Aircraft Accident Report No: 1/2015

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**Report on the accident to
Airbus A319-131, G-EUOE
London Heathrow Airport, England
24 May 2013**

Registered Owner and Operator	British Airways Plc
Aircraft Type	Airbus A319-131
Nationality	British
Registration	G-EUOE
Manufacturer's Serial Number	1574
Place of Accident	London Heathrow Airport
Date and Time	24 May 2013 at 0716 hrs (times in this report are UTC, unless stated otherwise)

Introduction

The event was reported to the Air Accidents Investigation Branch (AAIB) at approximately 0736 hrs on 24 May 2013 by Heathrow Airport Operations and an AAIB investigation was commenced immediately. In accordance with the provisions of ICAO Annex 13, France (the state of aircraft design and manufacture) and the United States of America (the state of engine design and manufacture) appointed Accredited Representatives from the BEA[1] and the NTSB[2], respectively. Technical assistance was also provided by the operator, the aircraft manufacturer (Airbus), the European Aviation Safety Agency (EASA), International Aero Engines (IAE) and UTC Aerospace Systems (UTAS).

Summary

During takeoff from Runway 27L at London Heathrow Airport, the fan cowl doors from both engines detached from the aircraft, damaging the airframe and a number of aircraft systems. The flight crew elected to return to Heathrow and on the approach to land on Runway 27R, leaking fuel from a damaged fuel pipe on the right engine ignited and an external fire developed. The left engine continued to operate satisfactorily throughout the flight. The right engine was shut down promptly, reducing the intensity of the fire, and the aircraft landed safely. It was brought to a stop on the runway and the emergency services were quickly in attendance. The fire in the right engine was extinguished and the passengers and crew evacuated via the emergency escape slides on the left side of the aircraft.

Footnote

1 Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile.
2 National Transportation Safety Board.

The investigation determined that a maintenance error had led to the fan cowl doors on both engines being left unlatched following scheduled overnight maintenance on the aircraft. The unlatched condition of the fan cowl doors was not identified prior to the aircraft's departure the next morning. A number of organisational factors were contributory to the maintenance error. The operator has since taken action to address these issues.

This, and numerous other similar events, shows that Airbus A320-family aircraft have a history of departing with the fan cowl doors unlatched. It is also evident that, in practice, the flight crew walk-around inspection is not entirely effective in detecting unlatched fan cowl doors and therefore a design solution is necessary. Enhanced methods of detection through design solutions are being considered by the aircraft manufacturer.

As a result of this investigation, five Safety Recommendations were made concerning: fatigue risk management; fan cowl door position warnings; fan cowl door certification requirements; in-flight damage assessments by cabin crew and aircraft evacuation procedures.

Findings

Operational aspects

1. Photographic evidence showed that the fan cowl doors were in an unlatched condition prior to the flight.

2. The unlatched fan cowl doors were not detected by the tug driver during his inspection of the aircraft prior to pushback.

3. The training and instructions for the tug driver's inspection of the aircraft did not contain the necessary detail to enable him to be able to identify a fan cowl door in the unlatched condition.

4. The unlatched fan cowl doors were not detected during the co-pilot's external walk-around.

5. The operator's training material on the conduct of the flight crew pre-flight walk-around included detailed instructions on checking the security of the fan cowl doors.

6. The co-pilot, who had completed the operator's pre-flight walk-around training several years previously, reported that he was not aware of the gap in the fan cowl doors when the doors are unlatched and held open by the hold-open device.

7. The A320-family FCOM instructions for the pre-flight walkaround contain specific entries for checking that the left and right engine fan cowl doors are closed and latched.

8. The pre-flight walk-around on G-EUOE was not conducted fully in accordance with the procedure as set out in the FCOM.

9. The operator did not conduct regular checks of flight crew's conduct of the pre-flight walk-around, nor was it required to.

10. Passengers were aware of the fuel leak from the right engine soon after takeoff and attempted to bring it to the attention of the cabin crew. The cabin crew did not assimilate this information and it was therefore not passed to the flight crew.

11. The information provided by the cabin crew to the flight crew did not accurately represent the state of the aircraft.

12. The commander did not have all of the available information regarding the damage to the aircraft to assist him in his decision making.

13. The QRH fuel leak procedure called for the right engine to be shut down; however, the commander, on considering the risks, elected to keep it operating.

14. The commander correctly identified and shut down the No 2 (right) engine after the fire warning activated, but this was not performed in accordance with the operator's SOPs and training.

15. The flight crew deviated from the manufacturer's FCOM SOP for task sharing for Abnormal and Emergency procedures.

16. The fire in the right engine continued after the aircraft came to a halt on the runway. The fire was quickly extinguished by the AFRS.

17. The left engine remained running until the AFRS requested that it be shut down.

18. The aircraft was evacuated quickly and without serious injury using only the exits on the left side of the aircraft.

Technical aspects

1. The fan cowl doors detached from the aircraft during takeoff because they remained unlatched following overnight maintenance and the unlatched condition of the fan cowls was not detected prior to the flight.

2. A section of the right engine inboard fan cowl door remained attached. This struck and punctured the FMU spill return pipe, causing a significant fuel leak on the right engine. The leaking fuel ignited during the approach to land.

3. When they decided to defer the IDG oil servicing task, the technicians responsible for servicing the aircraft did not follow AMM procedures for

leaving the aircraft with the cowls either fully open on stays, or closed and latched; nor did they place the required warning notices in the cockpit prior to opening the fan cowl doors.

4. The technicians were not required to, and did not load an IDG gun and oil into their vehicle prior to commencing planned maintenance tasks, due to a low expectation that the equipment would be required during the two Weekly Checks assigned to them during their shift.

5. The IDG oil servicing task was deferred because the technicians did not have the required IDG gun and oil when they needed them for G-EUOE. They elected to return to the aircraft later in their shift once they had completed other planned maintenance tasks and had drawn the necessary equipment from stores.

6. The technicians did not make an open technical log entry for the required IDG oil uplift prior to deferring the IDG oil servicing task.

7. When the technicians later returned to complete the IDG oil servicing task, they attended G-EUXI, an Airbus A321 on Stand 517, instead of G-EUOE on Stand 513. They did not check the aircraft's registration and did not recognise that they were at the incorrect stand or aircraft.

8. Previous cases of aircraft swap errors had occurred within the operator's line maintenance operation, but they had not been reported, and therefore no mitigating actions had been taken to prevent their recurrence.

9. The technicians successfully carried out an IDG oil level check and fan cowl closing procedure on G-EUXI.

10. The fan cowl doors on both of G-EUOE's engines remained unfastened and the IDG oil levels on both engines were below the serviceable level following the overnight maintenance shift.

11. The technicians completed G-EUOE's Daily and Weekly Check paperwork and technical log entries in the Terminal 5A southern crew room and not on board the aircraft, as G-EUOE's technical log had been removed from the flight deck in accordance with a local working procedure.

12. The technicians' working time records showed that both individuals were compliant with the company's working time limitations and legal requirements.

13. The performance of both technicians may have been compromised by fatigue, induced by the significant level of planned and overtime working undertaken prior to the overnight maintenance shift.

14. The quantity and scope of planned work for the technicians' shift was achievable, was not unusual or excessive, and was within their scope of approval as LMAs.

15. Both technicians had been trained in, and were familiar with, the AMM procedures relating to opening and closing the fan cowl doors.

16. Non-compliance with the AMM procedures for opening and closing fan cowl doors on Airbus A320-family aircraft was a common occurrence and was not specific to either of the technicians involved in the incident, or to the aircraft operator.

17. Previous safety actions taken by the aircraft manufacturer to prevent fan cowl door losses were only partially effective.

18. The high visibility paint on G-EUOE's fan cowl door latch handles was in a poor condition, with most of the paint either missing or obscured by blue paint overspray. There was no specific continued airworthiness instruction regarding maintenance of the high visibility paint finish in the AMM and repainting instructions contained in the fan cowl door SRM were ambiguous in that the areas of the latch to repaint differed from those defined in Service Bulletin V2500NAC-71-0227.

Causal factors

The investigation identified the following causal factors:

1. The technicians responsible for servicing the aircraft's IDGs did not comply with the applicable AMM procedures, with the result that the fan cowl doors were left in an unlatched and unsafe condition following overnight maintenance.

2. The pre-departure walk-around inspections by both the pushback tug driver and the co-pilot did not identify that the fan cowl doors on both engines were unlatched.

Contributory factors

The investigation identified the following contributory factors:

1. The design of the fan cowl door latching system, in which the latches are positioned at the bottom of the engine nacelle in close proximity to the ground, increased the probability that unfastened latches would not be seen during the predeparture inspections.

2. The lack of the majority of the high-visibility paint finish on the latch handles reduced the conspicuity of the unfastened latches.

3. The decision by the technicians to engage the latch handle hooks prevented the latch handles from hanging down beneath the fan cowl doors as intended, further reducing the conspicuity of the unfastened latches.

Safety Recommendations

The following Safety Recommendations are made:

Safety Recommendation 2015-001

It is recommended that the European Aviation Safety Agency publishes amended Acceptable Means of Compliance and Guidance Material in Part 145.A.47(b) of European Commission Regulation (EC) No 2042/2003, containing requirements for the implementation of an effective fatigue risk management system within approved maintenance organisations.

Safety Recommendation 2015-002

It is recommended that the European Aviation Safety Agency requires Airbus to modify A320-family aircraft to incorporate a reliable means of warning when the fan cowl doors are unlatched.

Safety Recommendation 2015-003

It is recommended that the European Aviation Safety Agency amends Certification Specification 25.901(c), Acceptable Means of Compliance (AMC) 25.901(c) and AMC 25.1193, to include fan cowl doors in the System Safety Assessment for the engine installation and requires compliance with these amended requirements during the certification of modifications to existing products and the initial certification of new designs.

Safety Recommendation 2015-004

It is recommended that British Airways Plc reviews, and amends as appropriate, its pilot and cabin crew training, policies and procedures regarding in-flight damage assessments and reporting by cabin crew in light of the lessons learned from the G-EUOE fan cowl door loss event.

Safety Recommendation 2015-005

It is recommended that British Airways Plc reviews its evacuation procedures and training to take account of the potential risks of leaving engines running during on-ground emergencies.