FINAL INVESTIGATION REPORT

ON

SERIOUS INCIDENT (AIRPROX) BETWEEN AIRBUS A320 AIRCRAFT VT-IEH (M/S INDIGO) & BOEING 777-300 AIRCRAFT A6EPJ (M/S EMIRATES) AT NAGPUR ACC ON 28.01.2018.

FOREWORD

In accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and Rule 3 of Aircraft (Investigation of Accidents and Incidents), Rules 2017, the sole objective of the investigation shall be the prevention of accidents and serious incidents and not to apportion blame or liability. The investigation conducted in accordance with the provisions of the above said rules shall be separate from any judicial or administrative proceedings to apportion blame or liability.

This document has been prepared based upon the evidences collected during the investigation and opinion obtained from the experts. Consequently, the use of this report for any purpose other than for the prevention of future accidents or incidents could lead to erroneous interpretations.

GLOSSARY

AAI	Airports Authority of India
AAIB	Aircraft Accident Investigation Bureau, India
ACC	Area Control Centre
AOP	Air Operator Permit
ATC	Air Traffic Control
ATD	Actual Time of Departure
ATIS	Automatic Terminal Information Service
ATPL	Airline Transport Pilot Licence
AMM	Aircraft Maintenance Manual
AUW	All Up Weight
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
COI	Committee of Inquiry
CPL	Commercial Pilot Licence
DGCA	Directorate General of Civil Aviation
DFDR	Digital Flight Data Recorder
DME	Distance Measuring Equipment
ETA	Expected Time of Arrival
HOW	Hand off Watch
HZ	Haze
IACO	International Civil Aviation Organization
IATA	International Air Transport Association
IFR	Instrument Flight Rule
ILS	Instrument Landing System
NM	Nautical Mile
PIC	Pilot In Command
QFE	Query Field Elevation
QNH	Query Nautical Height
R/T	Radio Telephony
RA	Resolution Advisory
SDD	Situation Data Display
STCA	Short Term Conflict Alert
SQMS	Standards, Quality Management and Safety
SOP	Standard Operating Procedures
TOW	Take off Watch
TCAS	Traffic Alert & Collision Avoidance System
VHF	Very High Frequency
VOR	Very High Frequency Omni Range
UTC	Co-ordinated Universal Time

INDEX

Final Investigation Report on Serious Incident (Airprox) Between M/s Indigo Airbus A320 flight IGO334 & M/s Emirates Boeing 777-300 flight UAE353 at Nagpur ACC on 28.01.2018.

1.	**Aircraft**		
	Type	**:**	Airbus A320 (Indigo)
			Boeing B777-300 (Emirates)
	Nationality	**:**	Indian (Indigo) & UAE (Emirates)
2.	**Owner/ Operator**	**:**	M/s Indigo (IGO334) & M/s Emirates (UAE353).
3.	**Pilot – in –Command**	**:**	ATPL Holders
	Extent of injuries	**:**	Nil
4.	**First Officer**	**:**	Qualified on type
	Extent of injuries	**:**	Nil
5.	**Place of Incident**	**:**	Nagpur ACC
6.	**Date & Time of Incident**	**:**	28thJanuary 2018 at 0553 UTC
7.	**Last point of Departure**	**:**	Hyderabad (Indigo) and Singapore (Emirates)
8.	**Point of intended landing**	**:**	Raipur (Indigo) & Dubai (Emirates)
9.	**Type of operation**	**:**	Scheduled Operation
10.	**Phase of operation**	**:**	During cruise
11.	**Type of Occurrence**	**:**	Air Proximity

(ALL TIMINGS IN THE REPORT ARE IN UTC)

SYNOPSIS

On 28.01.2018, M/s Indigo Airbus A320 aircraft was operating flight IGO334 from Hyderabad to Raipur and M/s Emirates Boeing 777-300 aircraft was operating flight UAE353 from Singapore to Dubai.

The Emirates flight UAE353, overflying Nagpur, was cruising at Flight Level (FL) 300 and M/s Indigo flight IGO334 was cruising at FL330 and was on direct track to Raipur. IGO334 flight requested for descent from FL330 to FL 250 and the Planning Controller gave descend to IGO334 to FL250 through the level of UAE353 which was cruising at FL300. Level Burst (LB) appeared on Radar SDD while IGO334 was passing through FL319. Thereafter, STCA appeared on the Radar Screen (SDD), when IGO334 was passing FL309. There was breach of separation between these aircraft and both aircraft reported getting TCAS RA to ATC. UAE353 was observed to follow TCAS RA and descended to FL296 and IGO334 was observed to descend to FL307 and then Climb to FL311.

Director General, Aircraft Accident Investigation Bureau appointed Investigator –In-Charge and Investigator vide order number INV-12011/8/2018-AAIB Dated 17 October 2018, to investigate the cause of the Serious Incident under Rule 11 (1) of Aircraft (Investigation of Accidents and Incidents), Rules 2017. Further, a Corrigendum was issued vide order no INV-12011/8/2018-AAIB Dated 26 May 2019 with change in Investigator –In-Charge.

.

1. FACTUAL INFORMATION

1.1 History of the Flight

On 28.01.2018, the M/s Indigo aircraft was scheduled to operate flight IGO334 from Hyderabad to Raipur and M/s Emirates aircraft was operating flight UAE353 from Singapore to Dubai. The aircraft IGO334 came in contact with RSR-South (Nagpur Radar South) on frequency 133.65 MHz at 053822 UTC and the aircraft UAE353 came in contact at 054303 UTC.

The traffic density at that time was moderate under the scope of RSR- South Radar Controller.

The Emirates flight UAE353, was overflying Nagpur, and was on cruise FL300. The Indigo flight IGO334, was on cruise FL330, and on direct track to Raipur. At 055003, IGO334 requested descent and in absence of Radar Controller (Radar Controller 1), the Planning Controller gave descend to IGO334 to FL250 through the level of UAE353 (at FL300) at time 055009 UTC. The cleared flight level was not entered on the data block of IGO334 by Radar Controller.

At 055228 UTC, IGO334 initiated descend from FL330 to FL250. At 055132 UTC, Level Burst (LB) appeared on Radar SDD while IGO334 was passing FL319.At 055236 UTC, STCA (red) appeared on the Radar Screen (SDD), when IGO334 was passing FL309. No predicted STCA (Yellow) warning appeared on the Radar Screen.

Fig: At 055236 UTC, STCA (Red) appeared on Radar Screen.

The relieving Radar Controller (Radar Controller 2) reported for duty and handing over/taking over procedure was carried out. At 055247 UTC, the Radar Controller 2 instructed IGO334, ***"IGO334, Re-cleared FL310"*** when IGO334 was passing FL307. At time 055249 UTC, the Radar Controller 2 inspite of taken over the duties, handed back the headset to the Radar Controller 1.

Fig: At 055247 UTC, RPS of IGO334 & UAE353 were almost superimposed.

Thereafter, the Radar Controller 2 had stood back (Behind Radar Controller 1 seat) and was observing the scope. At 055256 UTC, IGO334 stopped descent at FL307 and UAE353 was maintaining FL300 with both the RPS almost superimposed. UAE353, reported getting TCAS RA to ATC at 055251UTC and IGO334 reported getting TCAS TA and RA at 055305 UTC. UAE353 followed TCAS RA procedures and descended to FL296. As observed from the radar scope, IGO334 descended to FL307 and then Climbed to FL311. At 055258 UTC, the Radar Controller 1 again started transmitting on the Channel and at time 055322 UTC transmitted ***"IGO334 Radar Re Cleared FL 305"*** to IGO334 when both the aircraft were following TCAS RA. At time 055529 UTC, UAE353 re-affirmed getting TCAS RA ***"As checked, we have TCASRA at time 055300 UTC and we descended to FL295."***

Further, the Radar Controller 1 inspite of handed over the duties to Radar Controller 2, continued on ATC Channel for some more time. The Radar Controller 2 then took over the channel again and made the transmission at 055936 UTC.

The drake recording revealed use of Non-Standard Language in inter unit Coordination. Radar Controller 1 was continuously on ATC Channel for more than two hours (from 0330UTC to 0600 UTC).

1.2 Injuries to Persons

There was no injury to any of the occupant on board any of the aircraft.

1.3 Damage to Aircraft

Nil

1.4 Other Damage

Nil

1.5 Personnel Information

Both flights were operated by scheduled airlines and all the flight crew were appropriately qualified & licensed as per the existing regulations for operating the flight.

The RSR South Radar Controller was authorized to handle R/T (Radiotelephony) in the Radar environment and Planning Controller in procedural respectively. The Planning Controller was the Watch Supervisory Officer (WSO) of the shift.

1.6 Aircraft Information

The M/s Indigo aircraft is short to medium-range, narrow-body Airbus A320, commercial passenger twin-engine jet airliner and the M/s Emirates aircraft was long range, wide – body Boeing B777-300, commercial passenger twin-engine jet airliner.

1.7 Meteorological Information

The weather was fine and has no bearing on the occurrence.

1.8 Aids to Navigation

All aids to navigation on ground along with RSR South frequency 133.65 MHz. were reported working normal. All the aircraft navigational systems were also working normal.

1.9 Communications

During the time of incident both the aircraft, IGO334 & UAE353 were in positive contact with Nagpur, RSR-South at 133.65MHz. There was always two-way communications maintained between concerned ATC unit and both the aircraft.VHF range was reported to be poor.

1.9.1 ATC Tape Transcript

The ATC tape recording of frequency 133.75 MHz, RSR North was replayed and the relevant transcript is as follows:

RSR South, Frequency 133.65 MHz, Transmission with IGO334 & UAE353

TIME(UTC) HHMMSS	UNIT	TRANSCRIPT
05:38:22	IGO334	Nagpur IGO334 Namaskar
05:38:26	Controller	IGO334 Radar Namaskar Identified
05:38:29	IGO334	(garbled) Climbing level 310 sir level requested 350 and No traffic with
05:38:39	Controller	IGO334 Continue Climb 330
05:38:42	IGO334	Continue Climb 330 IGO334
05:38:51	IGO344	And Sir Confirm level 330 final level for us.
05:38:54	Controller	Affirm
05:38:55	IGO334	Roger Sir IGO334
05:44:53	Controller	UAE353 Radar
05:45:53	Controller	UAE353 Radar Confirm Squawk Confirm level
05:45:56	UAE353	380 reaching RIBRO
05:46:20	Controller	UAE353 Radar UAE345 Radar
05:46:34	Controller	UAE353 Radar

05:46:43	Controller	VTI VTI882 Identified report BUKLO break break UAE353 Radar
05:46:55	UAE345	Go ahead UAE345
05:46:56	Controller	Could you give a call to UAE353 and advise to contact Radar 133.65
05:47:03	UAE345	Roger, UAE345
05:48:30	Controller	UAE353 Radar
05:48:32	UAE353	UAE353 With You on 123.9 (garbled)
05:48:36	Controller	You are supposed to Contact Radar 133.65 over RIBRO
05:48:41	UAE353	Ya we called 33.65, we called 32.30, we called 123.9 (garbled) frequency (garbled)
05:48:47	Controller	Roger, but frequency is 133.65 Identified Cleared direct NINIM
05:48:53	UAE353	UAE353
05:48:55	Controller	Stand by
05:49:49	IGO334	Request Descent IGO334
05:49:58	IGO334	Nagpur IGO334
05:50:00	Controller	IGO334 Nagpur
05:50:03	IGO334	Request Descent
05:50:05	Controller	IGO334 Descent to FL250
05:50:08	IGO334	Descent to FL250 IGO334
05:52:09	Controller	Good Day
05:52:45	Controller	IGO33---334 Radar re-cleared FL310
05:52:51	UAE353	UAE353 TCAS RA
05:52:58	Controller	IGO334 Radar
05:53:05	IGO334	We have the TA Sir, TRA IGO334
05:53:09	Controller	IGO334 Radar
05:53:19	IGO334	Nagpur IGO334
05:53:22	Controller	IGO334 Radar re-cleared FL305
05:55:24	UAE353	Nagpur UAE353
05:55:27	Controller	UAE353 Radar
05:55:29	UAE353	As checked we have a TCAS RA Time 0553
05:55:34	Controller	Confirm TCAS
05:55:35	UAE353	We had a TCAS RA at Time 0553 we descended to level 295, Currently at Level 300 maintaining
05:55:45	Controller	Roger

1.10 Aerodrome Information

The Dr. Babasaheb Ambedkar International Airport, Nagpur is owned and operated by Mihan International PVT. LTD. The details of the airport are as follows:

Co-ordinates

ARP : N 21° 05' 31"
E 079° 02' 54"

Elevation : 1033 feet.

Runway Orientation and Dimension

Orientation - 14/32,
Dimension 3200 x 45 Meters

ATS COMMUNICATION FACILITIES

Service Designation	Call sign	Channel(s)
ARSR	Nagpur Control Nagpur Radar (Sector North)	123.900 MHZ
ARSR	Nagpur Control Nagpur Radar (Sector South)	133.650 MHZ
ARSR	Nagpur Control Nagpur Radar (Standby)	132.300 MHZ
APP	Nagpur Approach	120.400 MHZ
APP	Nagpur Approach (Standby)	121.900 MHZ
TWR	Nagpur Tower	118.100 MHZ
TWR	Nagpur Tower (Standby)	121.900 MHZ
ATIS	---	126.600 MHZ
ALRS	Emergency Frequency	121.500 MHZ
SMC	Nagpur Ground	121.900 MHZ

1.11 Flight Recorders

Both the aircraft were installed with Cockpit Voice Recorder (CVR) and Digital Flight Data Recorder (DFDR).

1.12 Wreckage and Impact Information

There was no damage to either of the aircraft.

1.13 Medical and Pathological Information

There was no reported adverse medical condition of the cockpit crew.

1.14 Fire

There was no fire.

1.15 Survival Aspects

The incident was survivable.

1.16 Tests and Research

Nil

1.17 Organizational and Management Information

Both aircraft were operated by a Scheduled Airlines.

The Radar Controller & Planning Controller, ACC – South were under the administrative control of Airports Authority of India which is responsible for Air Traffic Services at Nagpur airport, including En-Route Radar Surveillance, Terminal Approach Radar, Area Control Service, Approach Control Service and Aerodrome Control Service.

1.18 Additional information

1.18.1Traffic Alert and Collision Avoidance System (TCAS)

Both aircraft were equipped with TCAS, which detects potentially conflicting aircraft using secondary surveillance radar transponder signals and provides advice to the flight crews of the aircraft involved. The system's advice is rendered on 2 levels: via Traffic Advisory (TA) and Resolution Advisory (RA). A TA advises a flight crew of potential traffic conflicts, whereas an RA alerts the crew to an actual

conflict and provides advice on maneuvers to avoid collision. Both TAs and RAs provide visual and verbal alerts as follows: -

- TA provides information on proximate traffic and indicates the relative positions of intruding aircraft. TA is intended to assist flight crew in visual acquisition of conflicting traffic and to prepare pilots for the possibility of an RA.
- RA is divided into two categories: preventative advisories, which instruct the pilot to maintain or avoid certain vertical speeds; and corrective advisories, which instruct the pilot to deviate from the current flight path (e.g. “CLIMB” when the aircraft is in level flight).

A TCAS RA is based on a 5-second crew reaction time, unless the advisory is a reversal or there is an increase in strength of the original, in which case it is based on a reaction time of 2.5 seconds. Generally, there are 12 different TCAS RA annunciations, which use both aural commands and visual cues. The most common aural commands are “climb, climb” and “descend, descend.”

The RA ***“maintain vertical speed, crossing, maintain”*** is a preventive RA: it instructs a flight crew to maintain their current vertical speed and indicates that the aircraft’s own flight path will cross that of the intruder.

On aircraft equipped with TCAS, the system will coordinate their resolution advisories. The coordination ensures that complementary advisories are issued to each aircraft. The crew should promptly but smoothly follow the advisory and never maneuver in the opposite direction.

Visual Display of Traffic and Resolution Advisories

The navigation setting on the Multi-Function Display (MFD) can be configured to show traffic in automatic (pop-up) mode or continuous mode. The automatic mode shows only TA and RA indications, while the continuous mode shows all aircraft traffic, whether or not those aircraft constitute a threat.

During an RA, the primary flight display shows the required rates of climb or descent on the instantaneous vertical speed indicator.

After the transponder is initially selected ON, the TCAS display on the MFD defaults to the automatic mode. To view traffic in continuous mode, the flight crew must press the TCAS button, select the range to 40 NM or below on the electronic flight information system control panel, and ensure that the navigation page is selected to ARC or MAP mode.

1.19 Useful and Effective Techniques

Nil

2 ANALYSIS

The Emirates flight UAE353, was overflying Nagpur, and on cruise FL300. The Indigo flight IGO334 was at cruise FL330, and on direct track to Raipur. The traffic density at that time was moderate as observed on the scope of RSR- South Radar Control. When IGO334 requested descent, the Radar Controller 1 was not on the Radar channel and in absence of Radar Controller, the Planning Controller gave descend to IGO334 to FL250 through the level of UAE353 which was cruising at FL300. The flight level given to IGO334 was not entered on its data block. Thus, when IGO334 initiated descend from FL330 to FL250, Level Burst (LB) appeared on Radar SDD when it was passing FL319. As per the CCTV footage, the Radar Controller 1 was observed to have left the active channel for few times and during all these times the transmission was made by the Planning Controller which is in contravention to standard procedures as per MATS1. The Radar Controller 1 had performed duty on ATC channel for more than two hours which again is in contravention to standard procedures as per MATS1.

The Radar Controller 2 reported for duty and after handing over/ taking over procedure with Radar Controller 1 (which was not carried out as per laid down procedures in MATS -I) instructed ***"IGO334, Re-cleared FL310"*** when it was passing through FL307. IGO334 stopped descent at FL307 and UAE353 was maintaining FL300 when both the RPS almost superimposed. Subsequently, STCA (Red) appeared on the Radar Screen, when IGO334 was passing through FL309. No predicted STCA (Yellow) warning appeared on the Radar Screen.

UAE353 reported getting TCAS RA and on noticing the conflict, the Radar Controller 2 inspite of taken over the duties handed back the headset to the Radar Controller 1. Thereafter, the Radar Controller 2 had left the seat and was observing from behind.

Subsequently, IGO334 also reported getting TCAS TA followed by RA. The Radar Controller1 again started transmitting on the Channel and transmitted ***"IGO334 Radar Re-Cleared FL 305"*** to IGO334 (which is not a standard phraseology) when both the aircraft were following TCAS RA procedures which is again in contravention to standard procedures as per MATS1. UAE353 followed TCAS RA procedures and descended to FL296. As observed from the radar scope, IGO334 descended to FL307 and then Climbed to FL311. Thereafter, UAE353 re-affirmed getting TCAS RA ***"As checked, we have TCASRA at time 055300 UTC and we descended to FL295."*** Both aircraft then continued normal navigation.

The Radar Controller 1 continued on ATC Channel for some more time until the Radar Controller 2 took over the channel again well after the aircraft were clear of conflict.

The drake recording revealed use of non-Standard Language in inter unit Coordination. Radar Controller 1 was continuously on ATC Channel for more than two hours in contravention to the laid down procedure in MATS1.

3 CONCLUSION

3.1 Findings

a. Crew of both the aircraft were suitably qualified.

b. As per medical records made available by AAI, the Controllers were medically fit.

c. The Radar Controller was rated for Tower, Approach, Area Unit of procedural ATC and Route Surveillance Radar of Radar ATC.

d. The Planning Controller was rated for ADC (Tower), Approach and Area Units of procedural ATC Control only *and not rated for Radar Control (RSR).*

e. The traffic density (11 aircraft) at that time was moderate as observed on the scope of RSR- South Radar Control.

f. The Planning Controller was also the Watch Supervisory Officer (WSO) of the shift and was handling the aircraft in Radar Control/Radar environment in the absence of Radar Controller 1.

g. Planning Controller had given descend to IGO334 from FL330 to FL250 through the level of converging UAE353 at FL300 in the absence of Radar Controller 1. ***This led to the Airprox between IGO334 and UAE353.***

h. The Radar Controller 1 was not present at the ATC Channel just before the Airprox and was observed to have left the ATC Channel without briefing / handing over the Channel to other Radar Controller.

i. The Radar Controller 1 had left the ATC Channel five times from 0530 UTC (11:00 hrs. IST) to 05:52 UTC (11:22 UTC) i.e. during a span of just 22 minutes.

j. ***At 05:52:51 UTC, UAE353 reported getting TCAS RA to ATC.***

k. ***At 05:53:05 UTC, IGO334 reported getting TCAS TA to ATC.***

l. No STCA (Yellow) predicted warning appeared on the radar scope.

m. On noticing the conflict immediately after taking over the duties, the Radar Controller 2 handed back the headset to the Radar Controller 1.

n. At time 05:53:26, Radar Controller 1 instructed IGO334 ***"Re cleared FL305"*** (which is not a standard phraseology) when the aircraft was already following TCAS RA procedures.

o. UAE353 was observed on the scope following TCAS RA and descended to FL296.

p. IGO334 was observed on the scope to descend to FL307 and then climb to FL311.

q. Use of non-Standard Language in inter unit Coordination between ACC South and ACC North was observed.

r. After clear of conflict, both flights continued their normal navigation.

s. There was improper briefing and non-adherence to standard handing over taking over procedures.

3.2 Probable Cause

The incident occurred due to inadequate surveillance by RSR controller.

The RSR controller leaving the active channel and the planning controller handling the aircraft on radar contributed to the incident.

4 SAFETY RECOMMENDATIONS

a. NIL.

b. Actions have already been taken by Airports Authority of India to obviate such occurrences in future.

K. Ramachandran.
(K. Ramachandran)
Assistant Director, AAIB
Investigator

A P Tewari.
(Anil Tewari)
Director, AAIB
Investigator- In - Charge

Place: New Delhi

Date: 24 Oct 2019