Serious Incident

Aircraft Type and Registration:	Boeing 777-236, G-VIIT
No & Type of Engines:	2 General Electric Co GE90-85B turbofan engines
Year of Manufacture:	1999 (Serial no: 29962)
Date & Time (UTC):	28 June 2024 at 1120 hrs
Location:	London Gatwick Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 13 Passengers - 334
Injuries:	Crew - None Passengers - None
Nature of Damage:	Fire on the right-side main wheel brakes which was extinguished by fire crew
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	56 years
Commander's Flying Experience:	22,374 hours (of which 18,616 were on type) Last 90 days - 210 hours Last 28 days - 54 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and other enquiries by the AAIB

Synopsis

During takeoff, the co-pilot began retarding the thrust levers at airspeed V_1, instead of removing his hand from them. After momentarily advancing them again, he initiated the rejected takeoff (RTO) procedure around 2 KIAS later. The RTO was performed effectively and the aircraft stopped some distance before the end of the runway surface.

The report considers the complex nature of the takeoff roll and why mental rehearsal of motor actions may benefit pilots, particularly after time off from flying. It discusses the industry-wide challenge of preventing action slips. This operator had already published a methodical approach to control selections, which it has promoted in pre-flight briefing material. It has included the wider issue of 'focus' in its recurrent simulator training.

History of the flight

The aircraft was taking off from London Gatwick Airport (Gatwick), Runway 26L. On hearing the aircraft's automatic callout of airspeed "V_1"[1], the co-pilot (who was PF) inadvertently began retarding the thrust levers, instead of removing his hand from them to continue the takeoff. Simultaneously, the commander called "ROTATE" as the airspeed continued increasing through V_r[2]. The co-pilot vocalised the error and momentarily advanced the thrust levers again, before performing the RTO procedure[3].

The aircraft stopped before intersection GR (Figure 1). The airport rescue and firefighting service attended the aircraft and extinguished a fire from hot brakes on the right main landing gear.

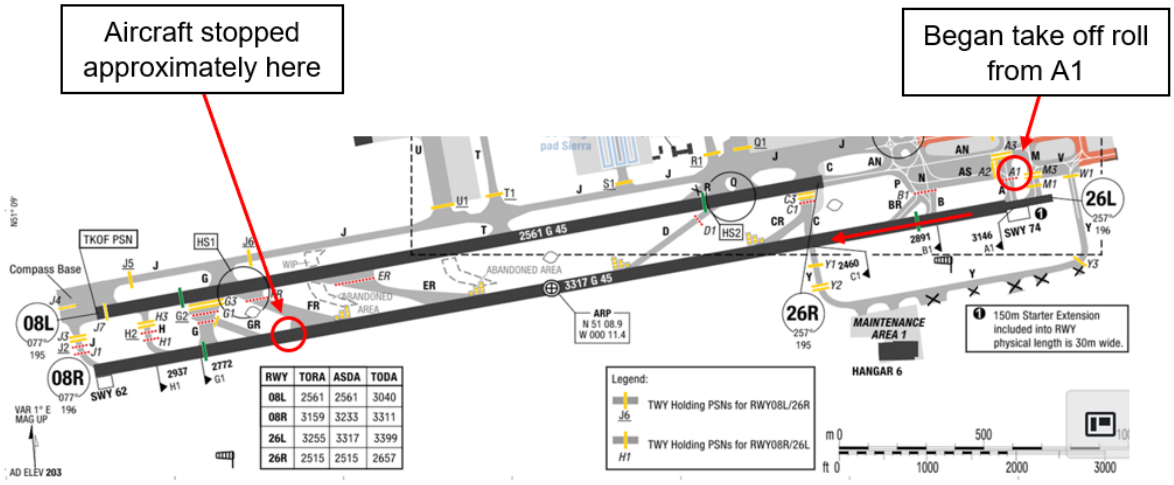

Figure 1

Excerpt from Gatwick ground chart

Information from the operator's operating manuals

The operator's *'Flight crew training manual'* (FCTM) described V_1 as *'the maximum speed in the takeoff at which the pilot must take the first action… to stop the airplane within the accelerate-stop distance*[4]*'* and *'the minimum speed… following a failure of an engine at which the pilot can continue the takeoff and achieve the required height above the takeoff surface within the takeoff distance'.* It stated *'The PF should keep one hand on the thrust levers until V1 in order to respond quickly to a rejected takeoff condition. After V1, the PF's hand should be removed from the thrust levers'.*

Footnote

1 V_1 is defined in the next section of this report.
2 V_r – The speed at which rotation of the aircraft into the air should be initiated.
3 The second thrust reduction began around two seconds after the first.
4 Acceleration stop distance available (ASDA) consists of the takeoff run available plus any stopway.

Performance

The aircraft's takeoff weight (TOW) was 248 tonnes, around 20 tonnes below its maximum takeoff weight (MTOW). Weather conditions were 11 kt headwind, temperature 18°C, QNH 1016 hPa, and dry runway surface. Departing from intersection A1 required using FLAP 5, assumed temperature[5] 42°C, and speeds V_1 160 kt, V_r 161 kt and V_2 165 kt.

The thrust levers were retarded first at around 160 KIAS[6], then again at around 162 KIAS. G-VIIT reached approximately 167 KIAS before stopping (Figure 2).

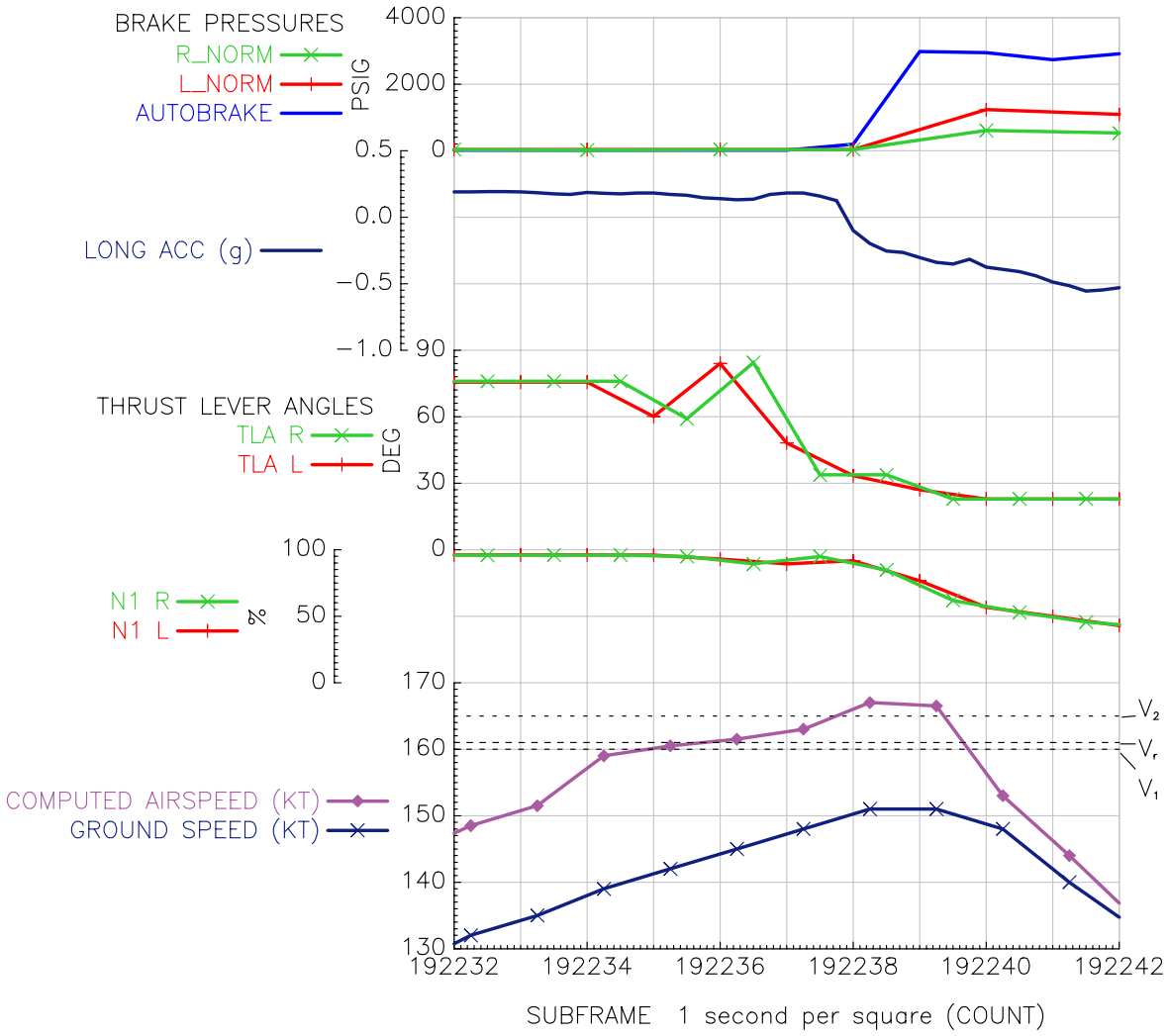

Figure 2

Recorded flight data

Footnote

[5] Using an 'assumed' temperature which is warmer than ambient temperature reduces engine thrust for takeoff.

[6] KIAS figures are based on 'computed airspeed' (Figure 2), which is the value displayed to the pilots.

Information from the operator's report

The operator's *'Cognitive task analysis'* report described the morning as otherwise *'unremarkable'* for the crew, with no obvious distraction or workload issues before the incident. The aircraft queued at A1 before lining up and waiting on the runway behind a landing aircraft.

Additional information from the crew

At the time of the incident, the co-pilot had 6,156 hours total flying time, with 2,700 hours on type, and 44 hours in the last 28 days. He was returning from annual leave having last flown on 14 June 2024. All his commercial flying had been in the right-hand seat. His last recurrent simulator evaluation was in February 2024.

The co-pilot reported being well-rested and feeling fine. He expressed surprise in himself over the inadvertent thrust reduction and could not identify a reason for it. He described instinctively pushing the thrust levers forward again. However, concern over re-adding thrust while further along the runway, and the uncertain takeoff performance decrement, meant he decided to commit to the RTO (which he felt he had effectively already initiated). He commented that in another situation he might have continued the takeoff using TOGA[7] thrust.

There was insufficient time for the commander to fully assess the situation before the aircraft began stopping. CVR evidence showed he responded to the RTO calmly and methodically such that it, and subsequent actions, were handled effectively by the crew.

Action slips

An action slip occurs when an action is not performed as intended, arising in routine or highly learned motor action sequences[8].

The operator had already reviewed its standard operating procedures relating to movement of critical controls and found that absence of cognitive thought and speed of execution commonly featured during action slips, such as flap and landing gear mis-selections. It released an *'Operational safety notice'* (OSN)[9] four days before the incident stating *'Pause before execution, and cognitively consider what the required action is… Methodically execute the action… Confirm correct execution'.* The operator described taking a cautious approach to publicising specific incidents to its crew, given industry experience suggests the act of discussing mis-selections might actually prime crew towards, rather than against, making them[10]. It has included 'mis-selections' in a new *'Safety topic'* section of its pre-flight briefing material for crew, and promoted the human factors topic of 'Focus' in its recurrent simulator training package.

Footnote

7 TOGA - Maximum take off and go-around thrust.
8 For example, AAIB report DHC-8-402, G-JEDU about inadvertent flap retraction after takeoff, which contains references to other events [accessed 17 March 2025].
9 Entitled *'Action slips when moving controls in the flight deck'.*
10 See footnote 8.

Mental rehearsal (perhaps colloquially called 'armchair flying') benefits cognition and motor skills for physical tasks[11].

Analysis

The RTO

The V_1 callout was a normal prompt for the co-pilot to move his left hand during the takeoff roll, while preparing to pull back on the control column with his right hand. However, he unintentionally pulled his left hand back instead. The resulting 'action sequence' resembled the RTO or landing manoeuvres, rather than a normal takeoff. There was no obvious reason for him being primed to do that – for example, he had not recently changed aircraft seat or type, or practiced landings or RTOs in a simulator – and he could not identify a reason for it on the day.

Any decision to stop an aircraft should be made by V_1, such that it is already stopping at V_1. The co-pilot first retarded the thrust levers at V_1. While the subsequent, instinctive, re-application of thrust would impede the aircraft's stopping performance, after a moment's conscious thought, he committed to the RTO procedure, fully retarding the thrust levers at around 2 KIAS above V_1. The aircraft's inertia meant its airspeed rose by another 5 KIAS before, in the somewhat benign performance conditions, it stopped some distance before the end of the runway surface. The crew performed the RTO and subsequent actions calmly and effectively.

The co-pilot identified that an alternative response to the action slip might have been to continue taking off using TOGA thrust. Performance calculations allow for taking off with one engine having failed after V_1. Both engines were operating during this event, but the investigation did not determine alternative outcomes.

Control selections and mental rehearsal

This incident alludes to the ongoing challenge for operators and crew in attending to control selections. This operator had already promulgated a staged method to its crew which, although written for other mis-selections, could encourage more deliberate motor actions. It has promoted the subject in training and briefing material.

The incident emphasises the complex nature of the takeoff roll. Pilots perform a series of motor actions during a normal takeoff, while also mentally preparing themselves to decide upon and enact different action sequences for an RTO. As well as relevant multi-crew and emergency briefings, pilots can improve their individual performance by mentally rehearsing what might seem like routine parts of an operation, especially after time away from flying.

Footnote

[11] For example: The Effects of Mental Practice on Motor Skill Performance: Critical Evaluation and Meta-Analysis - Karin E. Hinshaw, 1991; Retention of Airline Pilots' Knowledge and Skill - Stacey M. L. Hendrickson, Timothy E. Goldsmith, Peder J. Johnson, 2006 [accessed 13 March 2025].

Conclusion

By way of an action slip, the co-pilot began retarding the thrust levers at airspeed V_1. He instinctively advanced them again, then initiated the RTO procedure around 2 KIAS later. The RTO was performed effectively and, in benign performance conditions, the aircraft stopped some distance before the end of the runway surface.

Preventing action slips is an ongoing challenge for operators and crew. This operator had published guidance on methodical control selections, and has promoted the human factors topic of 'focus' in training and briefing material. The report considers why even experienced pilots may benefit from mentally rehearsing the takeoff roll and other routine procedures, especially after returning from time off.