the sole damage of engine, cowling, engine accessory, propeller, wing tip, antenna, tire, brake or fairing).

<Aircraft serious incidents to be investigated>

◎Item 2, Paragraph 2, Article 2 of the Act for Establishment of the Japan Transport Safety Board (Definition of aircraft serious incident)

A situation where a pilot in command of an aircraft during flight recognized a risk of collision or contact with any other aircraft, or any other situations prescribed by the Ordinances of Ministry of Land, Infrastructure, Transport and Tourism under Article 76-2 of the Civil Aeronautics Act.

◎Article 76-2 of the Civil Aeronautics Act

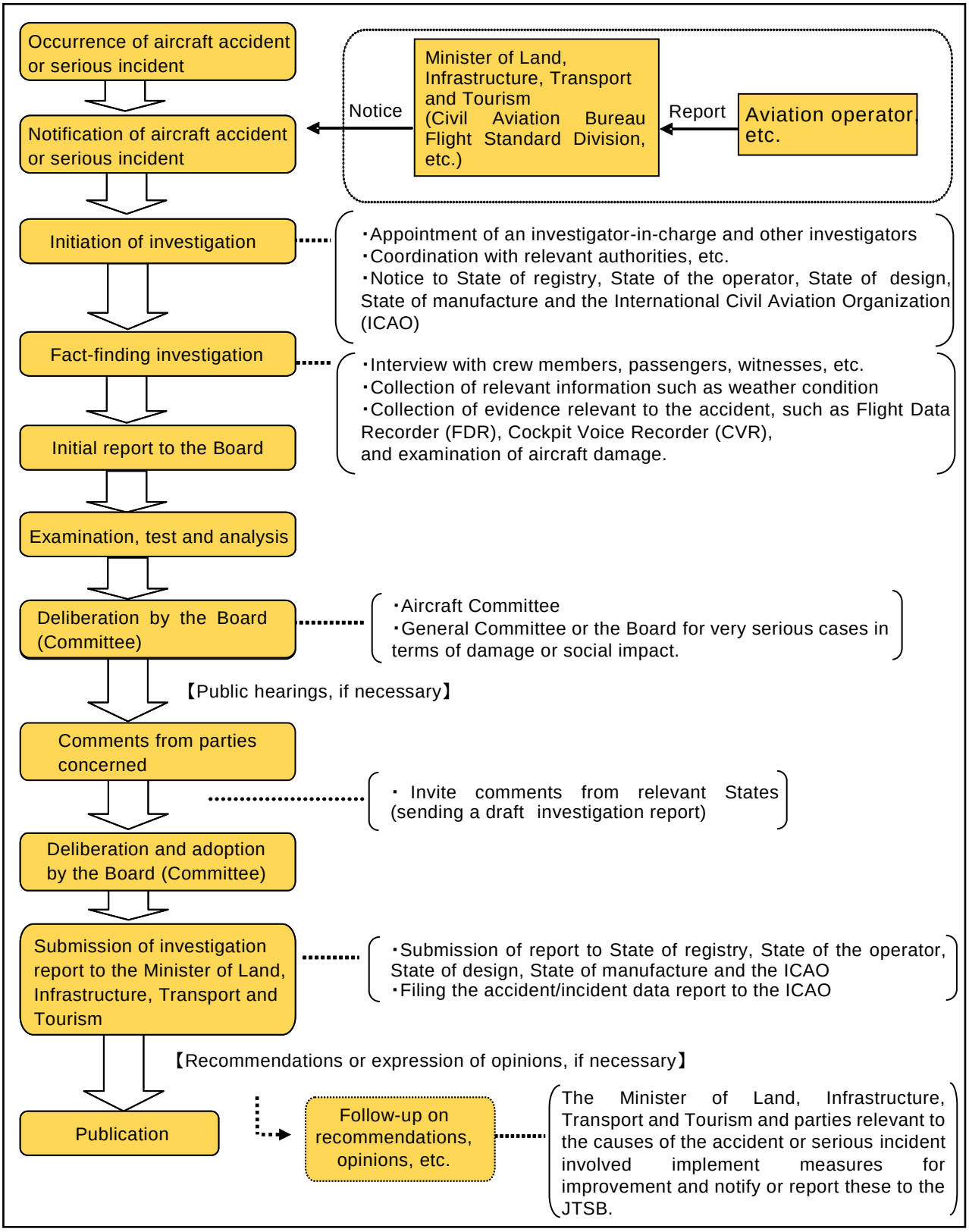
・When the pilot in command has recognized during flight that there was a danger of collision or contact with any other aircraft.

・When the pilot in command has recognized during flight that there is a danger of causing any of accidents listed in each item of paragraph 1, article 76 of the Civil Aeronautics Act, specified by Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism.

◎**Article 166-4 of the Ordinance for Enforcement of the Civil Aeronautics Act** (The case prescribed in the Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism under Article 76-2 of the Civil Aeronautics Act)

1 Take-off from a closed runway or a runway being used by other aircraft or aborted take-off
2 Landing on a closed runway or a runway being used by other aircraft or attempt of landing
3 Overrun, undershoot and deviation from a runway (limited to when an aircraft is disabled to perform taxiing)
4 Case where emergency evacuation was conducted with the use for emergency evacuation slide
5 Case where aircraft crew executed an emergency operation during navigation in order to avoid crash into water or contact on the ground
6 Damage of engine (limited to such a case where fragments penetrated the casing of subject engine
7 Continued halt or loss of power or thrust (except when the engine(s) are stopped with an attempt of assuming the engine(s) of a motor glider) of engines (in the case of multiple engines, 2 or more engines) in flight
8 Case where any of aircraft propeller, rotary wing, landing gear, rudder, elevator, aileron or flap is damaged and thus flight of the subject aircraft could be continued
9 Multiple malfunctions in one or more systems equipped on aircraft impeding the safe flight of aircraft
10 Occurrence of fire or smoke inside an aircraft and occurrence of fire within an engine fire-prevention area
11 Abnormal decompression inside an aircraft
12 Shortage of fuel requiring urgent measures
13 Case where aircraft operation is impeded by an encounter with air disturbance or other abnormal weather conditions, failure in aircraft equipment, or a flight at a speed exceeding the airspeed limit, limited payload factor limit operating altitude limit
14 Case where aircraft crew became unable to perform services normally due to injury or disease
15 Case where a slung load, any other load carried external to an aircraft or an object being towed by an aircraft was released unintentionally or intentionally as an emergency measure
16 Case where parts dropped from aircraft collided with one or more persons
17 Case equivalent to those listed in the preceding items

2 Procedure of aircraft accident/incident investigation



3 Statistics of investigations of aircraft accidents and serious incidents

The JTSB carried out investigations of aircraft accidents and serious incidents in 2016 as follows:

31 accident investigations had been carried over from 2015, and 13 accident investigations were newly launched in 2016. 28 investigation reports were published in 2016, and thereby 16 accident investigations were carried over to 2017.

12 serious incident investigations had been carried over from 2015, and 10 serious incident investigations were newly launched in 2016. Seven investigation reports were published in 2016, and thereby 15 serious incident investigations were carried over to 2017.

Among the 35 investigation reports published in 2016, one was issued with recommendations, and one was issued with safety recommendations.

Investigations of aircraft accidents and serious incidents in 2016

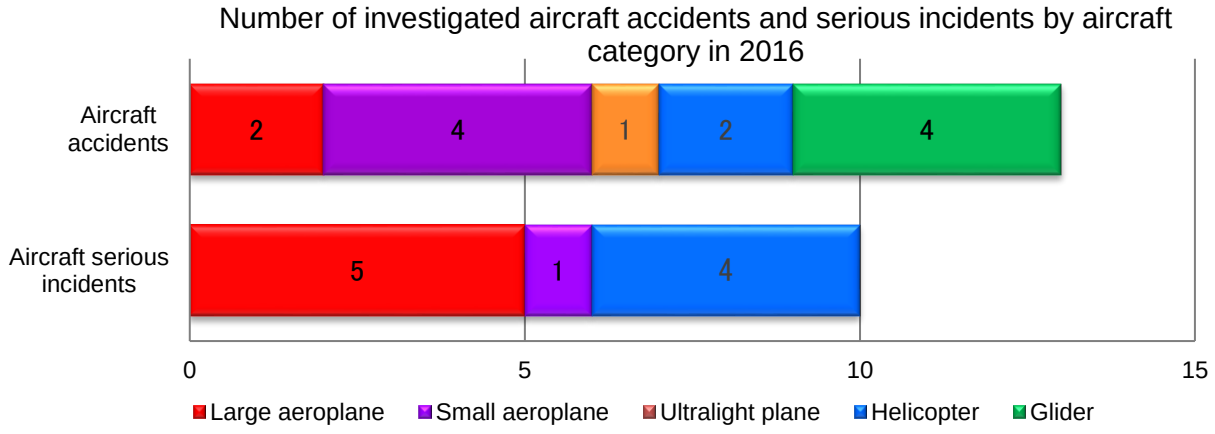
(Cases)

Category	Carried over from 2015	Launched in 2016	Total	Published investigation reports	(Recommendations)	(Safety recommendations)	(Opinions)	Carried over to 2017	(Interim report)
Aircraft accident	31	13	44	28	(1)	(1)	(0)	16	(0)
Aircraft serious incident	12	10	22	7	(0)	(0)	(0)	15	(0)

4 Statistics of investigations launched in 2016

The aircraft accidents and serious incidents that were newly investigated in 2016 consisted of 13 aircraft accidents, down by 14 from 27 for the previous year, and 10 aircraft serious incidents, up one from nine for the previous year.

By aircraft category, the aircraft accidents included two cases involving large aeroplanes, four cases involving small aeroplanes, one case involving ultralight plane, two cases involving helicopters, and four cases involving gliders. The aircraft serious incidents included five cases involving large aeroplane, one case involving small aeroplane, and four cases involving helicopters.



* Large aeroplane refers to an aircraft of a maximum take-off mass of over 5,700 kg.
* Small aeroplane refers to an aircraft of a maximum take-off mass of under 5,700 kg except for Ultralight plane.

In the 13 aircraft accidents, the number of casualties was 13, consisting of eight deaths and five injured persons.

Statistics of number of casualties (aircraft accident)

(Persons)

2016							
Aircraft category	Dead		Missing		Injured		Total
	Crew	Passengers and others	Crew	Passengers and others	Crew	Passengers and others	
Large aeroplane	0	0	0	0	1	3	4
Small aeroplane	1	3	0	0	0	1	5
Ultralight plane	0	0	0	0	0	0	0
Helicopter	0	0	0	0	0	0	0
Glider	3	1	0	0	0	0	4
Total	4	4	0	0	1	4	13
	8		0		5		

5 Summaries of aircraft accidents and serious incidents which occurred in 2016

The aircraft accidents and serious incidents which occurred in 2016 are summarized as follows: The summaries are based on information available at the start of the investigations and therefore are subject to change depending on the course of investigations and deliberations.

(Aircraft accidents)

1	Date and location of accident	Operator	Aircraft registration number and aircraft type
	February 23, 2016 On New Chitose Airport taxiway, Hokkaido	Japan Airlines Co., Ltd.	JA322J Boeing 737-800
	Summary	While the aircraft was taxiing prior to takeoff at New Chitose Airport, smoke appeared inside the cabin, as a result of which the emergency evacuation slide was used to evacuate the passengers on the taxiway. Of the three injured passengers, one was seriously injured and two suffered minor injuries.	
2	Date and location of accident	Operator	Aircraft registration number and aircraft type
	March 17, 2016 Sakae Town, Inba District, Chiba Prefecture	Privately owned	JA50KM PZL-Bielsko SZD-50-3 Puchacz (glider)
	Summary	The aircraft took off from Otone glider field, but crashed into a house near the location referred to above during flight. Two passengers died.	
3	Date and location of accident	Operator	Aircraft registration number and aircraft type
	March 23, 2016 Yanagita Town, Utsunomiya City, Tochigi Prefecture	Privately owned	JR1747 Ultralight Aircraft Challenger II-R447L (ultralight plane)
	Summary	The aircraft took off from Utsunomiya temporary airfield in Tochigi Prefecture for a leisure flight, but came into contact with trees and crashed while making its approach for landing after flying on a circular route. A total of two persons consisting of the pilot and the passenger were on board the aircraft, but neither of them was injured.	

4	Date and location of accident	Operator	Aircraft registration number and aircraft type
	March 26, 2016 Yao Airport, Osaka Prefecture	Privately owned	JA3788 Mooney M20C
	Summary	The aircraft took off Kobe Airport, bounced while the aircraft landed at Yao Airport and attempted go-around, but crashed into the above-mentioned place. The aircraft was destroyed and a fire broke out. A captain and three passengers were on board and all of them were fatally injured.	
5	Date and location of accident	Operator	Aircraft registration number and aircraft type
	April 10, 2016 Aso City Kumamoto Prefecture	Privately owned	JA2437 S.N. Centrair C 101B (glider)
	Summary	The aircraft crashed on the cross country course (lawn) by failure of forced landing in the Aso Tourism Ranch, with a winch has failed while climbing by winch launch for a familiarization flight from runway 26 of Aso Tourism Ranch landing field. The fuselage was destroyed. The Captain was not injured.	
6	Date and location of accident	Operator	Aircraft registration number and aircraft type
	May 5, 2016 Miharu Town, Tamura District, Fukushima Prefecture	Privately owned	JA21BB Glasflugel 304CZ-17 (glider)
	Summary	The aircraft took off from the Kakuda glider field in Miyagi Prefecture, but crashed near the location referred to above. One passenger died.	
7	Date and location of accident	Operator	Aircraft registration number and aircraft type
	May 6, 2016 Temporary airfield (Miho Airstrip), Shizuoka City, Shizuoka Prefecture	Privately owned	JA4023 Socata TB10
	Summary	On landing at the temporary airfield in Shizuoka City, Shizuoka Prefecture, the aircraft was unable to stop on the runway and overran it, causing damage to the aircraft. No one was injured.	
8	Date and location of accident	Operator	Aircraft registration number and aircraft type
	August 6, 2016 Kumamoto Airport, Kumamoto Prefecture	Privately owned	JA3628 Fuji Heavy Industries FA-200-180
	Summary	The aircraft took off from a temporary airfield inside Aso Dude Ranch in Yamada, Aso City, Kumamoto Prefecture for a leisure flight, but crashed onto the farm while flying on a circular route. The aircraft was destroyed and the pilot was severely injured.	
9	Date and location of accident	Operator	Aircraft registration number and aircraft type
	August 8, 2016 Hirasawa, Hadano City, Kanagawa Prefecture	Aero Asahi Corporation	JA6917 Kawasaki BK117C-2
	Summary	The aircraft took off from a temporary airfield in Isehara City, Kanagawa Prefecture, but touched down too strongly when landing at a temporary airfield in Hadano City, Kanagawa Prefecture, and the tail boom aft of the aircraft was broken off. No one was injured.	
10	Date and location of accident	Operator	Aircraft registration number and aircraft type
	August 9, 2016 Seawater pool in Shichigahama Town, Miyagi District, Miyagi Prefecture	Japan Coast Guard	JA968A Agusta AW139
	Summary	The aircraft took off from Sendai Airport, but when landing on the beach in the location referred to above for rescue activities, the bottom of the fuselage was damaged. No one was injured.	

11	Date and location of accident	Operator	Aircraft registration number and aircraft type
	August 25, 2016 On Runway B, Sendai Airport, Miyagi Prefecture	Civil Aviation College	JA5807 Hawker Beechcraft G58
	Summary	The aircraft took off from Sendai Airport, but when landing on Runway B during takeoff and landing practice at the Airport, it made a belly landing and stopped on the runway. No one was injured.	
12	Date and location of accident	Operator	Aircraft registration number and aircraft type
	October 10, 2016 Kokai, Oizumi Town, Oura District, Gumma Prefecture (Tonegawa river bed)	Privately owned	JA22WP Rolladen-Schneider LS4-b (glider)
	Summary	The aircraft took off from the Menuma glider field, but crashed in the location referred to above (on the north side of the glider field) during flight. One passenger died.	
13	Date and location of accident	Operator	Aircraft registration number and aircraft type
	November 10, 21016 While ascending after takeoff from Kagoshima Airport, Kagoshima Prefecture	Japan Airlines Co., Ltd.	JA658J Boeing 767-300
	Summary	The aircraft took off from Kagoshima Airport, but started to shake while ascending, and one member of cabin crew was injured.	

(Aircraft serious incidents)

1	Date and location of accident	Operator	Aircraft registration number and aircraft type
	March 1, 2016 At a height of approx. 100m above the vicinity of Mihama Town, Mikata District, Fukui Prefecture	Aero Asahi Corporation	JA9678 Aerospatiale AS332L1
	Summary	The aircraft took off from a temporary airfield in Mihama Town, Mikata District, Fukui Prefecture carrying a suspended cargo, but part of the cargo fell onto mountainous terrain inside the town during the flight (contents: electric insulators, weight approx. 800kg).	
2	Date and location of accident	Operator	Aircraft registration number and aircraft type
	March 21, 2016 On the runway at Kagoshima Airport, Kagoshima Prefecture	Privately owned	JA01YK Cirrus SR22T
	Summary	On landing at Kagoshima Airport, the nose gear broke and the aircraft stopped on the runway.	
3	Date and location of accident	Operator	Aircraft registration number and aircraft type
	April 17, 2016 At an altitude of approx. 12,000m near Matsue City, Shimane Prefecture	Ibex Airlines Co., Ltd.	JA06RJ Bombardier CL-600-2C10
	Summary	While the aircraft was turning back to Fukuoka Airport owing to bad weather at the destination, a malfunction occurred in the air bleed system (the system for sending air into the interior of the aircraft from the engine) near the location referred to above, and since the instrument display showed a drop in pressurization inside the cabin, the aircraft declared an emergency and landed at the Airport.	
4	Date and location of accident	Operator	Aircraft registration number and aircraft type
	May 27, 2016 On Runway C at Tokyo International Airport, Tokyo	Korean Air Lines	HL7534 Boeing 777-300

	Summary	While the aircraft was about to take off from Runway C at Tokyo International Airport, a malfunction occurred in the 1st (left-side) engine, causing the takeoff to be aborted and the aircraft to stop on the runway, whereupon the emergency evacuation slide was used to evacuate the passengers.	
5	Date and location of accident	Operator	Aircraft registration number and aircraft type
	May 27, 2016 At an altitude of approx. 5,000m approx. 50km southwest of Tokyo International Airport, Tokyo	All Nippon Airways Co., Ltd.	JA85AN Boeing 737-800
	Summary	The aircraft took off from Tokyo International Airport, but because the the cabin pressurization indicated a fall near the location referred to above during the climb, it turned back and landed at the said Airport.	
6	Date and location of accident	Operator	Aircraft registration number and aircraft type
	July 9, 2016 At an altitude of approx. 11,000m approx. 130km south-southeast of Chubu Centrair International Airport, Aichi Prefecture	Jetstar Japan Co., Ltd.	JA04JJ Airbus A320-232
	Summary	The aircraft took off from Fukuoka Airport, and although the speedometer indicators at the Pilot-in Command's and First Officer's seats were temporarily unstable near the location referred to above during the flight, they subsequently recovered, so that the aircraft continued to fly and landed at Narita International Airport.	
7	Date and location of accident	Operator	Aircraft registration number and aircraft type
	August 5, 2016 At a height of approx. 200m above the vicinity of Totsukawa Village, Yoshino District, Nara Prefecture	Aero Asahi Corporation	JA9678 Aerospatiale AS332L1
	Summary	The aircraft took off from a temporary airfield in Oto Town, Gojo City, Nara Prefecture carrying a suspended cargo, but part of the cargo fell onto mountainous terrain in the location referred to above during the flight (contents: one iron plate, weight approx. 800kg).	
8	Date and location of accident	Operator	Aircraft registration number and aircraft type
	October 7, 2016 At a height of approx. 150m above the vicinity of Hara, Sanjo City in Niigata Prefecture	Tohoku Air Service	JA6620 Kawasaki BK117B-2
	Summary	The aircraft took off from a temporary airfield in Sanjo City, Niigata Prefecture carrying a suspended cargo, but part of the cargo fell onto mountainous terrain inside the city during the flight (contents: approx. 250L of ready-mixed concrete, weight approx. 500kg).	
9	Date and location of accident	Operator	Aircraft registration number and aircraft type
	October 27, 2016 At a height of approx. 200m above the vicinity of Sakae Village, Shimo-Minochi District in Nagano Prefecture	Akagi Helicopter Co., Ltd.	JA9374 Fuji-Bell 204B-2
	Summary	The aircraft took off from a temporary airfield in Sakae Village, Shimo-Minochi District, Nagano Prefecture carrying a suspended cargo, but part of the cargo fell onto mountainous terrain inside the village during the flight (contents: office equipment, tools, etc., weight approx. 250kg).	
10	Date and location of accident	Operator	Aircraft registration number and aircraft type
	December 22, 2016 At a height of approx. 140m while approaching Tokyo International Airport, Tokyo	Peach Aviation Co., Ltd.	JA811P Airbus A320-214
	Summary	The aircraft took off from Taipei (Taoyuan), but when landing at Tokyo International	

		Airport, attempted to land on a closed runway instead of the runway instructed by the air traffic controller. The aircraft subsequently performed a go-around and landed at the Airport.

6 Publication of investigation reports

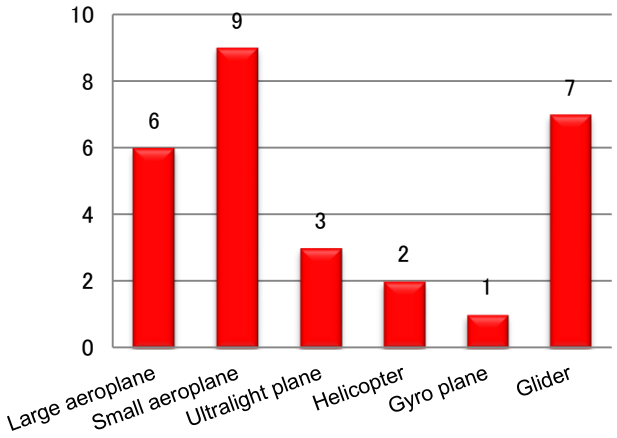
The number of investigation reports of aircraft accidents and serious incidents published in 2016 was 35, consisting of 28 aircraft accidents and seven aircraft serious incidents.

Breaking them down by aircraft category, the aircraft accidents involved six large aeroplanes, nine small aeroplanes, three ultralight planes, two helicopters, one gyro plane and seven gliders. The aircraft serious incidents involved four large aeroplanes, two small aeroplanes, and three helicopters.

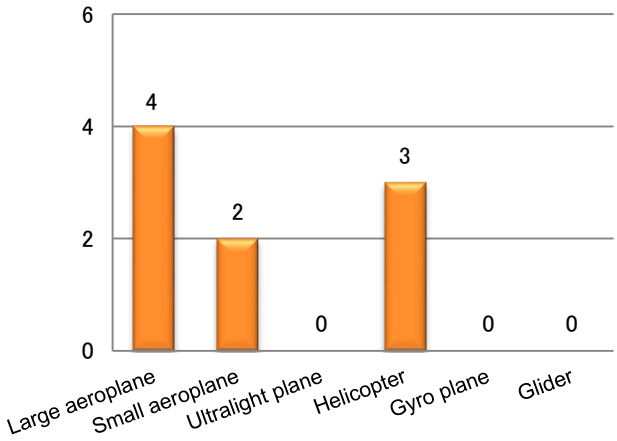
Note: In aircraft accidents and serious incidents, two or more aircraft are sometimes involved in a single case.

In the 28 accidents, the number of casualties was 70, consisting of five death, and 65 injured persons.

Number of published aircraft accident reports (28 cases) by aircraft category in 2016



Number of published aircraft serious incident reports (seven cases) by aircraft category in 2016



The investigation reports for aircraft accidents and serious incidents published in 2016 can be found on JTSB website at:

http://www.mlit.go.jp/jtsb/airrep.html

7 Actions taken in response to recommendations in 2016

Actions taken in response to recommendations were reported with regard to three aircraft accidents and one aircraft serious incident in 2016. Summaries of these reports are as follows.

① Aircraft serious incident involving a Eurocopter EC135T2, registration JA135E, operated by Hiratagakuen (Academic Corporation)

(Safety Recommendations on September 27, 2013)

Following its investigation of a serious incident at Kumejima temporary airfield on March 28, 2009, the Japan Transport Safety Board published an investigation report and issued safety recommendations to the European Aviation Safety Agency (EASA) on September 27, 2013. The Board received the following notice concerning actions taken in response to the recommendations.

○ Summary of the Serious Incident

A Eurocopter EC135T2, registration JA135E, operated by academic corporate body HIRATAGAKUEN, took off from Kumejima Helipad at 10:07 local time on March 28, 2009 for emergency patient transportation. When the helicopter was flying over the sea en route to Shuri Helipad on the main island of Okinawa, its left engine stopped around 10:20 at about 800 ft (about 240 m) about 6 nm (about 11 km) northwest of the Kerama Islands. It changed the destination to Naha Airport and landed there at 10:46.

There were six persons on board, consisting of the pilot in command (PIC) and a mechanic, a doctor and a nurse as medical personnel, and an emergency patient and an attendant, but no one was injured.

The inside of the left engine of the helicopter was destroyed, but there was no outbreak of fire.

○ Probable Causes

It is very likely that in this serious incident, the clogged injectors located relatively lower part of the left engine combustion chamber caused uneven fuel injection and combustion limited in the upper part, lead to a heat concentration to the Upper Structure resulting in engine interior damage.

Sea salt accumulation on fungicide with increased viscosity by heat probably clogged the fuel nozzles. Improper use of fungicide is probable. The JTSB could not determine the route of the sea salt penetration.

○ Safety Recommendations to European Safety Agency (EASA)

It is recommended that the European Safety Agency directs Eurocopter and Turbomeca to cooperatively study the helicopter operational environment and the effects of fungicide to inform helicopter customers of the proper dosing instructions and precautions.

○ Actions taken in response to the safety recommendations

Actions to be taken by the European Aviation Safety Agency (EASA)

After coordinating with Turbomeca, Airbus Helicopters Deutschland GmbH (AHD, formerly Eurocopter) reported back to EASA regarding the following process used for introducing new fuel specifications and additives.

－Engine limitations regarding fuels and fuel additives are detailed in the Engine Installation Manual.

－AHD assesses the applicable limitations (e.g. pressure limits, temperature limits, or specific mixing concentrations for additives), and takes these limitations into account when approving

aircraft standards, considering the helicopter operational environment. The outcome of this process is an update of the Rotorcraft Flight Manual (RFM) containing dosing instructions and approved additives.

* The original text of the notification from the European Aviation Safety Agency (EASA) can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/airkankoku/anzenkankoku8re_160202.pdf

② Aircraft serious incident involving a Boeing 737-700, registered JA16AN, operated by Air Nippon Co., Ltd.

(Recommendations and Safety Recommendations on September 25, 2014)

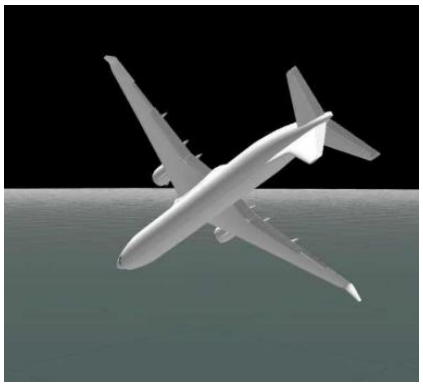
Following its investigation of an aircraft serious incident at an altitude of 41,000 ft about 69 nm east of Kushimoto on September 6, 2011, the Japan Transport Safety Board published an investigation report and also issued recommendations to All Nippon Airways Co., Ltd. as a party relevant to the cause of the serious incident and safety recommendations to the US Federal Aviation Administration (FAA) on September 25, 2014. The Board received the following notice on actions to be taken in response to the report, with regard to measures (implementation plans) based on the recommendations.

○ Summary of the Incident

On September 6 (Tuesday) 2011, a Boeing 737-700, registered JA16AN, operated by Air Nippon Co., Ltd., nosedived after having an unusual attitude (upset) at around 22:49 Japan Standard Time (JST: UTC+9hr, unless otherwise stated all times are indicated in JST) at an altitude of 41,000 ft about 69 nm east of Kushimoto while flying from Naha Airport to Tokyo International Airport as the scheduled flight 140 of the All Nippon Airways Co., Ltd.

There were 117 people on board the aircraft, consisting of the captain, the first officer, three cabin attendants and 112 passengers. Of these people, two cabin attendants sustained slight injuries.

There was no damage to the aircraft.



○ Probable Causes

It is highly probable that this serious incident occurred in the following circumstances: During the flight, the first officer erroneously operated the rudder trim control while having an intention of operating the switch for the door lock control in order to let the captain reenter the cockpit. The aircraft attitude became unusual beyond a threshold for maintaining the aircraft attitude under the autopilot control. The first officer's recognition of the unusual situation was delayed and his subsequent recovery operations were partially inappropriate or insufficient; therefore, the aircraft attitude became even more unusual, causing the aircraft to lose its lifting force and went into nosedive. This led to a situation which is equivalent to "a case where aircraft operation is impeded."

It is probable that the followings contributed to the first officer's erroneous operation of the rudder trim control while having an intention of operating the door lock control; he had

not been fully corrected his memories of operation about the door lock control of the Boeing 737-500 on which he was previously on duty; the door lock control of the Boeing 737-500 series aircraft was similar to the rudder trim control of the Boeing 737-700 series aircraft in their placement, shape, size and operability. It is somewhat likely that his memories of operation about the switch for the door lock control of the Boeing 737-500 aircraft had not been fully corrected because he failed to be fully accustomed with the change in the location of the switch for the door lock control. It is somewhat likely that this resulted from lack of effectiveness in the current system for determining the differences training contents and its check method, under which the Air Nippon Co., Ltd. and other airlines considered and adopted specific training programs to train pilots about how to operate the flight deck switches when their locations changed and the Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism reviewed and approved them. It is probable that the first officer's failure to properly manage tasks contributed to his erroneous operation of the rudder trim control.

It is somewhat likely that the similarities between the switches for the door lock control and the rudder trim control in their operability contributed to the delay in his recognition of the erroneous operation. Moreover, he was excessively dependent on autopilot flight and he failed to be fully aware of monitoring the flight condition.

It is somewhat likely that the first officer's recovery operations were partially inappropriate or insufficient because he was startled and confused on the occurrence of an unexpected unusual situation in which the stick shaker was activated during the upset recovery maneuver. It is somewhat likely that the followings contributed to his startle and confusion: he had not received upset recovery training accompanied with a stall warning and in unexpected situations, thereby he lacked the experience of performing duties in such situations before the serious incident, and he had not received upset recovery training at a high altitude.

○ Recommendations to All Nippon Airways

(1) Thorough implementation of basic compliance matters for cases when the aircraft is operated by a single pilot and training to this end

Thoroughly implement the preventive measures, described in the OM information published by the Company and in The Flight ANA Group, for all flight crew members as specific and permanent basic compliance matters and continuously train them to this end.

(2) Implementation of high altitude upset recovery training accompanied with stall warning and other events

Implement "upset recovery training" at a high altitude upon considering defined flight envelope validated region of flight simulators. If necessary, also introduce a system to examine whether the recovery process is made outside the validated region. Moreover, scenarios in which a stall warning and others will be simultaneously activated or in which an upset cannot be expected by trainees should be prepared for such training.

○ Actions based on the recommendations (completion report)

(1) Thorough implementation of basic compliance matters for cases when an aircraft is operated continuously by a single flight crew member, and training to this end

Education consisting of regular training (academic subjects) shall be held once every three years starting from fiscal year 2015 on the basic compliance matters for cases when an aircraft is operated continuously by a single flight crew member.

Completion report

It was confirmed that 2,024 recipients of regular training had completed training in matters stipulated for basic compliance, including "As far as possible, choosing times when the workload is low before leaving one's seat", "As far as possible, not handling multiple operations simultaneously while away from one's seat", and "Visually confirming and surely operating switches when entering the cockpit and unlocking".

(2) Implementation of high altitude upset recovery training accompanied by stall warnings

Training materials will be created to provide knowledge on stalling and education on methods of stall recovery, since fatal accidents due to upsets are often accompanied by stalling. Due to be completed by all flight crew members in regular training in fiscal year 2015.

Completion report

It was confirmed that 2,024 recipients of regular training had completed training in matters such as "There are multiple causes that lead to an upset situation", "Quick initial action based on correct awareness of the situation is important", and "Operations needed for recovery differ according to the situation in question".

(3) Progress in "Items to continue to be investigated in the future" under "Implementation Plans for Actions to be Taken"

We have investigated initiatives concerning "The introduction of systems to judge whether recovery processes are made outside of the defined flight envelope validated regions of simulators" and "The development of scenarios in which an upset cannot be expected by trainees" as part of the development of upset recovery training worldwide, through international conferences and the like. On the former, in particular, we have also started a review aimed at introducing such systems. On the latter, scenarios are being studied around the world, but we have not yet reached the point at which valid scenarios have been established and broadly shared. It will take time to introduce these scenarios, but we are applying ideas such as having instructors create an environment for upset situations in the simulator while the trainees have their eyes turned down, practice handing over, etc.

* The completion report can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/airkankoku/kankoku5-2re_160628.pdf

③ Aircraft serious incident involving a Bombardier CL-600-2B19 (Large Aeroplane), registered JA206J, operated by J-AIR Corporation

(Recommendations on February 26, 2015)

Following its investigation of an aircraft serious incident on the taxiway at Osaka International Airport on May 6, 2013, the Japan Transport Safety Board published an investigation report and also issued recommendations to IHI Corporation and J-AIR Corporation as parties relevant to the cause of the serious incident on February 26, 2015. The Board received the following notice from IHI Corporation on actions to be taken in response to the report.

○ Summary of the Serious Incident

On Monday, May 6, 2013, a Bombardier CL-600-2B19, registered JA206J, operated by J-AIR Corporation, took off from Oita Airport as the scheduled flight 2362 of Japan Airlines Corporation, a code-sharing partner, and landed on runway 32R at Osaka International Airport. While the aircraft was taxiing on the taxiway after landing, a caution message was displayed for a right engine fire detection system failure at around 12:15 Japan Standard Time (JST: UTC+9hr), and subsequently a warning message was displayed for a right engine fire. While the crew responded to the engine fire warning message, the aircraft continued to taxi and entered the parking spot. During maintenance work after the flight, evidence of fire was found within the engine fire zone.

A total of 55 persons were on board the aircraft, including the captain, two crew members, and 52 passengers. There were no injuries.

○ Probable Causes

It is highly probable that the cause of this serious incident was that the coupling nut connecting the right engine fuel manifold (fuel supply piping) and fuel injector (fuel injection nozzle) No. 14 was loose, fuel leaked from this area and was ignited by the heat of the engine, which resulted in fire in the designated fire zone.

Although it is somewhat likely that the reason why the coupling nut was loose was the insufficient tightening force of the coupling nut, resulting in gradually loosening caused by factors such as engine vibration, the Japan Transport Safety Board couldn't determine the cause of the loosening.

○ Recommendations to IHI Corporation

When conducting engine overhauls, reconfirm that the system ensures that important work for safety is surely carried out, including the tightening of the coupling nuts connecting the injector and manifold.

○ Recommendations to J-AIR Corporation

Enhance education and training involving important system functions for safety and reconsider the contents of training in response to an outbreak of fires.

○ Actions taken in response to the recommendations

1. Content of recommendations

> When conducting engine overhauls, re-examine to confirm that important work for safety is surely executed by the system, including the tightening of coupling nuts connecting the injector and manifold.

2. Content of re-examination

(1) Examinations in response to this event (method of tightening coupling nuts)

Loose torque was discovered on the coupling nuts of four engines, including the engine that caused the serious incident. In the procedure for tightening the coupling nuts, a worker performs the tightening work and an inspector then checks the work visually or by manual confirmation.

However, in the inspection processes after the nuts were tightened by workers, the inspector confirmed that they had been tightened but did not confirm the tightened torque values. Moreover, no record or other evidence was kept that could categorically eliminate the possibility of insufficient tightening strength due to worker error or other causes.

Improvements must be made, such as having work performed reliably using regulation torque values, and keeping records so that response measures can be taken quickly should any abnormality occur. To this end, examinations were carried out, not only on the engine in question but also deployed horizontally to other engines as well. This was done with a view to confirming whether records or other evidence can indicate that the work of tightening the coupling nuts, which is considered important for safety, has been reliably performed according to the manual, or whether appropriate preventive measures, such as structures that can prevent loosening, have been applied.

(2) Horizontal deployment to work items that are important for safety

In the engine manual, the manufacturer has referred to design-related knowledge, users' experiences and other factors in calling for particular attention by marking the word "CAUTION" on work that could cause damage to components if its procedures are not executed correctly. Re-examination was carried out to check (1) whether all work marked with "CAUTION" in the manual is examined to ensure that work that is important for safety is carried out reliably, (2) whether the work can be reliably performed according to the manual, (3) whether records or other evidence indicating that the work has been reliably performed can be shown, and (4) whether appropriate preventive measures are carried out in subsequent steps, etc.

3. Results of examination

(1) Examination in response to this event (method of tightening coupling nuts)

1) The torque wrench serial numbers and torque set values used for the Build Record regarding CF34-3 and CF34-8C/8E engines were to be recorded, and the operation was started. It was also confirmed that the coupling nuts for V2500 and CF34-10E engines have a wire-hanging structure, and that preventive measures against looseness are in place. [Action taken in November 2013]

2) Triple torque tightening was set as an item included in regular training (lectures) and training was carried out once again. [Action taken in March 2014]

(2) Horizontal deployment to work items that are important for safety (specific measures in response to the recommendations)

1) To call particular attention to work marked with "CAUTION", notices were again issued to ensure that items marked with "CAUTION" are checked before beginning the work, and an item to this end was added to the content of regular training. [Action taken in May 2015]

Excerpt from Implementation Plan

Regulations on processes for implementation and approval, including the establishment of a Committee, shall be drawn up to confirm whether work marked with "CAUTION" can be reliably performed according to the manual, whether records or other evidence indicating that it has been reliably performed can be shown, and whether appropriate preventive measures are carried out in subsequent steps, etc. To ensure the application of these measures even if "CAUTION" notices are added or revised, these regulations shall be notified to all members of the authorized maintenance organization. Based on these regulations, all work marked with "CAUTION" shall be re-examined and improvement measures implemented.

Matters in this completion report

2) As explained below, a "CAUTION" Process Screening Committee devised a system to ensure that work that is important for safety is reliably performed.

(a) A "CAUTION" Process Screening Committee was set up to study and confirm the following points concerning work marked with "CAUTION".

a. Whether work that is important for safety can be reliably performed according to the manual
b. Whether records or other evidence that the work has been reliably performed can be shown, or whether appropriate preventive measures are carried out in subsequent steps, etc.

(b) In its screening process, the "CAUTION" Process Screening Committee identified work in which the following three situations could occur as being particularly important for safety. These three situations are defined as serious incidents pertaining to engines in Article 166–4 of the Ordinance for Enforcement of the Civil Aeronautics Act (cases prescribed in Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism under Article 76–2 of the Civil Aeronautics Act).

a. Damage to an engine (limited to cases where fragments penetrate the casing of said engine)
b. Occurrence of fire or smoke inside an aircraft and occurrence of fire within an engine fire prevention area
c. Cases where parts dropped from an aircraft collide with one or more persons

(c) Work processes marked with "CAUTION" were divided into the following six basic categories, and methods of confirming and recording these were examined.

Category 1 In quantitative work corresponding to (b) a-c above, records of the work and quantities shall be kept, and quantities shall be confirmed by an inspector.

Category 2 In qualitative work corresponding to (b) a-c above, work records shall be kept and the actual item shall be confirmed by an inspector.

Category 3 In work corresponding to (b) a-c above where prevention measures have already been initiated and in general calls for attention, records shall be kept.

Category 4 In quantitative work not corresponding to (b) a-c above, work records shall be kept.

Category 5 In qualitative work not corresponding to (b) a-c above, work records shall be kept.

Category 6 In work not corresponding to (b) a-c above where prevention measures have already been initiated and in general calls for attention, records shall be kept.

(d) After screening by the "CAUTION" Process Screening Committee, the content of the record sheet was revised as a necessary improvement measure, and it was confirmed that the system enabled contracted engine maintenance work that is important for safety to be carried out reliably.

(e) In order to apply this reliably to cases in which "CAUTION" is added or revised in an engine manual, a statement concerning the "CAUTION" Process Screening Committee was added to the air safety management regulations and notified to all management staff and employees.

[Action taken in March 2016]

8 Provision of factual information in 2016

The JTSB provided factual information on one case (one aircraft accident) to relevant administrative organs in 2016. The contents are as follows.

① Serious incident involving a Boeing 777-300, registration HL7534, operated by Korean Air Lines

(Information provided on June 18, 2016)

The Japan Transport Safety Board provided the following information on the serious incident that occurred on May 27, 2016, to Civil Aviation Bureau, the Ministry of Land, Infrastructure, Transport and Tourism.

(Summary of the serious incident)

At around 12:38 Japan Standard Time (JST: UTC+9hr) on May 27, 2016, while a Boeing 777-300, registered HL7534, operated by Korean Air Lines was making a takeoff run on Runway C at Tokyo International Airport, a malfunction occurred in the left-side engine, causing the takeoff to be aborted and the aircraft to stop on the runway, whereupon the emergency evacuation slide was used to evacuate the passengers. (Nine persons with minor injuries)

(Information provided)

As a result of the investigation so far, the following facts have been discovered regarding the left-side engine of the aircraft.

(1) Part of the turbine disc was broken and had penetrated the engine casing.

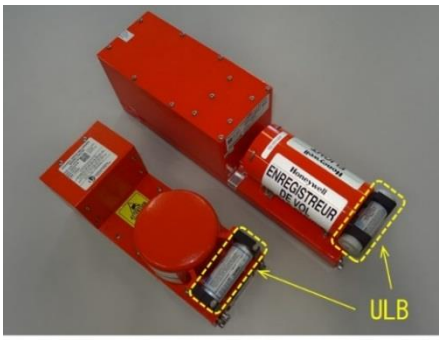
(2) The engine manufacturer (Pratt & Whitney, USA) issued a notice to users of this engine type, dated June 18 (JST), recommending them to carry out maintenance of the removed engine's turbine disc in line with the manual.

* The information provided can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/iken-teikyo/HL753420160527.pdf

Column

Underwater detection training carried out in Japan

Aircraft Accident Investigator

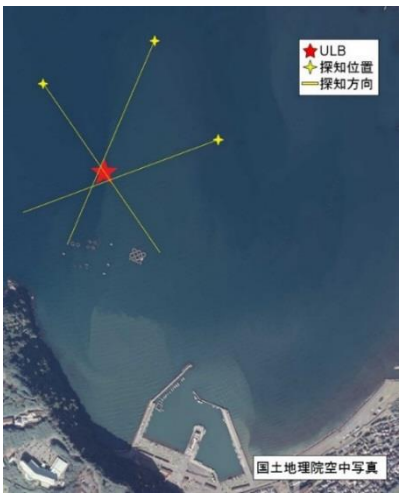


When the maximum takeoff weight of an aircraft exceeds a certain value for that type of aircraft, it must be equipped with a flight recorder (commonly known as a "black box"). The value in question differs according to the date when the initial airworthiness certificate was issued, among other factors. The flight recorder records aircraft-related data (such as location, speed, altitude and attitude) that are very useful when investigating and analyzing accidents, as well as voice data inside the cockpit. If an aircraft should crash and sink in the ocean or in a large river or lake, the flight recorder can be recovered once the crash location is identified, and can be of great assistance when investigating the cause of the accident.

A problem, however, is how to find and recover a flight recorder underwater. If the accident site is a lake or sea area in Japan, the general location of a crashed plane can be known from tracking records by air traffic control radar, etc., but the specific location underwater cannot be pinpointed with accuracy. Flight recorders are therefore equipped with Underwater Locator Beacons (ULB), which continue to emit ultrasound waves for about 30 days (at present) if submerged underwater. Detecting this signal makes it easier to discover and recover the flight recorder.

Fortunately, no accident of this kind has occurred in Japan in recent years, and no Japanese investigator has had actual experience of this sort. Instead, several investigators from the Japan Transport Safety Board have taken part in underwater detection training implemented by overseas aircraft accident investigation bodies. Given that Japan is surrounded by sea, however, we need to raise the technical level of underwater detection by JTSB investigators in readiness for any eventuality. To address this need, we have decided to conduct our own underwater detection training in Tomiura Bay, Chiba Prefecture, under instruction from investigators who have participated in overseas training, starting in fiscal year 2016. Thanks to this, all of our aircraft accident investigators will now be able to acquire skills in underwater detection.

To detect the ULB signal, a dedicated detector is required. When a ULB detector receives a ULB signal, it converts the ultrasound signal into audible sound (referred to below as "received sound"). Since the receiver antenna has directionality, the reception level is high if the receiver is facing toward the transmitted signal but becomes lower if it is facing in the wrong direction. The reception level also decreases as the distance from the ULB increases; as the level decreases, so the received sound also decreases, becomes mixed with noise and is harder to distinguish. It is therefore important to know how to recognize the received sound, so that it can be distinguished even at low volume levels.



The ULB signal converted by the detector sounds like the NTT time signal (marking seconds). Once the received sound can be heard, we record our own position on a GPS receiver while also measuring the bearing of the transmitter. By doing this in three or more locations and working out the point of intersection between them, we can specify the location of the flight recorder, etc. However, vessels tend to drift in currents while taking measurements, meaning that measurements and recordings have to be made quickly and accurately. It is important that we carry out training continuously, so that aircraft accident investigators can learn the necessary knowledge and skill to this end, and carry out underwater detection efficiently whenever necessary. This is also important in order to maintain or improve the underwater detection skills of aircraft accident investigators.

9 Summaries of major aircraft accident and serious incident investigation reports (case studies)

Crash after collision with power transmission lines during leaving from hovering

Shin Nihon Helicopter Co., Ltd. Aerospatiale AS332L1, JA6741

Summary: On Friday March 6, 2015, an Aerospatiale AS332L1, registered JA6741, operated by Shin Nihon Helicopter Co., Ltd., transported loads with external sling device. Afterward, when leaving and climbing from hovering at the loading site of forward base for fuel supply in Kii-Nagashima temporary helipad around 10:51 Japan Standard Time (JST: UTC +9 hours, all times are indicated in JST on a 24-hour clock), it collided with power transmission lines and crashed into the inclined surface of mountains.

A captain and an on-board mechanic were on board and both of them were fatally injured.

The Helicopter was destroyed and a fire broke out.

Findings

Sequence of the Helicopter's Flight

The Helicopter took off from the Helipad, traveled twice between the forward base and Yamato-dani, and left from hovering in order to go to the Helipad from the forward base for fuel supply, without keeping sufficient distance to the power transmission lines above the ground; therefore, it is highly probable that it collided with the power transmission lines located about 185 m from Pylon No. 64 in the direction towards Pylon No. 65, and crashed.

Selection of Leaving Route

It is somewhat likely that the captain tried to pass over Pylon No.64 which is closest to the forward base. However, there was the sun in the direction towards the Pylon No.64, which was too dazzling for the pilot to directly look ahead; therefore, it is somewhat likely that he turned about 40° to the left and went in the direction of the power transmission lines.

Flight Control in the Accident

If the Helicopter increased the output at the time unloading loads, climbed at a stroke, directed the nose to the traveling direction, and accelerated to shift to the climbing attitude, it is somewhat likely that the attitude of the Helicopter had largely changed, and that it was difficult to accurately grasp the relationship of positions between the Helicopter and the power transmission lines to which the distance was hard to perceive.

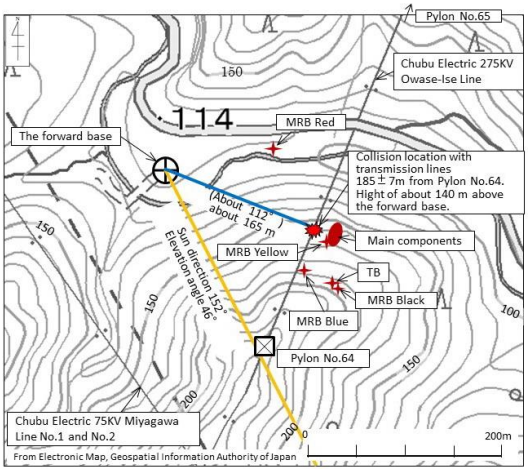
Factors of Preventing the Captain from Paying Sufficient Attention to Lines

The obstacle markings and the obstacle lights were not installed in the power transmission lines with which the Helicopter collided; however, it is highly probable that the captain had confirmed and grasped this in the preliminary survey flight; therefore, it is probable that if the captain had paid sufficient attentions to the power transmission lines, the collision with the lines could have been avoided even when they were not installed. It is somewhat likely that the following factors had influences on the fact that the captain could not pay sufficient attentions to the power transmission lines.

○ He could not afford to take it into consideration because he considered the quantity of fuel supply, and so on.

○ His concentration was deteriorate after he completed difficult loads transportation.

Condition of main components



Situation near the accident site

Probable Causes: In this accident, it is highly probable that the Helicopter did not fly with sufficient distance to power transmission lines stretched in the air when it left and climbed from hovering at the loading site of the forward base, causing the collision with the power transmission lines, which damaged the fuselage and made it crash.

Regarding the fact that the Helicopter did not fly with sufficient distance to the power transmission lines, it is somewhat likely that the captain did not visually confirm the lines soon until the collision, or he could not distinguish the distance to the lines and got closer to the lines than expected.

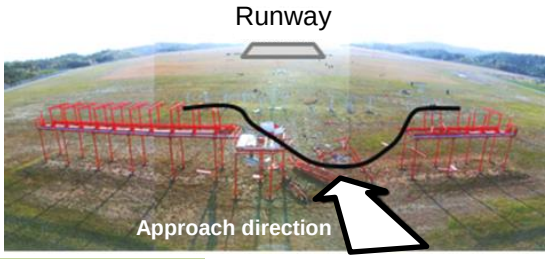
For details, please refer to the accident investigation report. (Published on April 28, 2016)
http://www.mlit.go.jp/jtsb/eng-air_report/JA6741-AA2016.pdf

Collision with the aeronautical Radio Navigation aids caused by undershooting
Asiana Airlines, Inc. Airbus A320-200, HL7762

Summary: On Tuesday, April 14, 2015, an Airbus A320-200, registered HL7762, operated by Asiana Airlines, Inc., as the scheduled Flight 162 of the company, approached lower than the prescribed approach path during approach to Hiroshima airport. The aircraft collided with the Aeronautical Radio Navigation Aids located in front of the runway 28 at 20:05 JST and KST, and it touched down in front of the threshold of the runway. Subsequently, it moved forward on the runway, and then deviated to the south side of the runway and came to a stop inside the runway strip of the airport.

There were 81 people on board, consisting of the Pilot-in-Command (PIC), six other crew members, a boarding mechanic and 73 passengers. Among them, 26 passengers and two crew members, 28 people in total, were slightly injured.

The aircraft was substantially damaged, but there was no fire breakout.



Findings

History of the Flight

- The aircraft commenced the approach to RNAV RWY28 from the final approach fix (FAF).
- After commencing the final approach, mist appeared near the end of the RWY28 approach and RVR (runway visual range) started to deteriorate rapidly.
- The PIC switched from autopilot to manual at about 1,000ft.
- At the decision altitude, the PIC announced "Continue approach".
- The FO said "Runway not in sight".
- The PIC instructed the FO to check the radio altitude.
- Because the runway could not be seen, the PIC performed go-around, but collided with a localizer frame stand.

Continuation of approach

- It is probable that the PIC turned off the AP and FD at 1,000ft, but did not understand that AP/FD must be used in RNAV approach up to the minimum descent altitude (DA) (433ft in this case).
- The PIC and FO said that the runway looked "a bit ambiguous due to cloud", and it is probable that it was difficult for them to continuously sight visual references in order to land safely.

Approach at less than the DA

- It is somewhat likely that the PIC was mainly referring to instruments and particularly to Bird when approaching at less than DA.

Probable Causes: It is certain that when landing on runway 28 at Hiroshima airport, the aircraft undershot and the PIC commenced executing a go-around; however, it collided with the Aeronautical Radio Navigation Aids located in front of runway 28 threshold, just before turning to climb.

Regarding the fact that the aircraft undershot, it is probable that there might be following aspects in causes: The PIC continued approaching without executing a go around while the position of the aircraft could not be identified by visual references which should have been in view and identified continuously at or below the approach height threshold (Decision Altitude: DA); and as well, the first officer, as pilot-monitoring who should have monitored meteorological conditions and flight operations, did not make a call-out of go-around immediately when he could not see the runway at DA.

Regarding the fact that the PIC continued approaching without executing a go- around while the position of the aircraft could not be identified by visual references which should have been in view and identified continuously at or below DA, he did not comply with the regulations and Standard Operating Procedures (SOP), and it is probable that there was a background factor that the education and trainings for compliance of rules in the company was insufficient. In addition, regarding the fact that the first officer did not make an assertion of go-around, it is probable that the Crew Resource Management (CRM) did not function appropriately.

For details, please refer to the accident investigation report. (Published on November 24, 2016)
http://www.mlit.go.jp/jtsb/eng-air_report/HL7762.pdf

Aircraft damage due to runway side excursion during landing

First Flying Co., Ltd. Viking DHC-6-400, JA201D

Summary: On Friday, August 28, 2015, at around 08:55 Japan Standard Time (JST: UTC + 9 hours. All times are indicated in JST on a 24-hour clock) a Viking DHC-6-400 registered JA201D and operated by First Flying Co., Ltd. departed from the side of the runway during landing at Aguni Airport for the purpose of passenger transport, collided with the airport perimeter fence and lateral groove and damaged aircraft.

There were 14 people on board the Aircraft, consisting of a PIC, a crewmember and 12 passengers (including one company employee). Of these, a crewmember and ten passengers suffered minor injuries.

The aircraft suffered substantial damage, but there was no outbreak of fire.

Findings

Situation Upon Approach

It is highly probable that the Aircraft made its approach without the procedure for confirming that the nose wheel is centered and the checklist being performed before landing.

Situation from Touchdown to Depart from the Side of the Runway

It is highly probable that the Aircraft touched down near the runway centerline with the nose wheel slightly deflected to the right, then rolled with the nose gradually turning to the right, and started deviating to the right when it was near the halfway position on the runway.

Situation of the Collision

It is probable that the Aircraft entered the grass area while skidding with its nose pointing slightly further to the right than the direction of travel due to the activation of the right hard brake that started just before the deviation from the runway, after which maximum brakes were applied to both main wheels but could not stop the Aircraft, which first collided with the lateral groove, then collided with the Perimeter Fence and came to a halt.

Landing Procedures of the PF

It is somewhat likely that the PF could not fully understand the situation when the nose started deflecting to the right after touchdown, because he did not have sufficient knowledge concerning the aircraft system of the Aircraft, and was unable to properly perform deceleration using reverse thrusts and brakes as he was distracted by the deflection.

Situation when the Aircraft stopped

Judgments and Actions Taken by the PIC

It is somewhat likely that the inadequate response of the PIC in the event of an unforeseen situation contributed to the fact that he could not properly control the aircraft when it started deflecting and it collided with the Perimeter Fence.

System of training in the Company

It is somewhat likely that one cause of this accident was that the FO undertook PF duties without adequate knowledge of the aircraft system, because the Company did not properly confirm the effectiveness of ground school training and training on the establishment of knowledge given to the FO. It is also somewhat likely that the insufficient awareness by the PIC of readiness for unforeseen situations and his inadequate response in the event of such situations, because the instructor training given to the PIC was not properly carried out, contributed to the occurrence of this accident.

Probable Causes: It is highly probable that this accident occurred because, when the aircraft landed, the First Officer, as the PF in charge of flying, could not properly control the aircraft as it started to deflect after touchdown, as a result of which the aircraft departed from the side of the runway and collided with a fence on the airport perimeter.

It is probable that the aircraft started to deflect after touchdown because the PF forgot to perform the checklist, while the PIC, as the PM in charge of duties other than flying, did not properly monitor the situation or did not perform the necessary pointed out, as a result of which the aircraft touched down with the nose wheel deflected to the right.

It is somewhat likely that the PF could not properly control the aircraft as it started to deflect after touchdown, because his knowledge concerning the aircraft system of the aircraft was inadequate, as a result of which he did not fully understand situations that cause deflection to start. It is somewhat likely, moreover, that the insufficient response by the PIC when an unforeseen situation arose contributed to this.

It is probable that the knowledge of the PF was inadequate and he did not fully understand situations that cause deflection to start, because the company had not properly confirmed the effectiveness of ground school training that should be undertaken prior to route training and training related to establishing knowledge.

For details, please refer to the accident investigation report. (Published on December 15, 2016)
http://www.mlit.go.jp/jtsb/eng-air_report/JA201D.pdf

Emergency operation to avoid crash into water surface

Peach Aviation Co., Ltd. Airbus A320-214, JA802P

Summary: On Monday, April 28, 2014, an Airbus A320-214, registered JA802P, operated by Peach Aviation Co., Ltd., as the scheduled Flight 252 of the company, departed New-Ishigaki Airport and approached Runway 18 of Naha Airport, guided by precision approach radar. At about 11:47 Japan Standard Time (JST, UTC + 9 hr: unless otherwise stated all times are indicated in JST) during this approach, at the position of about 4 nm north of the airport, the captain made a go-around as an emergency operation in order to avoid crash into water surface because the aircraft was losing its altitude. On this occasion, the Enhanced Ground Proximity Warning System issued some warnings. After that, the aircraft landed on the airport at 12:10.

There were 59 persons on board, consisting of the captain, five other crewmembers and 53 passengers, but nobody was injured.

There was no damage to the aircraft.

Findings

History of the flight leading up to the serious incident

When commencing the final approach

- The FO had a heavy workload with completing the checklist and communication with the final air traffic controller.
- The PIC operated the VS knob of the aircraft without making a callout.

→The altitude of the aircraft started to fall.

- The PIC was concentrating on radar guidance, and was not paying attention to the altitude of the aircraft.
- FO was prioritizing the checklist, believed the aircraft to be maintaining an altitude of 1,000ft by AP, and did not check the altimeter.

→The altitude of the aircraft continued to fall.

- After finishing the checklist, the FO noticed that the altitude of the aircraft was falling, and alerted the PIC.
- On realizing that the aircraft was descending, the PIC pressed the VS knob and commenced maneuvers to stop the descent.
- At the same time as the VS knob was operated, a warning was issued by the EGPWS (Enhanced Ground Proximity Warning System).
- At around the same time, the air traffic controller issued an instruction to “Maintain 1,000”.

→It is highly probable that the PIC initiated an approach go-around as an emergency maneuver to avoid colliding with the water surface.

Operation of the VS knob by the PIC

- It is somewhat likely that the PIC intended to stay true to the PAR approach, his first in a while and first in this type of aircraft, and overestimated his impression of the behavior of the aircraft after the glide path convergence.
- It is somewhat likely that, as a result, the PIC did not make a callout, preset the VS knob on the FCU panel to a sink rate of -900fpm, and following this, or some time after this, pulled the VS knob without intending to start the descent.

Flight monitoring

- Since it is probable that the PIC and FO had entrusted the maintenance of altitude to the AP, thus diminishing their alertness to the fact that they were flying at the low altitude of 1,000ft, and that they were not anticipating at all that the aircraft would descend unintentionally, it is probable that they did not pay attention to the FMA mode or basic instruments such as the altimeter and vertical speed indicator.

Probable Causes: It is highly probable that the serious incident occurred because the Captain executed an emergency operation in order to avoid crash into water as the aircraft, making an approach for runway 18 by precision approach radar-guidance at Naha Airport, began descent and continued.

It is probable that the aircraft began descent due to the captain's unintentional operation. It is also probable that the aircraft continued descending because the captain and the first officer were less aware of monitoring the altitude as they relied on autopilot system over maintaining of altitude and did not properly prioritize their tasks.

In addition, it is probable that insufficient risk management at the Naha Ground Controlled Approach Facility, relating to identification of that aircraft before meeting glide-path might descend and deviate below the Radar Safety Zone, consequently contributed to its continued descent of the Aircraft.

For details, please refer to the serious incident investigation report. (Published on July 28, 2016)
http://www.mlit.go.jp/jtsb/eng-air_report/JA802P.pdf

Attempted landing on runway occupied by vehicle

Japan Airlines Co., Ltd. Boeing 767-300, JA8299

Summary: On Sunday, April 5, 2015, a Boeing 767-300; registered JA8299 and operated by Japan Airlines Co., Ltd. took off from Tokyo International Airport continued its approach to Runway 29 at Tokushima Aerodrome after receiving a landing clearance at 10:53, found a vehicle on the runway at about 10:58 after passing the runway threshold, and executed a go-around.

There were 67 people on board the aircraft, consisting of a Pilot in command, seven other crewmembers and 59 passengers. No one was injured.

Findings

Situation of ATC operations
An electric maintenance worker requested permission to enter the runway in order to replace bulbs in the distance marker lights, and the supervisor, judging that there was enough time until the aircraft landed, granted this.

The supervisor, thinking that he could cope by memory alone as there were few takeoffs and landings scheduled, did not use the reminder (*).

* A sign used to show broadly that the runway was closed.

Situation of the reminder in use

○As the day in question was a Sunday and the work load was small, the supervisor was performing tower work and ground work alone.
○The supervisor was preoccupied with a request from a departure aircraft to use the runway in the opposite direction to arrival aircraft.

It is probable that the supervisor, who was combining the duties of the tower and the ground as a result of reducing the personnel number to one, was preoccupied with selecting a runway for the departure aircraft, and thus forgot about the presence of the work vehicle on the runway.

Work on the runway
Because it was a Sunday, the bulb replacement work, monitoring of the vicinity and handling of the transceiver were all carried out by the electric maintenance worker alone.

It is probable that, because he was working alone, this was one reason why he did not notice the presence of the aircraft until just before it landed.

He did not contact the Tower when moving among work locations on the runway, when adding work locations, or when completing the work.

It is probable that the fact that he did not contact the tower was one reason why the supervisor forgot about the presence of the work vehicle on the runway.

Probable Causes: It is highly probable that the serious incident occurred as JA8299 attempted to land because the Tower had issued a landing clearance to JA8299 on the runway occupied by the Work Vehicle.

It is probable that the Tower had issued a landing clearance to JA8299 to land because the Supervisor, who had the combined duties of the Tower and the Ground, had forgotten about the presence of the Work Vehicle.

It is probable that contributing factors were that, in a situation in which only one Air Traffic Controller was on duty in the aerodrome control tower and no support could be received from other controllers, he was preoccupied with selecting a runway for the Departure Aircraft, and that he did not use a reminder indicating that the runway was unusable for take-offs and landings.

For details, please refer to the serious incident investigation report. (Published on August 25, 2016)
http://www.mlit.go.jp/jtsb/eng-air_report/JA8299.pdf

Column

Training of aircraft accident investigators (participation in basic helicopter training)

Aircraft Accident Investigator

Of the 257 aircraft accidents and serious incidents (hereinafter "accidents") investigated by the JTSB over the ten years between 2006 and 2015, 50 or about 20% involved helicopters.

Investigators who were formerly helicopter pilots all say there is nothing more interesting to handle than a helicopter, but very advanced and specialized skills are required in order to do so. While investigating accidents in general demands a high level of knowledge and specialty, helicopters are especially unique and complex in their structure and flying characteristics. This means, in turn, that their behavior in accidents is also varied; the accident locations are often in places that are difficult to access, causing headaches for investigators.

Aircraft accident investigators are a collection of experts with different backgrounds, experience and skills, and when an accident occurs, they are sent to the accident site in teams. Having a broad range of knowledge outside one's own special field significantly enhances the overall performance of an investigation team. To make helicopters easier to understand, the Japan Transport Safety Board provides training on various type of aircraft, with regard to their physical structure, maintenance, handling method, and so on. This gives us a chance to learn the necessary knowledge and skills in between our investigations.

This time, we were given a precious opportunity to train about the structure, operational parameters, safety measures and other aspects of helicopter, using the real thing at Tokyo Heliport over the space of four days. We were thus able to receive valuable training while feeling great admiration for the feats of the early aviators, who had developed helicopters that can maintain such a subtle and exquisite balance while flying. In particular, taking a ride as a passenger on an engine test run was very exciting, as we were able to confirm the range of the instruments, just as we had learned in the classroom.

Taking a ride on an engine test run

Helicopters are active in so many essential aspects of our lives, whether in the construction of various facilities, or in transporting people and goods, disaster relief, medical emergencies (air ambulances), or media reporting. Indeed, our need for these services continues to grow. The progress and hi-tech development of helicopters is quite remarkable, and much effort is being invested in safety measures. Nevertheless, there were six helicopter accidents over the last year, and unfortunately this number is by no means in a decreasing trend.

To achieve a high quality of accident investigation and truly prevent accidents from recurring, we aircraft accident investigators will strive to improve and educate ourselves through various forms of drills and training.