

**INCIDENT**

<b>Aircraft Type and Registration:</b>	Airbus A320-214, G-EZTK	
<b>No &amp; Type of Engines:</b>	2 CFM56-5B4/3 turbofan engines	
<b>Year of Manufacture:</b>	2009	
<b>Date &amp; Time (UTC):</b>	20 January 2017 at 1430hrs	
<b>Location:</b>	In cruise, between Paphos and Athens	
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)	
<b>Persons on Board:</b>	Crew - 6	Passengers - 169
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Avionics cooling fan bearing degradation	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	31 years	
<b>Commander's Flying Experience:</b>	5,036 hours (of which 4,811 were on type) Last 90 days - 124 hours Last 28 days - 46 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and enquiries made by the AAIB	

**Synopsis**

The aircraft was in the cruise at FL340 when the crew became aware of a sudden "whirring" noise emanating from beneath the cockpit and forward galley area. This was accompanied by a distinct electrical burning smell in the cockpit. After a discussion with the Senior Cabin Crew (SCC) member the commander decided to divert. The commander and co-pilot donned oxygen masks, declared a PAN and initiated a descent and diversion with ATC clearance. The aircraft landed without further incident and there were no injuries to the passengers or crew. The cause of the noise and source of the burning smell was found to be a bearing failure within the avionics bay cooling extractor fan.

**History of the flight**

The aircraft was on a scheduled flight from Paphos to London Gatwick. It was approximately 1.5 hours into the flight, cruising at FL340, when there was a sudden "whirring" noise and vibration emanating from the beneath the cockpit and forward galley area. The cabin crew were also aware of the noise. Approximately one minute later, the flight crew noticed a distinct electrical burning smell in the cockpit and this was confirmed by the SCC member. The decision was made to divert to Athens and the commander and co-pilot donned oxygen masks and declared a PAN. They then initiated a descent and diversion with clearance from ATC. The passengers were informed of the situation and the crew's intentions over the passenger address. During the descent the crew consulted the Quick Reference Handbook (QRH) smoke and fumes checklist and initial actions were carried out. In the

absence of other indications or Electronic Centralised Aircraft Monitor (ECAM) cautions, the crew decided not to put the aircraft into an emergency electrical configuration. The aircraft landed without further incident, although it was 1.5 tonnes overweight at 67.5 tonnes. There were no injuries to the passengers or crew and a normal disembarkation was carried out.

### Engineering investigation

Engineering fault diagnosis found the avionics bay cooling extractor fan to have seized as a result of bearing failure. The component was replaced and the aircraft returned to service after completion of the overweight landing checks.

### Fan bearing history

There are two fans within the avionics bay conditioning system, an extractor fan and a blower fan, both fans are of the same type.

In this type of avionic bay fan, a bearing failure leads to damage to the stator, rotor and body of the fan with rubbing and friction. This manifests itself as a rumbling noise, with vibration and a frictional burning smell as experienced during this incident.

A small number of premature avionic bay conditioning fan bearing failures within the A319/320 family of aircraft had previously been identified by the manufacturer. This resulted in the introduction of ceramic bearings, which significantly improve reliability. The aircraft in this case was fitted with fans running on ceramic bearings.

However, despite the change to ceramic bearings, although better than the conventional bearings, they remain the parts in the fan assembly which tend to wear first and are the main failure mode. Accordingly, a Vendor Service Information Letter (VSIL) was issued by the manufacturer with additional steps to introduce an advisory time between overhaul (TBO) of 10,000 flying hours on the fans. Overhaul kits were also been made available which enable operators to replace bearings during a C check or other convenient scheduled maintenance package.

### Action taken

Failure of these fans is not considered to be a high-risk event and is unlikely to lead to additional system degradation provided simple actions are taken by the crew. However, of the two fans, failure of the blower fan was considered the least desirable scenario. Notwithstanding the VSIL, it was not immediately possible to overhaul all of the operator's 131 fans identified as being at risk and so a two phase mitigation policy was initiated in May 2016. Phase 1 was information gathering and the following criteria were applied to identify which fans were the priority for overhaul:

1. *Aircraft with both fans TBI > 20 000 FH (TBI time between inspection)*
2. *Blower fan TBI > 20 000 FH*
3. *Any unit repaired at least two times > 10 000 FH'*

The priority fans identified during Phase 1 determined the schedule for the Phase 2 overhaul programme with a planned throughput of 15 units per month.

### **G-EZTK extractor fan**

The avionics bay cooling extractor fan (P/N EVT3454HC, S/N 164900827) fitted to G-EZTK at the time of its failure, on 20 January 2017, had accumulated 25,181 hrs time since new (TSN) and 14,181 cycles since new (CSN). However, because the blower fan it was paired with had only been fitted to G-EZTK in April 2016, the fans fitted to EZTK were not a priority, as determined in Phase 1. Therefore, this relatively high life extractor fan remained in service.

### **Further action**

The aircraft operator continues to monitor fan life with an ongoing campaign targeting fans perceived as high risk, using criteria set by an analysis of in-service experience accompanied by manufacturer recommendations. To date, 82 of the 131 fans identified have been removed and overhauled. In addition, the operator will be participating in an in-service evaluation of a fan health monitoring unit. This equipment is designed to monitor vibration levels to give an early warning of possible bearing failure and to shut the fan down automatically when very high vibration is sensed to avoid critical failure that leads to smoke or burning smell events.

### **AAIB note**

This incident and the fleet-wide actions taken to address this issue by the operator, based on the recommendations by the manufacturer, are consistent with those detailed in an AAIB report in the February 2016 Bulletin regarding a similar incident to Airbus 320-232, G-EUYE, on 27 July 2015 reference EW/C2015/07/03 .