الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

Air Accident Investigation Sector

Serious Incident

- Summary Report -

AAIS Case Nº AIFN/0009/2021

Ground Collision

Operators:	flydubai and Gulf Air
Make and Model:	Boeing 737-800 and Airbus A321-200
Nationality and Registration:	The United Arab Emirates (A6-FER) and Bahrain (A9C-NC)
Place of Occurrence:	Dubai International Airport
State of Occurrence:	The United Arab Emirates
Date of Occurrence:	21 July 2021

This Investigation was conducted by the Air Accident Investigation Sector 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 Air Accident Investigation Sector issued this Summary Report in accordance with national and international standards and best practice. 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

Investigation Process

The occurrence involved flydubai Boeing B737-800, registration marks A6-FER, and Gulf Air Airbus A321, registration marks A9C-NC.

The occurrence was notified to the Air Accident Investigation Sector (AAIS) Duty Investigator (DI) by phone to the Hotline number (+971 50 641 4667) on 22 July 2021.

After the Initial/On-Site Investigation phase, the occurrence was classified as a '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.

The investigation was concluded in December 2022. However, it was reopened after new evidence emerged, enabling a thorough review of safety issues and the development of recommendations to enhance operational safety in coordination with relevant stakeholders (*Annex 13, Section 6.3*).

Notes:

1. Whenever the following words are mentioned in this Report with a first capital letter, they shall mean the following:
   - (Incident) – The serious incident that is the subject of this Summary Report
   - (Investigation) – The investigation into the circumstances of this serious incident
   - (Report) – This investigation Summary Report.
2. Photos and figures used in this Report are taken from different sources and are adjusted from the original for the sole purpose to improve the clarity of the Report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or enhancement of color, brightness, contrast, or addition of text boxes, arrows, or lines.
3. Unless otherwise mentioned, all times in this Report are given in 24-hour clock in Coordinated Universal Time (UTC), (UAE local time minus 4).
4. This Summary Report is structured using the relevant headings incorporated in the *Annex 13* Final Report format.

Factual Information

History of the Flight

On 21 July 2021, flydubai Boeing 737-800, registration marks A6-FER, was scheduled to operate night flight number FDM1461, from Dubai International Airport (OMDB) to Manas International Airport (UCFM), Kyrgyzstan. There were 124 people onboard, comprising 2 flight crewmembers, 6 cabin crewmembers, and 116 passengers.

On the same night, Gulf Air Airbus 321, registration marks A9C-NC, was scheduled to operate flight number GFA513 from OMDB to Bahrain International Airport (OBBI). There were 116 people onboard, comprising 2 flight crewmembers, 5 cabin crewmembers, and 109 passengers.

The FDM1461 flight crew reported onboard 42 minutes before departure time. The flight was delayed for about 47 minutes due to changes in the load sheet.

At 1934:32 UTC, GFA513 requested taxi clearance from stand Charlie 54, and the Ground controller provided the clearance by stating, "Gulf air five one three left on lima one right on mike hold at mike charlie." The flight crew read back the taxi clearance correctly. Thereafter, the flight crew requested taxi route Zulu and Lima 1. The Ground controller affirmed at 1935:27. The crew read back the taxi clearance stating, "Thank you zulu lima one mike hold at mike charlie gulf air five one three."

At 1937:40, FDM1461 requested taxi clearance from Stand Charlie 22, and the Ground controller cleared by instructing "Skydubai one four six one left at mike one right on mike hold at mike charlie." The crew read back the taxi clearance correctly.

At 1938:04, the Ground controller gave instructions to GFA513 stating, "Gulf air five one three behind flydubai seven three seven [another flydubai aircraft] from the right side, continue to holding point mike one three."

At 1939:53, GFA513 advised Ground controller that they will be ready for departure by Mike 10 Alpha by stating, "Gulf air five one three we would be ready by mike ten alpha." Ground controller affirmed the flight crew's request for changing the holding point from Mike 13 to Mike 10 Alpha.

While Ground controller was providing taxi instructions to both aircraft, he received a telephone call informing about inbound traffic. While attending the telephone call, which lasted until 1941:00, the Ground controller instructed FDM1461 to continue

taxiing to holding point Mike 13 at 1940:21, and the flight crew read back the clearance correctly.

At 1941:07, Ground controller called GFA513, instructing the flight crew to monitor Tower control frequency 118.75 MHz while the aircraft was taxiing on taxiway Mike, passing the intermediate holding position (IHP) Mike Golf. The flight crew acknowledged the instruction to monitor Tower frequency and read back the frequency correctly. Subsequently, at 1941:13, similar instructions were given to FDM1461 to monitor Tower frequency, and no instruction was issued to stop the aircraft before reaching a position abeam Mike 10 Alpha should GFA513 still be holding. The flight crew read back the frequency correctly.

At 1942:57, GFA513 turned left heading to the holding point Mike 10 Alpha. At that time, FDM1461 was about 650 meters away. When GFA513 stopped at Mike 10 Alpha holding point, FDM1461 was about 500 meters away.

As indicated by the flight data recorder (FDR) data, at 1943:58, the FDM1461 (B737) left wingtip contacted the holding GFA513 (A321). During the interview, the FDM1461 commander stated to the Investigation that the flight crew had checked for the wing clearance and perceived that the left wing was clear to taxi behind the holding A321, but this could not be confirmed since the cockpit voice recorder (CVR) was overwritten.

At 1944:15, GFA513 established communication for the first time with Tower controller and the controller requested confirmation if they are ready for departure by asking, “Gulf Air five one three ready[?]”, and the commander replied, “No sir I think this flydubai behind us hit us here on mike ten or mike thirteen alpha request to return to the gate.” Consequently, Tower controller asked, “Confirm that the flydubai hit you.”, and the crew replied, “Think so because we received a very [unreadable] hit in the back the aircraft shaking and he is passing behind us.”

At 1944:42, Tower controller contacted FDM1461 to gather further details on the Incident, and the flight crew replied, “Skydubai one four six one we hit the gulf air my apologies.” The controller reassured by asking, “Confirm did you hit the traffic behind you[?]”, to which the flight crew replied, “Aah we were cleared to mike one three and affirm we did feel a bit of a bang [unreadable] hit them.”

Tower controller informed the Duty Manager as per the procedures, called the airport fire services, and then reported the Incident to the AAIS Duty Investigator.

Damage to Aircraft

The B737 wingtip and A321 tail sustained minor damages (figures 1 and 2).

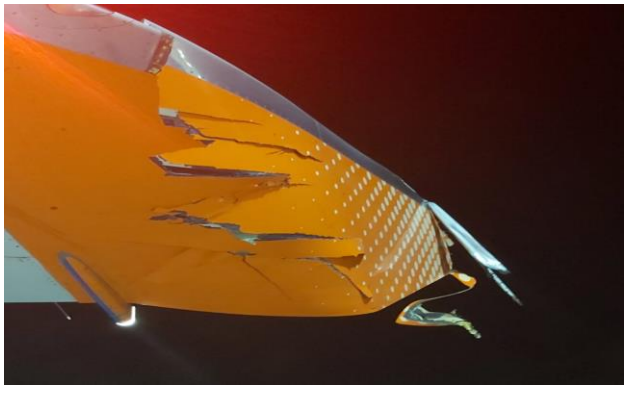

Figure 1. Damage to the B737 wingtip

Figure *2.* Damage to the A321 tail

Personnel Information

Flight crew qualifications

Both flight crewmembers of FDM1461 were holders of valid air transport pilot licenses (ATPL) and Class 1 medical certificates issued by the General Civil Aviation Authority (GCAA) of the United Arab Emirates. The commander’s medical certificate included a limitation annotated as 'VDL[1]' (Corrective

[1] (VDL) limitation is correction for defective distant vision whilst exercising the privileges of the license, the license holder shall wear spectacles or contact lenses that correct for defective distant vision as examined and approved by the AME (Aeromedical Examiner). According to CAR-Med Regulations: the “Distant visual acuity”, with or without

Lenses). The commander confirmed to the Investigation that corrective eyewear (glasses) was being used while taxiing the Aircraft.

The commander joined the Operator on 25 November 2014, with a total flight experience of 5,723 hours, 3,523 hours were on type at the time of the Incident. The Copilot joined on 29 August 2017, with a total of 2,124 flight hours, of which 1,736 were on type at the time of the Incident.

Similarly, both flight crewmembers of GFA513 held valid ATPL with A320 family type ratings and Class 1 medical certificates issued by the Ministry of Transportation and Communications of the Kingdom of Bahrain with the appropriate type rating. The commander had accumulated 6,280 flight hours, the majority on A321, while the Copilot had 1,700 total flight hours.

Air traffic controller's qualifications

Ground controller held a valid air traffic controller license endorsed by on job training instructor (OJTI), aerodrome control (ADC), and air traffic control (ATC) examiner (EXM), with a valid Class 3 medical certificate with no limitations.

Tower controller held a valid air traffic controller license with ADC rating and OJTI endorsement. He also held a valid Class 3 medical certificate with no limitations.

The Duty Manager held a valid air traffic controller license, ADC rating, OJTI, local competency examiner (LCE) endorsement, and Class 3 medical certificate with no limitations.

Aircraft Information

Boeing 737 overview

The B737-800 is a twin-engine aircraft designed to operate over short to medium ranges. The wingspan extends for 35.89 meters (figure 3).

As per the *flight crew training manual* (*FCTM*), "There is a larger area near the Aeroplane where personnel, obstacles, or guidelines on the ground cannot be seen, particularly in the oblique view across the flight deck. Special care must be exercised in the parking area and while taxiing."

Figure 4 shows the cockpit's external view, approximately 135 degrees to the left, near the window.

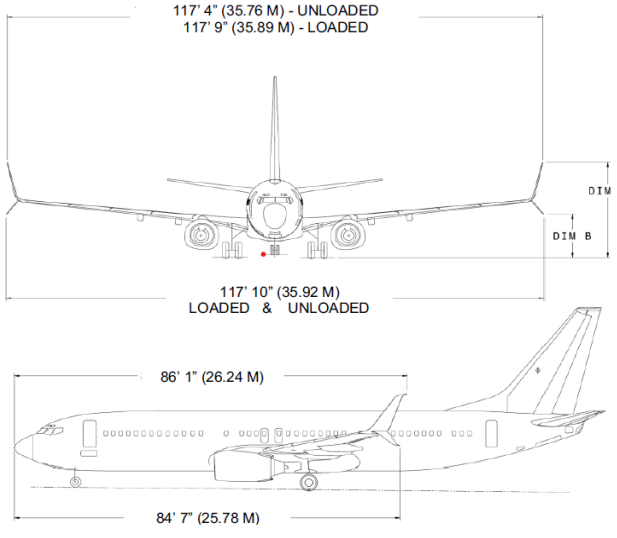

Figure 3. B737-800 dimensions [Source: B737-8 *FCOM* flydubai]

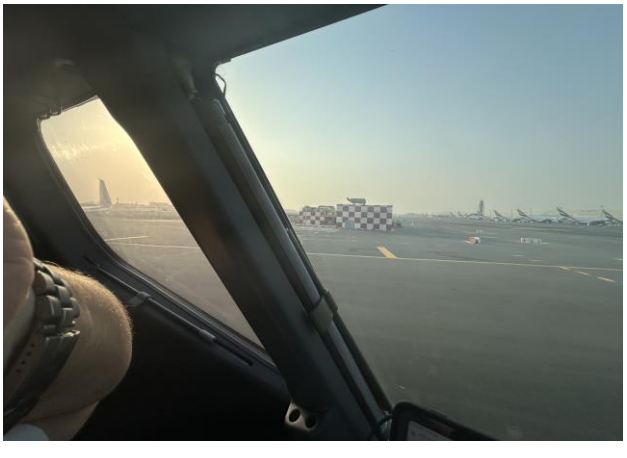

Figure 4. B737-800 cockpit external view to the left 135 degrees close to window [Source: flydubai]

correction, shall be in the case of Class 1 Pilot, 6/9 or better in each eye separately and visual acuity with both eyes shall be 6/6 or better. For Class 1 Pilots: A routine eye examination can be performed by an AME at each renewal of medical certificate. However, a comprehensive eye examination by an eye specialist (Ophthalmologist) is required at the initial GCAA examination. All abnormal and doubtful cases should be referred to an ophthalmologist during renewal or when clinically indicated.

Airbus A321 overview

The A321 is a medium-range aircraft, powered by two high-bypass turbofan engines mounted under the wings. The aircraft is 44.51 meters long, and the stabilizer height is 11.755 meters from the ground (figure 5). The pilot eye position is 4.56 meters above ground (figure 6).

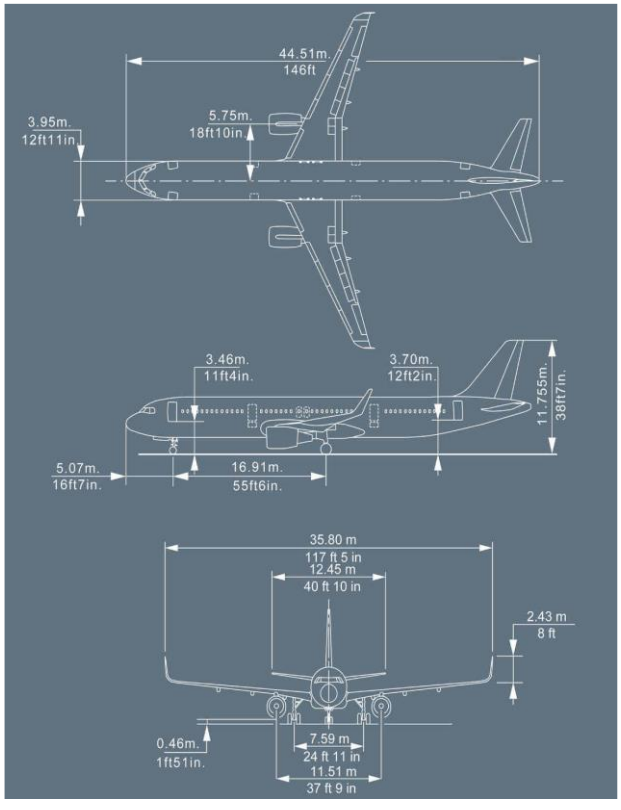

Figure 5. A321 dimensions [Source: *FCOM*]

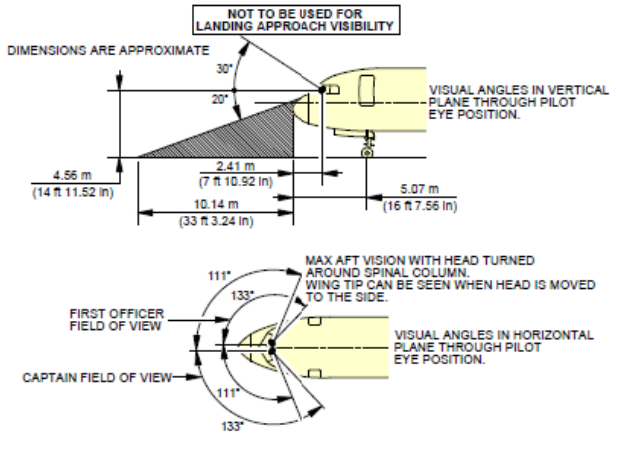

Figure 6. A321 pilot's eye level-A321 [Source: Airbus Document]

As per the *Airbus Documentation (Aircraft Characteristics Airport and Maintenance Planning)*, at 4.56 meters above ground level, the pilot's line of sight is extended for only 12.55 meters. The slope of the pilot's line of sight is restricted to 20 degrees downwards from the cockpit (figure 6). The hashed area in figure 6 lies outside the pilot's line of sight.

Weather Information

The automatic terminal information service (ATIS) at the time of the Incident indicated that the runway in use was 30R, the wind was blowing from 240 degrees at 8 knots, the temperature was 37 degrees Celsius, the dew point was 25 degrees Celsius, QNH was 999 hPa. Ceiling and Visibility OK (CAVOK), which refers to visibility more than 10 kilometers with no significant change.

Aerodrome Information

OMDB is the primary international airport serving Dubai and is located 2.5 nautical miles east of Dubai. OMDB has two runways, 12R/30L and 12L/30R. OMDB infrastructures were fully compliant with *CAR Part IX ADR – Aerodromes*. Both asphalt runways are 4,447 and 4,351 meters long, respectively. Figure 7 illustrates the runway 12L/30R and taxiway Mike layout.

Figure 7. OMDB runway 12L/30R layout [Source: UAE *AIP*]

Taxiway Mike 10 Alpha

As per the *Aeronautical Information Publication* (*AIP*), taxiway Mike is classified as ICAO code F with a strip of 115 meters and 18 meters of shoulder on both sides. Taxiway Mike 10 Alpha is 192 meters long and 38 meters wide.

Medical and Pathological Information

There was no evidence that a psychoactive substance, physiological, or psychological factors may have affected the performance of both flight crews.

The Operators of both Aircraft

The FDM1461 operator (flydubai) was established in March 2009, and its base of operations

is Dubai International Airport. The fleet of the company comprises 61 B737 aircraft.

The GFA513 operator (Gulf Air) is the national carrier of the Kingdom of Bahrain, which commenced operations in 1950. The airline operates a combination of Airbus and Boeing fleets.

Dubai Air Navigation Services (dans)

The air navigation service provider (dans) at OMDB provides multiple services: air traffic management (ATM), engineering (ATE), and airspace management (ASM).

Additional Information

Taxi procedures and speed limitations for B737

The "OM-A, 8.3.1.1.17" stated:

> "Normal taxi speed is approximately 20 knots, adjusted for conditions. On long straight taxi routes, speeds up to 30 knots are acceptable."

The FDR data showed that the FDM1461 (B737) taxi speed was 27 knots and slowed down to 12 knots prior to the collision with the GFA513 (A321).

The commander's responsibility during taxi

The B737 operator's *Operations Manual − Part A* (*OM-A*), stated:

> "One of the Commander's responsibilities is to ensure the safety of the aircraft from the moment the aircraft is first ready to move for the purpose of taxiing prior takeoff, until the moment it finally comes to rest at the end of the flight and the engine(s) used as primarily propulsion units are shut down."

Manual of Air Traffic Services

Part 3 of dans *Manual of Air Traffic Services (DMATS) – Dubai Tower*, stated:

> "5.3.8.4 TAXIWAY RESTRICTIONS
>
> **M13, M14, M10, and M7, M5, M4**
>
> There is 165m of taxiway between runway holding positions for the two runways (at M13, M14, M10 and M7, M5 & M4.
>
> If aircraft (irrespective of whether Code F, E, D or C) are holding at the holding points M13A&B, M14A&B, M10A&B and M7B, M5A&B, & M4, other aircraft are not permitted to taxi or hold behind."

As per *DMATS*, aircraft are not permitted to taxi behind another aircraft holding at certain designated holding points on taxiway Mike. This includes the holding point Mike 10 Alpha, where the A321 was holding.

Aerodrome control services

The *CAR Part VIII Subpart 4 – Air Traffic Services Organizations* outlines the following requirements related to ATC's responsibility in preventing collisions:

> "**CAR 4.19 AERODROME CONTROL SERVICES**
>
> (a) The applicant for an ATS certificate in respect of an aerodrome control service shall establish systems and procedures to:
>
> 1. Determine, from information received and visual observation, the relative positions of known aircraft to each other;
> 2. Provide for the issue of ATC clearances, instructions and information, including the runway in use at controlled aerodromes, for the purpose of preventing collisions between:
>
> i. aircraft flying in the vicinity of the aerodrome;
>
> ii. aircraft landing and taking off;
>
> iii. aircraft operating on the manoeuvring area;
>
> iv. aircraft, vehicles, and persons, operating on the manoeuvring area;
>
> v. aircraft on the manoeuvring area and obstructions on that area;
>
> …
>
> 5. Ensure aerodrome controllers maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome as well as vehicles and personnel on the manoeuvring area. Watch shall be maintained by visual observation, augmented in low visibility conditions by an ATS surveillance system when available.
>
> …"

Air traffic control clearances

The *ICAO Annex 2 – Rules of the Air* includes the following provision on air traffic control clearances:

> "**3.6.1 Air traffic control clearances**
>
> …
>
> 3.6.1.4 An aircraft operated on a controlled aerodrome shall not taxi on the manoeuvring area without clearance from the aerodrome control tower and shall comply with any instructions given by that unit."

Avoidance of collisions

The *ICAO Annex 2* includes the following provision pertaining to the duties of pilot-in-command:

> "**3.2 Avoidance of collisions**
>
> Nothing in these rules shall relieve the pilot-in-command of an aircraft from the responsibility of taking such action, including collision avoidance manoeuvres based on resolution advisories provided by ACAS equipment, as will best avert collision.
>
> *Note 1.— It is important that vigilance for the purpose of detecting potential collisions be exercised on board an aircraft, regardless of the type of flight or the class of airspace in which the aircraft is operating, and while operating on the movement area of an aerodrome.*"

Analysis

Positioning GFA513 (A321) at Mike 10 Alpha Holding Point

The Investigation could not determine the definite position of the A321 from the stop bar lights from direct observational evidence, and how far the nose was exactly away from the bar. Therefore, the Investigation carried out estimations based on the following facts and assumptions:

(a) The width of taxiway Mike is 25 meters;

(b) Mike 10 Alpha stop bar lights are positioned at about 83 Meters north from the taxiway Mike centerline;

(c) The wingspan of the taxiing B737-800 was 35.76 meters (figure 3), meaning that the left wingtip was about 17.88 meters from the centerline (half the span);

(d) The length of the holding A321 was 44.51 meters (figure 5); and

(e) Assuming that the B737-800 was taxiing on taxiway Mike centerline, as stated by the flight crew.

The Investigation estimated that the GFA513 was stopped at a position where the nose of the aircraft was more than 20.61[2] meters short of the stop bar lights (figure 8). At that time, FDM1461 was about 500 meters away while taxiing.

Referring to the A321 design characteristics, the pilot's eye level is approximately 4.56 meters above ground level and situated behind the aircraft's nose. Assuming the flight crew had correctly adjusted their seats with eyes aligned to the pilot's eye reference position, objects at least 12.55 meters ahead of the pilot's eye position would be visible, corresponding to a point approximately 10.14 meters in front of the aircraft's nose. The aircraft was positioned no closer than 20.61 meters from the stop bar. From the cockpit eye reference position, the stop bar lights were located about 10.47 meters ahead of the point where the flight crew's forward visibility began. No ICAO standard nor the A321 operator's procedures

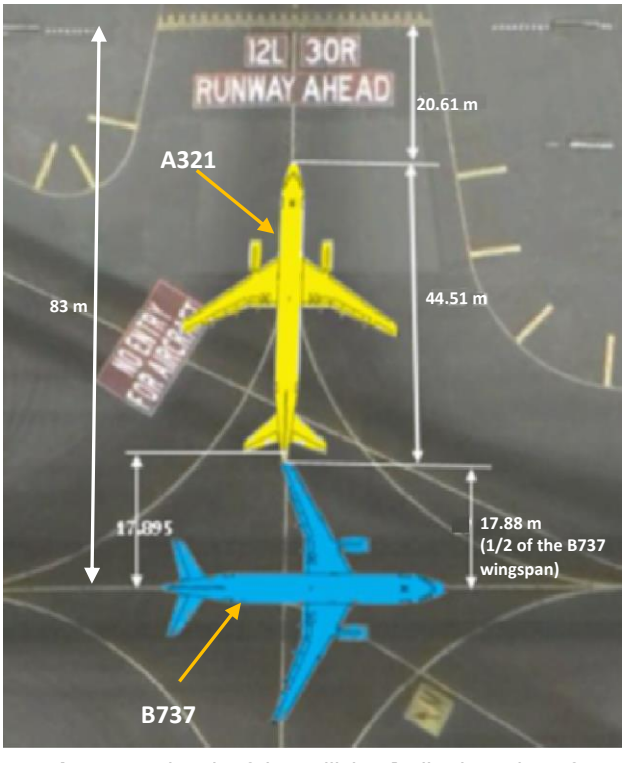

Figure 8. Sketch of the collision [Edited version of image from Dubai Airports internal report]

specified a minimum distance other than the requirement to stop before the stop bar.

The GFA513 flight crew reported that airfield signage and lighting were clearly visible from the cockpit. They were familiar with OMDB procedures and believed the aircraft was positioned appropriately, allowing full visibility of the stop bar and expecting its

[2] The nose of the A321 was positioned no closer than 20.61 meters from the stop bar lights. This measured distance did not account for the B737's inboard wing contact point or the A321's vertical stabilizer sweep.

tail would not obstruct taxiing traffic. However, at night, visual depth perception is degraded due to the absence of shadows and terrain references, while glare from airfield lighting can further obscure distance cues. Such conditions can contribute to misjudging the aircraft's stopping position, leading to a greater margin from the stop bar than intended.

Furthermore, whilst the GMR correctly indicated that the GFA513 was at the holding point, the design of the system is not accurate enough to establish the aircraft's exact nose and tail positions.

Judgment of the Separation Distance

The FDR data showed that the FDM1461 (B737-800) was taxiing at 27 knots, reducing its speed to 12 knots before the collision with the stationary GFA513 at holding point Mike 10 Alpha. This deceleration may indicate that the flight crew was concerned about wingtip clearance. Despite being cleared to proceed to holding point Mike 13 and passively monitoring the Tower frequency, the FDM1461 flight crew could have sought clarification, or held position before abeam Mike 10 Alpha until GFA513 had entered the runway following its line-up clearance.

At 1943:58, and as indicated by the FDR data, the FDM1461 left wingtip contacted the tail of GFA513. The FDM1461 commander informed the Investigation that wing clearance had been visually assessed and believed sufficient to proceed behind the holding GFA513.

The Investigation examined the oblique view limitations from the left cockpit seat of a B737-800. Based on Boeing's aircraft documentation, as well as pilot eye position standards from the *FCOM* and *AFM*, the commander's view of the left wingtip was restricted, especially if seat and headrest settings were adjusted for personal comfort. The sidewall and window framing further obstruct lateral visibility, as illustrated in table 1.

Table 1. B737-800 oblique view limitations from the left seat

Forward/left forward	Mostly clear	Minimal obstructions from window frames
Left side (90 degrees)	Partial	Can view left engine inlet and wing root area, but wingtip is not fully visible
Left-rear (135-180 degrees)	Severely limited	Cockpit sidewall, seat headrest and window framing block aft visibility

The Investigation also considered the role of night conditions in the flight crew's ability to judge separation margin. The B737-800's runway turnoff lights are integrated with the fixed landing light assembly, located inboard of the wing root. These lights project a narrow beam, typically between 30 and 45 degrees from the aircraft's longitudinal axis, providing lateral illumination forward of the wing.

While the lights improve forward visibility, their limited lateral spread restricts their usefulness in judging side clearances, such as wingtip separation.

As FDM1461 approached the GFA513 abeam Mike 10 Alpha, the tail of the A321 moved outside the illuminated field of the B737's lights. As a result, the flight crew had to rely solely on visual judgment, aided by ambient lighting from taxiway centerline and edge lights, and white navigation (position) light located on the aft fuselage / tail section.

Aircraft design limitations, specifically restricted oblique visibility from the left seat, combined with limited lateral illumination and low ambient light, significantly impaired the flight crew's ability to accurately judge wingtip clearance. This combination of factors likely contributed to the wingtip collision.

According to the Operator's standard procedures and *Annex 2* to the Chicago Convention, paragraph 3.2, the pilot-in-command is responsible for avoiding collisions and ensuring sufficient clearance while taxiing. The decision to proceed behind the holding GFA513 suggests that the prevailing reduced visibility conditions may have influenced the FDM1461 flight crew's judgment. While taxiway Mike is geometrically straightforward and well-lit, the reduced visual cues and the presence of GFA513 at intersection Mike 10 Alpha introduced situational complexity in judging lateral separation, even under otherwise favorable visibility conditions. Under these conditions, the FDM1461 flight crew should have reassessed the available clearance and coordinated with ATC before proceeding past the GFA513 holding at Mike 10 Alpha.

During the Incident, the FDM1461 commander was using corrective eyewear in accordance with the medical certificate requirements, and there was no indication of any visual acuity deficiency beyond the normal limitations associated with low-illumination environments. However, even with corrective lenses, depth perception and spatial awareness at night are inherently constrained by physiological and environmental factors rather than visual sharpness alone. Therefore, the collision was more likely the result of perceptual misjudgment under complex visual conditions than of any medical non-compliance.

Coordination

When Ground controller instructed GFA513, “Gulf air five one three holding point mike ten alpha monitor one one eight seven five.”, the controller did not coordinate the intersection departure (changing from Mike 13 to Mike 10 Alpha) with Tower controller. However, Ground controller updated the electronic flight progress strips (EFPS) to indicate Mike 10 Alpha.

When Ground controller instructed FDM1461, “Skydubai one four six one, continue to holding point mike one three.”, no advisory was provided to the flight crew regarding restrictions on taxiing behind the holding GFA513. As per the statement, the Ground Controller expected GFA513 to have entered the runway by the time FDM1461 reached a position abeam Mike 10 Alpha, and thus did not consider it a conflict. If the GFA513 remained at the holding point unexpectedly, the controller believed the obstruction would be obvious to the FDM1461 crew and would prompt them to stop, which was why the clearance was not amended.

As per the interview statement, the flight crew of FDM1461 believed there was sufficient room to pass behind, that they remained on the taxiway Mike centerline, and that Ground control would intervene if separation became an issue. This mutual expectation and assumption by both the controller and the flight crew contributed to reduced situational awareness and a breakdown in effective conflict recognition.

Although the Ground controller anticipated that the GFA513 would proceed onto the runway, the instruction issued to both aircraft was to *monitor* the Tower frequency. In accordance with standard phraseology protocols, the controller should have used the term *contact* to ensure an active handover and immediate two-way communication with the Tower. This was also the reason why GFA513 flight crew did not directly contact Tower control informing that they were ready to enter the runway for takeoff.

GFA513 and FDM1461 were the only aircraft awaiting departure, with no other traffic holding or taxiing outbound.

The Tower controller stated that during low-traffic periods, aircraft often reach the holding point before being ready for departure. Therefore, the controller usually confirms readiness before issuing line-up clearance, but had not yet done so for GFA513 at the time of the Incident. The controller added not being distracted from primary duties, but momentarily looked away, resulting in missing that GFA513 had arrived at the holding point. The controller was also unaware that GFA513 had been cleared to Mike 10 Alpha and was expecting a full-length departure, and did not notice that the flight progress strips indicated Mike 10 Alpha as the departure point due to lack of coordination between the Ground and Tower controllers regarding the GFA513’s revised departure intersection from Mike 13 to Mike 10 Alpha, which also led to a breakdown in shared situational awareness. These conditions revealed that the Tower controller’s situational awareness was reduced by expectancy bias and a brief lapse of attention, leading to an incorrect assumption that GFA513 was preparing for a full-length departure. This resulted in missed recognition of the GFA513’s actual position and readiness, contributing to reduced coordination and traffic awareness.

The *aeronautical information publication* (*AIP*), effective at the time of the Incident, under the title *Aprons, Taxiways and Check Locations/Positions Data*, did not incorporate information about restrictions on aircraft taxiing behind an aircraft holding at the designated taxiway Mike holding points. Similarly, the aeronautical navigation charts did not provide sufficient guidance to inform flight crew of the restriction to taxi behind another aircraft holding therein.

From a procedural perspective, according to *CAR Part VIII Subpart 4*, CAR 4.19 – *Aerodrome Control Services*, point (a) 5:

> “The applicant for an ATS certificate, in respect of an aerodrome control service, shall establish systems and procedures to: Ensure aerodrome controllers maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome as well as vehicles and personnel on the maneuvering area. Watch shall be maintained by visual observation, augmented in low visibility conditions by an ATS surveillance system when available.”

From the other side, the FDM1461 Operator's *OM-A* outlined that one of a commander’s primary duties is to ensure the continuous safety of the aircraft from the moment it is first cleared to taxi before takeoff until it reaches its final parking position after landing and the engines are shut down.

The Investigation believes that the lack of taxiing restriction guidance in the FDM1461 Operator’s documentation, due to the unavailability of such information to the Operator, eliminated a key safety defense that might have mitigated the risk of collision. The FDM1461 flight crew was not made aware of any restriction prohibiting taxiing behind the holding GFA513. The applicable restriction existed only within

local *DMATS* documentation and was not reflected in the aeronautical navigation charts available to the FDM1461 flight crew, nor published in the *AIP* to inform other operators, including foreign operators.

The responsibility for preventing collisions in the maneuvering area is shared between air traffic controllers and flight crews. To fulfil this responsibility effectively, all parties shall be supported by appropriate procedures, operational guidance, and available surveillance or visual aids (such as clearance guidance lines or wingtip cameras) to ensure the safe and orderly movement of aircraft.

Conclusions

Findings

(a) Both FDM1461 (B737-800) and GFA513 (A321) were airworthy for the flight.

(b) The flight crews of FDM1461 and GFA513 were appropriately licensed, medically fit, and had sufficient rest periods for the flights.

(c) Both Tower and Ground controllers were appropriately licensed, medically fit, and had sufficient rest periods.

(d) The flight was at night, with CAVOK weather.

(e) When the GFA513 turned left heading to holding point Mike 10 Alpha, the FDM1461 was about 650 meters away.

(f) When the GFA513 stopped at Mike 10 Alpha holding point, the FDM1461 was about 500 meters away.

(g) When instructing FDM1461 flight crew to monitor Tower frequency, the Ground controller did not include conditional instructions to stop before reaching a position abeam Mike 10 Alpha if GFA513 remained at the holding point.

(h) GFA513 was positioned more than 20.61 meters short of the stop bar lights at taxiway Mike 10 Alpha. This placed the tail of the aircraft partially obstructing taxiway Mike, resulting in the tail of the aircraft extending into the path of FDM1461's left wingtip and causing a wingtip-to-tail contact.

(i) The stop bar lights were visible to the GFA513 flight crew and located approximately 10.47 meters ahead of the point where the flight crew's forward visibility began, indicating a possible misjudgment of stopping distance, likely influenced by nighttime visual illusions and glare from airfield lighting.

(j) The GMR correctly indicated that the GFA513 was at the holding point, however, the design of the system is not accurate enough to establish the aircraft's exact nose and tail positions.

(k) Although the left wingtip was still visible, the B737-800 cockpit design and seat/headrest configuration, cockpit sidewall, and window framing restricted the FDM1461 commander's field of view, making it challenging to accurately judge lateral clearance.

(l) The runway turnoff lights on the FDM1461 provided limited lateral illumination, and the GFA513's tail likely felt outside their effective beam as the FDM1461 passed abeam, requiring the flight crew to depend on ambient lighting and visual judgment, even though the A321's white navigation (position) light on the tail was visible. No supplemental visual aids or onboard clearance monitoring systems were available to assist in accurately determining lateral separation from nearby obstacles or aircraft.

(m) The FDM1461 was taxiing at approximately 27 knots and decelerated to 12 knots before the wingtip contacted the holding GFA513. This reduction in taxi speed suggests the FDM1461 flight crew was exercising caution and may have been concerned about maintaining sufficient wingtip clearance.

(n) The FDM1461 flight crew did not seek clarification from ATC regarding safe passage or hold the aircraft before taxiing behind the holding GFA513.

(o) Both the Ground controller and FDM1461 flight crew assumed the other would ensure separation.

(p) The Ground controller expected the GFA513 to depart before FDM1461 reached a position abeam Mike 10 Alpha, or FDM1461 would stop taxiing if GFA513 remained at the holding point unexpectedly.

(q) Conversely, the FDM1461 flight crew presumed the clearance as confirmation that it was safe to proceed, and expected that the ATC, in this case the Tower controller, would provide appropriate instructions or intervene if any risk of conflict or collision became apparent.

(r) The FDM1461 flight crew misjudged the separation distance between the wingtip and the A321 tail.

(s) The Ground Controller instructed both aircraft to "monitor" the Tower frequency rather than using the standard phraseology "contact," which

delayed direct communication with Tower and contributed to the GFA513's prolonged hold.

(t) This mutual expectation between the flight crew and the Ground controller led to a confirmation bias, where both parties interpreted the situation in a way that aligned with their expectations, reducing the effectiveness of real-time monitoring and conflict detection.

(u) A breakdown in coordination between the Ground and Tower controllers regarding GFA513's revised departure plan, combined with a brief attentional lapse, resulted in the Tower controller being unaware of the GFA513's actual position and readiness at the Mike 10 Alpha holding point.

(v) The absence of standardized taxi restriction procedures in the FDM1461 Operator's documentation weakened a key layer of safety defense. The flight crew was not made aware of any restriction against taxiing behind a holding aircraft.

(w) The restriction was contained only in local *DMATS* documentation, not published in the *AIP* or reflected in the Lido charts accessible to the flight crew, resulting in inconsistency among the stakeholders that reduced situational awareness and increased collision risk.

Causes

The Air Accident Investigation Sector determines that the causes of the ground collision of the FDM1461 (B737) wingtip and GFA513 (A321) tail were:

(a) The Ground or Tower controller did not issue a stop instruction to FDM1461 before the aircraft reached a position abeam Mike 10 Alpha while GFA513 remained at the holding point.

(b) The GFA513 was positioned at a distance of more than 20.61 meters short of the stop bar at taxiway Mike 10 Alpha, resulting in its tail extending into the active taxi path of the FDM1461's left wingtip.

(c) The FDM1461 flight crew misjudged the available lateral clearance while taxiing behind the partially obstructing GFA513, resulting in a wingtip-to-tail contact.

Contributing Factors

(a) The Ground controller expected GFA513 to have entered the runway before the FDM1461 reached abeam Mike 10 Alpha and therefore did not issue conditional instructions to stop if GFA513 remained at the holding point.

(b) The FDM1461 flight crew did not request clarification or hold position before reaching a point abeam Mike 10 Alpha until GFA513 had entered the runway.

(c) Limited oblique visibility from the B737 cockpit's left seat, due to structural design, pilot seating configuration, and window framing, restricted the commander's ability to visually assess wingtip clearance.

(d) The limited lateral spread of the B737 runway turnoff lights prevented adequate illumination of the A321 tail, requiring the FDM1461 flight crew to rely on ambient lighting and visual judgment under nighttime conditions.

(e) Nighttime visual illusions and glare from airfield lighting likely impaired the GFA513 flight crew's perception of distance, contributing to the premature stop well short of the stop bar.

(f) The use of the phraseology "monitor" instead of "contact" Tower, prevented the GFA513 flight crew from actively coordinating with Tower for timely runway entry.

(g) A mutual assumption between the Ground controller and the FDM1461 flight crew that the other party would manage or mitigate the risk of conflict led to degraded situational awareness and ineffective conflict detection.

(h) The Tower controller's unawareness of GFA513's position and readiness as a result of a coordination breakdown with the Ground controller and a brief attentional lapse.

(i) The absence of harmonized taxiing restriction procedures between local ATC procedures (*DMATS*), the *AIP*, and the Operator's documentation led to reduced awareness among the FDM1461 flight crew about taxi restrictions applicable when GFA513 was holding at Mike 10 Alpha.

(j) While the GMR correctly showed GFA513 at the holding point, the system's design did not provide sufficient accuracy to determine the aircraft's exact nose and tail positions.

(k) The absence of an established coordination mechanism among the responsible stakeholders (ATC provider, Aerodrome Operator, and Aircraft Operator) contributed to the lack of consistent communication of taxi restrictions applicable at certain holding points, including Mike 10 Alpha, reducing the effectiveness of

shared situational awareness and safety defenses.

(l) With the lack of information from *AIP*, the Operator was not able to update its aeronautical navigation charts and standard operating procedures to provide correct guidance to the flight crew.

Safety Actions

Safety action taken by Dubai Air Navigation Services (dans)

Following the Incident, Dubai Air Navigation Services (dans) implemented immediate internal measures:

- Issued a unit-level safety bulletin highlighting the event and immediate lessons learned.
- Conducted targeted safety briefings with operational staff to raise awareness of taxi clearance hazards and controller-pilot coordination expectations.

Safety action taken by the General Civil Aviation Authority (GCAA)

Following the Incident, the General Civil Aviation Authority (GCAA) implemented coordinated safety actions to address both the immediate hazards and the underlying procedural inconsistencies identified.

1. UAE *AIP* Amendment

The GCAA amended the UAE Aeronautical Information Publication (AIP) to specify that aircraft on taxiways Mike and November are not permitted to taxi or hold behind another aircraft positioned at a runway holding point (RHP). The restriction applies to all aircraft categories and was introduced to prevent similar ground collisions. Subsequent updates refined the procedure based on operational demand.

2. Regulatory Oversight

The GCAA conducted continued oversight of the Dubai Air Navigation Services (dans) and Dubai Airports to verify that the new taxi restrictions were integrated into local procedures, operational practices. The oversight included verifying that the restrictions were incorporated into air traffic control documentation and effectively communicated as operational guidance for Ground controllers.

3. Safety Follow-Up and Harmonization

In coordination with UAE aircraft operators, the GCAA initiated targeted safety follow-up actions to align AIP content, local air traffic control procedures (*DMATS*), and operator documentation. These measures addressed procedural harmonization issues identified during the Investigation, ensuring consistency across all operational levels.

4. Implementation Verification

The regulatory actions included confirming that the taxi restrictions were integrated into operational documentation, controller training programs, and operator briefing materials, ensuring a coordinated approach to prevent procedural inconsistencies.

The current UAE *AIP* includes the procedure “To ensure wingtip clearance behind, flight crew are to hold as close as possible to RHP/IHP to remain visual with RHP/IHP paint markings and stop bar lights.”

Safety action taken by flydubai

Following the UAE *AIP* amendment that incorporated taxi restrictions after the Incident, flydubai updated its procedures accordingly. As these requirements evolved, flydubai continued to revise its procedures based on the latest available information.

Safety Recommendations

The Air Accident Investigation recommends that:

Dubai Air Navigation Services (dans)

SR13/2025

As per *DMATS*, if aircraft (irrespective of whether Code F, E, D or C) are holding at certain holding points, including Mike 10 Alpha, other aircraft are not permitted to taxi or hold behind. However, the Ground or Tower controller did not instruct FDM1461 flight crew to hold before reaching abeam Mike 10 Alpha while GFA513 remained at the holding point.

Therefore, the Investigation recommends that dans reinforce adherence to established taxi restrictions at OMDB and ensure controllers comply with these procedures for current and future operations.

SR142025

The Ground Controller instructed both aircraft to "monitor" the Tower frequency instead of using the standard phraseology "contact," which delayed direct communication with Tower and contributed to GFA513's extended hold. The controller had expected GFA513 to depart before FDM1461 reached abeam Mike 10 Alpha, which is an expectation that was not met, indicating expectation bias.

Therefore, the Investigation recommends that dans reinforce the correct use of standard ATC phraseology, specifically, using "contact" instead of "monitor" when a two-way handover to Tower is expected, to prevent communication delays and misaligned expectations.

SR15/2025

GFA513 was holding short of the Mike 10 Alpha stop bar, but the ground movement radar (GMR) did not provide sufficient accuracy of the aircraft's exact nose and tail positions, potentially affecting controller situational awareness and contributing to the wingtip-to-tail collision.

Therefore, the Investigation recommends that dans review the GMR system accuracy at OMDB, particularly its ability to detect aircraft holding short of stop bars. If limitations exist, evaluate and implement system or procedural improvements to ensure accurate surface surveillance in critical taxiway areas.

flydubai

SR16/2025

FDM1461 was taxiing at approximately 27 knots and decelerated to 12 knots before reaching a position abeam of the stationary GFA513, indicating that the flight crew may have been exercising caution and concerned about wingtip clearance. Despite this, no request for clarification was made to Ground control regarding the safe passage behind the holding GFA513. According to the Operator's policies, the commander is responsible for the safety of the aircraft during ground operations.

Therefore, the Investigation recommends that flydubai reinforce to its pilots the importance of confirming taxi clearance with ATC when maneuvering in proximity to stationary aircraft, particularly under conditions of reduced visibility and/or ambiguous wingtip clearance conditions.

Dubai Airports

SR17/2025

At the time of the Incident, the UAE *AIP* did not include taxi restrictions behind aircraft holding at specific taxiway holding points at OMDB, including Mike 10 Alpha, although such restrictions were contained in local ATC procedures (*DMATS*).

Therefore, the Investigation recommends that Dubai Airports review, formalize, and incorporate all amendments, such as taxi restrictions, into the Aerodrome Manual, and ensure they are submitted to the GCAA for inclusion in the UAE *AIP* and reflected on aerodrome charts under the appropriate sections.

This Report is issued by:

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