

INVESTIGATION UPDATE

AIRBUS A380-800, REGISTRATION 9V-SKE DIVERSION TO BAKU, AZERBAIJAN 5 JANUARY 2014

This investigation update contains facts which have been determined up to the time of issue. It is published to inform the aviation industry and the public of the general circumstances of the occurrence and should be regarded as tentative and subject to alteration or correction if additional evidence becomes available.

Air Accident Investigation Bureau of Singapore
Ministry of Transport
Singapore

24 February 2014

AIRCRAFT DETAILS

Aircraft type:	Airbus A380-800
Aircraft registration:	9V-SKE
Operator:	Singapore Airlines
Numbers and type of engines:	4 Rolls Royce Trent 900
Type of flight:	Scheduled passenger flight
Date and time of incident:	5 January 2014, 1818 H (UTC)
Location of incident:	Turkmenistan airspace
Phase of flight:	Cruise
Persons on board:	494

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1 On 4 January 2014, the day before the flight diversion incident, the aircraft operated a scheduled flight from Singapore to London. After take-off from Singapore, a cabin crew member noticed a constant louder than normal noise coming from the third left door on the main deck (D3L). A flight crew member subsequently went to the cabin to check on the door and did not notice anything unusual, other than the noise.

2 Prior to 4 January 2014, maintenance personnel inspected the door on 23 December 2013 because of reported noise. No anomaly was found except for a slightly worn seal on the door's upper edge. An entry was made in the Aircraft Deferred Defect (ADD)¹ log for this issue to be monitored. The ADD system allowed this defect to be rectified within 120 days.

3 After the aircraft arrived in London, the defect was reported to the maintenance personnel who then inspected the door. The areas inspected included

¹ Aircraft Deferred Defect is an aircraft defect which has been assessed as being within technical limits or as not affecting the airworthiness of the aircraft, and has had rectification deferred within a specified limit.

door seal, seal guides, rollers, stops, coverplate² and the condition of the exterior door skin. No anomaly was found, other than the slightly-worn seal noted previously. The defect remained on the ADD log.

4 On the aircraft's return flight to Singapore on 5 January 2014, the noise was heard again at D3L. According to the cabin crew member who was seated at D3L during the take-off, the noise was, as far as she could remember, louder than when she flew on the same aircraft to London on 2 January 2014. She felt around the door but did not detect any air leak or vibration on the door.

5 After the take-off and once the seatbelt sign was switched off, the cabin crew member immediately informed her cabin zone leader who in turn informed the in-flight supervisor (IFS). The IFS went to check on the door and detected no air leak or vibration on the door. He informed the flight crew when the aircraft reached the cruise altitude. The aircraft was cruising at 37,000 feet and the cabin pressurisation was normal with the cabin altitude at 6,000 feet³. A flight crew member subsequently inspected the door and did not observe anything unusual other than the noise. The flight crew decided to proceed with the flight and monitored the aircraft's pressurisation system.

6 About five hours into the flight, the flight crew noticed that the cabin altitude started to climb slowly. The flight crew decided to descend the aircraft when the cabin altitude was approaching 10,000 feet. They carried out actions according to the emergency descent checklist. Although not required by the checklist, but as a precaution, the flight crew chose to deploy the passenger oxygen masks⁴. In accordance with operating procedures, the flight crew descended the aircraft to 10,000 feet⁵.

7 The flight crew declared MAYDAY to Kabul Air Traffic Control (ATC) during the descent but did not get a response. Another aircraft which was flying in the vicinity heard their MAYDAY call and relayed the message to Kabul ATC. The flight crew intended to divert to Ashgabat in Turkmenistan which was the first airport on their list of emergency alternate airports in that area. However, they were informed that Ashgabat airport was at that moment not ready to accommodate the aircraft. The flight crew then divert to Baku in Azerbaijan which was the second airport on

² The coverplate is mounted to the upper edge of the door skin. It covers the gap between the door and the fuselage structure to prevent water from being trapped in the gap. The coverplate also serves as a fairing which smoothens airflow and reduces airflow noise.

³ The pressure of the air inside an aircraft's cabin is typically maintained at a level corresponding to an atmospheric pressure at an altitude of 6,000 feet even though the aircraft's altitude is much higher than 6,000 feet. This cabin pressure is higher than the air pressure outside the aircraft since, in the atmosphere, air pressure decreases as altitude increases.

⁴ The passenger oxygen masks are designed to be deployed automatically when the cabin altitude reaches 13,800 feet. The flight crew can also deploy the oxygen masks from the cockpit manually by pressing a pushbutton.

⁵ As the aircraft was flying over mountainous area, the flight crew had to first descend to 18,000 feet until they were cleared of the mountainous area.

their list of emergency alternate airports in that area. The aircraft landed in Baku without further incident.

8 The upper edge of D3L was found damaged. The door skin along this edge had folded outwards⁶, which allowed cabin air to leak, thus making the maintenance of cabin pressurisation difficult.

9 Throughout the flight, the highest cabin altitude reached was 11,600 feet. The aircraft cabin pressure decreased progressively and did not completely depressurise⁷. All oxygen masks were deployed and delivered oxygen flow. The amount of oxygen flow to the passenger oxygen masks is metered by the aircraft system and is dependent on the cabin altitude. At a cabin altitude of 11,600 feet, there was only a low oxygen flow through the masks.

10 The Air Accident Investigation Bureau of Singapore (AAIB) is investigating this incident, under delegation from the Interstate Aviation Committee.

11 The damaged door was removed in Baku and is now undergoing laboratory inspection and failure analysis examination to determine the cause of the door skin failure. The examination report is expected to be available to the AAIB by the end of April 2014.

12 In the meantime, the aircraft manufacturer has on 22 January 2014 issued a notice to all A380 operators requiring them to inspect any main deck door that is reported to be noisy in flight. The inspection includes:

- Visual inspection of coverplate for delamination and crack
- Visual inspection of door seal for significant damages
- Ultrasonic inspection of the external surface of the door skin where the coverplate is attached to the door

13 Besides looking into the door skin failure, the AAIB investigation will also look into such aspects as crew actions, cabin pressurisation system, design of the door assembly, and door inspection procedures.

⁶ The coverplate remained attached to the door skin.

⁷ When an aircraft depressurises completely, the pressure of the air inside the aircraft's cabin will be the same as the atmospheric pressure outside the aircraft. In other words, the cabin altitude will become the same as the aircraft's altitude in the atmosphere. This was not the case in this incident.