

الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY



Air Accident Investigation Sector

Serious Incident

– Summary Report –

AAIS Case N° AIFN/0012/2021

High Energy Rejected Takeoff

Operator:	Etihad Airways
Make and Model:	Boeing 787-9
Nationality and Registration:	The United Arab Emirates, A6-BLL
Place of Occurrence:	Abu Dhabi International Airport, Abu Dhabi
State of Occurrence:	The United Arab Emirates
Date of Occurrence:	28 September 2021



This Investigation was conducted by the Air Accident Investigation Sector (AAIS) of the United Arab Emirates pursuant to Civil Aviation Law No. 20 of 1991, in compliance with Air Accident and Incident Investigation Regulation, and in conformance with the provisions of Annex 13 to the Convention on International Civil Aviation.

This Investigation was conducted independently and without prejudice. The sole objective of the investigation is to prevent future aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

The AAIS issued this Summary Report in accordance with national and international standards and best practices. Consultation with applicable stakeholders, and consideration of their comments, took place prior to the publication of this Report.

The Summary Report is publicly available at:

<http://www.gcaa.gov.ae/en/epublication/pages/investigationReport.aspx>

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Investigation Process

The occurrence was reported to the AAIS Duty Investigator by phone call to the Hotline Number +971 50 641 4667.

After the initial assessment of the data, the occurrence was classified as 'serious incident'.

The scope of this Investigation is limited to the events leading up to the occurrence; no in-depth analysis of non-contributing factors was undertaken.

Notes:

1. Whenever the following words are mentioned in this Report with a first capital letter, they shall mean the following:
 - (Aircraft) – the aircraft involved in this serious incident
 - (Commander) – the commander of the aircraft
 - (Copilot) – the copilot of the aircraft
 - (Incident) – this investigated serious incident
 - (Investigation) – the investigation into this serious incident
 - (Operator) – Etihad Airways
 - (Report) – this serious incident investigation Summary Report.
2. Unless otherwise mentioned, all times in the Report are 24-hour clock in Coordinated Universal Time (UTC), (UAE local time minus 4).
3. The structure of this Summary Report is an adaptation of the Annex 13 Final Report format.

Factual Information

History of the Flight

On 28 September 2021, at 0758:22 UTC (1158:22 local time), the Etihad Airways Boeing B787-9, registration marks A6-BLL, commenced taxi for operating an instrument flight rules (IFR) passenger flight number ETD2333, from Abu Dhabi International Airport (OMAA¹), the United

Arab Emirates, to King Abdulaziz International Airport, Jeddah, Saudi Arabia. People on-board were 224 passengers, 2 flight crewmembers, and 9 cabin crewmembers. The Commander was the pilot flying (PF) and the Copilot was the pilot monitoring (PM).

At 0757:23 (about six minutes from the first call of ETD2333), Tower Aerodrome Control North (Aerodrome Controller North) called Aerodrome Controller South and requested to hold all departures because of the ongoing runway calibration operations. Shortly thereafter, Aerodrome Controller South called Aerodrome Controller North and Approach controller to request the release for all departing aircraft. Aerodrome Controller North declined the request. At that time, visual flight rules (VFR) military aircraft (call sign UAF2299) was lining up on runway 31L. Aerodrome Controller North also emphasized that VOR05 calibration flight was executing calibration activity in the opposite direction on the parallel runway 13L.

At 0800:33, Aerodrome Controller North called Aerodrome Controller South to release the military aircraft for departure after the separation distance from VOR05 became sufficient. At 0803:00, during taxi towards taxiway Echo 15, the ETD2333 Copilot contacted Aerodrome Control South to inform them that they were ready for takeoff. The Controller instructed the crew to hold on short of runway 31L at Echo 15.

At 0803:20, Aerodrome Controller South called Approach controller requesting the release of ETD2333, and also passed the traffic information of a military aircraft that took off earlier from runway 31L and was turning for the AD2 route. Approach controller replied that there was no requirement to obtain release since the preceding departing aircraft was on VFR and was operating inside OMAA Control Zone (CTR).

At 0803:42, Aerodrome Controller South instructed the crew to line up and wait for take-off clearance on runway 31L.

At 0804:25, after coordinating with Approach, Aerodrome Controller South contacted the crew querying about their readiness for departure, and the flight crew confirmed. At this time, another commercial aircraft was turning on final and intercepting ILS runway 31L, at about 9 nautical miles, and the calibration aircraft (callsign VOR05)

¹ OMAA is the ICAO four letter airport code for Abu Dhabi International Airport, the United Arab Emirates



was established on final runway 13L at a distance of about 6.5 nautical miles.

At 0804:30, Aerodrome Controller South issued take-off clearance including traffic information about the departing military traffic, wind information, and traffic information about another commercial flight that was on the final 6 nautical miles from the threshold of runway 31L.

During the issuance of take-off clearance by Aerodrome Controller South, Aerodrome Controller North called to stop the clearance. Simultaneously, at 0804:54, the preceding departing VFR military aircraft reported approaching Khalifa City South to Aerodrome Controller South, but the latter did not acknowledge the call and did not provide any additional instructions.

At 0805:05, Aerodrome Controller South contacted the crew and instructed them to cancel the take-off clearance and vacate the runway on taxiway Echo 14. On that call, the Controller attempted to raise the crew's attention by an incorrect callsign (UAF2333 instead of ETD2333) which went unnoticed and was also not read back by the crew. The crew immediately commenced take-off roll despite the Controller's repeated instructions to cancel the takeoff by addressing the crew by the wrong callsign.

The Controller passed traffic information in reference to traffic on the final (RBDN922) and calibration flight (VOR05). At 0805:17, the Controller attempted to raise the crew's attention by the wrong callsign "Uniforce two three three three" and requested the crew to confirm the reception of the previous instructions by stating "Did you copy?" The crew did not read back the instructions and continued the take-off roll.

During the time between the cancellation instructions and the Aircraft take-off commencement, Aerodrome South Controller passed traffic information to another traffic (callsign RBDN922) that was on final, and the calibration flight (VOR05) which was approaching runway 13L. At 0805:32, RBDN922 called the Controller reporting 4 miles on final runway 31L.

At 0805:38, the Aerodrome Controller South called the crew for the fourth time using the correct callsign, "Etihad two three three three stop". The crew read back the instructions correctly. At this time, the Aircraft was passing abeam taxiway Echo 13. The crew executed a rejected takeoff at 127 knots ground speed.

At 0805:47, Aerodrome Controller South instructed the crew to vacate via taxiway Echo 8 and to continue taxiing via taxiway Echo 6, hold short Echo 6 Papa 2. Meanwhile, Aerodrome Controller South called RBDN922 instructing them to go around and follow the standard missed approach procedure.

At 0806:00, Aerodrome Controller South called RBDN922 requesting to confirm established on ILS, and the crew confirmed and reported a distance of 3 nautical miles from the threshold of runway 31L.

At 0806:15, Aerodrome Controller South provided traffic information about the calibration flight operating on the north runway. At this time, the Incident Aircraft completely stopped on the runway and the crew informed Aerodrome Controller South about their intention to stay on the runway to verify whether the brakes' temperature is within limits.

At 0806:35, the crew reported to Aerodrome Controller South ready to taxi and requested information about the reason for the take-off cancellation. The Controller responded by stating that the VFR calibration flight was operating on the north runway and in opposite direction.

The Aircraft safely vacated the runway at 0807:18 after confirming that there were no abnormalities or malfunction in any of the Aircraft systems.

The Aircraft stopped on the runway abeam taxiway Echo 10, approximately 1,850 meters from the threshold of runway 31L. (Figure 1)



Figure 1. Aircraft stopped at the runway

Personnel Information

The Commander

The Commander held an air transport pilot license (ATPL), issued by the General Civil Aviation Authority of the United Arab Emirates (GCAA). The license validity was until 7 September 2024. The class 1 medical certificate was valid until 28 February 2023.

The Copilot

The Copilot held an ATPL, issued by the GCAA with validity until 16 December 2022. The



class 1 medical certificate was valid until 31 January 2023.

Based on the training records, both flight crewmembers attended the Operator's required training.

Both flight crewmembers stated that they were well-rested and fit for the flight.

Aerodrome Controller South

Aerodrome Controller South held ATC license, issued by the GCAA, and valid until 30 September 2022, with the OMAA Aerodrome Control rating expiring on 30 June 2022.

The licence was also endorsed by on-job training instructor (OJTI) issued on 29 January 2017.

The Controller was issued a class 3 medical certificate valid until 15 May 2022, with VNL² limitation.

Aerodrome Controller North

Aerodrome Controller North held ATC license, issued by the GCAA, and valid until 31 December 2021, with the OMAA Aerodrome Control rating expiring on 30 October 2021.

The licence was also endorsed by OJTI issued on 29 January 2017, local competency examiner (LCE) issued on 21 July 2019, and ATC examiner (EXM) issued on 9 February 2021.

The Controller was issued a class 3 medical certificate valid until 31 May 2022, with VNL limitation.

Meteorological Information

The weather prevailing at the airport was normal.

Aerodrome Information

The airport coordinates 24°25'59"N 54°39'04"E, indicating the mid-point of runway 13R/31L on the centerline. The airport is located 16.5 kilometers east of Abu Dhabi city. The airport elevation is 83 feet.

The airport is equipped with two asphalt runways: 13R/31L; and 13L/31R. Runway 31L has a landing distance available of 4,106 meters. The

distance between both runways' centerlines is 2,000 meters.

Runway 31L is equipped with an Instrument Landing System International Civil Aviation Organization Category (ILS ICAO CAT) II/III precision approach lighting system and precision approach path indicator (PAPI) lights for 3.0 degrees glide path.

Aircraft Information

The records of Aircraft technical logs provided to the Investigation showed no technical defects prior to the Incident. There were no reported post-flight maintenance fault messages.

Communication Information

The military aircraft reported approaching Khalifa City South (KCS). Aerodrome Controller South did not acknowledge the call and no instructions were given in the form of a frequency change as required.

Communications between the flight crew and all ATC units were generally clear. All were recorded by the ground-based voice recording equipment and made available to the Investigation.

Navigation Information

Controllers' stations

According to ATC schedule of the air navigation service provider, Aerodrome Control South and North functions at the time of the Incident were filled by air traffic control officers (ATCOs) who were a manager and specialist, trained and competent for the control positions being filled, but routinely employed in administrative duties. These ATCOs were assigned operational duties in that day, to communicate and control the traffic, coordinate and control calibration operations, and provide support to reduce the workload of other ATCOs who were on shift cycle.

On the day of the Incident, a shift change took place during the flight calibration operation which was initially started for runway 31R. Aerodrome Controller North took over at 0755. Shortly thereafter, she called Approach controller and

² As per CAR Part II, the ATC license holder has limitation of having a correction available for defective near vision and carry spare set of spectacles



informed him that the flight calibration would shift to runway 13L (opposite direction) and the calibration operations will be managed by her.

Concurrent with the tasks related to the calibration flight, Aerodrome Controller South was also responsible for managing departures and arrivals for runway 31L. At that time, the traffic sequence consisted of two departures and one arrival. The first was one departure military VFR, the second was the ETD2333 (the Incident flight) IFR departure, and the third was another commercial traffic on approach for runway 31L.

Subsequently, Aerodrome Controller North called Aerodrome Controller South requesting to hold all departures and advising that will be subject to release by Approach and Aerodrome Controller North.

Notice To Airmen (NOTAM)

A NOTAM was effective at the time of the Incident as follows:

“(A2348/21 NOTAMN
Q)
OMAE/QFAXX/IV/NBO/A/000/999/2426N
05439E005
A) OMAA B) 2109260600 C) 2109301100
D) SEP 26, 28 AND 30 BTN 0600-1100
E) FLT CLBR INPR TFC TO EXP POSS
DLA.

NO TRG FLT PERMITTED.”

The NOTAM stated that it is issued a new NOTAM number A2348/21 by Abu Dhabi Airport. The Qualifier (Q) illustrates that the code QFAXX/IV is in the interest of all IFR and VFR flights for 'NBO' indicates for the immediate attention of aircraft operators, for inclusion in Pre-flight Information Bulletin's (PIB) and Operationally.

The A) OMAA is the ICOA code for Abu Dhabi, B) is the from the date (2021-September-26) and UTC time (0600) (202109260600) and C) is till the date (2021-September-30) and time (1100) (202109301100).

Line D) specific dates that on 26, 28 and 30 September and approximate duration UTC time from 0600 till 1100.

The E) line is the message “Flight Calibration in progress traffic to expect possible delay”

Flight Recorders

The Aircraft was equipped with an enhanced airborne flight recorder (EAFR). The EAFR had the capabilities of both the flight data recorder (FDR) and cockpit voice recorder (CVR) (combined flight recorder).

The CVR and FDR data and ATC transcript were examined, and the time between the two data sets was synchronized.

The FDR data revealed that the ground speed reached 127 knots and started to reduce.

The brake parameters revealed that the brake pedal was pushed at 0805:41 for 20 seconds with 1,200 psi pressure, and at the same time, the speed brake handle was pushed to 35 degrees to stop the Aircraft. The Aircraft stopped at 0806:01.

Organizational and Management Information

The Operator carries out hazard identification and risk analysis as per the *Safety Management System Manual Chapter 5 - Safety Hazard Identification & Risk Management*. The safety assurance processes are employed for autonomous monitoring of the effectiveness of safety risk controls and corrective actions implemented across different operations departments.

GANS is a limited liability company based in Abu Dhabi. GANS is certified by the GCAA for providing approach and tower air traffic services from many airports to private and government customers including Abu Dhabi International Airport.

The flight calibration safety assessment, including the hazard identification and risk assessment, was carried out by GANS on 19 May 2021. There were four hazards identified resulting in risk analysis and mitigation.

The conclusion of the risk management to conduct flight calibration has been mitigated to an acceptable level, therefore, it was recommended that the calibration activities be continued as planned.

Flight calibration procedures

According to the *Flight Calibration Procedures* incorporated in the *Air Traffic Services Operation Manual (ATSOM)*, flight calibration operation is limited to VFR with “Close coordination between OMAA Radar and OMAA TWR shall be ensured at all times.” and the “Tower shall advise Approach as soon as flight calibrator starts up.”

According to air navigation policy, “Flight calibration shall have priority over scheduled traffic. ATC is encouraged not to interrupt a flight profile once started, except when it is necessary



for safety reasons.”, and all other airport operations will be conducted on the other available runway.

ATSOM required certain separation criteria in cases of flight calibration operations on a runway which is kept active for other regular departures and arrivals. The separation aims at preventing wake turbulences and its distance depends on the weight of the arriving/departing aircraft. In all cases, ATC shall provide services applicable to Class D airspace.

The flight calibration team shall be briefed about the separation procedure and other relevant information. The Tower supervisors and controllers shall also be updated about the calibration flight schedule and profiles by publishing *Temporary Instructions (TI)*.

On the other side, the OMAA Operations Management published *standard operating procedures (SOP)* which contained spacing and separation rules for cases when it is not possible to restrict the runway for exclusive calibration flights. The rules amend the ATSOM separation criteria that were already published informing that there shall be no other arrivals inside 10 nautical miles of the active runway. In the *Supplementary Instructions (SI)* it is stated “2.5.1 c) No opposite departures are allowed during the profile until the flight calibration aircraft goes around and is clear of the departing traffic.”

The Tower published *TI 279/21* which stated that on 26 September 2021, from 0600 to 1100 UTC, the south runway (13R/31L) shall be used for the flight calibration only, and all other traffic shall operate from and to the north runway (13L/31R). During the calibration flight, Aerodrome Control South shall establish communication with Aerodrome Control North frequency, and the North and South Aerodrome, as well as Ground Movement, shall be staffed and open along with the calibration duration. Office staff will assist on the roster during these times. The *TI* also stated that when the calibration aircraft is “Flying ‘arcs’³ across the ILS LOC, ATC shall ensure that other aircraft are kept clear of the ILS and path of the “arc” being flown.”

The instructions for operations in opposite directions with the runway in use are published in

ATSOM, volume 2, Tower, *Runway in use – Selection and Procedures*, stating that opposite runway arrivals and departures are permitted only for emergency declared by pilots only.” Similar instructions are also incorporated in ATSOM, volume 3, Abu Dhabi Radar Control, *Runway in use – OMAA Runway Selection and Procedures*.

Analysis

Communication in Tower

Aerodrome Controller South was under the impression that the instruction to cancel takeoff was heard by the flight crew and decided to instruct the flight crew to vacate through taxiway Echo 14.

There was no clear information from Aerodrome Controller North to Aerodrome Controller South on the profile of the calibration. When the military aircraft was holding short on taxiway Hotel, Aerodrome Controller North called Aerodrome Controller South stating that the military aircraft was released for departure, and informed that the flight calibration was proceeding to the west and did not provide further information on the flight calibration intentions or flight profile. The military aircraft departed and proceeded via VFR route AD2.

The Investigation believes that there was a lack of coordination between Aerodrome Controllers North and the South. They used non-standard phraseology while passing instructions or information. Aerodrome Controller South provided prolonged non-standard traffic information to departing traffic and to the landing traffic at the time when the go-around instruction was issued.

When Aerodrome Controller South observed that the ETD2333 started rolling on runway 31L, there was simultaneous traffic on the final of the northern runway (runway 13L), a flight calibration operated in opposite direction, and also traffic RDBN922 was on final runway 31L. During all this workload, Aerodrome Controller South transmitted the incorrect callsign UAF2333 by mixing the callsign of the military traffic with the Incident flight callsign (ETD2333). She noted the first three alphabetical characters from military flight callsign

³ An arcing approach is a type of instrument approach where the aircraft flies a set radius around the NAVAID in order to intercept a final approach course inbound.
<https://www.cfnotebook.net/notebook/maneuvers-and-procedures/instrument/arc->

[approach#:~:text=An%20arc%20approach%20is%20a,a%20final%20approach%20course%20inbound](#)



and the four numerical characters from the Incident flight.

Aerodrome Controller South was confused as simultaneous events were happening at the same time as well as a call from the military aircraft similar to the callsign.

There was audio transmission clipping that can be heard indicating the end of another simultaneous or double transmission. The Investigation was unable to confirm the source of the double transmission. At the same time, take-off clearance was passed by Aerodrome Controller South, and it was expected that ETD2333 might have read back the take-off clearance.

The Investigation noticed that while Aerodrome Controller South was reading the take-off clearance to ETD2333, Aerodrome Controller North interfered by loudly stating the non-standard phraseology "Do not launch that aircraft.", Aerodrome Controller South reacted by amending the ongoing instructions to ETD2333 by stating "aaa sorry aamm cancel takeoff clearance line up and wait." The transmission duration was of 16 seconds. At that time, the Aircraft was at a ground speed of 20 knots and a distance of about 1,350 meters from the threshold.

The subsequent two transmissions to the crew, with the incorrect callsign, may have caused the crew to ignore the Controller's instruction and continue the takeoff. ETD2333 did not read back any of the instructions and continued on the take-off roll. It was after the fourth call, with the correct callsign, the crew read back correctly and rejected the takeoff. The Aircraft stopped at about 1,850 feet from the threshold after reaching the ground speed of 127 knots.

The Temporary Instructions

As per *ATSOM*, volume 3, section 3, the opposite runway arrivals and departures are not permitted at OMAA except for aircraft emergency movements.

The published *TI 279/21* supplemented the *ATSOM* but did not contain specific instructions for the arrangement of arrival and departure traffic during the calibration flight operating from the direction opposite to the dual runway in use. The *TI* also did not incorporate specific procedures for issuing clearances by Tower and Approach.

Aerodrome Controllers North and South did not comply with the *ATSOM* while issuing clearance for a military VFR flight during calibration flight operation. Additionally,

Aerodrome Controller South issued a take-off clearance without coordination with Aerodrome Controller North and Approach controller.

Conclusions

Based on the evidence available, the following findings, causes, and contributing factors were made with respect to this Incident. These shall not be read as apportioning blame or liability to any particular organization or individual.

Findings

- (a) The Aircraft was certificated, equipped, and maintained in accordance with the requirements of the *Civil Aviation Regulations* of the United Arab Emirates. It was airworthy when released for the flight and no technical defects were reported.
- (b) Both flight crewmembers were qualified and current for the flight as per the requirements of the *Civil Aviation Regulations* of the United Arab Emirates.
- (c) Both flight crewmembers were well-rested and fit for the flight.
- (d) The Commander was the PF and the Copilot was the PM.
- (e) Aerodrome Controllers South and North were qualified in accordance with the requirements of the *Civil Aviation Regulations* of the United Arab Emirates.
- (f) Aerodrome Controller South issued a take-off clearance to the Aircraft without coordination with Approach or Aerodrome Controller North.
- (g) *ATSOM* did not contain sufficient procedures corresponding to the calibration flight separation and spacing for cases of arrival and departure traffic from the opposite direction from the calibration flight.
- (h) The separation criteria contained in *ATSOM* had not been incorporated in Tower or Approach *TI 279/21* and *TI 151/21*.
- (i) The flight environmental conditions were normal.

Causes

The Air Accident Investigation Sector determines that the cause of the high energy rejected takeoff at 127 knots was after the



Aerodrome Controller South instructions to stop the Aircraft.

The Aerodrome Controller South had previously issued a take-off clearance that was not in compliance with the published procedures.

Contributing Factors

The Air Accident Investigation Sector identifies the following contributing factors:

- (a) Aerodrome Controller South did not coordinate with Aerodrome Controller North when she issued the take-off clearance for the Aircraft as agreed on the phone call prior to the Incident;
- (b) Aerodrome Controller South transmitted an incorrect callsign when she called the crew to stop the takeoff, subsequently, the crew continued the take-off roll. The Controller also transmitted nonstandard phraseology when the take-off clearance was cancelled; and
- (c) Prolonged transmissions while issuing critical instruction (take-off clearance) that included information on traffic on finals and flight calibration operation.

Safety Recommendations

Safety Actions

Aerodrome Controllers South and North received two-day internal training to address the deficiencies observed during the internal investigation. The performance of Aerodrome Controller South was planned to be monitored for the period of three months and subject to six random tape reviews.

After completing the remedial training and receiving approval from the GCAA, Aerodrome Controller South was reinstated as an operational ATCO.

The internal investigation recommended the following:

- “
- enhance the procedures corresponding to the calibration flights by ensuring that all relevant procedures are incorporated into *ATSOM* and address management of change by supplementary or temporary instructions referring to such *ATSOM* requirements, and define criteria for

operations from the opposite direction of the calibration flight.

- provide the North and Aerodrome Controller South s and supervisor with a brief on the outcomes of the internal investigation.
- publish a Safety Bulletin with the lessons learned from the internal investigation.
- create and incorporate flight calibration operations as a part of the ATCOs annual assessment.”

The Air Accident Investigation Sector has reviewed the safety actions recommended in the internal investigation report that resulted in updating *ATSOM* and *OMAA Operations Manual* and considers the safety actions sufficient, therefore there are no further safety recommendations published in this investigation.

**This Summary Report is issued by the:
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