SERIOUS INCIDENT

Aircraft Type and Registration:	Boeing 747-443, G-VROY
No & Type of Engines:	4 General Electric CF6-80C2B1F turbofan engines
Year of Manufacture:	2001 (Serial no: 32340)
Date & Time (UTC):	20 November 2018 at 1850 hrs
Location:	London Gatwick Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 18 Passengers - 398
Injuries:	Crew - None Passengers - None
Nature of Damage:	Heat damage to flap track fairing, various access panels and inboard flaps
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	48 years
Commander's Flying Experience:	13,238 hours (of which 7,255 were on type) Last 90 days - 156 hours Last 28 days - 53 hours
Information Source:	Aircraft Accident Report Forms submitted by the flight crew

Synopsis

During engine start there was a fire in the No 2 engine tailpipe. The ground crew alerted the flight crew who extinguished the fire using the relevant checklist. The aircraft returned to the stand and all the passengers were disembarked. Despite examination and testing of various engine control units and valves by their manufacturers, no faults could be found and all the equipment operated within normal parameters.

History of the flight

G-VROY had recently undergone heavy maintenance overseas and its first revenue flight was London Gatwick (LGW) to Orlando (MCO). The aircraft was pushed back from the North Terminal, Stand 566 and the engines were started. All flight deck indications were normal until part way through the start sequence for engine No 2, when the groundcrew engineer alerted the crew to flames coming from the engine tailpipe. The fuel control switch was selected to CUT OFF, the QRH (quick-reference handbook) drill FIRE ENGINE TAILPIPE was completed and no temperature exceedances were reported. The airfield fire crews arrived on site shortly after the fire had been extinguished. The remaining engines were shut down and the aircraft was towed back onto the stand for the passengers to disembark.

Aircraft examination

There was evidence of heat damage on the adjacent flap track fairing, several access panels and the inboard flaps. Structural inspections were performed, with no significant findings. Cosmetic repairs and replacements were completed as required.

The quick-access recorder (QAR) data was analysed and prior to engine No 2 compressor rotation there was a large fuel demand (119% compared to 11% for the other engines) through the fuel metering valve (FMV). The hydro-mechanical unit (HMU) was removed from the aircraft and sent to the manufacturer for analysis. The unit was found to perform within expected limits. Various other valves and controllers were removed and returned to their manufacturers for analysis, also with no faults found. All work undertaken during the preceding heavy maintenance period was checked and no faults were found.

Discussion

Despite the strip, examination and testing of various valves and controllers for the incident engine, no faults could be found to explain the increased fuel flow recorded in the QAR data. The high fuel flow rate into the combustion chamber during engine start would almost certainly lead to an engine tailpipe fire. The ground crew quickly identified that the fire was in the tailpipe and alerted the aircrew who actioned the correct checklist. A fuel tank biocidal treatment had been carried out during the heavy maintenance period and although the additive treatments have been verified correct, it is suspected by the operator that some residual debris may have remained. This residue may have affected the operation of the HMU valves.