سلطنة عُمان
وزارة النقل والاتصالات وتقنية المعلومات
Sultanate of Oman
Ministry of Transport, Communications and Information Technology

Oman Transport Safety Bureau

Final Report

OTSB Case File No: AIFN-002/11/2023

IndiGo Airbus A-320neo Unauthorized Turn

Operator: IndiGO
Make and Model: Airbus A-320neo
Nationality and Registration Marks: India, VT-IFK
Location of the Occurrence: 24 °43'N 057°27'E, Muscat FIR,
State of Occurrence: Sultanate of Oman
Date and Time of Occurrence: 12th November 2023, 00:36 UTC
Date of Publication: 30th July 2024.

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Purpose of the Investigation

The investigation was conducted by the Air Accident Investigation Section of Oman Transport Safety Bureau (OTSB)-Ministry of Transport Communications and Information Technology-pursuant to the Civil Aviation Law 76/2019 Chapter 10, and in compliance with the Civil Aviation Regulation CAR-13 Aircraft Accident and Incident Investigation and Reporting Procedures, 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 Draft Final 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.

The Final Report will be publicly available at: http://www.mtcit.gov.om.

Abbreviations

AAIB	Aircraft Accident Investigation Bureau
AAIS	Air Accident Investigation Section
ACC	Area Control Center
ACMS	Aircraft Condition Monitoring System
AIP	Aeronuatical Information Publication
AIRPROX	Aircraft Proximity
AMD	Sardar Vallabhbhai Patel International Airport
ANSIC	Air Navigation Services Incident Coordinator
ATC	Air Traffic Control
ATCO	Air Traffic Controller Officer
BEA	Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile
FL	Flight level
Flt	Flight
FO	First Officer
ICAO	International Civil Aviation Organization
IIC	Investigator-In-charge
FIR	Flight Information Region
LT	Local Time
MATSOP	Manual of Air Traffic Standard Operating Procedures
METAR	Aerodrome routine meteorological report
MCT	Muscat
MCT FIR	Muscat Flight Information Region
NM	Nautical Niles
OKKK	Kuwait International Airport
OM	Operational Manual
OTHH	Hamad International Airport
PIC	Pilot-In-Command
PF	Pilot Flying

PM	Pilot Monitoring
RBL	Range Bearing Line
RDR	Radar
RNAV	Area Navigation
RVSM	Reduced Vertical Separation Minimum
SOPs	Standard Operating Procedures
TAF	Aerodrome forecast
TCAS	Traffic Collision Avoidance System
TCAS RA	Traffic Collision Avoidance system Resolution advisory
TFC	Traffic
VAAH	Ahmedabad Sardar Vallabhbhai Patel International Airport
UTC	Universal Time Coordinated
VTBS	Bangkok Suvarnabhumi International Airport
IGO	IndiGo
VOR	Very High Frequency Omni-directional Range
VHF	Very High Frequency
QTR	Qatar Airways

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 an Air Traffic Controller via ANSIC Report ASI,147-23(23/SI/23) dated 12th November 2023 at 8:51 a.m Local Time, then followed by the Operator IndiGo`s report through the OTSB e-mail on the same day. The OTSB instituted an investigation and classified the occurrence as a Serious Incident requiring investigation. The following parties were notified:

- Aircraft Accident Investigation Bureau -AAIB-India-as the State of Operator / State of Registry.
- Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile – BEA France-as the State of Design and Manufacturer .
- Germany (Federal Bureau of Aircraft Accidents Investigation - BFU) as the State of the Final Assembly.
- International Civil Aviation Organization (ICAO)
- 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 Air Accident Investigation Bureau (AAIB) - India is participating in the investigation by appointing an Accredited Representative and a Technical Advisor to the investigation.

Once the investigation is completed, OTSB will release and publish the Final Report. The Final Report will be made public at the link: http://www.mtcit.gov.om.

The incident involved IndiGo1667 Operated aircraft with registration marks VT-IFK, Airbus A320neo that departed from Kuwait International Airport (OKKK) at 23:17 (UTC) on an International scheduled flight with 2 flight deck crew, 4 cabin crew and 178 passengers maintaining flight level 350 to Sardar Vallabhbhai Patel International Airport (VAAH).

After clearance was issued by Air Traffic Controller (ATCO) to follow the flight plan (FPL) to exit point RASKI, on airway P307 between airway points PURNI – KUNUS, coordinates 24º 43'N 057º 27'E, over Muscat Flight Information Region at about 00:36 (UTC),the Indigo crew reported

that they experienced turbulence followed by a request to turn to the right 5 miles which was denied by the controller so then they asked for 2 miles offset to the right but was not approved by the ATCO . After communicating with ATCO who advised IGO1667 crew about RNAV1 restrictions on the airway P307 and accordingly cleared only for 1 mile offset. IGO1667 requested to either descend lower or to turn right heading 150 degrees due to heavy turbulence .

The ATCO immediately cleared IGO1667 to descend from FL350 to FL310, the crew followed the descend clearance and in addition they executed a right turn of more than 1nm without ATC clearance. ATCO realized the unapproved turn made by IGO1667 on the radar and promptly contacted IGO1667 to confirm if they were on a heading offset. The pilot advised ATCO that they made the turn and ATCO advised IGO 1667 that the heading will take them head on with another traffic (QTR871, B77W, Shanghai- China (ZSPD)-Doha Qatar (OTHH), FL320, flying on airway N571) on the opposite airway. The flight crew confirmed they were on a heading150 degrees and decending to FL310.

The ATCO was concerned about IGO1667`s right turn while on descent to FL310 as it was a potential conflict with traffic on airway N571, flight QTR871 which was maintaining FL320 and had to give avoiding headings to the left to both aircraft IGO1667 and QTR871 to avoid possible loss of separation. The controller issued the avoiding heading prior to the activation of the Short-Term Conflict Alert (STCA). Once IGO1667 was clear from QTR871,both aircraft continued to their destination.

OTSB established that the cause of the incident was due to the crew experiencing heavy wake turbulence then commenced a right turn beyond the ATCO`s approved 1NM, and commenced onto a heading of 150 degrees without ATCO`s clearance.

1. Factual Information.

1.1. History of the Flight.

1.1.1 On 12th November 2023,an IndiGo , with registration marks VT-IFK, Airbus A320neo was on a scheduled passenger flight from Kuwait International Airport (OKKK) to Sardar Vallabhbhai Patel International Airport (VAAH) ,India as flight IGO1667.There were two flight crew,four cabin crew and 178 passengers on board. The incident occurred during night time over MCT Flight Information Region (FIR) at the Global Positioning System (GPS) co-ordinates: 24º 43'N 057º 27'E at flight level (FL) 350.

1.1.2 At 00:29:47, the crew of IGO1667 established communication with Muscat Area Control and reported at flight level 350,squawking 1423.The Muscat Area Control communication was handled by the ATCO on the night shift at Muscat Area Control-West Sector radar position. The controller was controlling 17 aircraft at the time of the incident.

1.1.3. At 00:30:10, the crew of IGO1667 was over reporting point TONVO and the ATCO radar identified aircraft IGO1667 at FL350 and instructed the crew of IGO1667 to follow the flight plan route and to report at exit waypoint RASKI and requested for the flight`s estimate time over point RASKI. The crew of IGO1667 readback that they were on airway P307 to RASKI at flight level 350 .The controller repeated the request for the estimate over reporting point RASKI and IGO1667 responded,RASKI at 01:24.

1.1.4. At 00:35:55, between airway points PURNI and KUNUS on the airway P307, the crew of IGO1667 contacted ATCO and asked about the type of aircraft ahead of aircraft IGO1667 by 21NM. The ATCO responded that it was 777. The traffic, was aircraft QTR836 from Doha International Airport , Qatar to Bangkok, Thailand at FL350 on airway P307) as shown on the figure below.

Figure 1.ATC radar shows the IGO1667 on airway P307 at FL350 and QTR836 ahead at FL350.

1.1.5. At 00:36:05, the crew of IGO1667 requested permission to offset 5NM to the right to avoid and was not approved by the ATCO. At 00:36:09 ,the ATCO approved 1NM, however, the crew of IGO1667 again requested a 2NM offset. At 00:36:16, the ATCO responded that only 1NM is approved and that it is an RNAV 1 airway and the crew of IGO1667 acknowledged.

1.1.6. At 00:37:02,the crew of IGO1667 reported heavy turbulence, and because of the weight, requested to either descend or turn to the right onto a heading of 150 degrees. During radar playback at 00:37:07 aircraft IGO1667 was observed commencing a right turn from airway P307 beyond 1NM towards a heading of 150° and started descending from FL350. At 00:37:12 the ATCO cleared IGO1667 to descend to FL 310, which the crew of IGO1667 acknowledged.

1.1.7. At 00:37:53, the ATCO asked the crew of IGO1667 if they were on a heading and the crew of IGO1667 confirmed that they were on a heading then the crew explained themselves that they asked for a lower flight level or a heading as they were experiencing huge turbulence. The ATCO advised the crew of IGO1667 that they were heading into an opposite direction traffic and that the heading was not sanctioned. The conflicting traffic was aircraft QTR871 B777, from Shanghai- China to Doha-Qatar at FL320 on airway N571. The ATCO further communicated to the crew of IGO1667, that the crew of IGO1667complained about wake turbulence, and an offset was given; then the crew of IGO1667 requested either a turn or descent; and the ATCO approved the descent option. The ATCO advised the crew of IGO1667 that the heading was absolutely not approved and that a report will be filed.

Figure 2. ATC radar screen showing aircraft IGO1667 commencing right turn onto a heading of 150 degrees without ATC clearance.

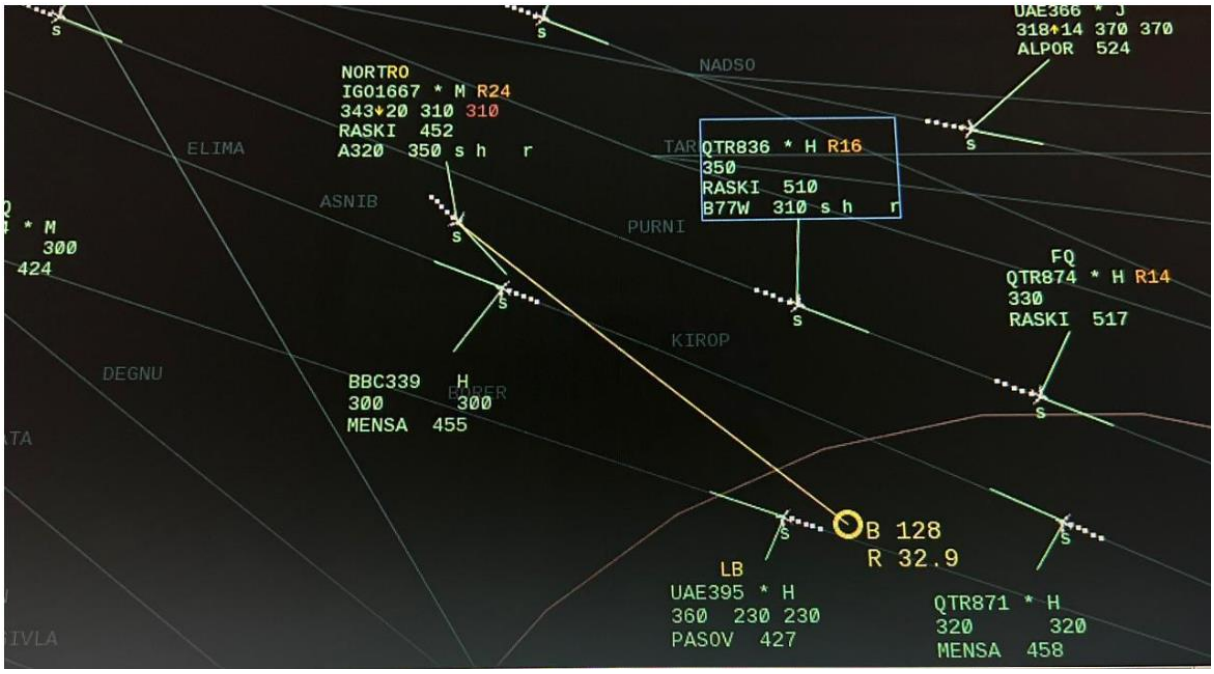

Figure 3.ATC radar shows aircraft IGO1667 while on unauthorized right turn descending to FL310 passing through FL343 and the potential traffic is aircraft QTR871 maintaining FL320

1.1.8. The crew of IGO1667 explained to ATCO in support of their action that they were experiencing huge turbulence, and the crew of IGO1667 requested for 5NM right turn which was not approved by the ATCO, then they asked for 2 NM turn and ATCO approved 1NM right turn. The crew further explained that it was such a huge turbulence that the aircraft could not maintain the speed and had to take a right turn until an approval was obtained from ATCO.

1.1.9. At 00:38:52 the ATCO instructed the crew of IGO1667 to immediately turn left onto a heading of 060 degrees, and the crew of IGO1667 readback the clearance. Then the ATCO instructed the crew of QTR871 to turn left on to a heading of 270 degrees, which the crew of QTR871 readback.Both headings were issued by the ATCO in order to keep IGO1667 and QTR871 clear from eachother.

1.1.10. At 00:39:40, the yellow STCA was activated between IGO1667 while descending through FL333 and QTR871 maintaining FL320. The ATCO asked the crew of QTR871 if they have commenced the turn, and the crew of QTR871 confirmed turning onto heading 270 degrees. At 00:39:49, the ATCO instructed the crew of QTR871 to cancel the turn and to resume navigation to exit point MENSA, which the crew of QTR871 acknowledged. At 00:40:16, the ATCO requested the crew of IGO1667 to also resume navigation to reporting point KUNUS and the crew of IGO1667 acknowledged.

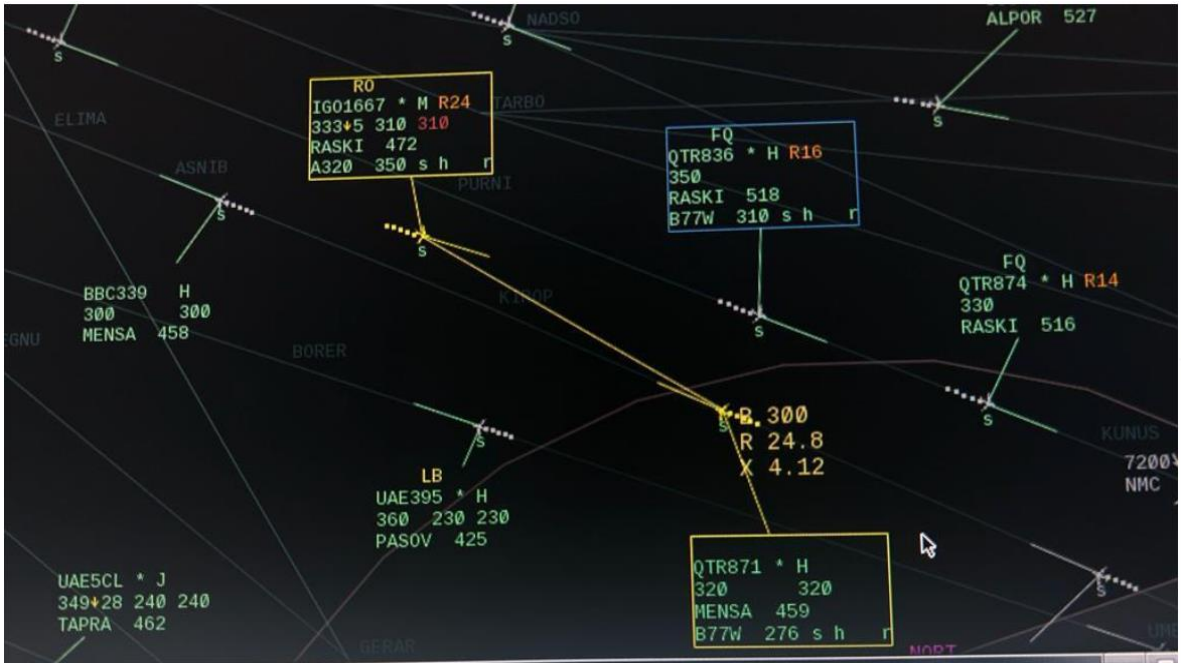

Figure 4 shows ATC Radar-The STCA yellow was activated between aircraft IGO1667 while on descent passing through FL333, rate of descent (ROD) 500ft and aircraft QTR871 maintaining FL320. Range Bearing Line(RBL) was 24NM head on.

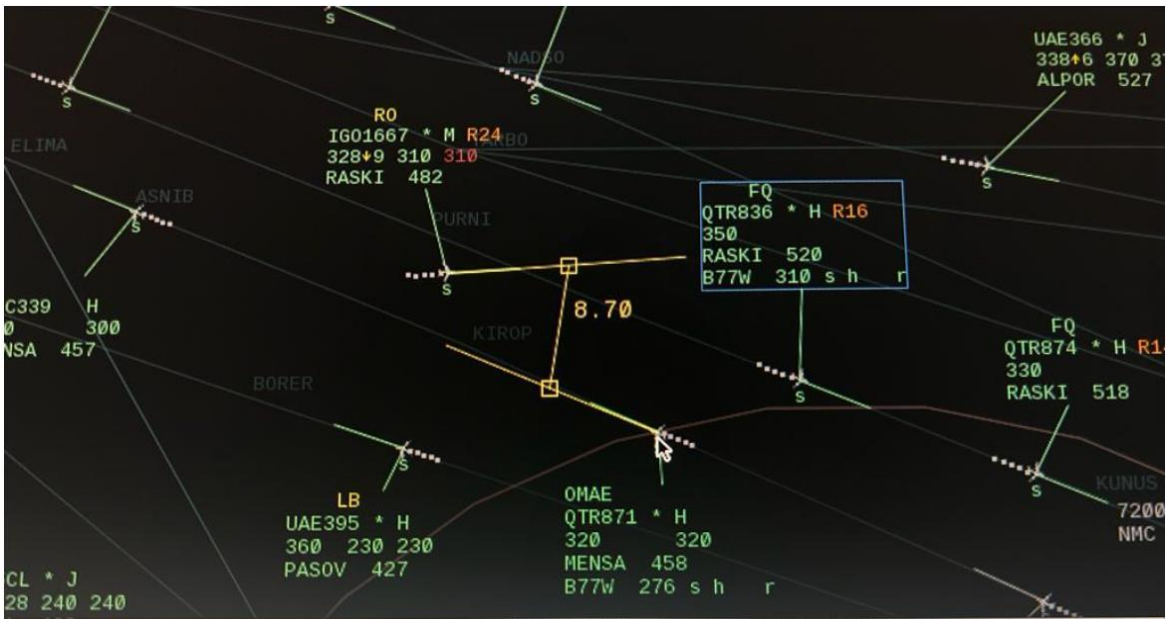

Figure 5. ATC Radar-shows distance vertical separation of 800 feet and lateral separation of 8.7NM

1.1.11 Since the minimum lateral separation was achieved as IGO1667 was reaching FL310 and was diverging from QTR871 maintaining FL320, the ATCO cancelled the turn of QTR871 and instructed the crew of QTR871 to resume own navigation to exit point MENSA and the crew of QTR871 readback and acknowledged.The ATCO also instructed the crew of IGO1667 to resume navigation to point KUNUS and the crew of IGO1667 readback.

1.1.12 At 00:44:15, the ATCO called the crew of IGO1667 to explain the situation. An exchange of words between the crew of IGO1667 and the ATCO ensued between 00:44:18 and 00:46:10, the content of which was similar to the communication which took place between 00:37:47 and 00:38:40. The ATCO reiterated that a report will be filed and that the crew of IGO1667 should feel free to do the same. The crew of IGO1667 advised that a report will be filed accordingly.

1.1.13 At 00:45:48, the ATCO informed the crew of IGO1667 that they were on decent for FL310 and there was an aircraft QTR871 on the airway N571 which was exactly 6.3 miles to the right of aircraft IGO1667 at FL320. At 00:46:04 the crew of IGO1667 responded by saying that the rate of decent was under control and were did not cross any IFR.

1.1.14. Post Incident and during the crew interview, the pilot flying (PF) stated that while experiencing the wake turbulence, the pilot-in- command (PIC) who was the pilot monitoring (PM) took over control of the aircraft and communications from the pilot flying.

1.1.15 During the interview, the ATCO indicated that the actions that were taken as being ideal with the situation environment as per his experience and the laid down procedures following the decision for not allowing 5NM requested by the crew of aircraft IGO1667. There was traffic load around the vicinity and ATCO did not feel comfortable to clear aircraft IGO1667 off the airway as the crew of IGO1667 had not clearly stated that they were experiencing severe wake turbulence when they initially requested deviation of 5NM. ATCO further reported had they been clear about their request, he would have considered other available provisions to assist the crew of IGO1667.

1.2. Injuries to Persons.

1.2.1 No injuries to Persons .

Injuries	Pilot	Cabin Crew	Passengers	Total on Board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
No Injuries	2	4	178	184	-
Total	2	4	178	184	-

Note: Other, means people on ground.

1.3. Damage to Aircraft.

1.3.1 No damages reported.

1.4. Other Damage.

1.4.1 No damages reported.

1.5. Personnel Information:

1.5.1. Captain

Nationality	Indian		
Licence type	ATPL	Licence validity	24 /12/ 2026
Medical validity	28/09/2024		
Ratings	A320 Instrument rating, Multi-Engine	4624.08 hours	
	A321 Instrument rating. Multi-Engine	184.36 hours	

Note:No Previous accidents refers to past accidents and or serious incidents the Pilot was involved in relation to this incident.

Flying experience:

Total hours	9336:45
Last 24 hrs	00:0
Last 7 days	2:18
Last 90 days	157:30

1.5.2. First Officer (FO)

Nationality	Indian		
Licence type	CPL	Licence valid	23/ 03 /2027
Medical valid	03/07/2024	Type endorsed	Yes
Ratings	A320 Instrument rating 2047:19 hours A321 Instrument rating 193:19 hours		
Latest LPC	17-07-23	Latest OPC	25-12-23

No Previous accidents or serious incidents reported.

Flying experience:

Total hours	2470:29
Last 24 hours	00:0
Last 7 days	23:33
Last 90 days	203:00

1.5.3. Air Traffic Controller (ATCO)

Nationality	Omani		
Medical Validity	16/03/2024	Licence Type	Area RDR/ Indra
Licence Validity	28/02/2025	Type Endorsed	Yes
Ratings	ACC, ACC RDR		

No Previous accidents or serious incidents reported.

1.5.3.1. During the interview the ATCO reported that the incident occurred during the second night shift of the six days roster (the ATCO`s roster is two morning shifts,two evening shifts and two night shifts).

1.5.3.2 On the 6th and 7th, the ATCO worked morning shifts which is from 03:00 UTC (07:00 LT) to 11:30 UTC (15:30 LT) . On the 8th and 9th, the ATCO worked evening shift which is from 11:30 UTC (15:30 LT) to 20:00 UTC (00:00 LT). On the 10th and 11th (the Occurrence date), the ATCO worked night shift which started from 20:00 UTC (00:00 LT) to 03:00 UTC (07:00 LT).

1.5.3.3 The ATCO reported during the interview that the workload on the day and time of the incident was assessed as moderate with no complexity.

1.5.3.4 The ATCO`s license was initially issued on 23rd February 2015 with an expiry date of 28th February 2025. The ATCO was issued with a Class three (3) medical certificate on 16th March 2022 with an expiry date of 16th March 2024

1.6. Aircraft Information:

1.6.1. The Airbus A320-232, manufactured in 2013 with Serial Number SN: 5476, is a low-wing airliner with twin turbofans and a conventional tail. The Airbus A320 family are narrow-body (single-aisle) aircraft with a retractable tricycle landing gear and powered by two wing pylon-mounted turbofan engines. Both certificates of registration and air-worthiness were valid.

Manufacturer/Model	Airbus 320-232
Serial Number	5476
Year of Manufacture	2013
Total Airframe Hours (After the Incident flight)	37223:36
Total Airframe Cycles (TAC)	22’549
C of A (Expiry Date)	30th April 2025
C of R (Issue Date) (Present Owner)	09th February 2018
Validity of Lease	30th April 2025
Type of Fuel Used	Jet A1

1.7. Meteorological Information:

1.7.1. Clouds:

The Satellite image at the time of the occurrence in figure 6, shows the direction from the flight and evidence of no cloud presence in the area north west of Muscat FIR. The Post Flight Report did not record any system failure relevant to the event. The Weather Radar System functioned normally at the time of the event.

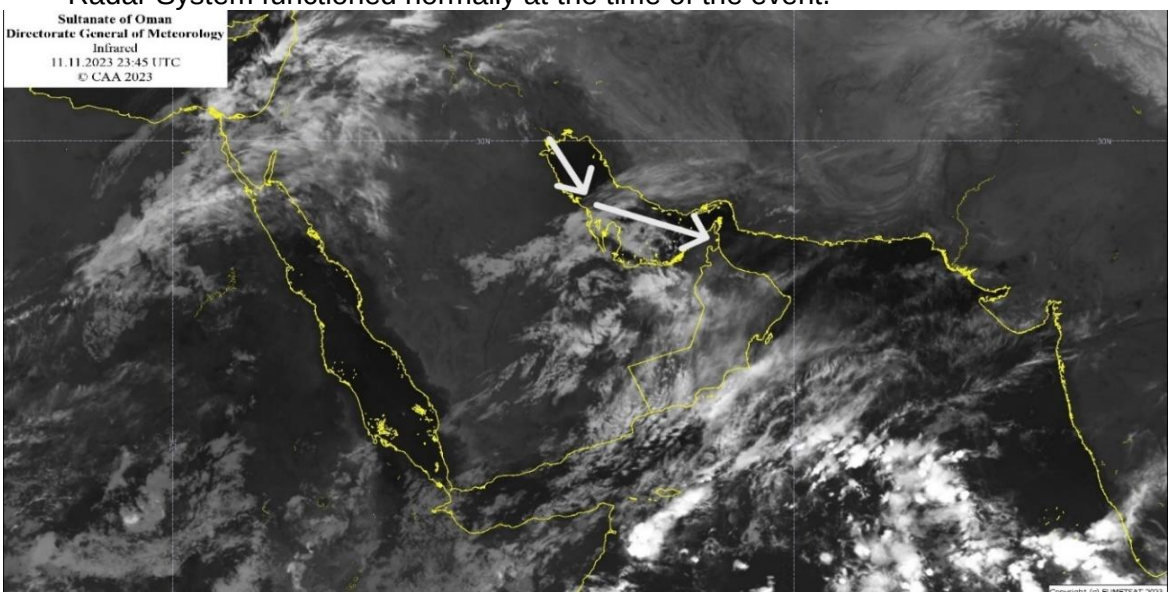

Figure.6 Satellite image

1.7.2. Upper winds and Total Air Temperature (TAT) :

Initial wind direction at TONVO FL350 was westerly 39 knots then increased gradually as stated below in the flight plan waypoints flight information.The incident occurred after waypoint PURNI with forecast flight plan wind 244 degrees and speed of 44 knots and next waypoint KUNUS the wind speed increased to 59 knots and shear rate of 09 at FL350 (See table below).

Flight Level	Sheer rate	Waypoint wind direction/speed
FL350	06	TONVO 243/039
FL350	08	PURNI 244/044
FL350	09	KUNUS 245/059
FL350	09	ALSAS 245/072
FL350	08	DERTO 246/074

1.8. Aids to Navigation.

1.8.1 The aircraft was equipped with standard navigational equipment as approved by the India DGCA. There were no records indicating that the navigation system was unserviceable prior to the serious incident.

1.9. Communication

1.9.1 The aircraft was equipped with standard communication equipment as approved by the India DGCA. There were no records indicating that the communication system was unserviceable prior to the serious incident.

1.9.2 Communications between the Indigo1667 flight crew and the ATCO were recorded, successfully retrieved and transcribed. Aircraft was fitted with a VHF radio set to cater for communication while flying. The communication was sufficient as per the controller's statement, there was always positive two-way communication between the ATCO and the aircraft on Muscat Radar frequency 119.8 MHz.

1.9.3 The ATCO reported that on 12th November 2023,the crew of IGO1667 deviated more than 1NM from the airway P307 without ATCO`s clearance.

Route designation (RNP/RNAV type) Significant points	Track (MAG)	Dis-tance (NM)	Change Over Point (NM)	Lower limit Upper limit MOCA	Class of Air-space	Lateral Limits (NM)	Direction of Cruising Levels		Remarks
1	2	3	4	5	6	7	8		9
P307 PAPA THREE ZERO SEVEN **(RNAV 1, RNAV 5)**									Muscat Control 135.60 MHz. Traffic entering the OOMM FIR via TONVO shall contact Muscat Control on 119.80 MHz.
✦ **TONVO**									X-ing A777
(FIR boundary) N250500 E0563200	112 ---	71		UNL FL150	A	1	ODD ↓		FIR OOMM, OMAE RNAV 1 on segment TONVO-PURNI
✧ **PURNI**									
N243804 E0574354		48				10			
✧ **KUNUS**	113 ---								
N241927 E0583226		47							
✧ **ALSAS**									X-ing R462
N240054 E0591955		27							
✧ **DERTO**	110 ---								X-ing G216
N235033 E0594746		83							
✧ **VAXIM**									X-ing A777, L301, L430
N231900 E0611100	115 295	34					ODD ↓		
✧ **SETSI**									X-ing N881
N230412 E0614410									
✦ **PARAR**	114 294	85						↑ EVEN	X-ing M628, N571, N767, Q620 FIR OOMM, VABF
(FIR boundary) N222630 E0630700				3000 FT					

Figure.7 Aeronautical Information Publication (AIP) -Oman

1.9.4 ATC VHF communication transcript between the West Controller (WC) on Frequency 119.8 and the IGO1667 crew is reflect below :

00:35:55 – IGO1667: radar IGO1667 what is the type of aircraft ahead of us 21NM 12o'clock
00:36:03 – WC: IGO1667 that is 777
radar observation (traffic QTR836, B777, OTHH-VTBS, FL350, flying on P307)
00:36:05 – IGO1667: Roger request 5 miles right to avoid
00:36:09 – WC: 5 miles is a lot mam take 1 mile
00:36:13 – IGO1667: Request 02 miles offset
00:36:16 – WC: Negative not approved mam this is RNAV 1 airways 1 mile is approved
00:36:20 – IGO1667: Roger 1 mile right
00:37:02 – IGO1667: and radar IGO1667 heavy turbulence because of this weight request lower or turn right on heading 150
00:37:07 – radar observation (IGO1667 was observed leaving the airway turning right)
00:37:12 – WC: IGO1667 descend FL310
00:37:19 – IGO1667: Descend level 310 confirm IGO1667
00:37:23 – WC: Good readback
00:37:24 – IGO1667: Ok
00:37:27 – radar observation(IGO1667 was observed flying on a heading 150 without informing ATCO)
00:37:34 – radar observation (IGO1667 was observed leaving FL350 on descent)
00:37:47 – WC: IGO1667 MCT

00:37:51 – IGO1667: Go ahead sir 1667
00:37:53 – WC: Are you on a heading?
00:37:54 – IGO1667: Yes, sir we advise you that give me lower level or heading it is a huge turbulence
00:38:01 – WC: Are you aware your heading is taking you in the face of traffic that is about to descend and this heading is not sanction radar observation (The traffic was QTR871, B77W, ZSPD-OTHH, FL320, flying on N571)
00:38:12 – WC: IGO1667 you complained from the wake turbulence I gave you an offset you came back with a request of either turning or descent we went for the descent option this heading that you made absolutely unapproved by MCT and I will be filing a report on that
00:38:33 – IGO1667: Yes, sir on my defence I would take it was a huge turbulence we ask for 5 mile fly we were not approved so we asked for 2 miles fly you said 1 mile and it was such a huge turbulence my aircraft was not maintaining this ahh the NAVAR was not even have to maintain the speed so I have to take a right until I get your approval
00:38:52 – WC: IGO1667 left turn now heading 060 I will get back to you
00:38:57 – IGO1667: Left turn heading 060 IGO1667
00:39:02 – WC: QTR871 Left heading 270
00:39:06 – QTR871: Left heading 270 QTR871
00:39:21 – radar observation (The STCA yellow (Short Term Conflict Alert) was activated between IGO1667 while descending through FL333, Rate Of Descent-500 and QTR871 maintaining FL320. Range Bearing Line was 24NM on opposite direction and QTR871)
00:39:40 – WC: QTR871 are you making the turn
00:39:44 – QTR871: Turning 270 QTR871
00:39:49 – WC: QTR871 cancel the turn resume navigation to MENSA
00:39:53 – QTR871: Ok back to MENSA QTR871
00:40:16 – WC: IGO1667 resume navigation to KUNUS
00:40:23 – IGO1667: Resume navigation to KUNUS IGO1667
00:41:45 – radar observation (IGO1667 was maintaining FL310)
00:44:12 – WC: IGO1667 MCT
00:44:15 – IGO1667: Go ahead IGO1667
00:44:18 – WC: I will have to explain the situation back again for this. You requested either offset by 5 miles or a descent and before MCT control cleared you for the offset or descent you commenced a turn heading 150 in the face of traffic was affecting your descent and that was not approved be advised I will be filing a report on this incident
00:44:46 – IGO1667: Sir I already answered in my defence we asked for 5 miles right which was not approved we asked 2 miles right which was not approved which was approved only 1 mile right and the aircraft was shaking really hard and that's why I have to take an action for the safety concern and I asked for right heading 150 or give me lower either of this since there was no response immediate so my aircraft turned.
00:45:13 – WC: That still does not justify making a turn without being vigilant in the surroundings and MCT cleared you for descend to get you clear of the wake turbulence your impatient is not actually a justification for this incident anyway I will be filing a report feel free to do the same

00:45:33 – IGO1667: Will file accordingly that aircraft was the rate of descend was under control there was no aircraft or no IFR was crossed
00:45:48 – WC: IGO1667 you were on the descent level 310 I had a QTR871 on the airways N571 which is exactly 6.3 miles to your right at level 32000:46:04 – IGO1667: I copied that all I'm saying is our rate of descend was under control and we were not crossed any IFR
00:48:10 – WC: IGO1667 128.15
00:48:14 – IGO1667: 128.15 IGO1667

1.10. Aerodrome Information.

1.10.1. Departure Aerodrome:

ICAO designation	OKKK (Kuwait International Airport)	
Aerodrome co-ordinates	N29.23 E047.98	
Aerodrome elevation	205 ft above mean sea level (AMSL)	
Runway designations	15L / 33R	08R / 26L (Closed)
Runway dimensions	3500 x 45 m	4080 x 45 m
Approach facilities	ILS, LOC, VOR, RNAV, PAPI's, runway lights	
Aerodrome status	Licensed Airport	
ICAO designation	OKKK (Kuwait International Airport)	
Aerodrome co-ordinates	N29.23 E047.98	

1.10.2. Destination Aerodrome:

ICAO designation	VAAH(Ahmedabad Sardar Vallabhbhai Patel Int. Airport)	
Aerodrome co-ordinates	N23.07 E072.63	
Aerodrome elevation	189 ft above mean sea level (AMSL)	
Runway designations	05/ 23	08R / 26L
Runway dimensions	3505 x 45 m	2700 x 60 m
Approach facilities	ILS, RNP, VOR, LOC, PAPI's, runway lights	
Aerodrome status	Licensed Airport	
ICAO designation	VAAH (Ahmedabad Sardar Vallabhbhai Patel Int. Airport	

1.11. Flight Recorders.

1.11.1 The aircraft was equipped with both the Flight Data Recording (FDR) and the Cockpit Voice Recorder (CVR). The operator reported that there was no information/data requiring a DFDR download after the incident flight. However,a download was

conducted on 14th November 2023, two days post the incident and did not contain relevant data for the incident flight. The DFDR of the incident flight was not downloaded as the aircraft was under MEL ACMS (Aircraft Condition Monitoring System) Maintenance Message. However, according to the maintenance records reviewed by OTSB, the MEL was cleared after the incident flight.OTSB consequently relied on other sources of flight information such as ATC recordings.

1.12. Wreckage and Impact Information.

1.12.1 No wreckage or impact information .

1.13. Medical and Pathological Information.

1.13.1 There was no evidence that physiological or psychological factors, nor incapacitation, had affected the performance of both flight crews or the ATCO.

1.14. Fire.

1.14.1 Not applicable.

1.15. Survival Aspects.

1.15.1 There was no services required of Rescue fire.

1.16. Tests and Research.

1.16.1 Not applicable.

1.17. Organizational and Management Information.

1.17.1 IndiGo airline approved by India DGCA was issued with Air Operating Certificate (AOC) to conduct air service that was being provided at the time of the incident. IndiGo has implemented Safety Management System (SMS), which mandates and encourages all personnel to report any incidents, including Mandatory Occurrence Reporting (MOR), through the Airline`s approved SMS. The crew adhered to this system and reported the occurrence during the aircraft's operation.

1.17.2 Crew Voluntary Report was initiated by the Flight Crew and received by IndiGo which was subsequently submitted to DGCA within 24 hours, India as 'Informatory Case of “NON-CONSIDERATION TO PILOT REQUEST”'. IndiGo did not report the occurrence directly to the AAIB,India.

1.17.3 The Operator Flight Safety Manual,section 3, Issue 4 , Revision 0, para 3.5 ; states that “on receipt of information, the Chief of Flight Safety / Dy. Chief of Flight Safety shall inform incident to Director Air Safety, HQ, Regional Air Safety Office / AAIB as soon as practicable”. Further reporting of occurences within 24 hours of receipt of intial information to Regulatory Authority through formal mail via fltsafetyhq@go-indigo.in.

1.17.4 The aircraft is owned by Irish Owner called M/S White OAK Aviation (AOE2) Limited and leased to Interglobe Aviation – India and operated by IndiGO.

1.18. Additional Information

1.18.1 The following information was extracted from IndiGo Operations Manual, Part A, Chapter 41.7 Issue V,Rev 00 dated 9th June 2022.

IndiGo	INTERGLOBE AVIATION LTD	FLT.OMA
	OPERATIONS MANUAL PART A	ISSUE V, Rev 00
	REDUCED VERTICAL SEPERATION MINIMUM	CHAPTER 41

Denial of ATC clearance into RVSM airspace	(Callsign) UNABLE ISSUE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [or DESCEND TO, or CLIMB TO] FL …….;
For a pilot to report when severe turbulence affects the capability of an aircraft to maintain height-keeping requirements for RVSM	UNABLE RVSM DUE TURBULENCE[1]
For a pilot to report that the aircraft equipment has degraded enroute below that required for flight within the RVSM airspace. (This phrase is to be used to convey both the initial indication of the non-MASPS compliance, and henceforth, on initial contact on all frequencies within the lateral limits of the RVSM airspace until such time as the problem ceases to exist, or the aircraft has exited the RVSM airspace.)	UNABLE RVSM DUE EQUIPMENT[1]
For a controller to confirm that an aircraft has regained its RVSM-approval status or a pilot is ready to resume RVSM operations	REPORT ABLE TO RESUME RVSM
For a pilot to report the ability to resume operations within the RVSM airspace after an equipment or weather-related contingency.	READY TO RESUME RVSM[1]
[1] *Indicates a pilot transmission*	

Figure 8 INDIGO`s Operations Manual Part/TR75/2023-Chapter1

1.18.2 Duties and Responsibilities of Crew Members other than the PIC: Source: Indigo`s Operations Manual Part/TR75/2023-Chapter1 (Source:Operator Operations Manual)

1.18.2.1 Co-Pilot

1.18.2.1.1 General

The co-pilot is subordinate to the PIC during the flight duty and flight execution. In addition,

a) Is expected to report facts which may influence the quality of the general flight execution to the PIC.
b) Have no doubts about his condition and proficiency before starting a flight and during flight execution.
c) Is equally responsible for the safety of flight operations.

1.18.2.1.2 Flight Execution

The Co-pilot will perform all duties as described in the company manuals under the supervision of the PIC and:
a) Assist in promoting an atmosphere in which a good understanding and cooperation between the crew members may be expected;
b) Be alert on developments which may endanger the safety of the flight; if he believes these developments exist, he will:
- Advise the PIC
- Ask the PIC to take appropriate action
c) If, in his opinion, strong doubts exist as to the physical or mental fitness of the PIC (incapacitation) and/or immediate action is required to prevent a highly critical situation, he shall take such action as deemed necessary (if possible, in consultation and agreement with other crew members).

Note: It is obvious that with the action described above, a highly undesirable situation is created. All further initiatives should be aimed at the safe completion of the flight.

1.18.3 Two Communication Rule (Source: IndiGo Operations Manual Part A/ TR 75/2023)

1.18.3.1 The pilot flying shall respond to any flight related standard call out communication made by the PM about deviation from standard operating procedure, standard practice and any deviation beyond the stipulated parameters laid down for the different phases of flight. The oral response shall be “check”, indicating that the pilot flying is aware of the deviation followed by the oral response “correcting”, indicating that he is initiating corrective action. If there is no response to two verbal standard call out communications, the PM must promptly evaluate if a situation of pilot incapacitation exists. If the airplane is in an unsafe flight condition, or is likely to enter an unsafe flight condition, the PM shall immediately take over control by calling “I have controls” and pressing the side stick take over push button so that flight control priority is transferred to his side stick and the other side stick is deactivated.

1.18.4 The definition of the wake turbulence (Source: Air Traffic Management (PANS-ATM), Chapter 4, section 4.9)

1.18.4.1 The term “wake turbulence” is used in this context to describe the effect of the rotating air masses generated behind the wing tips of aircraft, in preference to the term “wake vortex” which describes the nature of the air masses. Detailed characteristics of wake vortices and their effect on aircraft are contained in the Air Traffic Services Planning Manual (Doc 9426), Part II, Section 5.

1.19 Useful or Effective Investigation Techniques.

1.19.1 Not applicable.

2. Analysis

2.1 General

IndiGo airline approved by India DGCA was issued with Air Operating Certificate (AOC) to con-duct air service that was being provided at the time of the incident. IndiGo has implemented Safety Management System (SMS), whereby by all personnel are required and encouraged to report any occurrence including Mandatory Occurrence Reporting (MOR) and voluntary reporting system through their approved SMS, the crew followed the established SMS reporting system in reporting this occurrence during the operation of the aircraft. Although the occurrence was not reported directly to the Indian Accident Investigation Authority, the airline reported the occurrence to India DGCA. Based on the interviews conducted with the crew, there were no challenges with the occurrence reporting culture within the airline.

2.2 Flight operations

2.2.1 Crew qualifications:

The captain was qualified to act as PIC with a valid ATPL and class 1 medical certificate and issued a A320/321 rating to act as a pilot-in-command or co-pilot. The first officer was qualified to act as co-pilot with a valid CPL and class 1 medical certificate and was issued a A320/321 rating to act as a co-pilot only. The crew were properly licensed and qualified to operate the aircraft and they followed the procedures in collaboration with other parties to safely secure the aircraft and the passengers. Both the flight crew members were properly licensed and qualified to operate the flight, their licenses were issued in accordance with India DGCA requirements. OTSB determined that the crew`s qualifications was not a factor to the occurrence.

2.2.2 Operational Procedures:

The pilots were on their second sector of the day from OKKK and they had adequate flight information for the returning flight to VAAH. Weather related information is stated in the

Computer Flight Plan and any significant weather along the route affecting the flight is discussed between the crew during briefing prior to the flight.OTSB determined that the information on the actual Flight plan was not a factor to the incident.

It is also common that flight crew do discuss and agree the action to be taken prior to any deviation from the flight plan as per the Operations Manual. however, the deviation requires confirmation and clearance by ATCO, on this incident the PIC took control of the aircraft from the FO and at the same time communicating with ATC. The PIC switched from PM to PF and communicating at the same time, this was confirmed during the interview with the FO and was not in compliance with the operators procedures. Although the crew indicated that their priority was to descend in avoidance of the heavy turbulence, they did not follow the operator`s procedures.

Both flight crew had a flight briefing in accordance with Indigo Flight Operation Manual prior to the flight . Flight preparation pre-departure crew briefing and flight plan was made available to the crew including departure expected shear rate 9 at waypoint KUNUS in MCT FIR which reflected the forecast turbulence projected in the flight plan.During the interview, the crew stated that the weather information that was given in the flight plan did not reflect the actual weather and the crew after landing did report this to the Safety Department in Hydrabad.

2.2.3 Communications:

2.2.3.1 Communication between the crew and the ATCO was found to be not according to the procedures, OTSB determined that the communication was a factor to the incident due to the following:

2.2.3.2 At 00:36:05, the crew of IGO1667 requested 5 miles right to avoid without specifying the reason for the request neither did the ATCO challenge the crew.During the interview with the crew, they confirmed that they requested the 5 miles in order to avoid the wake turbulence ahead.The ATCO advised IGO1667 that it is a lot and approved 1 mile.The IGO1667 crew executed the right turn without the ATCO`s authorization though the IGO1667 crew did request to either be given a right turn onto a heading of 150 or to descend to FL310 and the ATCO cleared the crew of IGO1667 to descend to FL310.

2.2.3.3 At 00:36:13, the crew of IGO1667 requested 2 miles offset and the ATCO replied not approved and communicated with IGO1667 about RNAV1 procedures on airway P307 and cleared only for 1 mile offset.

2.2.3.4 At 00:37:02, the crew of IGO1667 reported to the ATCO “heavy turbulence because of this weight request lower or to turn right on heading 150”.At 00:37:07 which is 5 seconds later,the IGO1667 started executing a right turn beyond the approved 1nm without ATCO`s clearance and without informing the ATCO. At 00:37:12 , which is 10 seconds later, the ATCO cleared aircraft IGO1667 to descend to FL310 and the crew of IGO1667 acknowledged after confirming with the ATCO to descend to FL310. When the ATCO asked the

crew of IGO1667 for the reason for the turn without ATC clearance the crew of IGO1667 responded that there was no response to their request to either descend or turn but actually there was a response from the ATCO 10 seconds later to descend to FL310 which the crew IGO1667 readback.

2.2.3.5 The crew of IGO1667 reported that the reason they turned without ATCO`s clearance is because they did not get an approval to turn right or to descend to FL310 whilst actually the ATCO cleared the crew of IGO1667 to descend to FL310 ten seconds after the crew`s request.

2.2.3.6 Then the ATCO communicated with the crew of IGO1667 for the second time regarding the unauthorized right turn,the crew gave the reason that the aircraft was shaking really hard due to heavy turbulence and that`s why they had to take an action for the safety concern and when asked for right heading or lower either there was no immediate response from the ATCO.The ATCO cleared the crew of IGO1667 to descend to FL310 ten seconds after the crew`s request.

2.2.4 Weather**:**

2.2.4.1 Meteorological briefing involves determining forecast and actual weather conditions for the route planned and for selected airfields along the route. En-route weather comprises forecast winds and temperatures at cruising levels along the route together with forecasts of en-route weather conditions, especially cloud conditions and any associated turbulence and/or icing. This information is depicted on special charts. Airfield weather reports may be either actual reports (METAR-actual) or forecast conditions (TAF-forecast). METARs are issued at regular intervals; when a significant change to conditions occurs before the next METAR is due, a special report (SPECI) is issued. The crew did not observe any cloud on the weather radar system, and as they encountered wake turbulence on track, they requested a deviation from flight plan.

2.2.4.2 Weather Radar System in an aircraft is a specialized system designed to detect and display weather phenomena in the vicinity of the aircraft. It typically operates using radio waves, specifically in the microwave portion of the electromagnetic spectrum. Weather radar helps pilots to identify and navigate around hazardous weather conditions, enhancing flight safety and comfort. It provides essential information for flight planning and decision-making, allowing pilots to choose the safest and most efficient routes. Additionally, modern weather radar systems may have features like automatic turbulence detection and predictive weather analysis, further aiding pilots in avoiding potentially dangerous weather situations.

2.2.4.3 OTSB determined that the weather radar operation was normal and in accordance with the manufacturer’s requirements. The Post Flight Report of the aircraft did not record any system failure. No defects were raised by maintenance personnel regarding the aircraft weather radar system, therefore the OTSB determined that the weather radar system was not a factor to the occurrence.

2.2.4.4 Wind condition:The forecast wind at FL350 around the location of occurrence at the time of incident was at 244 degrees, and speed 44 knots.The flight plan details indicated that there was no indication of weather and showing shear rate (8-9) at the time of the incident.

2.2.5 Air Traffic Control:

2.2.5.1 Controller`s qualifications:

The ATCO`s license was initially issued on 23rd February 2015 with an expiry date of 28th February 2025. The ATCO was issued with a Class three (3) medical certificate on 16th March 2022 with an expiry date of 16th March 2024. The ATCO was issued with ratings (ACC, ACC RDR) to allow to operate as an Area Radar Controller at MCT ACC. The ATCO was properly licensed and qualified to communicate and to provide Air Traffic Services. The ATCO provided pertinent information to the crew in relation to the flight and the track. OTSB determined that the ATCO`s qualifications was not a factor to the occurrence.

2.2.5.2 The ATCO was properly licensed and qualified to communicate and handle the airspace. The ATCO provided pertinent information to the crew in relation to the flight and the track. OTSB determined that both the flight crew and ATCO qualifications were not a factor to the occurrence.

2.2.5.3 ATCO gave clear instructions with limitations to the crew after they requested descend to FL310. The crew of IGO1667 requested to either descend lower or turn right heading 150° due to heavy turbulence. The ATCO immediately cleared the crew of IGO1667 to only descend to FL310 and the crew of IGO1667 acknowledged the descent clearance but at the same time while still maintaining FL350 they had initiated the right turn without clearence.

2.2.6 Aids to navigation:

2.2.6.1 The Navigational system found to be serviceable and operated as required at the time of the incident. However, OTSB determined that the navigational aid was not a factor to the incident. RNAV is a method of Instrument Flight Rules(IFR) navigation that allows aircraft to operate on any desired flight path, rather than simply navigating directly between ground-based navaids.

2.2.7 Aerodrome

The aerodrome used by the incident aircraft, was found to be in compliance, and issued with the necessary approval. Therefore, OTSB determined that the aerodrome was not a factor to the incident.

2.3 Aircraft Maintenance

2.3.1 The aircraft IGO1667 was issued with a valid Certificate of Airworthiness and Certificate of Registration. It is owned by Irish Owner called M/S White OAK Aviation (AOE2) Limited and

leased to Interglobe Aviation – India and operated by IndiGO. The investigation team did not identify any maintenance related issue, nor inherent aircraft defect that may have contributed to the incident. Therefore, OTSB determined that aircraft maintenance was not a factor to this incident.

2.3.2 No data was obtained from the DFDR as the Operator stated that on arrival at AMD, there was no information/data requiring a DFDR download. A download was conducted on 14th November 2023 (two days after the occurence) did not contain relevant data for subject flight.

2.4 Human Factors

2.4.1 The crew of IGO1667 entered MCT FIR via waypoint TONVO at FL350.The ATCO cleared the crew of IGO1667 to follow flight plan route to RASKI on airway P307 which was acknowledged by the crew of IGO1667. After crossing waypoint PURNI the crew clarified about the preceding traffic and the controller replied as triple seven.After that, the crew requested deviation of 5 miles to the right without giving a specific reason to the ATCO.The ATCO did not approve neither did the ATCO seek for the reason thereafter IGO1667 requested 2miles and again it was not approved by the ATCO due to traffic but the ATCO approved 1nm and the crew of IGO1667 acknowledged.

2.4.2 At 00:37:02, the crew of IGO1667 reported “heavy turbulence because of this weight request lower or turn right on heading 150° and 10 seconds later at time 00:37:12 the ATCO cleared the crew of IGO1667 to descend to FL310 and the crew confirmed and readback. During this time as per the radar playback the crew of IGO1667 was already on a right turn beyond 1nm which was not approved by the ATCO. During the interview, both crew confirmed that the descent to FL310 was approved by the ATCO whilst the right turn beyond 1nm was not approved by the ATCO. During the interview the PIC stated that it is the first time to get such request denied by an ATCO. In accordance to the IndiGo SOPs they are supposed to comply with ATCO clearances.Therefore,crew`s actions were not consistent with the ATCO’s instructions nor with the Airline`s SOPs.

2.4.3 During the interview, the Captain could not recall that the ATCO granted them 1nm at the initial request.Upon entering Muscat`s airspace, the PF was the FO and the PM was the PIC but later in executing the right turn onto a heading of 150 the PF was the PIC. The decision to execute the right turn beyond the approved 1nm was taken by the PIC and the ATCO was not informed of this action neither was the FO aware of PIC intention.The FO did not challenge the PIC. In such cases the operator`s SOPs requires the FO to check with PIC and take appropriate actions however ,the FO’s action of not questioning the PIC was not consistent with the operator’s SOPs.

2.4.4 Although the crew reported to the ATCO experiencing heavy turbulence but during the interview the crew confirmed the type of turbulence as wake turbulence due to the preceding aircraft Boeing 777. The crew reported to the ATCO that the reason they commenced the

right turn beyond the approved 1nm is because the aircraft was shaking really hard however, due to the fact that the FDR was overwritten, OTSB could not determine if the aircraft was indeed shaking extraordinary as reported by the crew.

2.4.5 The TCAS monitoring is an important tool to the crew while planning deviations and gathering information of surrounding traffic. It enhances situation awareness which clearly would alert the crew on traffic separation. Although the crew of IGO1667 informed the controller that " the rate of descent was under control and there was no aircraft or no IFR was crossed",however during the interview the crew stated that as they were turning right they were aware of the traffic 3000ft below them aircraft (QTR871 maintaining FL320). Based on the above statements from the crew and the ATCO, it is likely that the crew were not aware of the conflicting traffic, if they were aware, they would have taken avoidance actions.

2.4.6 At time 00:37:02, the crew of IGO1667 requested either lower or a heading and mentioned the reason being heavy turbulence and the ATCO approved the descent of FL310 and not the right turn of heading of 150 due to traffic to the right on airway N571. As soon as the ATCO observed that the crew of IGO1667 had exceeded 1nm to the right of the airway, the ATCO immediately clarified with the crew of IGO1667 if they were on a right turn as only 1nm was approved.The ATCO was concerned about the crew of IGO1667`s right turn while on descent to FL310 as it was a potential conflict with traffic on airway N571,aircraft (QTR871 maintaining FL320) and the ATCO had to issue avoiding headings to the left to both aircraft IGO1667 and aircraft QTR871 in order to avoid possible loss of separation between the two aircraft.The ATCO issued the avoiding heading prior to the activation of the STCA. If the aircraft IGO1667 remained on the airway P307 with the descent clearance that was issued by the ATCO ,then aircraft IGO1667 would not have been in conflict with aircraft QTR871.

2.4.7 During the interview, the ATCO seemed to have a very good awareness of the traffic volume and weather conditions in the West Sector during the time of the incident. Despite the workload that was created due to the incident, the ATCO continued controlling the traffic safely and expeditiously and stayed alerted. As per ATCO`s statement and during the interview, some aircraft reported weather turbulence around the vicinity of West Sector hence by the crew of IGO1667 not specifying the first time the reason of requesting 5 miles to the right, the ATCO could not tell if it was due to the weather or from the wake turbulence due to the preceding aircraft.

2.4.8 During the interview, the ATCO referred to the actions that were taken as being ideal with this situation, as per his experience and the laid down procedures the refusal for not allowing 5NM requested by the crew of aircraft IGO1667, was due to the traffic load around the vicinity and did not feel comfortable to clear IGO1667 off the airway.However should the crew of IGO1667 had clearly stated that they are experiencing severe wake turbulence when they initially requested deviation of 5NM, the ATCO would have considered other available provisions to assist the crew of IGO1667.

2.4.9 The crew mentioned turbulence more than one occasion and in different times. At 00:36:05, the crew of IGO1667 requested permission to offset 5NM to the right to avoid, without specifying to avoid what and at 00:37:02 ,the crew of IGO1667 reported heavy turbulence. The crew of IGO1667 explained to ATCO in support of their action that they were experiencing huge turbulence. Post Incident and during the crew interview, the PF stated that while experiencing the wake turbulence. The crew were not consistent in their phraseology.

2.4.10 There was no evidence that incapacitation or physiological factors affected both the flight crew and ATCO performance. There was no evidence that the pilot suffered any sudden illness or incapacity which might have affected the crew ability to control the aircraft.

2.5 Survivability

2.5.1 Rescue fire service response: Rescue fire was not a factor to the incident as the incident happened on route.

3 Conclusions

3.1 General

From the evidence available, the following findings, causes, and contributing factors were made with respect to this Serious Incident. These shall not be read as apportioning blame or liability to any particular organization or individual. To serve the objective of this Investigation, the following sections are included in the Conclusions heading:

- Findings. Are statements of all significant conditions, events, or circumstances in this Incident. The findings are significant steps in this Incident sequence but they are not always causal or indicate deficiencies.
- Causes. Are actions, omissions, events, conditions, or a combination thereof, which led to this Incident.
- Contributing factors. Are actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided, or absent, would have reduced the probability of the Incident occurring, or mitigated the severity of the consequences of the Incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability.

3.2 Findings

3.2.1 The crew held the required licences and medical certificates which were found valid at the time of the incident. Both of their flying licences were issued by India DGCA.

3.2.2 The flight crew carried out normal radio communications with the relevant ATC units.

3.2.3 The pre-flight rest period was adequate and the flight duty time was within the Operator`s flight time limitations.

3.2.4 The flight crew actions and statements indicated that their knowledge and understanding of the aircraft operation.

3.2.5 Flight preparation pre-departure crew briefing and flight plan was handed to the crew including expected shear rate 9 at waypoint KUNUS in Muscat FIR which reflects the forecast turbulence projected in the flight plan.

3.2.6 The ATCO held the required licence and medical which was valid at the time of the incident issued by Oman CAA.

3.2.7 The ATCO was controlling 17 aircraft at the time of the incident.

3.2.8 The ATCO reported during the interview that traffic workload was assessed as moderate with no complexity.

3.2.9 At 00:36:05, the crew of IGO1667 requested to offset 5NM to the right to avoid but they did not state the reason for the request to off set and was not approved by the ATCO.

3.2.10 The ATCO did not approve the crew of IGO1667 request of 5 miles right of track due to the traffic around the west sector.

3.2.11 At 00:36:09, the ATCO approved 1NM, but the crew of IGO1667 again requested 2NM to offset without specifying the reason for the request, then the ATCO responded that “only 1Nm is approved this is RNAV 1 airway” and the crew of IGO1667 acknowledged.

3.2.12 On both occasions of IGO1667 crew`s requests, the ATCO did not enquire from the IGO1667 crew the reason for the request.

3.2.13 At 00:37:02,the crew of IGO1667 reported heavy turbulence, and because of the weight, requested a lower flight level or a right turn to a heading of 150 degrees. The ATCO cleared the crew IGO1667 to descend to FL310, which the crew of IGO1667 acknowledged.

3.2.14 At 00:37:07 the crew of IGO1667 commenced a right turn beyond the approved 1NM from airway P307 onto a heading of 150 degrees without ATCO clearance while descending from FL350 to FL310.

3.2.15 Due to the potential conflict between aircraft IGO1667 and aircraft QTR871,the ATCO issued avoiding heading to to the crew of IGO1667 turn left onto a heading of 060 degrees and a left heading of 270 degrees to the crew of QTR871 prior to the activation of the STCA.

3.2.16 At 00:39:21, a yellow STCA was activated between aircraft IGO1667 and aircraft QTR871. At 00:39:49,once the conflicting traffic were clear from each other, the ATCO instructed the crew of QTR871 and the crew of IGO1667 to cancel the turn and to resume navigation to their respective exit points.

3.2.17 There was no loss of separation between aircraft IGO1667 and aircraft QTR871.

3.2.18 The ATCO informed the crew of IGO1667 that a report will be filed regarding the incident and the crew of IGO1667 did file a report with the Indigo Flight Safety Department and was reported to OTSB.

3.2.19 The Operator did not report the occurence directly to the AAIB India as per the Operator's Flight Safety Manual, which states that on receipt of information, the operator shall inform incident to AAIB as soon as practicable. Further reporting of occurences within 24 hours of receipt of initial information.

3.2.20 During the interview with the FO (as the PF), it was stated that the PIC (as the PM) took control of both, aircraft flying and communications. The Crew resources management between the PIC and FO was not in consistent with the Airline procedures to be followed in respect to PF and PM. Therefore,the crew resource management was ineffective between the flight Crew.

3.2.21 The DFDR was not obtained due to the FDR being overwritten.The download was only conducted 2 days after the occurrence.

3.2.22 The aircraft was properly registered and issued with the Certificate of Airworthiness and Certificate of Registration which were valid at the time of the incident, both were issued by India DGCA.

3.2.23 The maintenance records indicated that the aircraft was maintained in accordance with existing regulations and approved procedures. There was no evidence of airframe failure or system malfunction prior to the incident.

3.2.24 The weather radar operation was normal and in accordance with manufacturer's requirements. No defects were raised by maintenance personnel regarding the aircraft weather radar system and the required weather information was at the crew's display at all times.

3.2.25 The forecast wind at FL350 around the location of occurrence at the time of incident was at 244 degrees, and speed 44 knots.The flight plan details indicated that there was no indication of weather and showing shear rate (8-9) at the time of the incident.

3.2.26 The crew were not consistent in their phraseology.They mentioned turbulence in more than one occasion and at different times, such as heavy turbulence, huge turbulence and wake turbulence.

3.2.27 There was no services required of Rescue fire, therefore Rescue fire was not a factor to the incident as there was no fire during and after the incident

3.3 Cause of the incident:

3.3.1 The crew of IGO1667 were authorized by the ATCO to turn 1NM right however,the crew turned beyond 1NM onto a heading of 150 degrees.This resulted in activating STCA due to the potential loss of separation with opposite direction conflicting traffic.

3.4 Contributing Factors:

3.4.1 The crew of IGO1667 commenced a right turn towards conflicting traffic that they were aware of without ATCO clearance.

3.4.2 Deviation from SOPs.

3.4.3 The crew resource management was ineffective between the flight crew.

4. Safety Recommendations

4.1 General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The intended purpose of a safety recommendation is the prevention of accidents or incidents and the reduction of the consequences of such occurrences. It, in no case, has the purpose of creating a presumption of blame or liability for an accident or incident.The OTSB expects that all safety issues identified by the investigation are addressed by the receiving States and organizations.

4.2 Due to the fact that this occurrence and its associated findings and risks, are in the interest of safety, OTSB recommends the following safety recommendations to the operator:

4.2.1 **SR 1 /2024** OTSB recommends that IndiGo to review Crew Resource Management (CRM) Training with the emphasis on the airmanship, procedures on deviation from the cleared route, assertiveness and the responsibilities of the PIC and FO.

4.2.2 **SR 2/2024** OTSB recommends that IndiGo to issue notice to crew for the use of standard phrase in addressing wake turbulence.

5. Appendices

5.1 Indigo Flight Release information which is given to the crew along with flight plan

5.2 Indigo instruction guideline procedures .

5.3 Flight Plan.

5.4 Enroute Weather information with the flight release given to the flight crew

5.5 Enroute Weather information with the flight release given to the flight crew

INDIGO BRIEF

INDIGO FLIGHT RELEASE

FLIGHT DATE: 11-NOV-2023
TYPE OF FLIGHT - IFR FLIGHT RELEASE VALID UPTO: 120440 UTC

REGN#	FLT NO.	DEPT	DEST	ALT1/ALT2	PZFW	TRIP FUEL	MIN FUEL REQD + EXTRA HOLD	TANKERING REC	TANKERING FUEL	PAX	FIC/ADC	T_ALT
VTIFK	IGO1667	OKKK	VAAH	VABB/NIL	061579	8295	12900	N	0	180		NIL

BAY NO: _____
REMARK:
* CREW ARE ADVISED TO REFER CFP FLIGHT LEVEL IN CASE OF RCF.
* ADDITIONAL FLIGHT INFORMATION, MEL & WEATHER BRIEFING: PRINTOUT ATTACHED.
* TANKERING SUBJECT TO PAYLOAD
* VALIDITY OF FRC IS SAME AS VALIDITY OF LAST SECTOR CFP MENTIONED AT THE RIGHT TOP CORNER

//MEL-CDL INFORMATION//

MEL:
VTIFK 21-52-02A AIR CONDITIONING RAM AIR INLET //EXP// 181123
MEL:
VTIFK 26-12-02A ENGINE #2 FIRE DETECTION LOOP A //EXP// 201123
MEL:
VTIFK 32-07-01B BRAKE TEMP INDICATION ON WHEEL SD PAGE //EXP// 201123
MEL:
VTIFK 36-00-01F AIR BLEED MAINTENANCE MESSAGE //EXP// 211123

Above figure: Indigo Flight Release information which is given to the crew along with flight plan

	6E96423	03JUL23 1030	31DEC23 2359	PILOTS ARE ADVISED TO ALWAYS MAINTAIN LISTENING WATCH ON THE ACTIVE FREQUENCY WITH ATC. FLIGHT CREW MUST USE ALL AVAILABLE RESOURCES TO ENSURE CLEAR AND UNAMBIGUOUS RECEPTION. BOTH CREW MEMBERS MUST AGREE ON THE CLEARED FL/ALTITUDE/FREQ ESPECIALLY DURING FIR CHANGE, USING EXISTING SOP'S OF CROSSCHECK AND CONFIRMING. IN CASE OF ANY DOUBT, A CLARIFICATION MUST BE SOUGHT FROM APPROPRIATE ATC BEFORE INITIATING ANY FL/ALTITUDE CHANGE. THE GUARD FREQ 121.5MHZ MUST BE MONITORED. PILOTS ARE ADVISED TO REVIEW CH 5 OF OMA AND CH 2 OF OMB

Above figure:Indigo instruction guideline procedures .

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OOMM MUSCAT

TONVO   109 023 453/479 350 243/039 06 03/0113 ..../.... 041  08573  ....

PURNI   112 071 454/481 350 244/044 08 09/0122 ..../.... 010  08198  ....

KUNUS   113 048 454/491 350 245/059 09 06/0128 ..../.... 010  07952  ....

ALSAS   113 047 454/499 350 245/072 09 06/0134 ..../.... 010  07713  ....

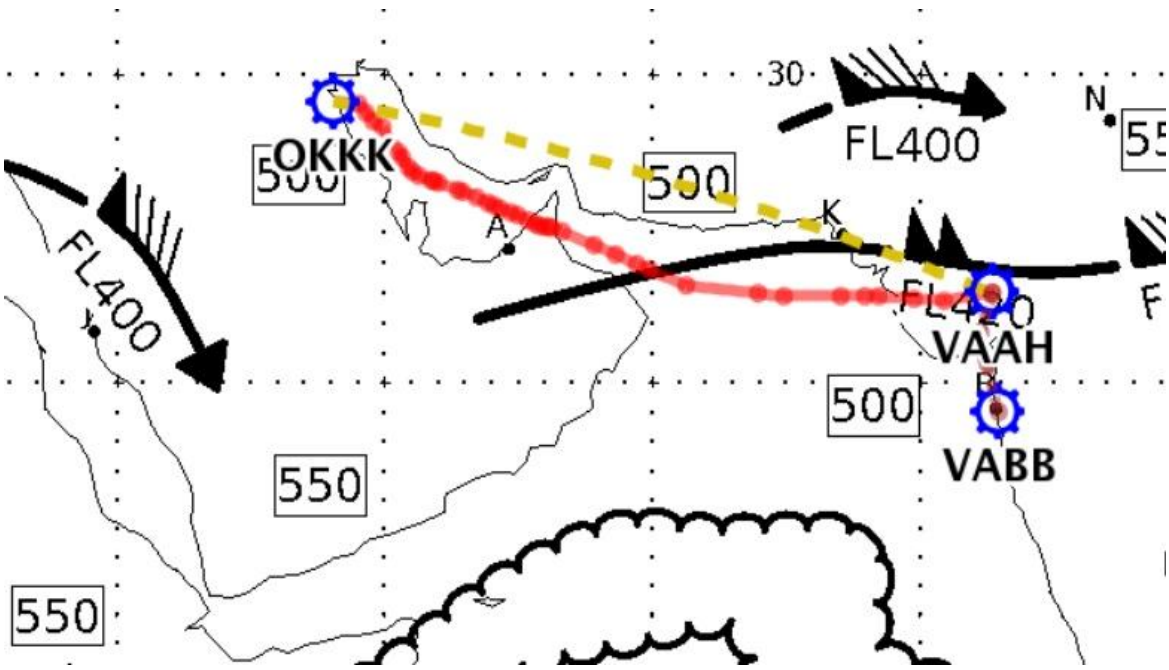
DERTO   112 027 454/502 350 246/074 08 03/0137 ..../.... 010  07575  ....

VAXIM   113 083 454/505 350 248/077 07 10/0147 ..../.... 010  07162  ....

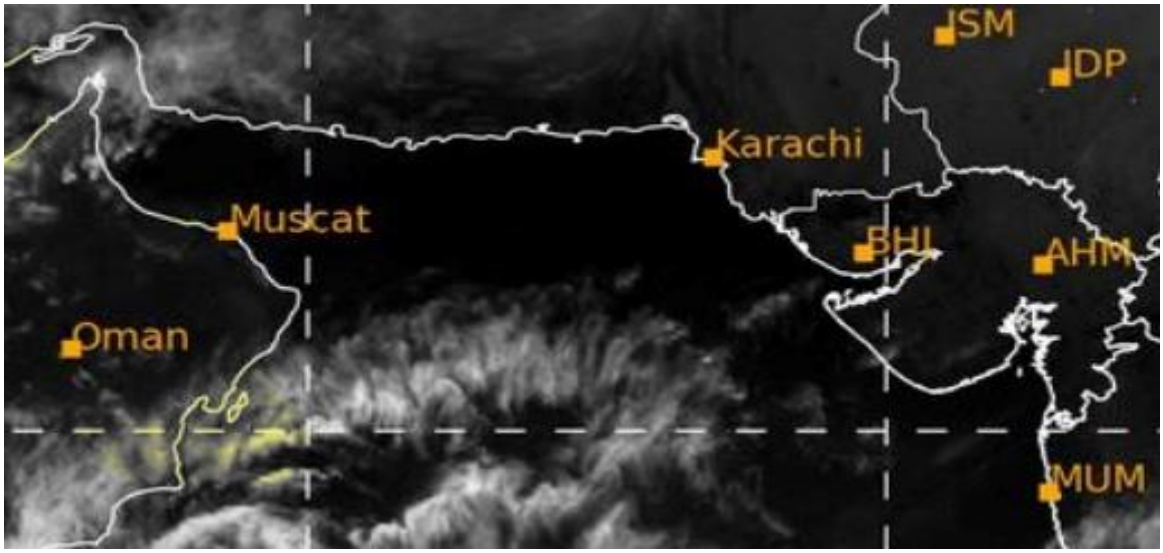
RASKI   096 149 453/522 350 253/077 06 17/0204 ..../.... 010  06451  ....

-VABF   --- --- ---/--- --- ---/--- -- --/0204 ..../.... ---  06433  ....
```

Above figure:-Indigo`s flight plan



Above figure: Enroute Weather information with the flight release given to the flight crew



Above figure:Enroute Weather information with the flight release given to the flight crew