

Oman Transport Safety Bureau

Preliminary Report

OTSB Case File No: AIFN-004/06/2024

TCAS Resolution between Etihad Airways-Airbus 321-231 and Air India Express Boeing 737-800NG in the Muscat FIR

Operator: Etihad Airways

Make and Model: Airbus A321-231

Nationality and Registration Marks: United Arab Emirates, A6-AEJ

Operator: Air India Express

Make and Model: Boeing B737-800NG

Nationality and Registration Marks: India, VT-AXT

Location of the Occurrence: Muscat FIR, 20°32'58.39"N059°59'05.57E

State of Occurrence: Sultanate of Oman

Date of Occurrence: 15th Jun 2024, 06:12 UTC

Date of Publication: 11th Jul 2024

Table of Contents	1-3
Purpose of the Investigation	3
Abbreviations	4
Synopsis	7
1. Factual Information	9
1.1. History of the Flight.	9
1.2. Injuries to Persons ETD390.	14
1.3. Damage to Aircraft.	14
1.4. Other Damage.	15
1.5. Personnel Information:.....	15
1.6 Aircraft Information:.....	19
1.7 Meteorological Information:.....	22
1.8 Aids to Navigation.	22
1.9 Communications.	22
1.10 Aerodrome Information.	23
1.10.1 Departure Aerodrome (ETD390)... ..	23
1.10.2 Destination Aerodrome:	23
1.11 Flight Recorders.....	25

1.12	Wreckage and Impact Information.	25
1.13	Medical and Pathological Information.	25
1.14	Fire.....	25
1.15	Survival Aspects.....	25
1.16	Tests and Research.	25
1.17	Organizational and Management Information.	25
1.18	Additional Information	26
1.19	Useful or Effective Investigation Techniques.	27
2.	Analysis	27
3	Conclusions	27
3.1	General	27
3.2	Findings	27
3.3	Causes and Contributing Factors.....	27
4	Safety Recommendations	27

Purpose of the Investigation

The investigation was conducted by Oman Transport Safety Bureau pursuant to Civil Aviation Law (CAL) 76/2019 Chapter 10, and in compliance with the Civil Aviation Regulation CAR-13 -, Sub Part CAR 13.070: Instituting and Conducting of Investigations as State of Occurrence, Accidents or Incidents in the Sultanate of Oman.

The sole objective of the investigation is to prevent future aircraft accidents and incidents and not to apportion blame or liability. Oman Transport Safety Bureau issued this preliminary Report in accordance with the National and International standards, and Industry best practice.

Unless otherwise mentioned, all times in this Report are UTC time. Local Time in The Sultanate of Oman is UTC plus (+) 4 hours. Photos and figures used in this report were taken from different sources and adjusted from the original for the sole purpose of improving clarity of the report.

This Report will be publicly available at: <http://www.mtcit.gov.om>.

Abbreviations

AAIS	Air Accident Investigation Section
AMSL	Above Mean Sea level
AFL	Actual Flight Level
AAI	Air Accident Investigations
AIP	Aeronautical Information Publication
ANSIC	Air Navigation Service Incident Coordination
APW	Area Proximity Warning
ATC	Air Traffic Control
ATCO	Air Traffic Controller
AWY	ATC Airway
AXB	Air India Express
BEA	Bureau d'enquêtes et d'analyses pour la sécurité de l'aviation civile
CAA	Civil Aviation Authority
CAL	Civil Aviation Law
CFL	Cleared Flight Level
CR	Central Radar
CVR	Cockpit Voice Recorder
ETD	Etihad Airways
FIR	Flight information Region
FL	Flight level
FMS	Flight Management System
FO	First Officer
FPL	Flight Plan
FPM	Feet Per Minute
Ft	Feet
GCAA	General Civil Aviation Authority
ICAO	International Civil Aviation Organization
IIC	Investigator-in-Charge



LB	Level Burst
LPC	License Proficiency Check
MATSOP	Manual of Air Traffic Standard Operating Procedures
MC	Medium Term Conflict Detection
MCT	Muscat
MSAW	Minimum Safe Altitude Warning
NM	Nautical Mile
NTSB	National Transportation Safety Board
OOMS	Muscat International Airport
OPC	Operator Proficiency Check
OTSB	Oman Transport Safety Bureau
PF	Pilot Flying
PM	Pilot Monitoring
RA	Resolution Advisory
RDR	Radar
RO	Route off
ROC	Rate of climb
ROD	Rate of descent
RVSM	Reduced Vertical Separation Minima
RPA	Radioactive Protection Advisor
SEP	Separation
SOP	Standard Operating Procedures
STCA	Short Term Conflict Alert
SQK	Squawk
SQ	SSR Code Conformance alert
TA	Traffic Advisory
TCAS	Traffic Collision Avoidance system
UTC	Universal Time Coordinated
VOR	VHF Omnidirectional Range Navigational aid
VHF	Very High Frequency
WPT	ATC way point

Indra System Safety net Alert Abbreviation		
STCA	Short Term Conflict Alert	"Yellow" Prediction "Red" Violation
AW	Minimum Safe Altitude Warning (MSAW)	
W	RVSM	
LB	Level Burst	"Yellow" CFL not matching AFL "Red" CFL not matching Mode-S flight level
HG	Heading conformance	
MC	Medium Term Conflict Detection	
RO	Route off	
SQ	SSR Code Conformance alert	

Synopsis

Oman Transport Safety Bureau (OTSB) was notified of the occurrence by the Sultanate of Oman Civil Aviation Authority (CAA) -Directorate General of Air Navigation (DGAN)- Air Navigation Service Incident Coordination (ANSIC) through OTSB email on 16th of June 2024 at 12:34 Local Time.

The serious incident involved Etihad Airways ETD390 aircraft with registration marks A6-AEJ , Airbus 321-231 and Air India Express AXB817 aircraft with registration marks VT-AXT, Boeing 737-800NG. Aircraft AXB817 entered Muscat Flight Information Region (FIR) via point LOTAV maintaining flight level (FL) 320 flying on westerly direction destination Muscat (OOMS) while aircraft ETD390 entered via point LABRI maintaining FL310 flying on an easterly direction to exit waypoint LOTAV.As ETD390 was on Airway (AWY) M300 between waypoint (WPT) EMURU and GOLBA whilst AXB817 was on AWY M300 (bidirectional) between GOLBA and WPT EMURU on descent from FL340 to FL320 ,Air Traffic Controller (ATCO) identified aircraft AXB817. The ATCO cleared aircraft AXB713 that entered MCT FIR via WPT TOTOX destination OOMS to descend to FL160.The crew of AXB713 did not read back the descent clearance and instead the crew of AXB817 readback to descend to FL160.Aircraft AXB817 continued descending to FL160 on AWY M300 which was through the flight level of aircraft ETD390 that was maintaining FL310. Aircraft ETD390 and aircraft AXB817were on the same AWY head-on, with a closing distance of 30 seconds between them. Thereafter, the Short Term Conflict Alert (STCA) was triggered on the ATCO radar screen between conflicting traffic aircraft ETD390 and aircraft AXB817 and the Traffic Collision Avoidance System (TCAS) Resolution Advisory (RA) were activated by both aircraft. At the time the ATCO issued a clearance to the crew of AXB817 to maintain FL320 and to turn right 20 degrees in order to avoid the conflict with aircraft ETD390 both crew of aircraft AXB817 and ETD390 reported to the ATCO applying the TCAS-RA avoidance maneuver respectively. Once aircraft AXB817 and aircraft ETD390 were clear of conflict, aircraft ETD390 climbed back to FL310 and aircraft AXB817 climbed to FL320 as instructed by ATCO. Furthermore, both aircraft continued to their destinations and landed safely without any further incident.

The OTSB instituted and decided to conduct an investigation and classified the occurrence as a serious incident requiring investigation. The following parties were notified:

- State of Operator and Registry United Arab Emirates General Civil Aviation Authority- Air Accident Investigations (GCAA-AAI)
- State of Operator and Registry Republic of India - Aircraft Accident Investigation Bureau (AAIB)
- State of Design and Manufacturer of Boeing 737-800NG United States of America National Transportation safety Board (NTSB)
- State of Design and Manufacturer of Airbus A321-231 France-Bureau d'enquêtes et d'analyses pour la sécurité de l'aviation civile French Safety Investigation Authority (BEA)
- International Civil Aviation Organization (ICAO)
- Sultanate of OMAN Civil Aviation Authority (CAA)

In line with OTSB Investigation procedures, the Director of OTSB appointed an Investigator-In-Charge (IIC) and an investigation team to assist the IIC with the investigation. The following parties are involved in the investigation by appointing accredited representatives and advisor to the investigation: -

- State of Operator, and Registry United Arab Emirates General Civil Aviation Authority- Air Accident Investigations (GCAA-AAI)
- State of Operator and Registry Republic of India Aircraft Accident Investigation Bureau (AAIB)
- State of Design and Manufacturer of Airbus A320 France-Bureau d'enquêtes et d'analyses pour la sécurité de l'aviation civile (BEA), French Safety Investigation Authority, Airbus, Organization responsible for type design and final assembly of the aircraft.
- National Transportation Safety Board (NTSB) of United State of America, Boeing, Organization responsible for type design and final assembly of the aircraft.

After the investigation is completed, OTSB will release and publish the Final Report. The Final Report will be made public at the below link:

<http://www.mtcit.gov.om>.

1. Factual Information.

1.1. History of the Flight.

- 1.1.1. On the 15th of June 2024, Etihad Airways aircraft with registration marks A6-AEJ, an Airbus 321-231 departed from Zayed International Airport (OMAA) on an international scheduled flight ETD390 with intended destination Colombo-Bandaranaike International Airport (VCBI). While Air India Express aircraft with a registration marks VT-AXT, a Boeing B737-800NG on the same day departed from Mangalore International Airport (VOML) on an international scheduled flight AXB817 with intended destination Muscat International Airport (OOMS).
- 1.1.2. Both aircraft had a flight plan over Muscat FIR on a bidirectional airway M300 where ETD390 entered MCT FIR Central Sector WPT LABRI AWY N318 TOLDA P570 EUMRU M300 on east-bound direction to exit WPT LOTAV. While AXB817 entered MCT FIR Middle sector through WPT LOTAV then WPT EMURU destination OOMS maintaining FL340 on M300 EMURU T505 MCT flying westbound direction.
- 1.1.3. At point WPT LOTAV aircraft AXB817 was identified by the Middle ATCO and after that the ATCO issued a clearance to aircraft AXB817 to descend to FL320 and was acknowledged by aircraft AXB817.
- 1.1.4. At 06:07:15, the crew of AXB817 commenced the descend leaving FL340 for FL320. Thereafter the Middle Sector ATCO transferred aircraft AXB817 to the Bravo sector ATCO.
- 1.1.5. At 06:09:42, the crew of AXB817 established contact with MCT Bravo sector ATCO reporting on descend passing FL327 for FL320. There was no reply from the ATCO as ATCO was busy coordinating with the Middle Sector ATCO regarding frequency change for a Saudi aircraft (SVA843) that was approaching Jeddah's FIR. According to Bravo Sector position audio playback there was a lot of distortion background noise from the frequency, step down(block) of transmissions and echo during the radio calls made to the ATCO.
- 1.1.6. At 06:10:05, another aircraft AXB713 entered MCT FIR from WPT TOTOX on AWY A775 destination OOMS requested from Bravo ATCO to descend from FL380 to FL160 and the ATCO instructed the crew of AXB713 to stand by.
- 1.1.7. At 06:10:30 approaching the Bravo sector, the crew of AXB817 established first contact with Bravo sector ATCO and the ATCO identified aircraft AXB817.
- 1.1.8. At 06:10:53, Bravo sector ATCO instructed the crew of AXB713 to descend to FL160. But, the crew of AXB713 did not readback. At 06:10:58, the crew of AXB817 replied, "descend FL160 AXB817". No further instructions were issued by the ATCO. At 06:11:00, aircraft AXB817 entered Bravo sector at WPT GOLBA and continuing with the descent passing through FL322 for FL160 and at the time, aircraft ETD390 was less than 40NM on the same AWY M300 opposite direction maintaining FL310.

- 1.1.9. During this time in accordance to the statement of the crew of ETD390, one of the crew seats was not occupied as one of the crew was away in the lavatory and when the crew felt the descent of the aircraft the crew immediately return to the seat and took over.
- 1.1.10. At 06:11:10, Level Burst (LB) alert was activated on the ATCO Indra radar display screen as AXB817 was on descent passing through FL322 with a Rate of Descend (ROD) 500 feet per minute (FPM) and aircraft ETD390 was maintaining FL310 as indicated in figure 1 below.



Figure 1 indicating Level Burst (LB) on aircraft AXB817 while on descent passing through FL322 for FL160 with ROD 500FPM,

- 1.1.11. At 06:11:45, the Medium Term Conflict Detection (MC) alert along with the LB was activated on aircraft AXB817 displayed on ATCO radar screen while aircraft ETD390 was maintaining FL310 and aircraft AXB817 was on descent passing through FL317 for FL160 at a ROD 1000 FPM as indicated on the below figure 2.

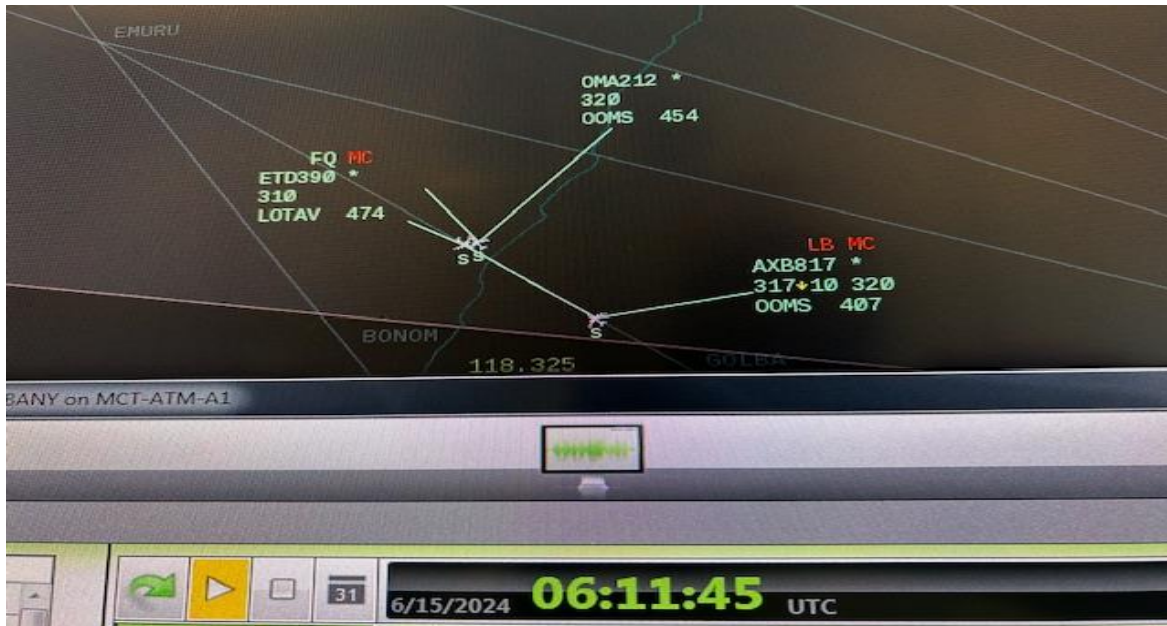


Figure 2 indicates Medium Term Conflict Detection activated on both aircraft ETD390 and AXB817.

1.1.12. At 06:11:50, yellow Short Term Conflict Alert (STCA) warning was activated on the ATCO radar screen between aircraft ETD390 and aircraft AXB817 with a distance of 12.27 Nautical Mile (NM) and 30 Seconds apart as per the below figure 3.

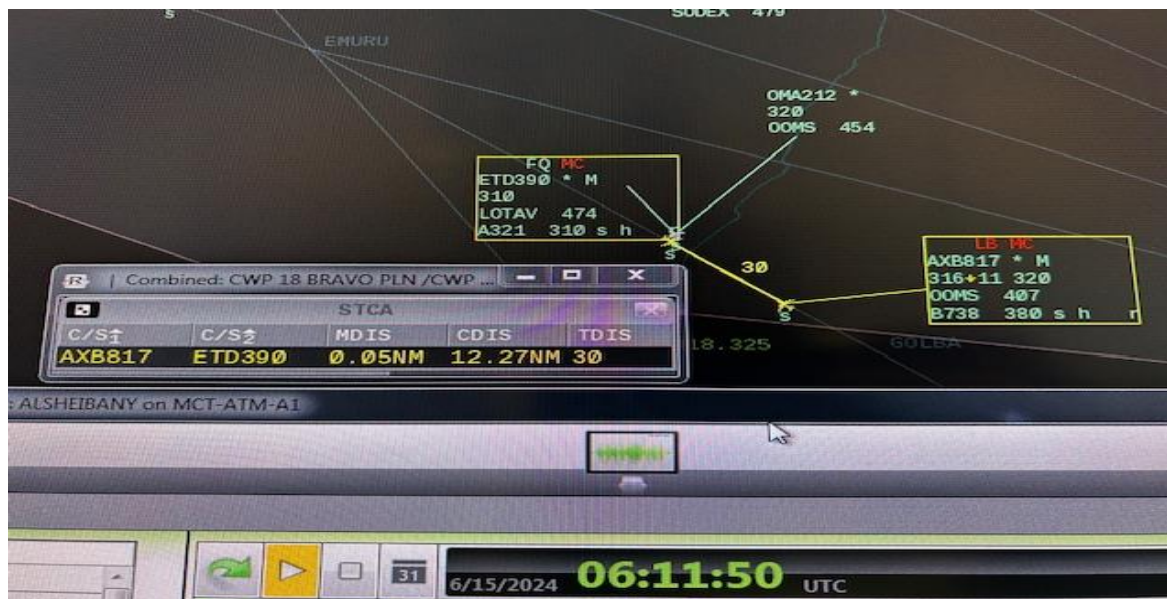


Figure. 3 STCA alert activated on ATCO radar screen Between ETD390 and AXB817

- 1.1.13. At 06:12:01 the Bravo ATCO issued clearance by calling EXB817 to maintain FL320 and to turn right twenty degrees.
- 1.1.14. At 06:12:10 the crew of AXB817 replied to the ATCO that they are on Resolution Advisory (RA) and to stand by. At 06:12:11 the ATCO called again EXB817 to maintain FL320 and EXB817 crew replied "Standby one Sir we are on RA".
- 1.1.15. At 06:12:14, during radar playback both aircraft ETD390 and AXB817 were observed responding to TCAS RA, aircraft AXB817 climbed to FL315 on ROC 300 fpm and aircraft ETD390 descended to FL309 ROD 300 fpm as shown in the below figure 4.

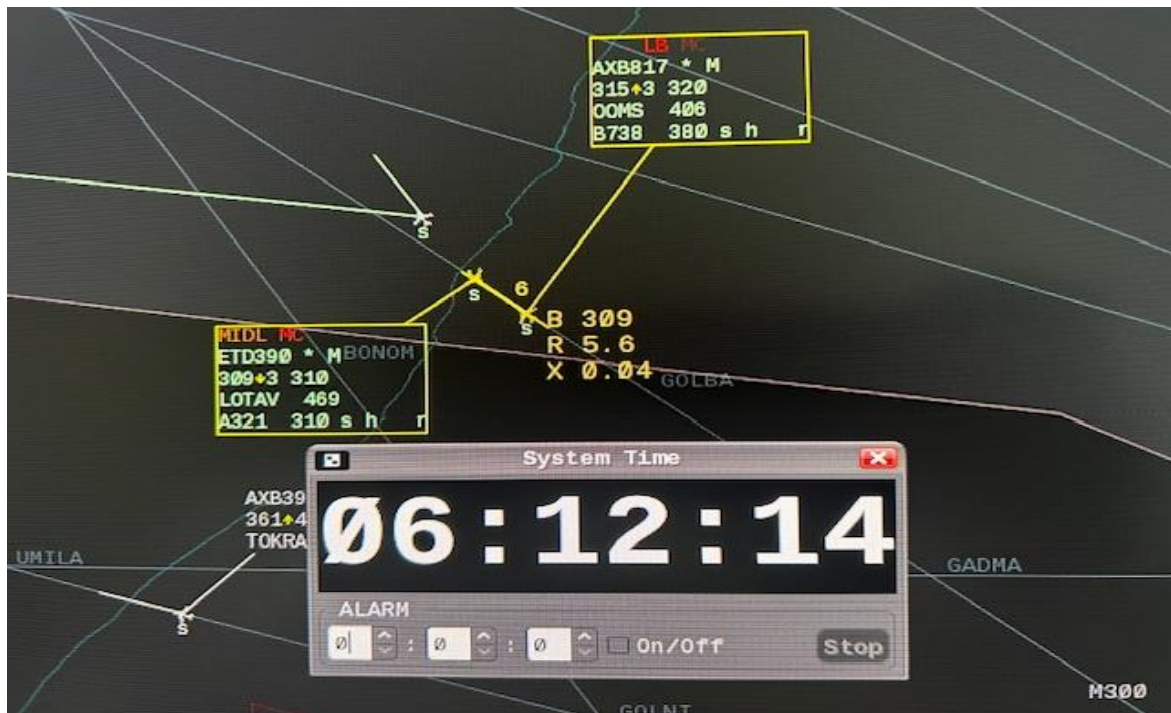


Figure 4 : shows aircraft AXB817 was observed on the radar climbing to FL315 with ROC 300 fpm while aircraft ETD390 was descending to FL309 with a ROD 300 fpm.

- 1.1.16. At 06:12:25, red alert (STCA) was activated and displayed on the ATCO radar screen between aircraft AXB817 while on climb passing through FL317 ROC 1000fpm and aircraft ETD390 on descent passing through FL308 ROD 800 fpm with a closing head-on distance of 4.52nm apart prior to both aircraft passing each other as shown in figure 5 below.



Figure 5: showing aircraft AXB817 while on climb passing through FL317 ROC 1000fpm and aircraft ETD390 on descent passing through FL308 ROD 800 fpm.

- 1.1.17. At 06:12:33, Bravo ATCO called the crew of ETD390 “ETD390 MCT” and the crew of ETD390 replied “ETD390 TCAS RA”.
- 1.1.18. At 06:12:59, the crew of AXB817 reported to Bravo ATCO “clear of conflict and climbing back to FL320. The ATCO asked the crew of AXB817 “Who gave you clearance to descend 300. The crew of AXB817 replied “Ah Sir you gave us clearance I repeated back and you acknowledged” then the ATCO replied “Negative we descend AXB713”. Then AXB817 replied “Sir you said 817, I acknow... I asked you twice and you acknowledged anyway we are back to 320 now Sir 817” then the ATCO said “Negative we descend AXB713”.
- 1.1.19. At 06:13:05, the red STCA was still was activated on the ATCO Radar display screen even after both aircraft passed each other safely while AXB817 was maintaining FL315 and ETD390 was maintaining FL308 as shown in Figure 6 below.

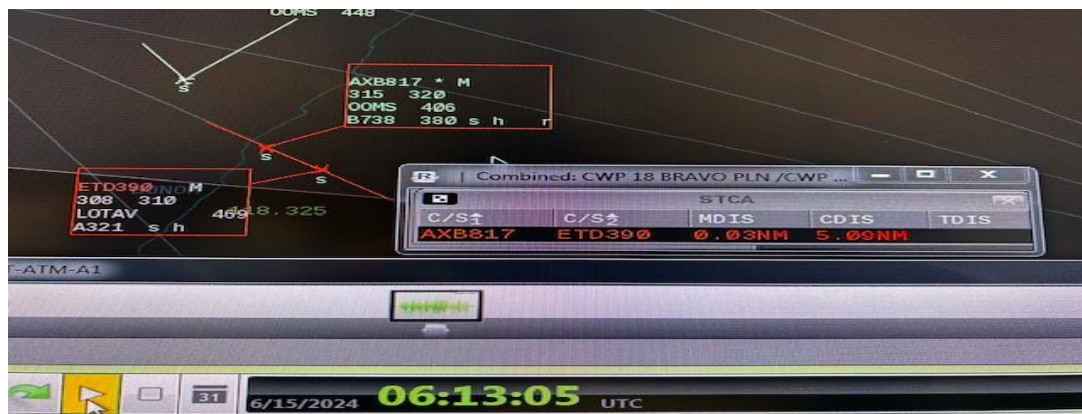


Figure 6: shows the red STCA was still was activated on the ATCO Radar display screen even after both aircraft passed each other safely

1.1.20. Both aircraft AXB817 and ETD390 continued to their destinations and landed safely without any further incident

1.2. Injuries to Persons ETD390.

Injuries	Pilot	Cabin Crew	Passengers	Total on Board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
No Injuries	2	5	196	203	-
Total	2	5	196	203	-

Note: Other, means people on ground.

Injuries to Persons AXB817

Injuries	Pilot	Cabin Crew	Passengers	Total on Board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
No Injuries	2	4	79	85	-
Total	2	4	79	85	-

Note: Other, means people on ground.

1.3. Damage to Aircraft.

1.3.1 No damages were reported.

1.4. Other Damage.

1.4.1 No other damages were reported

1.5. Personnel Information:

1.5.1 Captain ETD390

Rank	Captain		
Nationality	United Arab Emirates		
Medical validity	15 th Jun 2025	Licence type	ATPL-A
Licence validity	23 rd Jul 2024	Type endorsed	A320
Ratings	A320, A330, A350, A380		
English Language Proficiency	Level-5 Exp:02 nd Jan 2029		
Latest LPC Issue and Expiry Date	06 th May 2024 Exp: 31 st May 2025	Latest OPC Issue and Expiry Date	06 th May 2024 Exp: 30 th Nov 2024

Flying experience:

Rank	Captain
Total hours	5703
Total Flying Hours On Type	1241
Last 24 Flying Hours	1:01
Last 7 days Flying Hours	10:48
Last 30 days Flying Hours	54:14
Last 90 days Flying Hours	96:19

1.5.1.1 The PIC was issued an Airline Transport Pilot license (ATPL) which is rated for A320, A330, A350 and A380. The license was valid with an expiry date of 23rd July 2024. He is holding level 5 English Language proficiency that is expire on 2nd Jan 2024.

1.5.1.2 The PIC was issued a Class (one) 1 medical certificate with an expiry date of 15th Jun 2025. The last medical assessment date was conducted with no limitations.

1.5.2 First Officer (FO) ETD390 -Pilot Flying (PF)

Rank	First Officer		
Nationality	India		
Medical validity	09 th May 2025	Licence type	ATPL-A
Licence validity	10 th Dec 2026	Type endorsed	A320
Ratings	A320		
English Language Proficiency	Level 4 Expiry: 25 th Dec 2024		
Latest LPC Issue and Expiry Date	29 th Apr 2024, EXP: 30 th Apr-2025	Latest OPC Issue and Expiry Date	29 th Apr 2024, EXP: 31 st Oct 2024

Flying experience:

Rank	First Officer
Total hours	3098
Total Flying Hours On Type	2997
Last 24 Flying Hours	01:01
Last 7 days Flying Hours	08:20
Last 30 days Flying Hours	34:30
Last 90 days Flying Hours	119:25

1.5.2.1 The FO is holding an ATPL -A and rated A320. The is valid till 10th December 2026 and holding level 4 of English Language proficiency which will expire on 25th Dec2024.

1.5.2.2 The FO was issued a Class 1 medical certificate that's expire on 9th May 2025.

1.5.3.1 The PIC was issued an Airline Transport Pilot license (ATPL) which is rated for Boeing B737 300-900. The license was valid with an expiry date of 18th Jul 2027. He is holding level 5 English Language proficiency.

1.5.3.2 The PIC was issued a Class (one) 1 medical certificate with an expiry date of 03rd Mar 2025. The last medical assessment date was conducted with no limitations.

1.5.4.1 Captain AXB817 PF

Nationality	Indian		
Medical validity	03 rd Mar 2025	Licence type	ATPL
Licence validity	18 th Jul 2027	Type endorsed	B737 300-900
Ratings	BOEING 737 300-900, BE 200, PA 34, PA 28		
English Language Proficiency	5		
Latest LPC Issue and Expiry Date	Latest PPC 10 th Apr 2024 valid upto 09 th Oct 2024 IR/PPC 13 th Nov 2023 valid upto 12 th Nov 2024	Latest OPC	Issue and Expiry Date 13 th Dec 2023 VALID UPTO 12 th Dec 2024

Flying experience:

Total hours	5350 hours
Total Flying Hours On Type	2650 hours
Last 24 Flying Hours	03:24 hours
Last 7 days Flying Hours	11:57 hours
Last 30 days Flying Hours	67:02 hours
Last 90 days Flying Hours	185:06 hours

1.5.4.2 First Officer (FO) AXB817 Pilot Monitoring (PM)

Nationality	Indian		
Medical validity	31 st Jul 2024	License type	ATPL
License validity	26 th Dec 2033	Type endorsed	B737 300-900 MAX
Ratings	BOEING 737 300-900, MAX, C172 , PA 34		
Eng Lan Proficiency	5		
Latest LPC Issue and Expiry Date	Latest PPC valid up to 21 st May 2025 IR/PPC 12 th Apr 2024 VALID 21 st May 2025	Latest OPC	Issue and Expiry Date 17 th Jan 2024 VALID UPTO 16 th Jan 2025

Flying experience:

Total hours	4800 hours
Total Flying Hours On Type	4500 hours
Last 24 Flying Hours	07:54 hours
Last 7 days Flying Hours	28:28 hours
Last 30 days Flying Hours	46:38 hours
Last 90 days Flying Hours	150:41 hours

1.5.4.1 The FO is holding an ATPL -A and rated B737 300-900 MAX. The is valid till 26th December 2033 and holding level 5 of English Language proficiency.

1.5.4.2 The FO was issued a Class 1 medical certificate that's expire on 31st Jul 2024.

1.5.5 Air Traffic Controller in MCT FIR Bravo Sector:

Nationality	Omani		
Medical valid	02 nd Jun 2025	Licence type	AREA-AIR TRAFFIC CONTROLLER
Licence valid	31 st Dec 2026	Type endorsed	YES
Ratings	ACC RDR	LPR	LEVEL 5

1.5.5.1 The ATCO license was issued on 20th Dec 2011. The license proficiency check was conducted on 16th Oct 2023 with an expiry date of 15th Oct 2024.

1.5.5.2 ATCO was also issued with English language proficiency rating LEVEL 5 that's valid and expiry date of 18th Aug 2026.

1.5.5.3 The ATCO medical was assessed on 29th May 2023 and issued a Class three (3) medical certificate with expiry date of 2nd Jun 2025.

1.5.5.4 The ATCO was issued with ratings to allow operating as a controller at OOMM as Area RDR/INDRA. The last Air Traffic Control Rating Proficiency check was conducted on 16th Oct 2023.

1.5.6 Air Traffic Controller in MCT FIR Middle Sector:

Nationality	Omani		
Medical valid	15 th Jun 2025	Licence type	AREA AIR TRAFFIC CONTROLLER
Licence valid	31 st Oct 2025	Type endorsed	TBN
Ratings	ACC RDR	LPR	Level 5 Extended

- 1.5.6.1 The ATCO license was issued on 08th Oct 2015. The license proficiency check was conducted on 18th Feb 2024 with an expiry date of 17th Feb 2025.
- 1.5.5.2 ATCO was also issued with English language proficiency rating LEVEL 5 Extended that's valid and expiry date of 31st Oct 2028.
- 1.5.5.3 The ATCO medical was assessed on 06th Jun 2024 and issued a Class three (3) medical certificate with expiry date of 15th Jun 2025.

1.6 Aircraft Information:

1.6.1 Airframe Information (ETD390)

Manufacturer/Model	Airbus A321-231	
Serial Number	6842	
Year of Manufacture	2015	
Total Airframe Hours (At Time of Accident)	29790:53	
Last Inspection (Date & Hours (TSN))	11 th Apr 2024	28978:59
Last Inspection Airframe Cycles (CSN)	9752	
Hours Since Last Inspection	811:54	
Type of inspection performed	32 A-Check	
CRS Issue Date	11 th Apr 2024	
C of A (First/initial Issue Date)	16 th Nov 2015	
C of A (Expiry Date)	ARC Expiry 15 th Nov 24	
C of R (Issue Date) (Present Owner)	16 th Nov-2016 Sonic Leasing Co. LTD.	
Type of Fuel Used	Jet A1	
Operating Category	TBN	

Previous Accidents	Nil
--------------------	-----

Engine 1:

Manufacturer/Model	V2500
Serial Number	V18253
Part Number	V2533A5
Hours Since New	22151
Hours Since Overhaul	9730
Hours since last shop visit	9730
Cycles Available Before Next Shop Visit	343
Oil type	Eastman Turbo Oil 2197

Engine 2:

Manufacturer/Model	V2500
Serial Number	V16917
Part Number	V2533A5
Hours Since New	31290
Hours Since Overhaul	2724
Hours since last shop visit	2724
Cycles Available Before Next Shop Visit	3147
Oil type	Eastman Turbo Oil 2197

1.6.2 Aircraft Information (AXB817):

Manufacturer/Model	Boeing/737-800NG	
Serial Number	36331	
Year of Manufacture	2007	
Total Airframe Hours (At Time of Accident)	57968:11	
Last Inspection (Date & Hours (TSN))	25 th May 2024	TSN: 57685:15
Last Inspection Airframe Cycles (CSN)	CSN:19111	
Hours Since Last Inspection	282:56 FH	

Type of inspection preformed	Scheduled Maintenance PH-49
CRS Issue Date	25 th May 2024
C of A (First/initial Issue Date)	29 th Jul 2007
C of A (Expiry Date)	TBN
C of R (Issue Date) (Present Owner)	18 th Jan 2022
Type of Fuel Used	Jet A1
Operating Category	Normal
Previous Accidents	TBN

Engine 1:

Manufacturer/Model	CFM56-7B
Serial Number	896967
Part Number	CFM56-7B27-3
Hours Since New	52388 FH
Hours Since Overhaul	21282 FH
Hours since last shop visit	21282 FH
Cycles Available Before Next Shop Visit	2862 FC
Oil type	Mobiljetoil II

Engine 2:

Manufacturer/Model	CFM56-7B
Serial Number	894445
Part Number	CFM56-7B27
Hours Since New	51852 FH
Hours Since Overhaul	15928 FH
Hours since last shop visit	15928 FH

Cycles Available Before Next Shop Visit	2458 FC
Oil type	Mobiljetoil II

1.7 Meteorological Information:

- 1.7.1 According to the Oman Directorate General of Meteorology (DGMET) office there was no significant weather and the wind indicated south westerly at 15 Knots as it shown in figure 8.

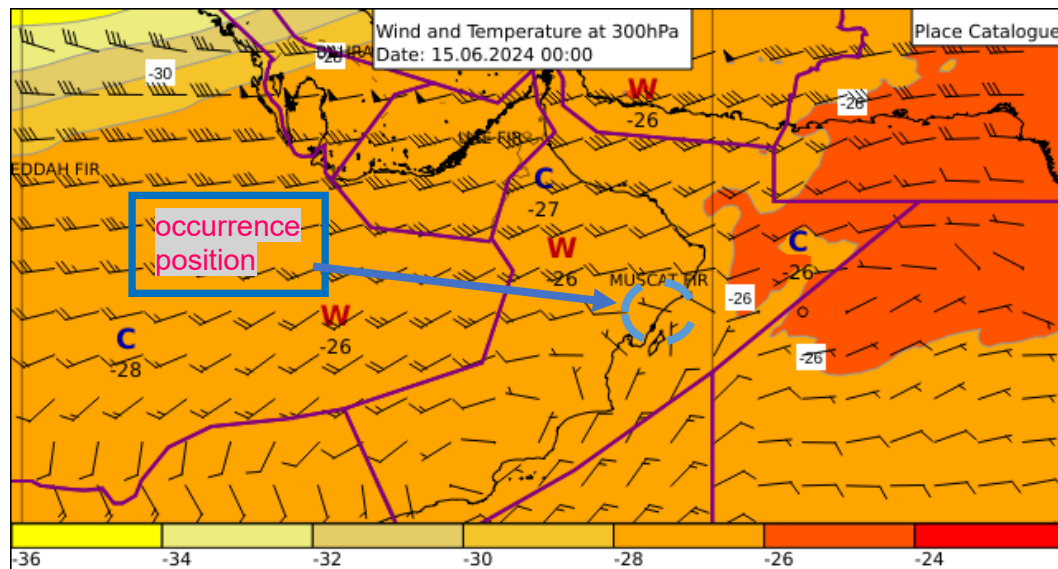


Figure 8 showing the weather conditions at the time and date of the occurrence

1.8 Aids to Navigation.

- 1.8.1 Both aircraft were equipped with standard navigational equipment as approved by the GCAA and India CAA. There were no records indicating that the navigation system was unserviceable prior to the serious incident.

1.9 Communications.

- 1.9.1 Both aircraft were equipped with a standard communication system as approved by the United Arab Emirates GCAA and India CAA. No defects that could render the communication system unserviceable were recorded before the flight.

- 1.9.2 The ATC radio calls were distorted with back noise and sometimes stepped over transmissions and receivers. Moreover, an echo was indicated During the occurrence.

1.10 Aerodrome Information.

1.10.1 Departure Aerodrome (ETD390):

ICAO designation	OMAA (Abu Dhabi Zayed International Airport, UAE)	
Aerodrome co-ordinates	N24 27.51 E054 38.60	
Aerodrome elevation	83 ft MSL	
Runway designations	RWY 31L/13R	RWY31R/13L
Runway dimensions	4106m / 60m	4100m / 60m
Runway used	13L	
Category for Rescue Fire Fighting	10	
Approach facilities	ILS	
Aerodrome status	Licenced – (Operational)	

1.10.2 Destination Aerodrome:

ICAO designation	VCBI (Colombo Bandaranaike international airport)
Aerodrome co-ordinates	N07 10.97 E079 53.09
Aerodrome elevation	29 ft MSL
Runway designations	22/04
Runway dimensions	3350m / 45m
Runway used	22
Category for Rescue Fire Fighting	9
Approach facilities	ILS
Aerodrome status	Licenced – (Operational)

1.10.2 Aerodrome Information (AXB817):

Departure Aerodrome:

ICAO designation	VOML (Mangalore International Airport)
Aerodrome Coordinates	12° 57' 43.42" N 74° 53' 23.23" E
Aerodrome elevation	318 Ft
Runway designations	06/24
Runway dimensions	2450 m X 46 M
Runway used	24
Category for Rescue Fire Fighting	CAT 7
Approach facilities	HIRL
Aerodrome status	Licensed (Operational)

Destination Aerodrome:

ICAO designation	OOMS (Muscat International Airport)	
Aerodrome co-ordinates	23°35'36"N 058°17'04"E	
Aerodrome elevation	25 ft (ft)	
Runway designations	08R/26L	08L/26R
Runway dimensions	4080 x 60 M	4000 X 45 M
Runway used	08 L	
Category for Rescue Fire Fighting	CAT 10	
Approach facilities	ILS, RNP, VOR, Runway Lights, PAPI's	
Aerodrome status	Licensed (Operational)	

1.11 Flight Recorders.

1.11.1 Both aircraft were fitted with both the Flight Data Recording (FDR) and the Cockpit Voice Recording (CVR) however, OTSB determined that there is no need to remove both FDR and CVR for downloads. OTSB will be relying on other flight information data such as Flight Data Management (FDM), Air Traffic Services (ATC) communication records to assist in the investigation.

1.12 Wreckage and Impact Information.

1.12.1 Not relevant to the occurrence.

1.13 Medical and Pathological Information.

1.13.1 Not relevant to the occurrence.

1.14 Fire.

1.14.1 Not relevant to the occurrence.

1.15 Survival Aspects.

1.15.1 To be discussed in the final report.

1.16 Tests and Research.

1.16.1 To be discussed in the final report.

1.17 Organizational and Management Information.

1.17.1 Both flights were scheduled as international passenger flights, operated under Part 121.

1.17.2 The operator (Etihad Airways) was issued an Air Operating Certificate (AOC) by the State of Registry and State of Operator, UAE-GCAA, issued on 5th September 2023 with an expiry date of 31st October 2025. The certificate authorized the operator to perform Air carrier operations as specified in the operator's operations specifications, in accordance with the operations manual and UAE Civil Aviation Regulations.

1.17.3 The operator (Etihad Airways) aircraft bearing registration A6-IEJ was operating under lease agreement with SINOC leasing CO LTD who are the owners of the aircraft.

1.17.4 The operator (Air India Express) was issued an Air Operating Certificate (AOC) by the State of Registry and State of Operator, India CAA, reissued on 25th April 2024 and valid until suspended

or revoked. The certificate authorized the operator to perform commercial air operations as defined in the operator's operations specifications, in accordance with the operations manual, Law No. 15 OF 2002, as amended and its ensuing Regulations.

1.18 Additional Information

1.18.1 ETIHAD Airways: Airbus 321 Flight Crew Operations Manual

Traffic Avoidance:

Immediately accomplish the following by recall whenever a TCAS traffic advisory (TA) or resolution advisory (RA) occurs.

WARNING: Comply with RA if there is a conflict between RA and air traffic control.

WARNING: Once as RA has been issued, Auto Pilot (AP) to off and both Flight Directors (FD) to Off. Safe separation can be compromised by adjusting or maintaining the vertical speed if it has changed, by responding promptly and smoothly except as necessary to comply with the RA.

Note: Avoid excessive maneuvers while attempting to maintain the vertical speed just outside the red area of the vertical speed scale, and within the green area. If necessary, use the full range between Vmax and VMAX.

Note: Do not use flight director pitch commands until clear of conflict.

For Traffic Advisory (TA):

When a TCAS RA is activated the flight crew shall use standard ICAO phraseology TCAS RA to notify ATC. Once an aircraft departs from its ATC clearance or instruction in compliance with an RA, or a pilot reports and RA, the controller ceases to be responsible for providing separation between that aircraft and any other aircraft affected as a direct consequence of the maneuver induced by the RA. The controller will resume responsibility for providing separation to all the affected aircraft when the flight crew report "CLEAR OF CONFLICT".

Nothing in the above procedures or those specified in the respective type TCAS RA shall prevent the commander from exercising his best judgement and full authority in the choice of the best course of action to resolve a traffic conflict or avert a potential collision.

Whenever an aircraft has maneuvered in response to TCAS RA, the commander shall submit a mandatory ASR.

1.19 Useful or Effective Investigation Techniques.

1.19.1 To be discussed in the final report.

2. Analysis

2.1 To be discussed in the final report.

3 Conclusions

3.1 General

The investigation is on-going and will be looking into other aspects of this serious incident investigation which may or may not have safety implications.

3.2 Findings

To be discussed in the final report.

3.3 Causes and Contributing Factors

To be discussed in the final report.

4 Safety Recommendations

The Investigation is on-going and should at any stage OTSB identify any safety issues, OTSB will issue the safety recommendations to address any safety concerns or risk identified.