

## Engine fire during climb, turn back, emergency landing

<b>Aircraft</b>	Bombardier CRJ700 Canadair Regional Jet Series 700, registered F-GRZH
<b>Date and time</b>	15 August 2011 at 06 h 50 <sup>(1)</sup>
<b>Operator</b>	Brit Air
<b>Place</b>	Lyon Saint-Exupéry Airport (69)
<b>Type of flight</b>	Scheduled public transport of passengers
<b>Persons on board</b>	Captain (PF), Copilot (PNF), 2 cabin crew, 32 passengers
<b>Consequences and damage</b>	Left engine damaged

<sup>(1)</sup>Except where otherwise indicated, times in this report are UTC.

*This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.*

### 1 - HISTORY OF FLIGHT

The aeroplane took off from runway 36L at Lyon Saint-Exupéry Airport bound for Barcelona (Spain) with 36 people on board.

Climbing through 2,800 ft QNH, the crew noticed two noises. They checked the engine parameters, which were normal, and decided to continue the climb. At 4,000 ft, the L ENG FIRE warning was triggered. The engine parameters were normal and the crew applied the "engine fire" procedure that resulted in the left engine shutting down and to fire extinguishers 1 and 2 being set off. The crew transmitted a distress message to the controller. The warning stopped.

The crew turned back and landed on runway 36R, with the left engine shut down. The passengers disembarked normally.



External damage to engine

### 2 - ADDITIONAL INFORMATION

#### 2.1 Examination of the Engine

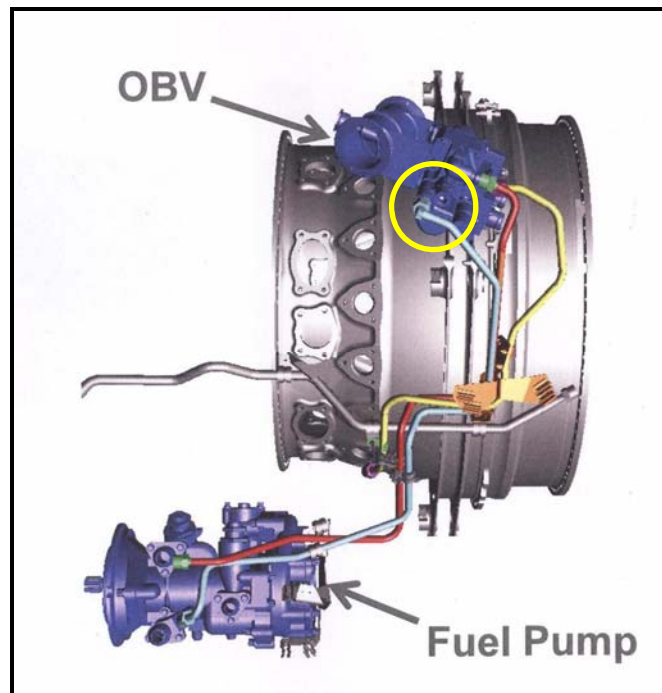
The aeroplane was equipped with two General Electric CF-34-8C5B1 engines.

The external examination of the left engine showed a burnt area. Opening the cowlings made it possible to localise the probable origin of the fire in the vicinity of the “operability bleed valve” (OBV).

A more detailed examination of the engine revealed that the OBV fuel supply piping connector had come out of its seating, causing a fuel leak.

## 2.2 System Description

The OBV is a butterfly-type valve that allows air to be regulated in the compressor, controlled by a fuel supply under pressure. The OBV assembly includes three connectors identified as “Supply”, “Return” and “Drain”. When the valve is installed on the engine, the fuel supply pipes coming from the fuel pump are connected via three connectors on the valve.



OBV assembly diagram

A fuel supply connector loosened, which introduced play and wore the threads in the aluminium OBV ring lock fuel fitting. The damage to the threads led to the disconnection of the connector and the fuel leak.



Disconnected OBV connector external damage

## 2.3 Maintenance of the Engine

The incident occurred after 14,343 cycles and 15,413 flying hours. The OBV was a factory-installed part on this engine. No maintenance on this system is planned by the manufacturer. In addition, no maintenance operation was recorded for this system during the two checks performed on the engine at the manufacturer's since its entry into service.

## 2.4 Similar Cases

Two other similar incidents of OBV connector disconnection occurred on Bombardier CRJs equipped with the same type of engines.

## 3 - LESSONS LEARNED AND CONCLUSION

An OBV fuel supply pipe becoming dislodged from the ring lock fuel fitting caused a fuel leak under pressure on the hot parts of the left engine and caused the fire.

The forces applied on the piping were enough to cause the loosening of the connector, leading to wear on the threads in the ring lock fuel fitting .

The absence of any planned maintenance (with the exception of a visual inspection of the engine) on this part, whose replacement is planned only in case of part failure, implies that the anomaly could not be detected before a failure occurred.

Following this incident, the manufacturer selected another supplier who offered a more robust unit.

This event showed that the OBV installed on the engine was not subject to any specific maintenance during the life of the engine. This event and the other incidents of a similar type reported on identical engines led the FAA to issue an Airworthiness Directive (AD 2013-06-06<sup>(2)</sup> of 8 May 2013) specifying the replacement of OBV's installed on GE CF34-8C and CF34-8E engines, depending on the following criteria:

*"Remove OBVs*

*(1) For OBVs with fewer than 6,000 flight hours since new on the effective date of this AD, remove the OBV from service before accumulating 12,000 flight hours since new, or within four years after the effective date of this AD, whichever occurs first.*

*(2) For OBVs with 6,000 or more flight hours since new on the effective date of this AD, remove the OBV from service before accumulating an additional 6,000 flight hours, or within two years after the effective date of this AD, whichever occurs first."*

<sup>(2)</sup>see : <http://www.regulations.gov/#!documentDetail;D=FAA-2012-1288-0007>