

SERIOUS INCIDENT

Aircraft Type and Registration:	Airbus A321-231, G-EUXJ
No & Type of Engines:	2 International Aero Engine V2533-A5 turbofan engines
Year of Manufacture:	2007 (Serial no: 3081)
Date & Time (UTC):	24 November 2019 at 1820 hrs
Location:	On takeoff from Glasgow Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 8 Passengers - 208
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	57 years
Commander's Flying Experience:	20,593 hours (of which 12,061 were on type) Last 90 days - 148 hours Last 28 days - 62 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

During the takeoff roll the flight crew realised the aircraft was not accelerating as expected. Just prior to V_1 the commander applied full power. The aircraft took off and continued its planned flight without further incident. The flight crew subsequently discovered they had entered an incorrect reduced thrust temperature into the flight management computer.

The investigation found the incorrect entry was probably a result of distraction during the data entry. The subsequent standard procedures and checks did not detect the error.

History of the flight

The flight crew were starting the fourth day of a four-day short haul period of duty. The duty for the fourth day was a single sector from Glasgow Airport to London Heathrow in G-EUXJ; the commander was the pilot flying. During the previous three days they had flown A319, A320 and A321 aircraft. The crew reported that they were well rested.

During passenger boarding the flight crew had a few minutes spare, so, as encouraged by the operator, the commander allowed a couple of passengers to visit the flight deck. Later, whilst the flight crew were entering the takeoff performance figures into the FMGC¹

Footnote

¹ FMGC – Flight Management and Guidance Computer.

the senior cabin crew member asked if they could accept another flight deck visitor. The commander ignored the request and focused on the data entry but, he reported, it may have distracted him.

The takeoff was planned from the full length of Runway 05. The surface wind was from 080° at 5 kt, the visibility was 2,800 m in drizzle with cloud broken at 400 ft. The temperature was 8°C and the runway surface was wet. The takeoff performance calculation required FLAP 1, a flex² temperature of 49°C, a non-standard acceleration altitude of 1,070 ft and takeoff speeds of V_1 139 kt, V_R 147 kt and V_2 151 kt.

The flight crew completed the flight deck preparations and the aircraft was pushed back from the stand on time at 1803 hrs. At 1808 hrs the flight crew received their final load sheet which was consistent with the provisional figures. During taxi air traffic control asked if they could depart from Intersection F as another aircraft was holding at Taxiway G with a technical problem. However, before the flight crew changed the performance figures the crew of the other aircraft resolved their problem and it was able to depart. G-EUXJ continued to the full length of the runway and the flight crew completed the before takeoff checklist. As they started the takeoff roll, their standard review of the Flight Mode Annunciators (FMA)³ was interrupted by several radio transmissions.

During the takeoff roll both pilots reported that they felt something was wrong, they felt the aircraft was not accelerating as they expected. The commander reported that “something was not right but I could not put my finger on it”. At approximately 100 kt the co-pilot verbalised “this does not feel right, have we got enough power”. At 137 kt the commander advanced the thrust levers to TOGA⁴ power. The co-pilot recalled the aircraft had entered the last 900 m of the runway when the aircraft rotated. Subsequent flight data showed that the aircraft crossed the upwind end of the runway at 276 ft. The aircraft continued to Heathrow without further incident.

After takeoff, the flight crew realised they had entered a flex temperature of 79°C instead of 49°C.

Recorded information

The operator provided a copy of the flight data during the takeoff. Figure 1 shows the takeoff profile in red with an approximation of the expected profile in green.

Footnote

² Reduced thrust.

³ FMA – Flight Mode Annunciator, displaying the armed and engaged modes of the autopilot and autothrust.

⁴ TOGA – Takeoff Go-Around.



Figure 1
G-EUXJ takeoff profile

Commander's report

During the takeoff performance data entry the pilot flying is required to read the performance figures from the printed performance calculation. The pilot monitoring enters these into their MCDU⁵. The pilot flying is then required to check these are entered correctly on their MCDU screen. The commander was not sure if he said "79°" when he read the flex temperature or if he said the correct number and the co-pilot inadvertently pressed 7 rather than 4. He highlighted that the 7 and 4 keys are next to each other on the keyboard. He was not sure why he did not spot the error when he checked his MCDU but thought he may have been looking at the non-standard acceleration altitude. The commander highlighted that not many airports require a non-standard acceleration altitude so he may have been focusing on this rather than the flex temperature. During this process the flight crew were briefly distracted by a call from the cabin crew and this may have been why the error was made or why it was not spotted.

After the point where the initial error was made there are several points in the standard procedures when the flex temperature is checked. It is reviewed in the pre-start checks, during the before takeoff checks and in the FMA review on the takeoff roll. However, these checks only require the flight crew to read the temperature and do not refer to the original performance data. The commander subsequently realised that a flex of 79°C was not typical for a A321; the temperature is more typically in the fifties. However, 79°C would not be abnormal for a A319 which the flight crew had flown four times during their tour.

After the incident the commander resolved to ensure a sterile flight deck when loading takeoff performance data, by closing the flight deck door during this time.

Footnote

⁵ MCDU – Multipurpose Control and Display Unit.

Previous events

On 21 July 2017 a Boeing 737-800 (C-FWGH) taking off from Belfast International Airport struck a runway approach light 29 m beyond the end of the takeoff runway. The investigation found that an outside air temperature (OAT) of -52°C had been entered into the FMC instead of the actual OAT of 16°C. The AAIB have investigated many other serious incidents involving incorrect takeoff performance figures.

The report into the C-FWGH serious incident highlighted that Takeoff Acceleration Monitoring Systems are now available which can alert flight crew to insufficient acceleration during the takeoff roll⁶. The AAIB made a Safety Recommendation to the EASA and the FAA to sponsor the development of technical specifications and, subsequently, develop certification standards for a Takeoff Acceleration Monitoring System.

Analysis

The flight crew inadvertently entered a flex temperature of 79° instead of 49°. The error was not detected during the subsequent procedures and checks.

The error was likely made due to a combination of brief distraction and entering a non-standard acceleration height. The subsequent checks do not require the flight crew to refer back to the source data and, whilst the selected flex temperature was unusual for a A321, it was not usual for the A319 which the flight crew had been operating during the tour.

The flight crew realised there was insufficient power during the takeoff roll and applied TOGA power.

The operator has reminded its pilots about the hazard of distraction during critical data loading and are reviewing their procedures to improve the likelihood that data entry errors are detected.

Safety actions

The operator has issued a safety notice to all its flight crew highlighting this and previous events. The notice emphasises the importance of avoiding distractions whilst loading the takeoff performance data.

The operator is also reviewing its takeoff performance data entry and checking procedures in order to ensure that there are sufficient opportunities in the procedures to trap any error.

Footnote

⁶ <https://www.gov.uk/aaib-reports/aircraft-accident-report-aar-2-2018-c-fwgh-21july-2017> (accessed 6 January 2020).