

الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY



Incident

- Summary Report -

AAIS Case N° AIFN/0011/2018

Inadvertent Opening of Emergency Exit Hatch and Deployment of Slide Ramp

Operator:	Saudia Airlines
Make and Model:	Airbus A320
Nationality and Registration:	Saudi Arabia, HZ-AS55
Place of Occurrence:	Dubai International Airport
State of Occurrence:	The United Arab Emirates
Date of Occurrence:	20 September 2018



Investigation Objective

The Investigation was performed by the Air Accident Investigation Sector (AAIS) pursuant to the UAE *Federal Act No. 20 of 1991*, promulgating the *Civil Aviation Law, Chapter VII- Aircraft Accidents, Article 48*. It is in compliance with the *Civil Aviation Regulations (CARs), Part VI Chapter 3*, in conformity with *Annex 13 to the convention on International Civil Aviation*, and in adherence to the *Air Accidents and Incidents Investigation Manual*.

The sole objective of this Investigation is to prevent aircraft accidents and incidents. It is not the purpose of the investigation to apportion blame or determine liability.

This Summary Report is made public at:

<http://www.gcaa.gov.ae/en/epublication/pages/investigationReport.aspx>

Investigation Process

The Incident involved an Airbus A320 aircraft, registration HZ-AS55, and was notified to the AAIS Duty Investigator by phone to the Hotline Number (+971 50 641 4667).

After the Initial/On-Site Investigation phase, the occurrence was classified as an 'Incident'.

The scope of this Investigation is limited to the events leading up to the occurrence; no in-depth analysis of non-contributing factors was undertaken.

Notes:

1. Whenever the following words are mentioned in this Report with first capital letter, they shall mean the following:
 - (Aircraft) The aircraft involved in this Incident
 - (Incident) The incident that is the subject of this Report
 - (Investigation) The investigation into the circumstances of this Incident
 - (Report) This Incident Summary Report
2. Photos and figures used in this Report are taken from different sources and are adjusted from the original for the sole purpose to improve the clarity of the Report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or

enhancement of colour, brightness, contrast, or addition of text boxes, arrows, or lines.

3. This Summary Report is structured using the relevant headings as depicted in the *Annex 13* Final Report format.



Factual Information

History of the Accident

On 20 September 2018 at 1038 local time, Saudia Airlines flight SV566 from Jeddah King Abdulaziz International Airport (OEJN), Saudi Arabia, operated by an Airbus A320-214 aircraft, registration HZ-AS55, landed at Dubai International Airport (OMDB), the United Arab Emirates. There were two flight crewmembers, 5 cabin crewmembers and 119 passengers on-board.

The flight and the landing were uneventful and the Aircraft taxied to gate C58 as instructed.

After turning towards the terminal, two fire-fighting vehicles, which were located on either side of the taxiway, started spraying jets of water to welcome the Aircraft with a water salute in celebration of the Saudi Arabia National Day (figure 1). The vehicle turret operators selected a water jet with a high kinetic energy to form a far-reaching arc.

The fire-fighting vehicle positioned on the left side of the Aircraft, FIRE 8, experienced a problem with the roof turret, which ceased to follow the operator's input from the hand controller. The high pressure water jet was suddenly sprayed upwards and then downwards, as the Aircraft passed underneath (figure 2). The Aircraft was struck by the water jet causing the left forward over-wing emergency exit hatch to open. The hatch fell into the cabin. This resulted in the deployment of the left over-wing emergency slide ramp.

The flight crew was alerted to the opening of the emergency hatch by the master warning system and stopped the Aircraft immediately. They were not aware that a water salute had been arranged on arrival at the gate and therefore they could not inform the cabin crew or passengers prior to the event.

The Aircraft was towed to the gate with the slide ramp attached, where the passengers disembarked normally.

The deployment of the over-wing emergency exit hatch into the cabin slightly injured the passenger seated in the adjacent window seat. The passenger received medical attention and decided to continue their journey after being medically cleared.

Once the Investigation team was satisfied that the relevant evidence was collected and secured, the Operator's maintenance organisation inspected the Aircraft and detached the slide ramp.

The Aircraft departed Dubai International Airport at 1622 local time as a commercial flight following a four-hour delay, after the Operator's Technical Services department issued an Engineering Authorization, which permitted the operation of the Aircraft for one flight without the left over-wing slide ramp fitted.



Figure 1. Aircraft arrival at gate (start of water turret malfunction)



Figure 2. Water jet strikes the over-wing emergency exit hatch

Damage to Aircraft and Property

As a result of the opening of the over-wing emergency exit hatch, the slide ramp deployed and inflated. An inspection of the slide ramp approximately one hour after the Incident, identified that the slide deployment mechanism had been activated and the slide ramp had deployed and had remained inflated as designed. The emergency exit hatch and the airframe hatch attachments and mechanism were inspected by a company engineer. No damage was found and the emergency exit hatch was refitted. The inflated slide ramp was detached from the aircraft.

There was no damage to property, or to the environment.

Personnel Information

The Commander held an ATPL and had accumulated a total of 6,728 hours, including 405 hours on the Airbus A320.

The Copilot held a CPL and had accumulated all of his total 2,207 hours on the Airbus A320.

Both pilots had valid aviation medical licenses.

Aircraft Information

The Aircraft involved was an Airbus A320-214, and was delivered from the manufacturer to the Operator in 2017. It had accumulated 4,977 hours and 3,933 landings.

The A320-214 is a 'narrow body' design with a single aisle cabin, which was configured with 12 business class and 132 economy class seats.

It is equipped with four floor level type I emergency exits (doors 1L, 1R and 4L and 4R), and four type III emergency exits at rows 35 and 36 (forward over-wing exits L and R, and aft over-wing exits L and R) as shown in figure 5. Opening either of the floor level type I exit doors in the armed position, automatically deploys a slide raft to assist evacuees exiting from these doors. The opening of any of the over-wing emergency exit hatches, deploys a slide ramp over the trailing edge of the wing to assist in evacuation.

Over-wing Emergency Exit Hatch Mechanism

The four type I passenger doors may be operated from outside the aircraft by lifting a control handle upright, after the cabin pressure has been equalized by the flight crew, and the doors have been disarmed by the cabin crew from within the cabin. Refer to figure 3.

The type III over-wing emergency exit hatches are not armed or disarmed during Aircraft operations because these exits are only used during an emergency situation. While their condition is always considered as 'armed', they are only operational when the cabin pressure is equalized. Similar to the type I cabin doors, their installation design prevents them from opening while the cabin is pressurized.

The type III emergency exits are opened from inside the cabin by removing a cover and operating a pull handle. These exits are accessible from the outside via the upper surface of the wing, and they are opened by pushing a red push panel, as shown in figure 4. Applying force to the push

panel allows an untrained person to operate and open the exits.

The exit hatches are not hinged and when operated they open inwards into the cabin, from where they are picked up and then thrown outside by the passenger seated nearest to the hatch.

Each emergency exit hatch weighs approximately 15 kg.

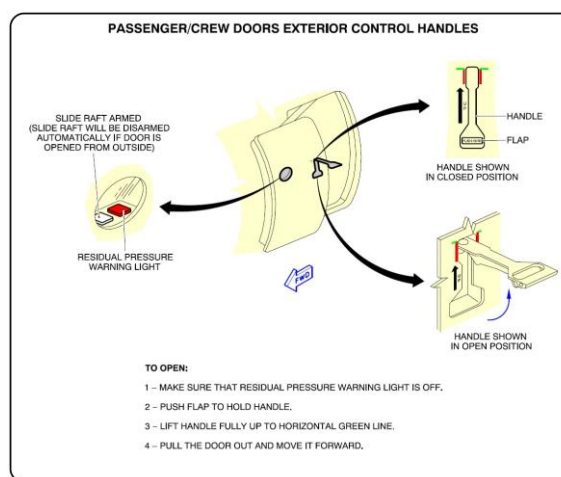


Figure 3. Passenger door opening mechanism
[Source: Airbus]

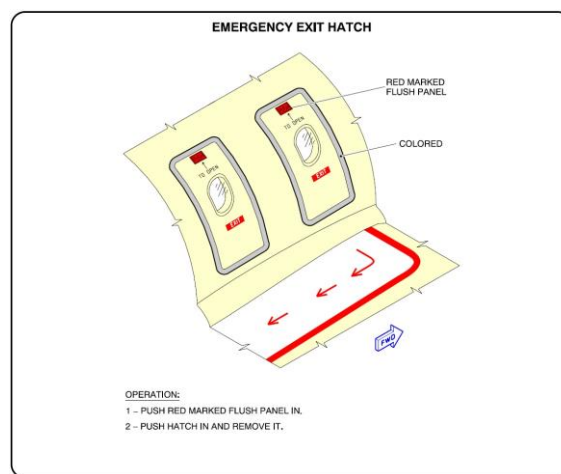


Figure 4. Over-wing emergency exit hatches
[Source: Airbus]

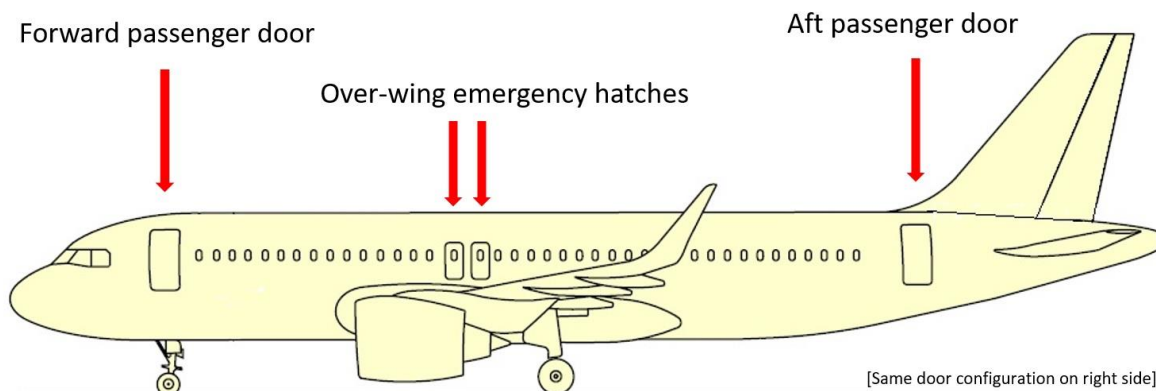


Figure 5. A320 (Emergency exit) door configuration

Deployment of the Over-wing Slide Ramp

The opening of the over-wing emergency exit hatch resulted in the deployment of the left side slide ramp. An inspection identified that the slide ramp deployed successfully and as designed. No damage to the slide ramp or the Aircraft was visible and the slide ramp remained fully inflated until it was detached

The flight crew were alerted by a master caution warning to the fact that the left forward over-wing emergency exit hatch had been opened. They initially suspected that a passenger had opened the hatch from the inside. The Aircraft was stopped immediately and the parking brake was set. This was followed by both engines being shut down. It became apparent later that the opening of the hatch had been unintentionally initiated from outside the Aircraft.

Aerodrome Information

Dubai International Airport (OMDB), is certificated by the General Civil Aviation Authority of the United Arab Emirates, and is located 4.6 kilometers east of Dubai city.

The Airport rescue and firefighting services comply with Category 10 requirements of Part XI- Aerodrome Emergency Services, Facilities and Equipment, of the Civil Aviation Regulations, and they also conform to ICAO Annex 14- Aerodromes requirements.

Organizational and Management Information

FIRE 8 Roof Turret Repair Report

The fire-fighting vehicle that suffered the turret malfunction, a Rosenbauer Panther 8X8, was removed from service after the Incident. The vehicle manufacturer was notified and dispatched a maintenance team to inspect and repair the

turret mechanism. An AAIS investigator attended the maintenance activity, which identified that the loss of vertical turret control was caused by a fault in the elevation control potentiometer on the control handle.

The potentiometer was replaced and the turret movement re-calibrated before FIRE 8 returned to service.

History of Rosenbauer Panther 8X8 Turret Failures

The fire vehicle manufacturer was contacted and they stated that no similar turret control problems had been reported previously.

Dubai Airport Fire Vehicle Turret Maintenance

The fire-fighting vehicle maintenance organisation provided the investigation with maintenance records for the fleet. No similar turret problems had been recorded in the preceding 12 months. However, the maintenance technicians advised that similar movements had been observed previously and rectified by a re-calibration of the turret and hand controller movements.

Water Salute Communication

The Investigation interviewed the Commander of the Aircraft, who advised that the intent of the water salute was not communicated to the flight crew. This resulted in an unexpected spraying of the Aircraft after it turned towards passenger gate C58. Cabin crewmembers could therefore not be informed and became concerned when they noticed that the fire vehicles started spraying water onto the Aircraft. The reaction of the passengers was not known.

The request for the water salute to celebrate the Saudi Arabia National Day originated from Dubai Airports Aviation Business Development. It



was communicated to the Airport Fire Services Operation Center and the Operator's Operations Manager.

This request was not communicated to the Aircraft flight crew, or the ground handling crew who were awaiting the Aircraft at the gate.

The Operator's Technical Services' Engineering Authorization

The Operator's Technical Services department issued Engineering Authorization number S25-A10024, to permit the operation of the Aircraft without the left side over-wing slide ramp fitted. The authorization was issued specifically for this event and included a number of conditions and restrictions.

The conditions included that the emergency exit hatch was inspected in accordance with the *Pre-Flight Installation of the Enclosure Door* procedure in the aircraft maintenance manual, that the exit hatch was secured during the flight, and that each crew member was informed that the over-wing slide ramp was inoperative and could not be used in case of an emergency.

The restrictions as described in the authorization, included the blocking off and identification of rows 33 to 44, reducing the passenger seat capacity from 144 to 72 seats.

Additional Information

Water Salute Process

Historically, water salutes were initiated for ceremonial purposes and carried out by airport fire services.

Water salutes were intended to celebrate inaugural airline flights, final airline services, retirement of respected airline pilots, or other special occasions.

Typically, a water salute involved two or more fire vehicles, perpendicularly parked outside the taxiway, spraying water jets in an arc above a taxiing aircraft. The spray pattern was adjusted to a high velocity, forceful jet, to achieve the necessary spray distance.

Some airport fire services have modified this traditional arrangement. To avoid spraying water onto an aircraft, two fire-fighting vehicles leading the taxiing aircraft and form a moving arc of water ahead.

Reported Incidents during Aircraft Water Salutes

In March 2015, a Virgin Airlines Airbus A330, sustained damage to both engines when, after an inaugural flight from Manchester, the UK, to Atlanta, the United States, foam instead of water was sprayed during a water salute. The subsequent flight was cancelled.

A Japan Airlines Boeing 787 sustained damage to the wing in 2014 at Tampa International Airport, the United States, when, during a water salute, the right wing hit the water turret of the fire vehicle, which was parked too close to the taxiway. Water salutes at the airport were suspended as a result.

In 2006, a United Airlines Boeing B777 sustained engine damage, when fire fighters decided to swap water with fire-fighting foam, during a water salute to celebrate a retiring airline pilot, at Dulles Airport, the United States.

Analysis

Flight Crew Performance

The flight crew conducted an uneventful landing and taxi at Dubai International Airport, and were surprised when the fire vehicles initiated a water salute after the Aircraft had turned towards the passenger gate. This was particularly unexpected, as the Saudi Arabia National Day occurred three days later, on 23 September 2018.

As there was no information available, the flight crew continued taxiing until they became aware that the left forward over-wing emergency exit hatch was open. Suspecting that a passenger had opened the emergency exit hatch, they immediately stopped the Aircraft, applied the parking brake, and shut both engines down to ensure that any exiting passenger would not be endangered by an operating engine.

The flight crew found themselves in an unexpected situation where they had to react to unpredictable external events. They followed known procedures to the best of their knowledge and the information available to them at the time.

Water Salute Communication

The intent of the water salute was poorly communicated. All of the relevant stake holders were not informed, which resulted in a break-down of information flow and confusion on the ground, and in the Aircraft. The flight crew were therefore unable to prepare the cabin crew or the passengers.

The flow of information is critical, as unsuspecting passengers may panic and behave



erratically. This may lead to unsafe actions by passengers and could pose a threat to the safety of those on-board.

Water Salute Procedures

The process of water salutes is not generally formalized by airlines, airport operators, or airport fire services.

The Investigation reviewed several incidents that occurred during water salutes, which resulted in damage to aircraft and had also led to decisions to halt the practice at some airports.

While water salutes are accepted practice for special events, they remain non-normal practice. Therefore, airport operators, airlines and airport fire services should have a risk assessment process in place to ensure that damage and potential injury can be avoided.

Malfunctioning Turret Procedures

The failure of the water turret to follow the hand controller commands, appears to have been a fault that had occurred prior to this Incident. Although the maintenance organization could not provide maintenance records, maintenance staff were aware of the fault and the re-calibration rectification.

Correct functioning of fire vehicle water turrets is critical. As this incident has shown, the fault in the turret controller has the potential to cause injuries, hinder fire-fighting or rescue activities, or cause damage to aircraft, or equipment.

While, as per the fire vehicle manufacturer, the turret malfunction had not occurred previously, it is recommended that a regular turret check be introduced to ensure that any malfunctions are identified and rectified at an early stage.

It is also recommended that the airport fire services consider a 'dry' turret check prior to any water spraying operation, to ensure that the turret follows the hand controller's inputs prior to spraying water.

A320 Over-wing Emergency Exit Hatch Design

There are different designs for type III emergency exits, commonly used for over-wing positions. While some are hinged and open outwards, the exits on the Airbus A320 are not hinged and they are designed to be brought into the cabin when opened. It is a design feature of these hatches that they are thrown out of the opening by the passenger, to commence the evacuation from the exit.

While the Incident demonstrated a scenario where the hatch opened unexpectedly, it is also an important feature of this design that the hatch can be successfully opened by an untrained person from the outside. This could be a passenger who had evacuated from another exit, or a bystander, not involved in an incident or accident.

The Investigation was unable to identify other similar occurrences, where these exits opened unexpectedly.

Conclusions

Findings

- (a) The Aircraft was certificated, equipped and maintained in accordance with the existing requirements of the *Civil Aviation Regulations* of the United Arab Emirates.
- (b) The Aircraft was airworthy before the Incident.
- (c) The flight crewmembers were appropriately licensed.
- (d) The landing and taxiing were uneventful until the Incident.
- (e) The fire vehicle's roof turret sprayed water erratically when the turret became uncontrollable.
- (f) The Aircraft's left forward over-wing emergency exit hatch opened when the latch was pushed in by the high kinetic energy of the water jet.
- (g) The slide ramp deployed as designed, when the emergency exit hatch opened.
- (h) The passenger sitting next to the emergency exit hatch sustained minor injuries when the hatch fell into the cabin.
- (i) The Aircraft was not damaged.

Causes

The Air Accident Investigation Sector determines that the cause of the Incident was the erratic directional movement of the water jet onto the push panel of the left forward over-wing emergency exit hatch, which, when pushed inwards, resulted in the emergency exit hatch opening and falling into the cabin, slightly injuring the passenger seated in the window seat.



Contributing Factors to the Incident

The Air Accident Investigation Sector identifies the following contributing factors to the Incident:

- (a) The fire vehicle's hand controller potentiometer failed to control the movements of the roof turret.
- (b) The process of a water salute had not been formally described and risk assessed by the airport fire service, thus the possibility of erratic water turret movement was not identified.

Safety Recommendations

The Air Accident Investigation Sector recommends that the UAE General Civil Aviation Authority requires UAE aerodromes which allow water salutes to:

SR07/2019

Conduct a formal risk assessment and draft a procedure for the conduct of water salutes, to ensure that identified risks are mitigated so that water salutes can be conducted safely.

SR08/2019

Introduce a routine "dry" turret check procedure, to ensure that malfunctioning turrets are identified during maintenance, or prior to their operation with water or foam.

**This Report is issued by:
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