
Smoke emergency on ground, Boeing 727 F (Freighter), N6815

Micro-summary: This Boeing 727F experienced electrical smoke after arrival.

Event Date: 1998-07-17 at 0303 UTC

Investigative Body: Aircraft Accident Investigation Board (AAIB), United Kingdom

Investigative Body's Web Site: <http://www.aaib.dft.gov.uk/>

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Boeing 727 F (Freighter), N6815

AAIB Bulletin No: 3/99 Ref: EW/G98/7/22 Category: 1.1

Aircraft Type and Registration:	Boeing 727 F (Freighter), N6815
No & Type of Engines:	3 Pratt & Whitney JT8D turbofan engines
Year of Manufacture:	Not known
Date & Time (UTC):	17 July 1998 at 0303 hrs
Location:	Edinburgh Airport
Type of Flight:	Freight
Persons on Board:	Crew - 3 - Passengers - Nil
Injuries:	Crew - Nil - Passengers - N/A
Nature of Damage:	Aircraft battery (only) overheat/fire
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	54 years
Commander's Flying Experience:	16,200 hours (of which 170 were on type) Last 90 days - 170 hours Last 28 days - 50 hours
Information Source:	Aircraft Accident Report Form submitted by commander

The aircraft was being operated by a USA based company under contract to an operator based in Brussels. It had just arrived on stand at Edinburgh Airport after an uneventful flight from East Midlands Airport. After the brakes had been set and while the crew were shutting down, the flight deck filled with smoke. The crew were unable to identify the cause and therefore shutdown all electrical power, including ground power, opened the flight deck windows and evacuated the aircraft. The Airport Fire Service attended the aircraft and found that the main battery, located below the underfloor E3 electronic rack in the forward fuselage, was 'hot and smoking'. They removed the battery, which was of the nickel-cadmium ('Ni Cad') type, and took it to a safe area. Damage was limited to the battery and battery charger; there was no damage to the aircraft. The battery and charger were replaced and the aircraft then departed for Aberdeen.

Although the operator did not subsequently forward any information relating to the reasons for this particular battery overheat, such nickel-cadmium battery overheat incidents can occur for a variety of reasons. The associated charger is fitted with a thermal sensor to prevent 'thermal runaway'. The CAA Occurrence Database contained records of only 12 battery overheat incidents over the last 20 years, however it was considered likely that other incidents may not have been reported where associated damage was limited to the battery and charger. At least 10 of the 12 reports involved nickel-cadmium batteries, which are very widely used. In one case the battery was reported to have been 'still hot' some 9 hours after the associated occurrence. Nickel cadmium batteries exhibit a rising charge current with increasing temperature and can overheat and catch fire if overcharged. The associated battery chargers are designed to supply a 'pulsed' charging current and are equipped with protective circuitry. There is a battery temperature sensor which can interrupt the charge current. A number of cases are recorded where charger malfunction, associated with either failure to pulse the charge current correctly or failure to terminate charging, has resulted in subsequent overheating damage to such batteries. In other cases failure of one or more battery cells has caused the charger to overcharge the remaining cells. It is possible that a dormant fault in the overheat protection circuit could lead to a battery fire, should a cell fail.

Since the potential consequences of such battery overheats and associated fires in flight may be very serious, the following Safety Recommendation is made:

Safety Recommendation 98-73

The CAA should remind operators of public transport aircraft of the potentially dangerous nature of battery fires and the need for the timely reporting of such serious incidents so that they can be fully investigated.