Concorde Type 1 Variant 102, G-BOAE, 5 May 1996

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INCIDENT

Aircraft Type and Registration: Concorde Type 1 Variant 102, G-BOAE

No & Type of Engines:4 Rolls Royce Olympus 593/610 turbojet engines

Year of Manufacture:1977

Date & Time (UTC):5 May 1996 at 1141 hrs

Location: Atlantic position 18_ West

Type of Flight: Public Transport

Persons on Board: Crew - 9 Passengers - 55

Injuries: Crew - None Passengers - None

Nature of Damage:

Commander's Licence: Airline Transport Pilot's Licence

Commander's Age:48 years

Commander's Flying Experience:12,500 hours

Last 90 days - 85 hours

Last 28 days - 20 hours

Information Source:AAIB Field Investigation

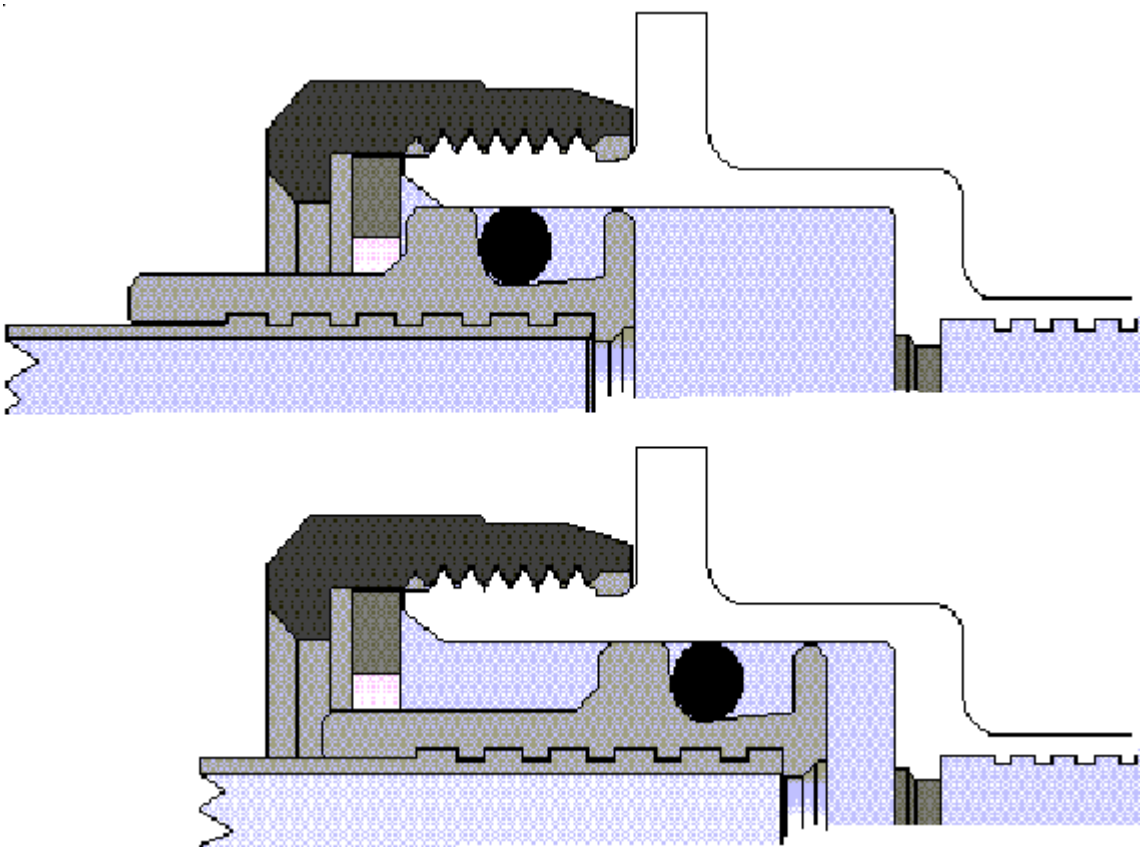
The aircraft was on a scheduled flight from London Heathrow Airportto New York Kennedy Airport and had reached 18_ West at FL 490and a speed of M1.97 when the crew felt a rumble on the flightdeck. The Master Warning Light for fuel then illuminated followedby the No 1 engine accumulator and fuel low pressure lights. The No 1 fuel low pressure magnetic indicator was seen to indicateopen and the fuel scavenge pump had commenced operating. TheNo 1 fuel tank contents decreased rapidly to 450 kg suggestingthat a fuel leak of some kind had occurred. The crew commenceda turn back towards London maintaining FL 490 and made a PAN callto Prestwick Oceanic Control on the HF radio. They then deceleratedthe aircraft to subsonic speed and carried out a precautionaryshut-down of the No 1 engine.

When instructed by ATC, the crew selected the emergency code onthe secondary radar transponder and were given a direct trackto the Ockham VOR beacon. They were then cleared without delayto Heathrow where they carried out a "fuel saving" landing;this is an approved heavy-weight landing procedure. After theaircraft had taxied clear of the runway, it was inspected by thefire service who confirmed that there was no visible externalfuel leak.

Fuel reconciliation checks between the gauged fuel contents ofall the tanks, and the total fuel before flight less that whichhad been burnt by the engines, indicated that the 'missing' fuelhad not been lost overboard, but had been transferred from No1 tank to No 6 tank. This was subsequently confirmed by refillingNo 1 tank from No 6 and switching on the No 1 engine feed pumps. The fuel then transferred from No 1 to No 6 tank.

The No 1 fuel collector tank feeds the No 1 engine and the deliverypipe passes through the No 6 tank. The access to the tank isseverely limited, and consequently the pipe run consists of anassembly of 4 pipes and 5 pipe couplings. One of these pipecouplings had come apart, with the exception of its electricalbonding lead, and the coupling seal was found on the tank floor.

The compression seal coupling used on the fuel distribution pipeworkwas designed to allow for expansion and contraction of the pipeworkin sympathy with airframe thermal expansion. Consequently thescrew end cap defines the extent of the pipe movement rather thanforming a fixed locating device. It is locked by a spring whichsits between two adjacent lugs. Whilst not to Class 1 lockingstandards, there is no record of a previous coupling failure inthe CAA data base.



Expanding fuel pipe coupling

The pipes were removed and replaced during an intermediate checkfor access to tank fuel leaks, but the pipe joint had remainedintact during the subsequent ground runs and for two sectors

comprisingflights to New York and return. The Concorde Operations EngineeringController has conducted an internal enquiry into this lapse inquality and has made recommendations to his management to preventa recurrence; these include a recommendation to carry out a duplicatecheck of fuel couplings.