

Korea Aviation voluntary Incident Reporting System

GYRO



Korea Aviation safety voluntary Incident Reporting System



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KAIRS Report

Unauthorized Entry On Taxiway



<Description>

At that time, I was serving as co-pilot, and after push-back at Narita Airport, I had been taxiing into runway 16R for take-off as assigned. At the ground, the captain takes charge of control while I as the co-pilot was in charge of ATC and handling of equipment. After we had been assigned route 1, a ground route for departing from Narita through S8 Gateway, when we were taxiing as specified in the chart, there was a situation that required us to change the taxiway for re-assignment due to a mistake regarding the taxiway. It was the correct procedure to enter from TXYC by passing S1 and taking a right turn on W to enter W, and we had even mutually confirmed in call-outs among crew members that we were "Approaching S1, Next W," and we had gone straight at ABEAM S1. Then, when we reduced the speed of the airplane and took a right turn toward S1 Gateway about 45 degrees, we had realized that we had made a wrong entry, so we stopped immediately. At that time, it was impossible for us to proceed to the right route toward W direction due to the position of the airplane being stopped. When I prepared to talk about the situation to ground control, I first heard the assuring message from the ground "HOLD POSITION I UNDERSTAND YOUR SITUATION" and then "REVISE YOUR TAXI, RIGHT TURN ON S8 GATEWAY, LEFT TURN W9, JOIN W, THAN ROUTE 1." So, we were able to join the normal route 1 from close by the taxiway, and fortunately there was no other traffic nearby, so we could taxi without any problems for taking off.

• KAIRS Comment :

The Narita Airport has a relatively complex structure in comparison with other airports, so the information about the airport must be sufficiently understood in advance. Moreover, the classification of taxiway, etc. is not so easy in comparison with the complexity of structure, and thus it requires attention.

First of all, based on the contents of this report, it seems like that there was insufficient CRM. It is considered that there was a failure to confirm whether the taxiing has proceeded in accordance with the instructions of the control tower, through continuous conversation with the co-pilot.

Second, there was insufficient preliminary preparation by the pilot. It seems that the pilot failed to make sufficient preparations, such as confirmation of the preliminary information, etc. about the relevant airport through charts, etc. In particular, it is essential to ensure one has sufficient information about the airport in advance at a relatively complex place like Narita Airport.

Finally, there seems to be no education or training for pilots that will enable them to recognize the situation. Domestically, training is mainly about emergency situations, and landing / taking-off training, and there is almost no training on taxiing.

Most countries other than the USA have legislated the need for complete Multi-Crew Coordination Education, but there is no domestic legislation on this.

* Multi-Crew Coordination Education: This is a certificate course for individuals who control one-seater planes to complete the simulator and ground education for two-seater planes or more, and its main contents are the education of co-work between pilots. It is necessary to strengthen the pre-flight preparation of pilots such as the confirmation, etc. of information related to the airport, and as shown in the overseas case, it is necessary to prepare a domestic education course on recognition of emergency situations, taxiing, Multi-Crew Coordination, etc. Furthermore, the normal progress upon the instruction from the control shall be thoroughly checked through CRM, and the improvement of indications, markings, etc. in Narita Airport also seems to be necessary to enable pilots to recognize them more easily.

KAIRS Report

Course Deviation Due To Misunderstanding Of Instruction By Control



<Description>

At the time of flight, we were approaching a Visual RWY34 at Fukuoka Airport. We had been approaching in normal descent angle around 1,000 Ft. of FINAL RWY 34, but had gone below the normal descent angle, and so we had initiated the go-around based on the advice of PM. After the completion of initial control of go-around, TWY Control told us "RWY HDG CLIMB 3,000FT" but we were already heading 3,000FT, and again, the TWY Control told us to maintain 3,000FT, but at this time the airplane was already heading 3,500FT. PF had converted to manual operation for a prompt descent to 3,000FT and had controlled to maintain 3,000 FT, and then TWY Control had transferred to DEP Control. Upon making contact with DEP Control, PM reported "MAINTAIN RWY HDG, 3,000FT" and after PM heard "DRT DGC77 CLIMB & MAINTAIN 4,000FT," PM had entered FMS after obtaining the consent of the pilot. However, in our confirmation afterward, it was confirmed that DEP Control had instructed "DRT DGC VOR". At that time, PM had concentrated on the manual operation of PF, altitude adjustment, and Flap speed limit monitor, and had recognized the instruction of DEP Control as "DGC 77" instead of "DGC VOR". This misunderstanding of the instruction from the control is considered to have occurred due to the strong expectation that the instruction from control would let the plane into the pattern based on the traffic. After that, it was transferred back to the approach and the App Control had instructed "HDG 270 CLIMB & MAINTAIN 5,000FT" upon the report of "DRT DGC77 CLIMB & MAINTAIN 4,000FT". Then, we approached again to Visual RWY 34 with radar vector, and made a normal landing for the second time.

• KAIRS Comment :

It is considered that this case complexly combines 3 big issues. First, it seems that the preliminary knowledge of the Fukuoka Airport Chart was insufficient. It seems that DGC77 is a waypoint that does not exist in the official chart, and even though there were contents not listed in the chart among the instructions from control, it seems like there was a failure to make the correct recognition. Second, there seems to be a communication problem between the controller and pilot. From the perspective of the pilot, even though it was the situation to consider that the control instruction had not been clearly delivered, the pilot had controlled the flight as the pilot expected, and there was no confirmation from the pilot or controller regarding the relevant contents.

Finally, there was an issue of whether there was normal performance of control and operation work. Based on the contents of the report, the late instruction by the controller is one of the causes of the altitude deviation, and it is considered that the route

deviation had occurred in accordance with the entry of FMC without the confirmation of the waypoint by the pilot. It is considered that the relevant case has high potential to lead to a big accident if it proceeds any further without the adjustment. In conclusion, the pilot must recognize the situation sufficiently with the chart related to the flight destination before the flight, and cross checking between PF and PM regarding the control instruction must also take place. In addition, it seems to be necessary to improve in order for CRM (Cockpit Resource Management) to be performed normally.

KAIRS Report

Baggage Management Within The Cabin



<Description>

1. A passenger sitting at the bulk head seat placed baggage that seemed to be a laptop computer on his knee during take-off instead of putting it in the overhead bin. If there is an escape attempt in the event of an emergency situation, it is considered that this could lead to a big accident. I inquired to the head office, but I received the reply that there is no size limitation on baggage carried by passengers in the front seat.
2. A passenger was on board the flight while holding a bottle of liquor purchased from the duty free shop. I know that typically, a liquor bottle purchased from the duty free shop must be placed in the overhead bin, but cabin crew guided the passenger without putting the bottle of liquor purchased from the duty free shop at the overhead bin. Later, the crew manager guided the passenger to put the liquor bottle in the overhead bin, but it seems that accurate recognition of the regulation is necessary.

It is considered that this issue occurred due to a lack of recognition by cabin crew of the regulation related to the storage of carry-on baggage. For a passenger sitting at the bulkhead seat, the carry-on baggage must be stored in the overhead bin, while for other seats it can be stored in the storage box under the

front seat. It seems that measures are required to ensure cabin crew are well-aware of the regulations regarding the storage of carry-on baggage in the plane through the transmission of relevant contents. Moreover, the regulation regarding the storage of carry-on baggage in the plane is shared as follows.

※ Regulation regarding the storage of carry-on baggage in the plane (Based on the flight technology for fixed wing aircraft)

8.3.3 Carry-on Baggage

A. A business using aircraft may not allow the boarding of carry-on baggage in the plane if it cannot be stored safely and appropriately in accordance with the flight regulations.

B. A business using aircraft may not allow the closing of the passenger gate of the aircraft for the ground or reverse movement unless a minimum of 1 crew member confirms that each piece of carry-on baggage is fastened tightly with the approved tie-down at the upper shelf; it is loaded for the door to be closed; or it is loaded at the permitted location at the behind the partition.

C. A business using aircraft may not allow the carry-on baggage to be in excess of the maximum permitted weight indicated at the loading location. Note. The loading location shall be sustainable with the baggage under the impact of a collision sufficient to incur the maximum inertial force prescribed under the emergency landing situation being certified with aircraft.

8.1.12.8 Accessibility of Emergency Exits and Equipment

During the ground movement, take-off, landing of aircraft or the period of a passenger staying in the aircraft, no one may allow carry-on baggage or other objects to obstruct the access of passengers to the emergency exit.

ASRS Report (Call Back)

AIRSPACE VIOLATIONS

From NASA's ASRS(Aviation Safety Reporting System)

The National Airspace System (NAS) is complex. The NAS comprises controlled, uncontrolled, special use, and other airspace. Types of airspace are dictated by the complexity or density of aircraft movements, nature of the operations conducted within the airspace, the level of safety required, and national and public interest. Each type of airspace has its own rules and regulations that govern aircraft operations. The NAS must accommodate a multitude of different and changing operational needs. It is continually being modified, and accordingly, high levels of proficiency and adaptability are required from both pilots and controllers. Any unauthorized entry into NAS airspace is a

Federal Aviation Regulation (FAR) violation and may result in an airborne conflict, reduced separation, or a decrease in flight safety. Unauthorized entries occur for many reasons. Procedural errors, airborne conflicts, misconceptions regarding airspace or specific operating requirements, and disregard for FARs have all been identified in reports submitted to ASRS.

This month CALL BACK shares reported incidents of airspace violations along with some of the reporters' reactions, concerns, and insight.

ASRS Report (Call Back)

From One Threat To Another

A BE200 pilot observed an intruder on the Traffic Alert and Collision Avoidance System (TCAS). The airborne conflict and subsequent evasive action resulted in an unannounced incursion into Class B airspace without prior clearance.

■ After a VFR departure, the Tower approved a right turn on course for departure eastbound. Shortly after departing the Class D airspace during level cruise flight at 4,500 feet MSL, I saw a TCAS target appear about four miles ahead and around 500 feet below my altitude. I continued to scan outside trying to visually acquire the traffic as well as update their position on the TCAS. As I approached the target, it began to indicate a climb on the TCAS.

I was unable to acquire it visually and unable to determine a direction of travel. At a distance estimated at less than one-half mile on the TCAS screen, I took evasive action in the form of a climb to avoid a potential collision. There was no other traffic displayed above us in the area. During the evasive action, I inadvertently penetrated the overlying Class B airspace starting at 5,000 feet MSL by an estimated 300 feet for about 30 seconds. After passing the TCAS target, I descended back down below the Class B airspace. I was not in contact with Approach during or after the...incident.

ASRS Report (Call Back)

Ins And Outs Of Class B Airspace

This air carrier Captain was vectored out of and back into Class B airspace. The incident triggered questions, concerns, and misconceptions regarding Class B requirements.

■ We were coming into New Orleans on the RYTHM arrival, which ties directly to the RNAV [approach to] Runway 20. Somewhere around OYSTY, Approach cleared us to 2,000 feet, slowed us to 210 [knots], and cleared us for the approach. We were in IMC. We descended to be outside JASPO (the FAF) at 2,000 feet. This resulted in... getting down to 2,000 feet prior to 15 NM from New Orleans (outside the Class B), doing about 210 knots. When we got to RAYOP, Approach said, "You are reentering the Class B." Oh. Whoops. Class B excursion.

This whole Class B thing has become such an issue that I don't even know what is right anymore. Clearly we were speeding below the lateral limits. However, I was under the impression that the Class B excursions have been occurring during visual approaches, where the pilots are operating on their own recognizance and descending too soon. In this case, we were under ATC control, on an instrument approach, and in IMC. The Controller gave us a clearance below the floor of the Class B, and at a high speed... We were at an ATC assigned speed too high for that position. Are we really supposed to be trapping this type of ATC error...without the tools to do so?... I just don't understand what's going on... [ATC] did not warn us that we might go out the bottom and...didn't tell us when we did.

ASRS Report (Call Back)

Do Not Enter

An air carrier Captain did not recognize a procedural error that occurred prior to departure. That error led to a late turn immediately after takeoff and resulted in the aircraft entering a prohibited area.

■ I was Pilot-in-Command.... After all pre-departure checklists were completed, we taxied to...Runway 1 for takeoff. I glanced over at the First Officer's (FO's) side to see if everything was set up.... Everything looked normal. We made a normal takeoff, broke ground, and did the normal post-rotation clean-up of the aircraft. When we reached the fix on the departure... [where we should have] turned...up the river, I knew something was wrong. I grabbed the yoke and made an immediate left turn...back on course. When I looked at the FO's [Primary Flight Displays (PFDs)],... they were configured incorrectly for the takeoff, so I...corrected his displays. After [that], I engaged LNAV and VNAV to their normal takeoff configuration...[and] selected the autopilot on.... I glanced out my left window and saw [that]...I was still over the river. Shortly afterward,

we were handed off from Tower to Departure.... At some point, we were queried if we had a minute to talk... The Controller then informed us that we had a "possible traffic deviation." I started thinking about it and did not think I had done anything wrong. When I landed,...I was informed that we had penetrated the P-56A airspace that protects the White House. The event occurred because one pilot was not in [the proper] FMS [mode].... When the airplane wanted to turn, it was not [directing the FO] to do that. I will now double check the screens and navigation tools that are supposed to be on...for takeoff.

ASRS Report (Call Back)

It's A Bird, It's A Plane, Or Is It?

A private pilot sighted what was thought to be a large bird in controlled airspace. The pilot's confusion changed to surprise when the species was identified.

■ [I] departed Grand Prairie Municipal Airport at 2,500 feet with a southerly heading until I was clear of Cedar Hill (all the big towers). Once clear, I started to turn left to overfly Mid-Way Regional Airport [JWY] and climb to 3,000 feet. [Beyond the] Class B [airspace], I started my climb to 7,500 feet toward the Little Rock area. I was using Terrell Municipal Airport as a fix and a check for weather and altimeter [setting] when I noticed something that looked like a bird.... I see a lot of birds of different types, and I thought I was seeing a bird at first. I thought, "Good, I'm higher and the bird should not be a factor." Then I tried to refocus my eyes as the movement wasn't quite like a bird; it was close, but not the same. Worse, my brain was not making sense of what kind of bird this might be as I was trying to "see" a black vulture....

My eyes kept telling me that this black vulture had four evenly spaced red dots (as a square) on its back. Then I got mad – that's a drone. And since I don't know a lot about them, I have no way to process how close the drone was. My best guess is within 500 feet. My position was...southwest of Terrell Municipal Airport at 7,500 feet.

CHIRP Report (Feed Back)

Fuel Selector Off

From CHIRP(Aviation and Maritime Confidential Incident Reporting)

Report Text:

I was conducting solo night circuits to retain currency in order to carry passengers at night. While conducting the downwind leg checks I changed tanks to the fullest. The tank selector on the PA32R is located on the floor under the throttle quadrant. Inadvertently while changing tanks from right to left, I had pushed the selector up against the hardware stop built to prevent accidentally selecting off while changing tanks. While turning base the engine began to run rough and power was lost. The engine failure checklist called for changing tanks, which upon doing so immediately restored power, enabling a safe landing. Upon landing the aircraft I examined the fuel selector and found the built in stop was still functioning and pushing the selector against the stop did not reproduce the problem on the ground (I assume because of lower power selection on the ground). The fuel had been drained prior to the flight and found to contain no contamination.

Lessons Learned - Checking fuel for contamination on the PA32 is imperative including operating the under fuselage drain. Night operations include unique hazards, which require visually checking items by torchlight. One cannot be complacent in assuming that inbuilt safety devices will always work. I will modify the checklist for the aircraft to include starting on the left tank to avoid having to change to that tank and risk pushing the selector too far.

CHIRP Comment:

Whilst it is normal procedure on the PA32 (and other aircraft types) to select the fullest tank for landing it is also recommended to switch on the electrical fuel pump before making the tank selection and to leave the electrical pump running for some 30 seconds after the fuel tank change to prevent possible fuel starvation. The fuel selector can be problematic on the Piper PA32. It does have positive detents for each selection and normally requires a positive "two-handed" operation to depress the safety feature in order to move the selector to "off".

However, it is in an awkward position to operate and to check visually the selection that has been made. Although the selector and the stop appeared to be working normally when checked on the ground after the incident, it would be prudent to have the aircraft checked by an engineer to ensure there was no hidden or dormant failure. The reporter's comments about modifying the checklist require caution since checklists are normally part of an aircraft's airworthiness certification.

CHIRP Report (Feed Back)

Late Runway Information

Report Text:

On approach I called final and was advised that my landing was to be on the north side grass and not the hard runway that I had planned for. I sidestepped the approach and landed without issue. I was not aware of a NOTAM advising the hard runway to be closed due to the runway designator being changed - there were work people and vans on the hard runway. I was not made aware on initial radio contact, nor on my PPR call that morning that the hard runway was not available as it was obstructed and that I was to land on the grass. I was only advised on final that I was to land on the grass runway.

Lessons Learned - Be prepared for the unexpected, I could have gone around but I had enough time to adjust the approach and land on the parallel runway. On initial radio call clarify which runway you intend to land on, the runway numbers can mean either the hard or grass.

CHIRP Comment:

Many CHIRP reports concern communications: messages that don't contain all the necessary information, messages not received, not acknowledged correctly and information not assimilated. Whenever there is an option (in this report the hard runway or the parallel grass runway) it is advisable to make it clear which option is required on every transmission and acknowledgement.

CHIRP Report(Feed Back)

Forgotten Fuel Cap

Report Text:

My friend and I flew to [] from [] uneventfully with me as front seat passenger. After a break for lunch it was my turn to fly the return leg. I conducted a walk-round and my friend agreed to dip the tanks to ensure sufficient fuel for the return leg. We monitored fuel burn meticulously, not least because we have found the fuel gauges of our [aircraft] to be inaccurate. The dip readings showed 100 litres in the tanks, sufficient for just over two hours at 155 mph based on recent experience. That would give at least an hour's reserve on arrival. As both aboard were pilots, we agreed how my friend would assist with the flight then I

taxied the aeroplane out for departure. Prior to departure we could smell fuel in the cockpit so we checked the drain cocks under the wing (by opening the door and reaching out rather than exiting the aeroplane) then dismissed the matter when no obvious source of the smell could be found. En route back to [] I noticed the fuel gauges were reading empty on the left and almost empty on the right.

I remarked to my friend that this coupled with the fuel smell prior to departure were of concern and he reassured me that he had had a similar experience in the past and the gauge readings had proved to be erroneous. Moreover, we knew we had over an hour's fuel reserve on board so I took no notice and continued on towards home. With [destination] in sight I initiated a cruise descent and at around 1400 feet the engine began to run down. I applied carb heat and it recovered briefly before stopping altogether. I immediately realised that we had a fuel issue and made a Mayday call on the local frequency. I would estimate that less than a minute later, we were on the ground, following, thankfully, a successful forced landing with no damage and no injuries. On exiting the aeroplane, the understanding of how close a call we'd had begun to dawn. Then my friend spotted that the fuel cap was missing. We dipped both tanks at the scene soon after landing and found them to be dry! Following a call to [the land-away location] the following morning, the fuel cap was found on the grass where we had been parked!

Lessons Learned - I was PI and as such wholly responsible for the safety of the flight. In future I will not delegate responsibility for any safety critical task (or any part of a walk-round), no matter how competent the 'assistant', when I'm PI. I should have thoroughly checked for the source of the smell of fuel prior to departure rather than quickly dismissing it as a trivial matter. I will always check the fuel caps myself prior to every flight. I should not have let the confirmation bias on the fuel readings en route persuade me that all was well and should have read the obvious signs and diverted immediately with plenty of potential diversion airfields nearby.

CHIRP Comment:

We are grateful for this honest report and agree with the Lessons Learned. Of note, any fuel state which requires the declaration of an emergency by the pilot is an occurrence that is reportable to the AAIB.

Aviation News

Metroliner Cargo Flight Turns Ugly When Loose Screwdriver Hit Propeller During Takeoff



A Swearingen SA226-TC, N158WA, was substantially damaged due to foreign object damage to the airplane's propeller and fuselage during initial takeoff/climb from Boise Air Terminal, Idaho, USA. According to Federal Aviation Administration personnel, about the time the airplane was rotating from runway 10L, the pilot experienced a light vibration; he subsequently returned to BOI and landed uneventfully. During a post-landing examination of the airplane, it was revealed that a portion of the outboard section of a left propeller blade, which had fragmented into 2 pieces, was missing. Additionally, about a 4 inch by 4 inch puncture hole was observed to have gone through the left forward side of the fuselage just aft of the main air stair door; a piece of the propeller blade was found in the cabin. It was further noted during a runway sweep for foreign objects shortly after the occurrence, that a screw driver which had been used during maintenance on the airplane earlier, and the second piece of the propeller blade tip, were both recovered from the departure runway in the same approximate location from where the airplane would have rotated.

Probable Cause: "Company maintenance personnel's failure to remove a screwdriver that was left lodged in the windshield wiper area of the forward fuselage during maintenance and subsequently became dislodged on takeoff/initial climb and collided with a left propeller blade."

Travel Tips

Current Status Of Preliminary Seat Purchase Service By Domestic LCCs

- * All domestic LCC companies have introduced the preliminary seat purchase service.
- * Expansion of charged additional services such as purchase service of side seats, etc.

The biggest characteristic of LCCs is that they offer low air fare, but most additional services other than the basic service are provided at a charge. In general airline companies, it would be reasonable to request a specific seat if it is in the same class, but on an LCC, there are many cases in which some more favorable seats are provided for a charge. On most domestic LCCs, if you want to designate a specific seat, you would have to use a preliminary seat purchase service. Most LCCs such as Jeju Airlines that is leading the domestic LCC market, Jin Air, T-way Air, etc. have provided a preliminary seat purchase service, and Air Busan has recently joined this trend.

Classification	Range of designation	Detailed contents	Fare (Section/Route difference)	Special matters
Jeju Airlines	All flights All seats	- Seat in the first row - Seat next to the emergency exit - Other general seats	- General seats: + 1,000 ~ 15,000 won - First row/ emergency exit: + 10,000 ~ 30,000 won	Possible to purchase a side seat Fare: + 10,000 ~ 50,000 won
Jin Air	All flights All seats	- Seat in the first row - Seat next to the emergency exit - Other general seats	- General seats: + 4,000 ~ 19,000 won - First row/ emergency exit: + 6,000 ~ 40,000 won	Jiny Plus: + 15,000 ~ 100,000 won
T-way Air	All flights All seats	- Premium - Semi-premium - General seat * Including a seat next to the emergency exit	- Difference for each seat / route + 4,000 ~ 25,000 won	Possible to purchase a side seat Fare: +15,000 ~ 35,000 won (Impossible on domestic routes)
Air Busan	International flight	- Seat in the first row - Seat next to the emergency exit - Other general seats	- Difference for each seat / route + 6,000 ~ 25,000 won	Possible to purchase a side seat Fare: +15,000 ~ 35,000 won
Easter Jet	All flights	- Seat in the first row - Seat next to the emergency exit	- Difference for each seat / route + 7,000 ~ 25,000 won	Possible to purchase a side seat Fare: +10,000 ~ 40,000 won
Air Seoul	International flight	- First row and seat next to the emergency exit - General seat	- Difference for each seat / route + 10,000 ~ 20,000 won	Possible to purchase a side seat Fare: +15,000 ~ 30,000 won

* Most are subject to a discount if purchased on-line. (As of Jul. 2018)

- Source: www.airtravelinfo.kr (Aviation travel information)-

Common Aviation Knowledge

12 Aviation Accidents That Led To Changes In The Field Of Aviation

- * Aviation has developed through a repeated history of trials and errors.
- * Many improvements of procedures and technological developments have come about as a response to an aviation accident.

There is a saying that the changes and developments that have taken place in the field of aviation are made out of blood. "Flying in the sky" is the achievement of the human dream, but since flying in the sky is a challenge and adventure in itself, the risk has been increased as well.

There are many cases in which the development of aviation technology has not outrun the danger. From the pioneer era of aviation to the present time, aviation accidents have continuously occurred, resulting in the sacrifice of numerous lives. This is because it is very difficult to accurately predict the danger that may occur from an aircraft being flown in the sky. While coming up with new safety measures after an accident may seem like "locking the barn door after the horse has been stolen," the fact is that we can always lose the horse again, and so we have to improve on safety while thinking about the pain of the past.

Ironically, aviation accidents have had significant influences on various areas of the development of technology as well as the measures / policies for the safety of aviation. This may seem to be developed over the pain. Of these aviation accidents, there are some accidents that gone beyond mere accidents to have a huge impact on the aviation industry.

- Air collision accident of aircraft (1956) - Sky over Grand Canyon



A Super Constellation aircraft of TWA (002) and DC-7

aircraft of United Airlines (718) collided in the sky over the Grand Canyon, and 128 people – all passengers on both aircraft – were lost. This accident led the US government to make an investment of 250 million USD in upgrading the entire ATC system. Ever since, there have been no air collisions between two large aircrafts in the USA. Furthermore, this accident led to the establishment of the FAA (Federal Aviation Agency) in 1958. Unfortunately, in 1986 there was another air collision accident in which 86 people were killed, which was a collision between a small plane called a "Piper PA-28" and a large aircraft. As a result of this accident, a law was made requiring small planes to be equipped with a Transponder, enabling the development of TCAS (traffic collision avoidance system).

- ▶ Influence: Development of the collision avoidance system and the improved ATC system

- United Airlines flight no. 173 (1978) - Portland
In Portland, when the DC-9 passenger flight (no. 173) of United Airlines failed to land the first time and remained in the air, the pilot did not recognize that the indication given by the fuel gauge was incorrect. The fuel ran out and the pilot attempted an emergency landing nearby, resulting in the deaths of 10 out of the 189 passengers. This accident gave a birth to the pilot training program, so-called Cockpit Resource Management (CRM), with new concept emphasizing teamwork and communication, a shift from the previous "captain is god" paradigm. Al Haynes, a United Airlines pilot who made a successful emergency landing of a DC-10 aircraft in 1989, once commented that this would be not have occurred without CRM.

- ▶ Influence: Showing the importance of teamwork and communication in the cockpit

- Air Canada flight no. 797 (1983) - Cincinnati



In the process of an escape after the emergency landing of a DC-9 aircraft owned by Air Canada at Cincinnati Airport due to a fire during the flight, 23 out of 46

passengers were killed due to the rapid expansion of the fire. In this accident, the fire that occurred within the sealed compartment had been expanded by the supplying of oxygen from outside when the door of the aircraft was opened. In relation with this accident, FAA insisted on the installation of smoke detectors and automatic fire extinguishers within the aircraft toilets. Following this, all airliners around the world were required to replace the seats with seats made from incombustible material, and to install a guidance cabin light system to enable escape in an emergency.

- ▶ Influence: Mandatory installation of smoke detectors and automatic fire extinguishers at the lavatory in the aircraft

- Delta Airline flight no. 191 (1985) - Dallas
When the L-1011 passenger flight of Delta Airlines approached Dallas Airport for landing, it fell due to some kinds of wind shear such as micro-burst, and 135 out of the 163 passengers were killed. Like the Pan Am Airlines accident in 1982, it was revealed that wind shear was the cause of accident, so the FAA mandated the installation of an Airborne wind shear detection and alert system, a preliminary wind shear detection system developed after 7 years of research, on all aircrafts. Since then, there has only been one case of accidents occurring due to wind shear.

- ▶ Influence: Mandatory installation of wind shear detection device

- Aloha Airlines flight no. 243 (1988) - Maui



A B737 passenger aircraft of Aloha Airlines, which lost parts of its body during a flight due to an explosion, landed safely at Kahului Airport. Though one crew member was sucked out of the plane upon the explosion, the rest of the crew and all passengers were safe. US NTSB considered that this was the result of repeated corrosion and the accumulated fatigue during the more than 89,000 flights performed by this aircraft. As a result, the FAA commenced a research program on

old aircraft in 1991 in order to reinforce requirements related to aircraft inspection and maintenance.

► Influence: Reinforcement of requirements on the inspection and maintenance of old aircraft

- Swiss Airlines flight no. 111 (1988) - Nova Scotia



An MD-11 passenger aircraft owned by Swiss Airlines that was heading to Geneva fell into the sea, killing 229 – all crew members and all passengers. This accident occurred due to a fire in the cockpit that spread due to presence of combustible material, making control of the aircraft impossible. Sparks from some of the wires at the top of the cockpit caused a fire that spread rapidly, which was determined as the main cause, and so the FAA required that the cockpit material in 700 aircrafts of McDonnell Douglas be replaced with non-flammable material.

► Influence: Mandatory use of insulation for wiring material

- United Airlines flight no. 232 (1989) – Sioux City



When a DC-10 passenger aircraft owned by United Airlines made an emergency landing at Sioux City after its number 2 engine turned off during the flight, 111 out of 296 passengers were killed. When the engine stopped, the hydraulic system could not be operated, causing this accident. Ultimately, this was traced back to an initial manufacturing problem of titanium alloy, that resulted in the mechanism to

detect the cracking of fan disk in the engine not being activated. The FAA instructed that the hydraulic system of all DC-10 aircraft be amended, and the method of engine inspection was changed as well since the FAA requests a dual safety system on all aircraft being developed in the future.

► Influence: Improvement of engine safety and change in inspection method

- American Airlines flight no. 427 (1994) - Pittsburgh



A B737 aircraft owned by American Airlines crashed during its landing at Pittsburgh Airport, killing 132 passengers and crew members. This accident had occurred due to a problem with the operation of a rudder, which is one of the control surfaces. An investigation carried out by American Airlines over 5 years found that the cause of this accident was the same as for the accidents involving United Airlines flight number 585 in 1991 (25 deaths) and East-wind Airlines flight number 517 in 1996 (no casualties). In detail, some of the valves of the rudder control system had been blocked, resulting in the rudder being operated in reverse. Following this discovery, the Boeing Company was required to spend 500 million USD to repair the 2,800 B737 aircrafts being operated in the world at that time.

► Influence: Improvement of structural problem on the rudder of aircraft

- Value Jet flight no. 592 (1996) - Miami



A DC-9 aircraft operated by Value Jet fell out of the sky due to a fire accident that started in an oxygen container loaded at the cargo bay, killing all 110 passengers. As a

result of this accident, the FAA mandated the installation of smoke detectors and automatic fire extinguishers at the cargo bay of all commercial flights, and reinforced regulations on the transportation of dangerous goods.

► Influence: Mandatory installation of smoke detectors and automatic fire extinguishers at the cargo bay in the aircraft

- TWA flight no. 800 (1996) - Long Island



A B747 passenger aircraft operated by TWA that was heading to Paris exploded right after taking off from JFK Airport in New York, killing all 230 passengers. Initially suspected as an act of terrorism, an investigation found that a defect in the central fuel tank was the cause. The fire had occurred due to an electric spark near the fuel tank for the central wing, so the FAA instructed that the wiring design structure near the fuel tank be changed. As the same time, the Boeing Company developed a fuel inactivation system, in which nitrogen gas is injected into the fuel tank in order to reduce the possibility of an explosion, and installed this in all aircraft it developed moving forward.

► Influence: Change of wiring design near the fuel tank (Prevention of electric spark)

- Air France flight no. 447 (2009) - Atlantic Ocean between Rio and Paris



An A330 passenger aircraft operated by Air France that was heading to Paris from Rio de Janeiro fell into the Atlantic Ocean, killing all 228 passengers. The automatic flight control system had been suspended due to a

problem with the speedometer, after which the co-pilot made a mistake that resulted in an engine stall.

While a problem with the pitot tube in the speedometer was the initial cause, the lack of proficiency on the part of the pilot, who is responsible for restoring it, was highlighted as a bigger cause. As a result of this accident, it was made mandatory to increase the weight given to education in manual flight, even for modernized aircraft, which depends on the automated system.

The automated system in the Boeing aircraft can be disabled at the judgment of the pilot, but Airbus aircraft are entirely dependent on the aircraft's automated system.

► Influence: Reinforcement of manual operation training in order to reduce the dependency on the aircraft's automated system

- Malaysia Airlines flight no. 370 (2014) - Presumed in the Indian Ocean



A B777 passenger aircraft operated by Malaysia Airlines that was heading to Beijing in China went missing after leaving Kuala Lumpur. 17 days after the accident, the aircraft had been presumed to have fallen at the southwest of the Indian Ocean, but the exact location and cause was unknown. As of the present time in 2018, the aircraft has still not been found, and all 239 crew members and passengers are presumed to have been killed. If the real-time tracking device suggested after the accident of Air France flight no. 447 had been attached, it is considered that the plane could have been found even after the accident. There is a growing consensus worldwide on the need to develop real-time tracking devices for aircraft.

► Influence: Showing the necessity of a real-time tracking system for aircraft

-Source: www.airtravelinfo.kr (Aviation travel information)-

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