Final Investigation Report on Serious Incident of Airprox between A321 aircraft VT-IUO (IGO2113) and A320 Aircraft VT-ISO (IGO2206) operated by M/s Indigo at IGI Airport, Delhi on 17.11.2023

AIRCRAFT ACCIDENT INVESTIGATION BUREAU

MINISTRY OF CIVIL AVIATION

GOVERNMENT OF INDIA

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 of an Accident/Incident shall be the prevention of accidents and 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, opinion obtained from the experts and laboratory examination of various components. Consequently, the use of this report for any purpose other than for the prevention of future accidents or incidents could lead to erroneous interpretations.

Unless otherwise indicated, all times in this report are stated in Coordinated Universal Time (UTC). The relationship between IST and UTC is IST = UTC + 5½ hours.

For reasons of data protection and simplification of the text, this report uses exclusively the generic masculine.

Note:

Figures used in this report are taken from different sources and are adjusted from the original for the sole purpose to improve the clarity of the Report. Modifications to images used in this report are limited to cropping, magnification or addition of text boxes, arrows or lines.

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GLOSSARY

ACAS	Airborne Collision Avoidance System
ADC	Aerodrome Control
AP	Auto Pilot
APAD	Approach departure
APP	Approach Control
ATM	Air Traffic Management
ATC	Air Traffic Control
ATPL	Airline Transport Pilot License
ATS	Air Traffic Services
ATIS	Automatic Terminal Information Service
C of A	Certificate of Airworthiness
CAR	Civil Aviation Requirement
CDIS	Current Distance (between tracks in STCA)
CFP	Computerized Flight Planning
CLD	Clearance Delivery
CPL	Commercial Pilot License
C of R	Certificate of Registration
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DGCA	Director General Of Civil Aviation
DCL	Data Link Clearance
DEP	Departure
EFS	Electronic Flight Strip
FO	First Officer
FCOM	Flight Crew Operation Manual
FCTM	Flight Crew Training Manual
FCU	Flight Control Unit
FL	Flight level
FMGS	Flight management and guidance System
FPM	Feet per minute
FRTO	Flight Radio Telephone Operator’s License

Hrs	Hours
IGO	M/s Interglobal Aviation
IST	Indian Standard Time
IIC	Investigator-in-charge
MATS	Manual of Air Traffic Services
MEL	Minimum Equipment List
MDIS	Minimum predicted distance
NCR	National Capital Region, India
ND	Navigation display
NM	Nautical miles
PF	Pilot Flying
PIB	Permanent Investigation Board
PIC	Pilot in Command
PM	Pilot monitoring
RA	Resolution Advisory
ROC	Rate Of Climb
RT	Radio Telephony
RWY	Runway
SID	Standard Instrument Departure Route
SNET	Safety Net
STAR	Standard Instrument Arrival Route
STCA	Short term conflict alert
TA	Traffic Advisory
TCAS	Traffic alert and collision Avoidance system
TPC	Threats-Plan-Considerations
UTC	Universal Time Coordinated
VOR	VHF Omnidirectional Range
VSP	Variable Site Parameter (in ATC Automation)

SUMMARY

Final Investigation Report on Serious Incident of Airprox between A321 aircraft VT-IUO (IGO2113) and A320 Aircraft VT-ISO (IGO2206) operated by M/s Indigo at IGI Airport, Delhi on 17 Nov 2023				
1.	Aircraft		Aircraft 1	Aircraft 2
		Operator	M/s Interglobal Aviation	M/s Interglobal Aviation
		Type	A321-271NX	A320-251N
		Call Sign	IGO2113	IGO2206
		Wake turbulence	Medium	Medium
		Flight Rule	IFR	IFR
		Nationality	Indian	Indian
		Registration	VT-IUO	VT-ISO
2.	Pilot – In – Command		ATPL holder	ATPL holder
	Extent of Injuries		Nil	Nil
3.	Co-pilot		CPL holder	CPL holder
	Extent of Injuries		Nil	Nil
4.	Extent of Injuries to passengers & Cabin Crew		Nil	Nil
5.	Sector		Delhi–Hyderabad (VOHS)	Delhi- Raipur
7.	Flight Plan Route		Q23 PEDMA W27	L759 KKJ W138
8.	Type of operation		Schedule	Schedule
9.	Phase of operation		Climb	Climb
10.	Runway used		RWY27	RWY29R
11.	SID given		AKRIB 6A	ITBAN 6C
12.	Date & Time of Incident		17.11.2023 & 070143 UTC	
13.	Place of Incident		Delhi Airspace	
14.	Type of Occurrence		Infringement of Separation Minima (Air Proximity)	
15.	Applicable ATC Separation		Surveillance based horizontal separation of 3 NM and vertical separation of 1000 feet	
16.	ATS Unit		APAD (Approach Departure)	

SYNOPSIS

On November 17, 2023, M/s Indigo A321 aircraft VT-IUO was scheduled to operate flight IGO 2113 from Delhi to Hyderabad, and M/s Indigo A320 aircraft VT-ISO was scheduled for flight IGO 2206 from Delhi to Raipur.

IGO 2113 received departure clearance, SID AKRIB 6A, from RWY 27 at 0633 UTC and departed at 0701 UTC. It established contact with APAD which cleared it to climb to FL80 However, at 070141, IGO 2113 was observed turned left toward the takeoff path of RWY 29R instead of following SID AKRIB 6A. At the same time, IGO 2206 departed from RWY 29R following SID ITBAN 6C, climbing to 4000 feet. IGO 2206 came in contact with APAD, and the controller instructed it to climb to 4000 feet. During this sequence, a breach of separation occurred between IGO 2113 and IGO 2206, triggering a Current Conflict alert at 070143 UTC. Both IGO 2113 and IGO 2206 received TCAS-RA.

Both the Aircraft came very close and at the time of the closest vertical separation of 400 feet, lateral separation was 1.2 NM. TCAS RA maneuver was performed. There were no injuries to any of the occupants on board in either aircraft. There was no damage to the aircraft.

The occurrence was classified as a Serious Incident as per Aircraft (Investigation of Accidents and Incidents) Rules, 2017 and an Investigation into circumstances of this serious incident was ordered vide No. INV- 12011/3/2022-AAIB dated 04.12.2023.

Unless otherwise indicated, recommendations in this report are addressed to the regulatory authorities of the State having the responsibility for the matters with which the recommendation is concerned. It is for those authorities to decide what action is taken.

1. Factual Information

1.1. History of Flight

1.1.1 On November 17, 2023, M/s Indigo's A321 aircraft VT-IUO was parked at Stand number 237, scheduled for flight IGO2113 from Delhi to Hyderabad. The company's other A320 aircraft, VT-ISO, parked at Stand number 207, and was scheduled for flight IGO2206 from Delhi to Raipur.

1.1.2 On the day of occurrence, Three Runway Westerly mode i.e. 29 R (Departure), 29 L (Arrival), 27(Mixed) was in operation at Indira Gandhi International Airport, Delhi.

1.1.3 IGO2206 initially contacted clearance delivery at 061954 Hrs on frequency 121.95 and received clearance for RWY 29R SID ITBAN 6C initial Level 4000 squawk 0544. Similarly, IGO2113 requested departure clearance via Data link at 063030 Hrs. Subsequently, IGO2113 received the clearance message "RWY 27 SID AKRIB 6A initial level FL070 at 063401 UTC, and the same was acknowledged by the FO of IGO2113 at 063653 Hrs. During this time, IGO2206 changed over to SMC middle. Subsequently, IGO2206 requested SMC middle for pushback and startup approval at 063713 UTC, and the same was approved. IGO2113 tried to contact delivery at 063824 for a changeover and inquired SMC Middle about the delivery frequency. However, IGO2113 was told to monitor, as the SMC middle will advise delivery to contact the IGO2113. Later, SMC Middle enquired IGO2113 for its readiness for pushback as per the IGO2113 flight plan transferred to them. IGO2113 confirmed its readiness. Subsequently, IGO2113 was approved for pushback and granted engine startup permission. Following this, IGO2113 requested taxi from SMC middle and was given progressive taxi clearance via routes N, N1, link 34, K, K2, and G. IGO2113 was transitioned to SMC north. During the same period, IGO2206 also requested for taxi and received progressive taxi clearance N, link 33, K, A till P9, and transferred from SMC middle to SMC south.

1.1.4 Subsequently, SMC South issued taxi clearance to IGO2206 via taxiway A and P7 up to the holding point of Runway 29R. The aircraft was later transferred to ADC S2, where it was instructed to line up on Runway 29R and advised to expect a delay of 1 minute 30 seconds.

Meanwhile, SMC North cleared IGO2113 to taxi to the holding point of Runway 27 via taxiways G, F, D, and D2, after which the aircraft was transferred to ADC N.

1.1.5 IGO2113 was cleared for takeoff from Runway 27 at 065951 Hrs. After departure, the aircraft established contact with APAD, which cleared it to climb to FL80. However, at 070140 Hrs, IGO2113 initiated a left turn toward the takeoff path of Runway 29R instead of following the cleared SID AKRIB 6A. The flight crew did not monitor the selected heading, and control of the aircraft had at that point transitioned to the First Officer.

1.1.6 Similarly, IGO2206 received takeoff clearance and departed from Runway 29R at 070011 Hrs, following SID ITBAN 6C and climbing to 4,000 feet. At 070143 Hrs, a loss of separation occurred between IGO2113 and IGO2206, resulting in the generation of a Short-Term Conflict Alert (STCA). At the point of closest proximity, the vertical separation between the two aircraft reduced to 400 feet, and the lateral separation decreased to 1.2 NM.

1.1.7 On observing the STCA, the ATCO attempted to contact IGO2113. As there was no response, the controller instructed IGO2206 to stop its climb at 2,600 feet. Meanwhile, both aircraft received and executed TCAS Resolution Advisories. The controller subsequently instructed IGO2113 to turn right to heading 270, after which standard separation was restored. There were no injuries to any occupants on either aircraft, and no damage was reported.

1.1.8 Further, During the interview, the crew of IGO 2113 stated that the MCDU setup was completed for Runway 29R, which was the expected runway for departure that day and completed the briefing. ATC clearance was subsequently received via datalink for Runway 27, and the AKRIB 6A departure was issued. The first officer accepted the clearance and noted it down on the flight plan. Subsequently, briefing was done by the crew again and speed was calculated and was updated by the PF and failed to update departure page. During this time, the PF was occupied with signing the technical logbook and flight release paperwork. Due to ongoing construction work at Delhi, the crew planned for a progressive taxi.

1.2. Injuries to Persons

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

1.3. Damage to Aircraft

Nil

1.4. Other Damage

Nil

1.5. Personnel Information

1.5.1. Crew Information – VT-IUO (IGO 2113)

	PIC	FO
Age	49	30
Licence	ATPL	CPL
Date of Issue	16/01/2012	06/05/2021
Valid up to	17/12/2025	05/05/2026
Category	A320, A321	A320, A321
Date of Class I Med. Exam	25/08/2023	04/09/2023
Class I Medical Vaid up to	02/09/2024	12/09/2024
Date of issue FRTOL License	21/08/2022	21/01/2020
FRTO License Valid up to	14/11/2054	20/01/2025
Endorsements as PIC	02/03/2017	NA
Total flying experience	10329: 47 Hrs	724: 39 Hrs
Total flying experience on type	6447:37 Hrs	419:47 Hrs
Total flying experience during last 1 year	682:59 Hrs	419:47 Hrs
Total flying experience during last 6 Months	356:53 Hrs	365:16 Hrs
Total flying experience during last 30 days	33.02 Hrs	61:56 Hrs
Total flying experience during last 07 Days	09:51 Hrs	10:16 Hrs
Total flying experience during last 24 Hours	00:00 Hrs	00:00 Hrs

Rest period before flight	15:25 Hrs	43:35 Hrs
Whether involved in Accident/Incident earlier	No	No
Date of latest Flight Checks and Ground Classes	ALRC-03/02/2023 REF-31/10/2023	ALRC-02/06/2023 REF-09/11/2023

Both the pilot and the co-pilot were adequately rested, and the crew had also previously operated a flight to Delhi.

1.5.2. Crew Information – VT-ISO (IGO 2206)

	PIC	FO
Age	44	30
License	ATPL	CPL
Date of Issue	12/11/2020	07/06/2021
Valid up to	11/11/2025	06/06/2026
Category	A320, A321	A320, A321
Date of Class I Med. Exam.	14/12/2022	05/10/2023
Class I Medical Vaid up to	25/12/2023	10/10/2024
Date of issue FRTOL License	12/03/2023	28/10/2020
FRTO License Valid up to	08/11/2040	27/10/2025
Endorsements as PIC	16/10/2019	NA
Total flying experience	14337:30 Hrs	550:23 Hrs
Total flying experience on type	2268:43 Hrs	248:25 Hrs
Total flying experience during last 1 year	797:15 Hrs	248:25 Hrs
Total flying experience during last 6 Months	392:42 Hrs	248:25 Hrs
Total flying experience during last 30 days	63:11 Hrs	44:27 Hrs
Total flying experience during last 07 Days	07:30 Hrs	02:59 Hrs
Total flying experience during last 24 Hours	07:30 Hrs	02:59 Hrs
Rest period before flight	15:30 Hrs	17:55 Hrs
Whether involved in Accident/Incident earlier	No	No
Date of latest Flight Checks and Ground Classes	ALRC-16/10/2023 REF-21/12/2022	ALRC-13/08/20 23 REF-20/11/2023

Both the pilot and the co-pilot were adequately rested, and the crew had also previously operated a flight to Delhi.

1.5.3. Air Traffic Controller

Age (Years)	39
Date of Issue & Validity of License	Issue: 24.10.2019, Validity: 15.12.2044
Station	IGI Airport, New Delhi
Endorsement in License	ADC, APP(Procedural + Surveillance)
Date of Medical Exam & Validity	07.12.2021, Validity: 21.06.2025
English Proficiency Level and Validity	FIVE, Validity: 15.12.2028
Last date of proficiency check	23.05.2023 – ADC 14.09.2023 -APP(Procedural+Surveillance)

The controller had adequate rest. As per APAD logbook entries, the controller took over the approach departure at 0640 UTC. On scrutiny of controller logbook, it was observed that the period of duty during the incident is not reflected in controller's logbook.

1.6. Aircraft Information

1.6.1. Indigo Flight IGO2113 (VT-IUO)

The aircraft was Airworthy. All pertinent documents/certificates for the aircraft's operation were valid as of the incident date. Some of the snags were carried forwarded under MEL prior to the incident flight and MEL was valid.

1.6.2. Indigo Flight IGO2206 (VT-ISO)

Aircraft was Airworthy and all pertinent documents/certificates for the aircraft's operation were valid as of the incident date. There was nil snag pending to the aircraft prior to the incident flight.

1.7. Meteorological Information

Weather for RWY 27 as per the METAR at Delhi at the time of incident was as follows:

Time (UTC)	Wind (deg/Kts)	Visibility (m)	RVR (m)	Temp (°C)	QNH (Hpa)	Weather	Cloud
06:00	360/02	1000	1500	26	1020	FU	NSC
06:30	Calm	1000	1900	26	1019	FU	NSC
07:00	040/02	1100	2000	26	1018	FU	NSC

1.8. Aids to Navigation

All navigational aids were available at Delhi airport and all navigation instruments on both the aircraft were reported to be serviceable.

1.9. Communications

At the time of incident both the aircraft were in contact with Delhi ATC on frequency 118.825 MHz. There was two-way communication between the aircraft and ATC. No abnormality was reported in any communication system.

Following is the salient transcript of ATC tape of communication between the aircraft (IGO2113 & IGO2206) with Delhi APAD on frequency 118.825 MHz.

Time HHMMSS	Unit	Transmissions
070109-070119	IGO2113	RADAR NAMASKAR IFLY TWO ONE ONE THREE CLIMBING PASSING ONE THOUSAND SIX HUNDRED
	RADAR	IFLY TWO ONE ONE THREE RADAR IDENTIFIED CLIMB TO FLIGHT LEVEL EIGHT ZERO
	IGO2113	CLIMB FLIGHT LEVEL EIGHT ZERO IFLY TWO ONE ONE THREE
070141 IGO 2113 observed turning left toward the takeoff path of RWY 29R (Refer Fig:01 of Annexture)		

070143 Breach of separation between IGO2113 and IGO2206 occurred and Automation System generated Current Conflict alert (in Red). (Refer Fig:02 of Annexture) **At this time controller was in contact with one Air India Aircraft.**		
070145- 070153	IGO2206	RADAR IFLY TWO TWO ZERO SIX GOOD AFTERNOON PASSING TWO THOUSAND CLIMBING FOUR THOUSAND ITBAN SIX CHARLIE
	RADAR	IFLY TWO TWO ZERO SIX IDENTIFIED CLIMB TO FOUR THOUSAND FEET
070158- 070159	RADAR	IFLY TWO ONE ONE THREE RADAR
070201- 070206	RADAR	IFLY TWO TWO ZERO SIX STOP CLIMB TWO THOUSAND SIX HUNDRED FEET
	IGO2206	STOP CLIMB TWO THOUSAND SIX HUNDRED I FLY TWO TWO ZERO SIX
070203 Automation System generated TRA Alert in the data block of IGO2113 and IGO2206 (Refer Fig:04 of Annexture)		
070206- 070208	RADAR	IFLY TWO ONE ONE THREE RADAR
070208- 070217	IGO2113	WE ARE TCAS RA IFLY TWO ONE ONE THREE
	RADAR	TURN RIGHT HEADING TWO SEVEN ZERO
	IGO2113	RIGHT HEADING TWO SEVEN ZERO IFLY TWO ONE ONE THREE
070222 current conflict alert disappeared. (Refer Fig:06 of Annexture)		
070227- 070231	RADAR	IFLY TWO ONE THREE EXPEDITE CLIMB
	IGO 2113	WHAT LEVEL YOU WANT
070305- 070310	IGO2113	SIR TCAS BY RA CAN, YOU PLEASE GIVE US THE TRAFFIC DETAILS SO THAT WE CAN REPORT
070311 TRA Alert disappeared in the Automation system. (Refer Fig:07 of Annexture)		
070312- 070334	IGO2113	IFLY TWO ONE ONE THREE SIR
	RADAR	WHAT SID YOU WERE FOLLOWING SIR
	IGO 2113	SIR WE HAVE EXPERIENCED TCAS RA CLIMBING PASSING FOUR THOUSAND THREE HUNDRED ON OUR CLIMB TO EIGHT HUNDRED EIGHT THOUSAND AND FOLLOWING HEADING TWO SEVEN ZERO.
	RADAR	IFLY TWO ONE ONE THREE STOP CLIMB FLIGHT LEVEL SEVEN ZERO
	IGO 2113	STOP CLIMB FLIGHT LEVEL SEVEN ZERO AND SIR WE REQUEST TRAFFIC INFORMATION WHICH CAUSED TCAS RA IFLY TWO ONE ONE THREE.
070336- 070345	IGO2206	SIR REQUESTING TRAFFIC INFORMATION THIS IS IFLY TWO TWO ZERO SIX, WE ALSO EXPERIENCED TCAS RA AND MAINTAING TWO THOUSAND SIX HUNDRED NOW.

	RADAR	STAND BY
070427-070433	RADAR	IFLY TWO TWO ZERO SIX CLIMB TO FLIGHT LEVEL SEVEN ZERO
	IGO2206	CLIMB LEVEL SEVEN ZERO IFLY TWO TWO ZERO SIX
070440-070455	RADAR	IFLY TWO ONE ONE THREE WHAT SID YOU WERE FOLLOWING
	IGO 2113	SIR WE WERE FOLLOWING AKRIB SIX ALPHA I FLY TWO ONE ONE THREE
	RADAR	CONFIRM AKRIB SIX ALPHA
	IGO2113	AFFIRM SIR AKRIB SIX ALPHA AS PER THE CLEARANCE FOR RUNWAY TWO SEVEN
	RADAR	WHY DID YOU TAKE A LEFT TURN SIR
070502-070507	RADAR	IFLY TWO ONE ONE THREE CLIMB TO FLIGHT LEVEL EIGHT ZERO
	IGO2113	CLIMB FLIGHT LEVEL EIGHT ZERO IFLY TWO ONE ONE THREE.

Later both IGO2113 and 2206 were provided with requested traffic information.

1.10. Aerodrome Information

Indira Gandhi International Airport is being operated and managed by Delhi International Airport Limited (DIAL). The airport co-ordinates are 28°34'07" N,77°06'44" E. Airport Elevation is 778 ft.

The air traffic services at IGI airport are provided by AAI which includes Aerodrome Control service (ADC/SMC), Approach Control service (APP), Area Control Service (ACC), Terminal Approach Radar (TAR) and Route Surveillance Radar Service (RSR).

At the time of serious incident, Three Runway Westerly mode i.e. 29 R (Departure), 29 L (Arrival), 27(Mixed) was in operation. RNAV1 SIDs are established for all runways.

As per AIP supplement 74/2023, the following are the westerly flow SID Scheme:

ATS Route	RWY 27	RWY 28	RWY29 R	RWY29L
W19/Q23	AKRIB 6A	AKRIB 6B	AKRIB 6C	AKRIB 6D

Further, RWY10/28 was temporarily closed for resurfacing works till 15.12.2023. All its associated taxiways were not available for operations except K6-H6 and TWY K2-H2 crossing. Additionally, Category 10 Rescue and Fire Fighting Services are available at Delhi Airport.

1.11. Flight Recorders

Both the aircraft were equipped with Flight Recorders i.e., Digital Flight Data Recorder (DFDR) and Cockpit Voice Recorder (CVR).

1.11.1. Cockpit Voice Recorder (CVR)

Both Aircraft received TCAS RA. However, only the CVR recording of IGO2113 was downloaded after the incident and CVR recording was not downloaded for IGO 2206. On further query, the AME informed that the crew of IGO 2206 neither reported the occurrence orally nor made the required entry in the flight record book with the reason, as mandated by company policy.

CVR recording of IGO2113 was available starting from the pushback clearance given to the aircraft. Scrutiny of CVR recording of IGO2113 revealed the following salient points: (The timing is CVR reference time)

Initially IGO2113 tried to contact clearance delivery but no response from clearance delivery. Subsequently IGO2113 enquired SMC Middle about delivery frequency. SMC Middle enquired IGO 2113 for its readiness for pushback as the IGO2113 flight plan was transferred to them. IGO2113 confirmed its readiness. Subsequently, IGO2113 was approved for pushback, and granted engine startup permission.

Crew carried out the cockpit preparation, before start and after start check list.

Time	CVR Readout
Between 00:02:34 and 00:04:47	It was heard that the crew conducted safety briefings and discussed Return/diversion considerations. However, the crew did not cover main items of the plan which includes SID details. subsequently took taxi clearance
During taxi to holding point RWY 27, it is observed that the crew was engaged in non-essential chatter.	
00:21:10	Take-off commenced and the aircraft was cleared to FL 080
00:22:28	It was heard as PIC saying, "You have controls, I have coms."
00:22:50	Traffic Traffic aural message was heard. TCAS, followed by "maintain vertical speed maintain" aural message was heard
00:23:11	An autopilot cavalry charge was heard on tape, followed by instructions to level off.
00:23:14	crew intimated radar that they had TCAS RA and subsequently they read back "Right Heading 270."
00:23:17	Clear of conflict was heard
00:23:49	crew discussed that this might be ATC problem
00:24:30	crew contacted ATC for traffic information.
00:24:40	It was heard as PIC saying that "the fault is ours, you know what has happened, last minute SID change
00:25:50	Crew told ATC, "We were following AKRIB 6A IFLY 2113, AKRIB 6A as per clearance for RWY 27."
00:26:20	It was heard as PIC saying that "When clearance was received, you at that time did not change". In response, the copilot responded that "Madam communicated". The PIC further commented that "We had enough time"
00:30:40	ATC gave traffic info to IFLY 2206 that traffic was IFLY 2113.
00:31:00	ATC gave traffic information to IFLY 2113 that IFLY 2206 departed from RWY 29L.

1.11.2. Digital Flight Data Recorder (DFDR)

DFDR data of both the aircraft were provided and the data of the incident flights were analyzed and used in the investigation to corroborate with the other available evidence in order to confirm the findings and other factors leading to the incident.

Time	FDR readout

07:00:43	IGO 2113 took off from RWY 27 and started climbing to FCU selected altitude of 8000 ft at time 07:01:19.
07:01:07	IGO 2206 took off from RWY29 R, starting its climb to FCU selected altitude of 4000 ft.
07:01:25	While passing altitude 1768 ft, the heading of IGO2113 began decreasing from 280 and the aircraft started to deviate from its assigned track
07:01:51	TA was triggered in both aircraft for 8 sec, and at that time IGO 2113 and IGO 2206 were passing through altitude of around 2340 ft and 1940 ft respectively During TA, IGO 2206 continued its climb and reached 2120 ft.
07:01:59	While IGO2113 was passing 2568 ft, RA was generated for 18 seconds and during RA, AP was disconnected, dual inputs were registered from both the side sticks and maximum ROC registered is 4461 FPM. At this time IGO 2206 was passing 2144 ft when RA triggered, there was decrease in its vertical speed to max (-) 544 FPM and descended to 2084 ft Then TA was triggered again for 8 seconds.
At 07:02:25	both aircraft were clear of conflict

1.12. Wreckage and Impact Information

Not relevant as there was no damage to either of the aircraft.

1.13. Medical and Pathological Information

The crew of both Flights IGO2113 and IGO2206 have undergone the preflight Breath analyzer check and found negative.

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

1.17.1. M/s Interglobe Aviation (Indigo)

M/s Indigo is a scheduled operator which is based in NCR region. Training facility of Indigo for flight crew is at Gurugram, Haryana. M/s Indigo has a fleet of Airbus A320 CEO, A320 NEO, A321 NEO and ATR-72 aircraft.

1.17.1.1. Operations Manual of M/s Indigo

- Para 2.1.2.9 of Operations Manual Part B lays down the procedure for Insertion of SID/STARS into MCDU flight plan as reproduced below:

  The primary Flight plan should be VOR-VOR till such time SID/STAR is received. Departure runway and expected arrival runway can be entered with a discontinuity initially. Optimum fuel planning cannot be cross-checked till a realistic route is programmed into the FMGS. Good Airmanship is to be exercised in this regard with the following objectives:

  i. Aircraft must not deviate from the airway unless a STAR is allocated, or ATC gives vectors.

  ii. Realistic fuel figures must be cross-checked with the help of FMGS.

  To summarize, the PF may insert the STAR for realistic route planning. But it must not leave the airway unless cleared for arrival via the STAR. For this reason, the pilot may leave a discontinuity at the transition point. Either of the two techniques is acceptable; Inserting STAR or not doing so, if 'Good Airmanship' is applied.

  In case of no SID, insert a 'PD'waypoint at 10 nm on out bound track from station VOR and retain the discontinuity.

- Para 2.1.2.10 of Operations Manual Part B, lays down the procedures regarding ATC clearance as reproduced below:

  It is preparable to have both pilots seated in their seats when ATC clearance is obtained from delivery. However, if this is not possible, clearance may be obtained by one pilot (PF). In this case, it is to ensure that the instructions are written down clearly in the space provided in the CFP, readback and confirmed by ATC.

  PIC has the option to request an alternate clearance if any clearance is not acceptable to him due to any technical or operational restriction. An alternate clearance could entail a delay due to existing air traffic.

  Data Link Clearance (DLC) is not required to be readback. It must be discussed with the other pilot when he is available in the cockpit to ensure that both pilots understand the clearance instructions.

- Para 34.8.4.1 of operations manual Part A lays down the procedures regarding occurrences requiring CVR downloading:

  Occurrences requiring CVR downloading, The PIC must make an entry in the flight record book with reason. This will enable the AME to take the necessary action to download the CVR. In the case of the Accident /serious incidents CVR shall be removed from the earliest opportunity.

  CVR shall be removed in case of the following incidents, among others, as per DGCA CAR Sec 5 Series C Part 1:

  - ❖ Unintentional deviation from the intended track or attitude, caused by a procedural error, systems or equipment defect
  - ❖ The separation between the aircraft was less than prescribed for the situation

1.17.1.2. Flight crew techniques manual (FCTM) of M/s Indigo

- FCTM of M/s Indigo on Sterile Cockpit Rule states below:

  When the aircraft is below 10 000 ft, any conversation that is not essential should be avoided: This includes conversations that take place in the cockpit, or between the flight crew and cabin crew.

  It is important to adhere to this policy, in order to facilitate communication between both of the flight crew, and to ensure the effective communication of emergency or safety-related information, between flight and cabin crew members.

- FCTM of M/s Indigo on FMGS cross check states below

  When the PF finishes the FMGS preparation, the PM must check the PF's entries. The PM performs this check via a check of the different FMGS pages, in the same order as the FMGS preparation. By checking the setup, the PM should achieve the same mental image as the PF of the intended departure procedure, trajectory, and constraints. The PM should check with the PF if anything is not clear.

- FCTM of M/s Indigo on Departure briefing states below

  In order for both crew members to share the same mental image, the following structure and minimum items are described for the departure briefing:

Step	PF	PM
1	Cockpit door closed - Set an environment with no distraction	
2 a		Plan * - T.O RWY (Intersection) - SID designator - First cleared altitude - MSA/MORA for climb trajectory - Extra fuel and time
2 b	Plan * - Hotspots of planned taxi route - Stop margin for RTO - EOSID - Return/diversion considerations - Special operation - Non-standard operation	
3 a		Identified THREATS
3 b	Identified THREATS	
4	MITIGATIONS	
5	MISCELLANEOUS	

*The PM should start to brief the main items of the PLAN. This ensures that both pilots share the same mental image of the flight trajectory after the FMS preparation (by PF) and check

(by PM) according to SOP. Then, the PF briefs the hotspots of potential taxi-routes if any, and considers at least the following items:

- Consideration for RTO (stop margin if available)

- The EOSID/Engine-out trajectory

- The considerations for a return landing or diversion if so required (weather/weight).

The PF recalls any Special Operations or Supplementary procedures to be applied. Briefing the PLAN should normally only be a high-level description. It should normally not be a repetition of the detailed setting and checking of the flight trajectory in the FMS performed in the respective SOP items.

1.17.1.3. Flight Safety Manual of M/s Indigo

Para 4.5 of FSM on Investigation of incidents states that Significant Occurrences shall be internally investigated by Flight safety with participation of stakeholders from relevant departments. Post internal investigation, minutes of meeting will be shared by Flight safety team stating findings/recommendations and also request for the evidence of action taken by the respective departments.

Further, PIB Incidents shall further be investigated by the Permanent Investigation Board in association with Regional Air Safety Office, DGCA.

1.17.1.4. Safety Management System manual of M/s Indigo

Para 8.2.2. of SMS manual states that all incident reports and mandatory reporting will be used for hazard identification as part of reactive hazard identification process. Further, M/s Indigo safety risk assessment and mitigation program to ensure:

Hazards are analyzed to determine corresponding safety risks to aircraft operations.

- Safety risks are assessed to determine the requirement for risk mitigation actions.
- When required, risk mitigation actions are developed and implemented in operations.

1.17.1.5. Flight Crew Operating Manual (FCOM) of M/S Indigo

The manual describes the Standard Operating Procedures of Cockpit Preparation and states that FMS preparation must be completed by Pilot Flying (PF) and cross-checked by the Pilot Monitoring (PM).

1.17.2. Airports Authority of India (AAI)

The Air Traffic Services at Delhi are being provided by Airports Authority of India (AAI). AAI was constituted to provide Air Traffic Services over entire Indian Air Space which comprises of providing air traffic control service, advisory service, flight information service, alerting service, etc. It is entrusted with the responsibility of creating, upgrading, maintaining and managing civil aviation infrastructure both on the ground and air space in the country. It is governed by a board of directors, consisting of whole-time members, as well as part-time members, appointed by the Government of India.

1.17.2.1. Manual of Air Traffic Services Part II (MATS II)

MATS II of Delhi Airport describes the procedure on Short Term Conflict Alert (STCA) as follows:

AAI employed the Indira ATM Automation System Safety Net Processor (SNET) that generates short-term conflict alert to the controllers. The objective of the STCA is to facilitate the controllers to ensure standard separation between controlled flights by generating, in a timely manner, an alert of potential infringement of separation minima and on actual infringement of the standard separation minima.

The alerts are of two types depending on the current separation between the tracks:

a) Prediction

b) Violation

The Prediction alert is generated 90 (the current VSP) seconds prior to the predicted breach of standard separation (with respect to current speed/heading/rate of climb/descend of both the tracks). In the event the standard separation minima is actually infringed the Prediction alert gets converted to Violation alert.

Further, The STCA list presents all the pairs of tracks, related to the sector, that are in STCA alert status i.e. either in prediction (YELLOW) or violation status (RED). The list is automatically generated and displayed when the system detects that there are tracks in STCA conflict. The list includes the minimum predicted distance (MDIS) between aircraft in conflict, the current distance (CDIS) between them and for STCA in prediction status, the predicted time to become an actual violation.

Further, procedures to be followed when STCA is generated as follows

1. Press ACK button in ST conflict silences the audible alarm. This acknowledgement signifies that appropriate action has been/will be taken.
2. In the event an STCA is generated in respect of controlled flights, the controller shall give undivided attention to the effected aircraft and without delay take action to ensure that the applicable separation minimum will not be infringed.
3. Further when STCA is displayed, the controller should evaluate the reason for delay and take appropriate action.
4. He/she should recheck the clearance issued, which shall conform to the standard separation minima and ensure terrain clearance. He/she should also crosscheck with the pilot that he/she has received the clearance correctly.
5. If the STCA is received with respect to an aircraft working with adjacent sector controller, then he/she should initiate coordination to ensure an effective course of action.
6. All STCAs shall be reported to the Ops SUP on duty.
7. Following the generation of an STCA, a controller should be required to complete an air traffic incident report only in the event that a separation minimum was infringed.

Further, upon reviewing the incident records from August 2023 to November 2023, AAI reported only one SID deviation (out of six reportable occurrences) to the DGCA. The other 05 occurrences, including one on 07.10.2023 wherein one aircraft had to be given an avoidance instruction by ATC, were not reported to DGCA.

However, these occurrences were communicated to the airline by AAI, and the STCA issue was also discussed with the scheduled airlines during the Flight Operations Performance Working Committee meeting held in 13.12.2023.

1.17.2.2. Unwarranted STCA Warnings

Automation system generates STCA alerts that do not reflect an actual risk of collision, often due to the system misinterpreting the radar data or the complex geometries of parallel runway operations.

1.17.2.3. Controller Statement on STCA Warnings

On query to the controller, it was informed by him that during simultaneous departures, the alert usually comes as the distance between both runways is less than 3 miles.

On replay of random recordings, it was observed that during simultaneous departures, the unwarranted STCA was generated. Such unwarranted alerts were taken into account considering the possibility of rejecting the warranted alerts by controllers among these unwarranted alerts.

1.17.2.4. AAI response on STCA Warnings

On query to AAI on unwarranted STCA warning, the following was submitted:

The simultaneous departure procedures from the runway pair 27 and 29 and the pair 28 and 29 have been in existence at IGI Airport for more than a decade.

The ATM automation system has functionality to suppress short-term conflict alerts in certain volumes of airspace wherein there will not be any short-term conflict alert in such volume. Further, such suppressed volume cannot be reactivated in case of any requirement via online basis i.e. for activation/deactivation of short-term conflict alert in such airspace volume one needs to restart the automation system. This in turn is a complex and complicated process and it is normally recommended in a lean traffic environment. It is possible to define a volume of airspace in the takeoff path Runway 27 and Runway 29 R such that no unjustified alerts due to simultaneous departures from Runway 27 and Runway 29 R are generated. Activation of such suppressed volume wherein short-term conflict alert has been deactivated will have following consequences. Firstly, in the situation of any deviation from the stipulated SIDs in the suppressed volume of airspace, no short-term conflict alert will be generated i.e. Justified (warranted) short-term conflict alert in such suppressed volume will also get suppressed. Secondly, when the mode of operation will change to easterly mode, there will not be any warning generated between arrivals on Runway 09/10 and 11L/11R in such a suppressed area i.e. again Justified (warranted) short term conflict alert in such suppressed volume will also get suppressed.

AAI also had Informal discussions with OEM M/s Indra engineers at the time of installation of the system to explore the possibilities of inhibiting the STCA between some flights without affecting other flights by creating some STCA inhibition areas around the airport, since the issue of STCA between simultaneous departures was also prevalent in the earlier AutoTrac-3 system of M/s Raytheon. However, the solution for the same could not be found according to the system capabilities regarding the generation and inhibition rules of STCA. Furthermore, given the sensitivity and significance of the STCA tool in ATC operations, no experiments were conducted after that.

Further, it is not clear whether AAI carried out any safety assessment, as no safety assessment documents related to simultaneous departures were submitted by AAI.

Subsequent to the incident, OEM was contacted regarding the unwarranted STCA warning to determine if they could assist with its resolution. OEM replied and the solution to issue is currently under deliberation, as a similar problem of unwarranted STCA generation is also being encountered for arrivals.

1.17.2.5. Manual of Air Traffic Services Part I (MATS I)

MATS I describe the action of controller in case RA in Para 15.7.3.2 is reported by Pilot as follows:

"When a pilot reports an ACAS Resolution Advisory (RA), the controller shall not attempt to modify the aircraft flight path until the pilot reports "CLEAR OF CONFLICT"."

1.18. Additional Information

1.18.1. Flight plan of IGO 2113

```
RECEIVED FPL/17-11-23 04:36:32
 IHX3471 170436
FF VIDPINDR VIDPZPZX VIDPZRZX VIDPZTZX
170436 CYYZXNSP
(FPL-IGO2113-IS
-A21N/M-SDFGE1HIRWYZ/LB1
-VIDP0640
-N0449F330 Q23 AKRIB Z16 BULDI Q23 PEDMA/N0454F320 W27
-VOHS0148 VOBL
-PBN/A1B1C1D1O2S1S2 NAV/TCAS II EQUIPPED RNP2 CONTINENTAL
 DOF/231117 REG/VTIUO
 EET/VABF0031 VOMF0114
 SEL/EQCM CODE/8013D4 PER/C RMK/RT DESIGNATOR IFLY)
```

The Flight Plan above has been filed by IGO2113. It was received on 17/11/2023. It gives following information-

The flight is IFR, Scheduled from IGI, Delhi airport to RGIA airport, Hyderabad at Flight level 330. Alternate aerodrome filed is KIA, Bangaluru. Route filed to be followed is via Q23, AKRIB, Z16, BULDI, Q23, PEDMA and W27.

1.18.2. DCL clearance of IGO 2113

```
PENDING/EVENT/17-11-23 05:35:00

SEGMENT (1) PENDING

DCL ACTION/17-11-23 06:30:30
RCD REQUEST VTIUO  /237  /R/33000

EFS_NOTIFY/FDD24/17-11-23 06:30:35
ASSR:0517

SEGMENT (1) NOTIFIED
DEP RWY: 27
SID: AKRIB6A

EFS ACTION/FDD24/17-11-23 06:33:59
EFS_SID_HEADING_LEVEL:AKRIB6A/F070


EFS ACTION/FDD24/17-11-23 06:34:01
DCL CLEARANCE_REQ/27//0517//R/33000

DCL ACTION/17-11-23 06:36:53
CDA
```

Above is the Clearance delivery report (CLD) which is as follows:

Clearance was requested by IGO2113 at time 063035 Hrs. At time 063359 Hrs clearance was transmitted "AKRIB 6A /Flight Level 70" (Refer Fig:8 of Annexure). The same was acknowledged by aircraft at time 063653 Hrs.

1.18.3. Similar incidents

A detailed examination of the occurrence data provided by AAI indicated that six previous SID-deviation events involving M/s Indigo aircraft had occurred within a four-month period from August 2023 to November 2023, preceding the serious incident under investigation. The following five of these six deviations took place at Delhi.

S.No.	Date	Call Sign	Reg	Dep RWY	Dest	Assigned SID	Turn after Dep
1	07/08/2023	IGO2403	VT-IMS	28	VOBL	AKRIB6B	Left
2	26/09/2023	IGO6713	VT-ILV	27	VASD	AKRIB6A	Left
3	07/10/2023	IGO6238	VT-IUJ	27	VOMM	AKRIB6A	Left
4	06/11/2023	IGO2206	VT-IPJ	29R	VERP	ITBAN6C	Right
5	11/11/2023	IGO6091	VT-IPH	27	VOCI	AKRIB6A	Left

Further, scrutiny of the occurrence and safety reports of Indigo, along with the technical logbooks for the involved aircraft, showed that no PDR entries were recorded for any of the above SID deviations.

Review of the available records indicates that the occurrences listed at S. Nos. 1, 4, and 5 were investigated by the operator's Permanent Investigation Board (PIB). It was further observed that two events i.e VT-ILV on 26.09.2023 and VT-IUJ on 07.10.2023, were not reported by the operating flight crews to the airline. These occurrences were subsequently brought to the operator's attention through an email from AAI dated 08.10.2023. While the operator initiated action for VT-IUV on 22.11.2023 following the serious incident and counselled the crew members concerned, no action was taken with respect to the SID deviation involving VT-ILV on 26.09.2023. Further, neither of these two incidents was reported by M/s IndiGo to DGCA or AAIB.

AAI had previously reported another similar event to the operator on 05.11.2022. No action was recorded in relation to this event as well.

It was further observed that AAI had notified M/s IndiGo of all six events from 2023 that occurred in Delhi; however, none of these events were reported by AAI to DGCA or AAIB.

As per the operator's hazard register, the relevant hazard was identified and entered on 21.12.2023. By that date, three additional similar events had occurred. Between August 2023 and December 2023, a total of nine similar SID-deviation events were recorded, six of which occurred within a period of 41 days.

Subsequently, the operator conducted a safety risk assessment and classified the risk as 3C (occasional and major). The following mitigation measures were then implemented:

1. Revision of company policy in the operations manual regarding SID insertion, procedures for obtaining ATC clearance via RT/DCL, and the management of interruptions during the pre-departure phase to provide clearer guidance.
2. Initiation of a promotional campaign to highlight the revised SOPs, along with the issuance of an advisory on interruptions and distractions to AOCS, Engineering, and IFS, outlining the associated flight operations policy changes.
3. Instructions to training personnel to emphasize the importance of completing aircraft set-up prior to briefing, ensuring correct data entry, and performing thorough cross-checks during the pre-departure phase as part of training activities.

1.18.4. DGCA CAR requirements on mandatory occurrence reporting

The DGCA CAR Section 5 Series C Part I, Appendix A contains list of mandatory reportable occurrences, which include the following:

- Unintentional significant deviation from air speed, intended track, or altitude.
- ACAS/TCAS RAs.
- Infringement of separation minima.

1.19. Useful or effective Investigation Techniques

Nil

2. Analysis

The analysis was carried out based on the available evidence such as Crew & Controllers Statements, ATC Tape, DFDR data, CVR data RADAR display etc.

2.1. General

Both the aircraft were having valid C of R, C of A and all other relevant certificates were valid at the time of incident. All concerned Airworthiness Directives, mandatory Service Bulletins, and DGCA Mandatory Modifications on both the aircraft and its engines were complied with as on date of event.

The crew of both the aircraft had valid licenses and fulfilled all other requirements to operate the flight. Their medical and all trainings were current as on date of occurrence. The crew of both the aircraft were paired for the first time to operate the flight. However, they both have operated to Delhi before.

The ATC controller was having valid license and was qualified to operate RT on Delhi approach Surveillance Control as on date of incident.

2.1.1. The weather at the time of the incident was fine and did not contribute to the occurrence.

2.2. Human factors and Adherence to Standard Operating Procedures

2.2.1. Crew of IGO 2113

The Aircraft VT-IUO was scheduled to operate the flight IGO2113 sector from Delhi to Hyderabad. During Cockpit preparation, the crew did the initial setup, and SID was entered anticipating RWY 29R for takeoff without obtaining delivery clearance in contravention to the company FCOM which states that the primary Flight Plan should be VOR-VOR until SID is received.

Subsequently, the delivery clearance "RWY 27 SID AKRIB 6A heading level F070" was received via ACAIRS and acknowledged by the FO. Following this, only the performance page was updated in FMGS after calculations and the PF did not update the Runway and SID information. Additionally, PM did not verify the FMGS entries, contrary to the standard procedures specified in the FCOM.

During the crew interview, it was also noted that there were a few interruptions during the cockpit preparation, which may have led to distractions and breaks in workflow during the MCDU setup.

Further, the crew received pushback approval and given progressive taxi clearance to RWY 27 and the error went unnoticed. It was also noticed that the crew engaged in non-essential conversation in the sterile environment as per company policy amidst the heightened workload resulting from infrastructure upgrades at Delhi.

Upon reaching RWY 27, the aircraft received line up clearance and subsequently received takeoff clearance. The aircraft took off from runway 27. Upon reaching an altitude of 1768 feet, the aircraft started to turn left. The crew did not monitor the heading. At this time, control changed to the FO. After 25 seconds, TA was triggered for approximately 8 seconds, followed by an RA for 18 seconds, and then TA for approximately 8 seconds. During the RA, AP was disconnected, and dual inputs were registered from both side sticks twice. And then, the crew took corrective action, and the aircraft was clear of conflict. There was no handover/take over call made. Also, Crew did not identify the Wrong SID till TCAS RA.

Further, CVR readout confirms that a safety briefing was conducted; however, the crew did not cover the SID details, which were part of the minimum items to be discussed during the briefing and the PIC informing the FO that he had not updated the SID in the FMS suggests that the briefing was conducted without proper verification, and that the PIC had assumed that FO had updated the SID as per the clearance.

From the above, it is evident that the crew did not adhere to the SOPs properly. The flight crew neither updated the correct SID information in the FMGC nor performed an adequate cross-check of the entered data. Additionally, the deviation in heading after takeoff was not effectively monitored.

2.2.2. ATCO

At the time of incident, three Runway Westerly mode was in operation. IGO2113 took off normally and established contact with APAD at 070109 Hrs who gave it climb to F80. Later, IGO2113 started turning towards take off path of RWY 29R at 070141 Hrs, instead of following SID AKRIB 6A which requires right turn after the take-off.

At the same time, IGO2206 departed from RWY 29R following SID ITBAN 6C climbing to 4000 feet and in the meantime, Breach of separation between IGO2113 and IGO2206 occurred, and Automation System generated Conflict alert at 070143 Hrs and IGO 2206 came into contact of APAD at 070146 Hrs. APAD Controller instructed IGO2206 to climb to 4000 Feet at 070153 Hrs.

APAD Controller gave a call to IGO2113 at 070158 Hrs but aircraft IGO2113 didn't respond. Then APAD Controller instructed IGO2206 to stop climbing 2600 Feet which was read back by IGO2206 and Automation System generated TCAS-RA Alert in the data block of IGO2113 and IGO2206 at 070203 UTC. APAD Controller again gave a call to IGO2113 to which IGO2113 responded getting TCAS-RA. APAD Controller then instructed IGO2113 to turn Right HDG 270. Subsequently, Standard separation was restored at 070220 UTC. Conflict Alert disappeared at 070221 UTC and TRA Alert disappeared at 070311 UTC.

From the above, the controller promptly acted on the STCA and averted the conflict by stopping the climb of IGO 2206. However, he did give instructions to IGO 2113 when the aircraft was in RA, during which the controller should not attempt to modify the aircraft's flight path until the pilot reports clear of conflict.

On further scrutiny of the controller's ALB, it was observed that the duty period during the incident was not recorded, although it was correctly recorded in the unit logbook. While this did not directly contribute to or cause the incident, AAI may take suitable action to prevent such lapses.

2.3. Operator's Safety Assurance

The operator, M/s Indigo, had a policy in place stating that all incident reports and mandatory reporting were to be utilized for hazard identification as part of the reactive hazard identification process and for investigating significant events.

However, the pattern of sudden SID incidents was not adequately recognized, despite its severity warranting attention. Further, the operator did not act promptly to an incident notification received from AAI and proactive measures were not evident prior to this serious incident, and in two instances, no corrective action has been taken by the operator.

SRA was carried out subsequently and corrective action was done as recommended.

Additionally, as per company policy, occurrences requiring Cockpit Voice Recorder downloading must be recorded by the Pilot-in-Command in the flight record book along with the reason. However, the crew involved in the similar SID incidents failed to make the required entry, resulting in the non-availability of CVR data for investigation, including for this serious incident in which the crew of IGO 2206 did not specify requirement of CVR download in the FRB.

Moreover, both the airline operator and the crew failed to notify DGCA and AAIB of the occurrences on two separate occasions.

From the above, it is evident that the operator did not take adequate proactive measures to address repeated Standard Instrument Departure deviation incidents. The associated hazards were not identified in a timely manner, which could have prevented recurrence. Moreover, in some instances, the operator did not take any action on the safety reports, and these SID deviations occurrences were not reported to the DGCA and AAIB, indicating shortcomings in the occurrence reporting system. Additionally, the flight crew did not document the requirement to preserve the Cockpit Voice Recorder data in the Flight Report Book, leading to the loss of critical audio recordings that were essential for the investigation

2.4. Effectiveness of Ground based safety net

STCA is intended to provide timely alerts to air traffic controllers regarding an increased risk to flight safety. In this case, an STCA red alert was generated approximately 12 seconds after the aircraft deviated from its intended track. The controller acted on the alert and successfully prevented a conflict.

During the investigation, it was observed that unwarranted STCA alerts were frequently triggered because the distance between the two runways is less than 3 miles. This phenomenon was already known to the ATCO. However, no formal safety risk assessment was conducted.

On further enquiry, it was noted that disabling the STCA between two departures or suppressing the STCA in the area are not viable options, as such actions would also lead to the suppression of genuine STCA warnings or violations.

Therefore, the OEM was contacted regarding the false STCA alerts and possible additional measures, considering the critical timing between the two runway SID tracks. The solution is currently under deliberation, as a similar STCA alert issue is also being encountered for arrivals.

Further, it is observed that following the generation of an STCA alert, controllers are required to complete an air traffic incident report only if a separation minimum was infringed. Non-justified alerts are generally ignored. However, a few of the STCA occurrences where there was a conflict and another aircraft had to be given an avoidance instruction, were not reported to DGCA/ AAIB. However, these occurrences were brought to the attention of the airline operator.

From the above, it is evident that safety net is generally effective. However, frequent unjustified alerts require attention and additional measures also required to be introduced to alert the controller considering the criticality of alert and the proximity of the two runway SID tracks.

3. Conclusion

3.1. Findings

3.1.1 Both the aircraft were having valid C of R, C of A and all other relevant certificates were valid at the time of incident.

3.1.2 The crew of both the aircraft had valid licenses and fulfilled all other requirements to operate the flight.

3.1.3 The ATC controller was having valid license and was qualified as on date of the incident.

3.1.4 The weather at the time of the incident was above the visibility minima.

3.1.5 No abnormality was reported in any communication system.

3.1.6 Crew of IGO 2113 did not adhere to SOP and SID was entered anticipating RWY 29R for takeoff without obtaining delivery clearance.

3.1.7 PF did not update the RWY and SID information for Rwy 27 on FMGS after the crew received delivery clearance.

3.1.8 PM of IGO2113 did not cross check the FMGS data entries.

3.1.9 IGO2113 crew did not verify the SID information's during TPC briefing.

3.1.10 Crew did not take measures to avoid disturbance during cockpit preparation.

3.1.11 Sterile cockpit was not maintained during taxi by the IGO2113 crew.

3.1.12 IGO 2113 Crew did not monitor the heading deviation after the take-off.

3.1.13 There was no hand over/take over call made by the IGO 2113 crew during RA maneuver.

3.1.14 The ATCO did not record the period of duty during the incident in his logbook.

3.1.15 CVR recording of IGO2206 was not downloaded due to non-reporting of the incident by PIC. Similar occurrences of non-reporting of CVR data download were observed in other SID deviation involving different flight crew.

3.1.16 As part of SMS, M/s Indigo did not take adequate proactive measures to address repeated Standard Instrument Departure (SID) deviation incidents.

3.1.17 No corrective action was taken by M/s Indigo on some safety reports received from AAI.

3.1.18 In some instances, SID deviation occurrences were not reported to the DGCA or AAIB by M/s IndiGo and AAI, as required under the applicable provisions.

3.1.19 The controller responded promptly to the Short-Term Conflict Alert and averted the conflict by instructing IGO 2206 to stop climbing.

3.1.20 The controller gave instructions to IGO 2113 during RA maneuver.

3.1.21 The Ground safety net was effective. However, Frequent unjustified STCA alerts have been generated by the System require attention and no safety assessment had been carried out in this regard prior to this serious incident.

3.2. Probable cause of the incident

The serious incident was caused due to the following:

- Non-adherence to Standard Operating Procedures (SOP) by the flight crew of IGO2113 during cockpit preparation and failure to update the SID when it was provided.
- Inadequate measures taken to minimize disturbances during cockpit preparation
- Failure to cross-verify the SID information during the TPC briefing.
- Lack of monitoring during the climb

3.3. Contributory factor of the incident

Despite repeated SID-related occurrences, the company did not take any corrective action. Timely action could have prevented the incident.

4. Safety Recommendations

4.1 In view of finding 3.1.18, It is recommended that DGCA should reiterate the CAR to all operators and ANSPs to ensure compliance of prompt reporting of mandatory occurrences without fail.

4.2 In view of findings 3.1.16 and 3.1.21, It is recommended that DGCA may carry out a one-time inspection to assess the effectiveness of Safety Management System of all the scheduled operators and ANSP.

4.3 In view of finding 3.1.15, It is recommended that DGCA should take appropriate measures to reiterate that flight data recorders and cockpit voice recorders are downloaded and made available after an incident for investigation purposes.

4.4 In view of findings 3.1.6, 3.1.7, 3.1.8, 3.1.9 and 3.1.10, it is recommended that M/s Indigo should reiterate the importance of completing aircraft set-up before conducting briefings, ensuring correct FMGS entry, avoiding disturbances during cockpit preparation and carrying out comprehensive cross-checks during training activities. The corrective action in this regard has already been addressed by M/s Indigo. The same may be verified by DGCA during the surveillance audit.

4.5 In view of findings 3.1.11 and 3.1.13, it is recommended that M/s Indigo should reiterate to all its flight crew members the importance of handover and takeover callouts, and of maintaining a sterile cockpit during critical phases of flight.

4.6 In view of finding 3.1.21, it is recommended that AAI may conduct a study on unjustified STCA alerts and on other ANSPs conducting high-intensity simultaneous parallel departures, in order to identify possible shortcomings in airspace design and ATC

procedures, monitor overall safety levels, and mitigate associated risks. The same may be monitored by DGCA.

4.7 In view of finding 3.1.20, it is recommended that AAI may issue an advisory circular to reemphasize that controllers should refrain from attempting to modify an aircraft's flight path when the aircraft is in RA.

4.8 In view of finding 3.1.14, AAI may issue an advisory circular to ensure that controllers properly log their duty periods in their individual ALB.

Annexture

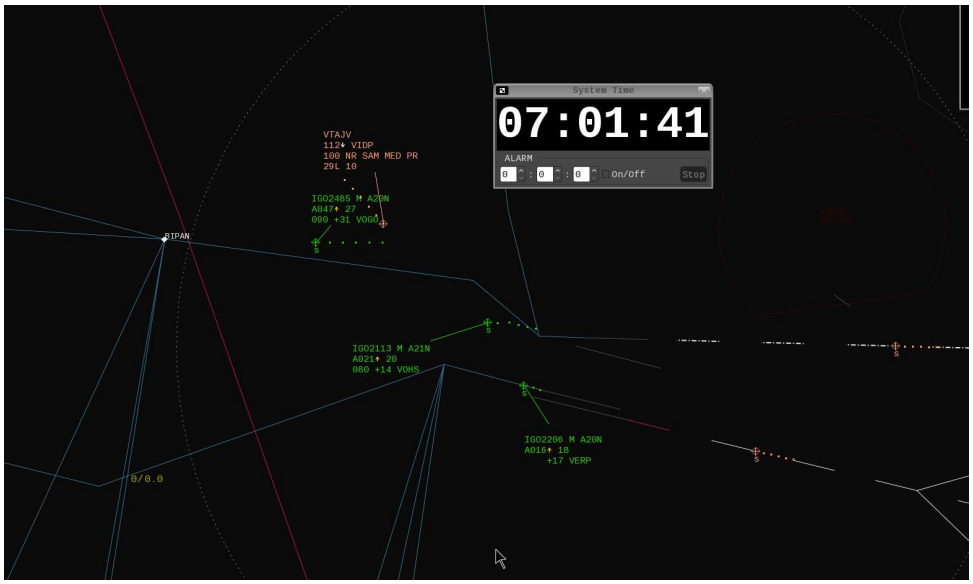

Figure 1 IGO2113 and IGO2206 airborne, with IGO2113 turning left

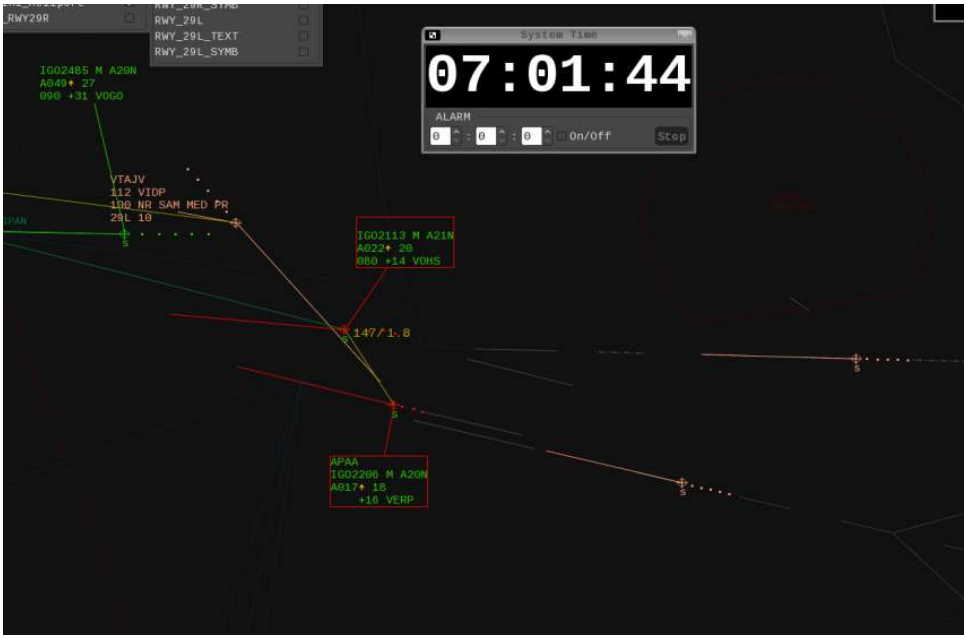

Figure 2 Generation of Current Conflict

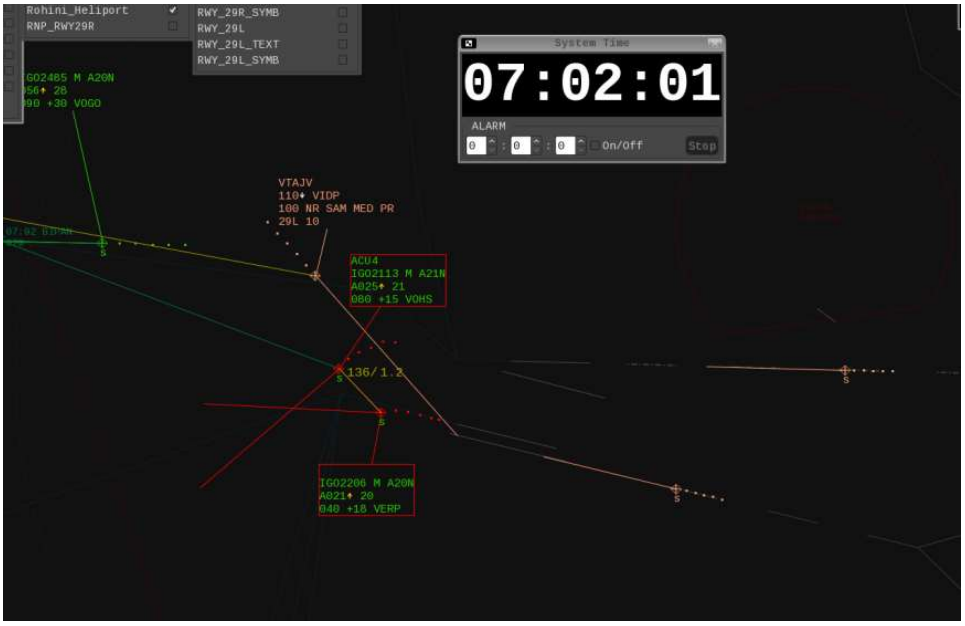

Figure 3 Minimum vertical separation 400 feet at lateral separation of 1.2 NM

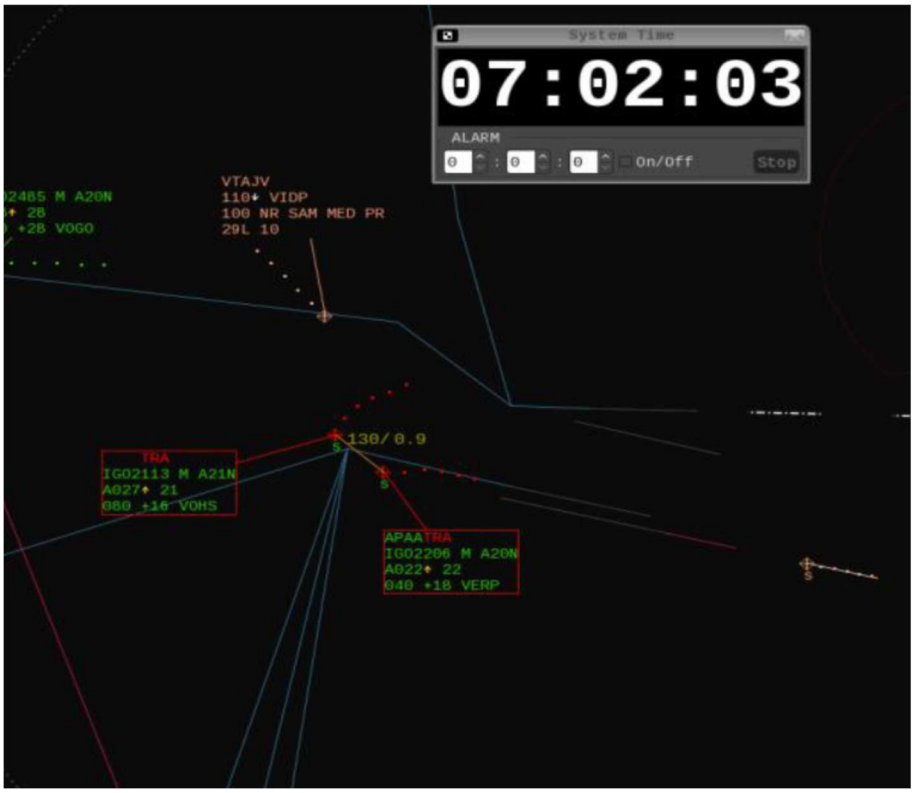

Figure 4 TRA Alert

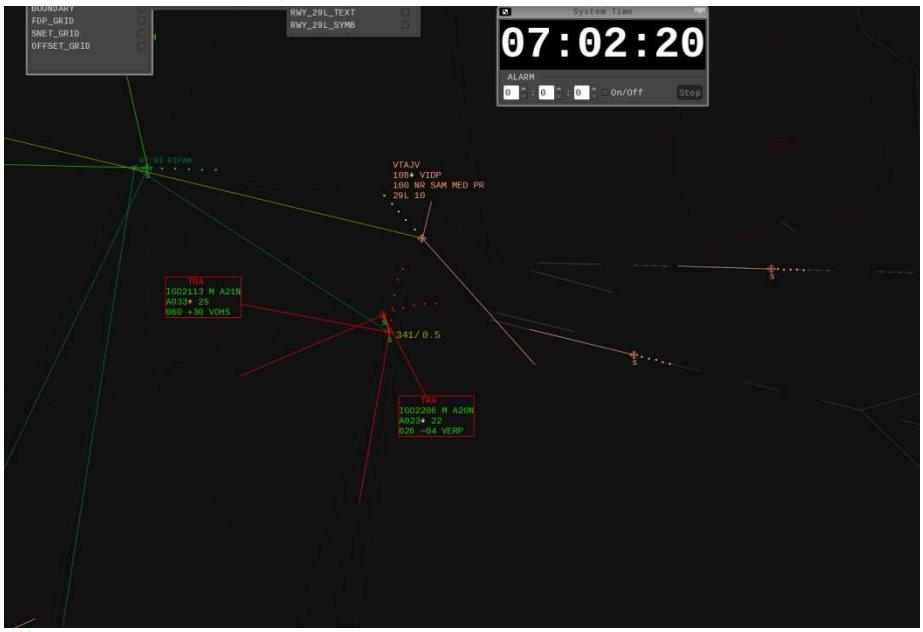

Figure 5 Vertical separation restored to 1000 feet

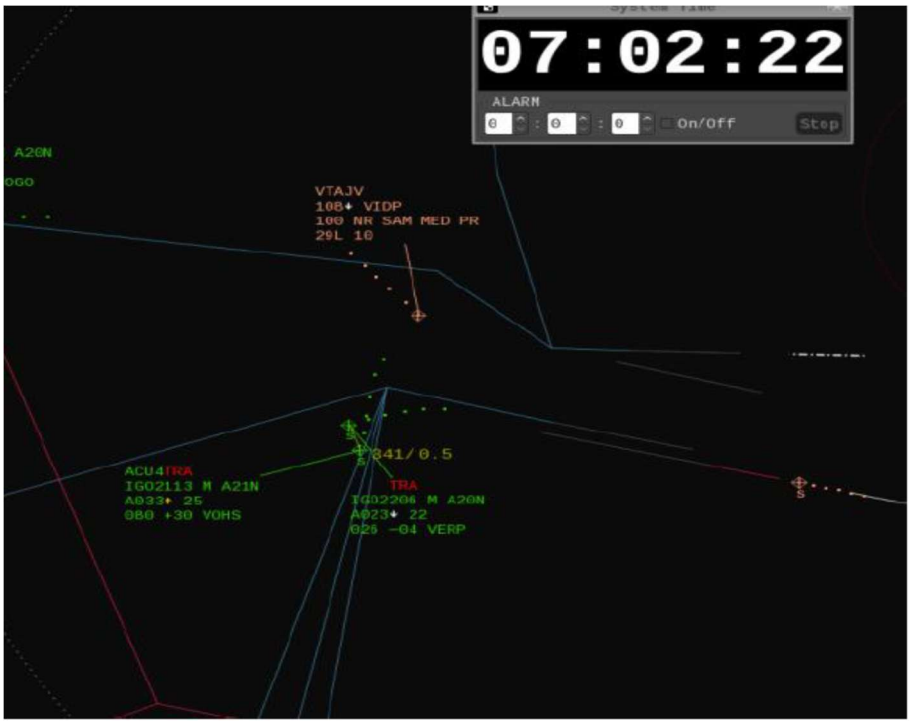

Figure 6 Disappearance of Current conflict alert

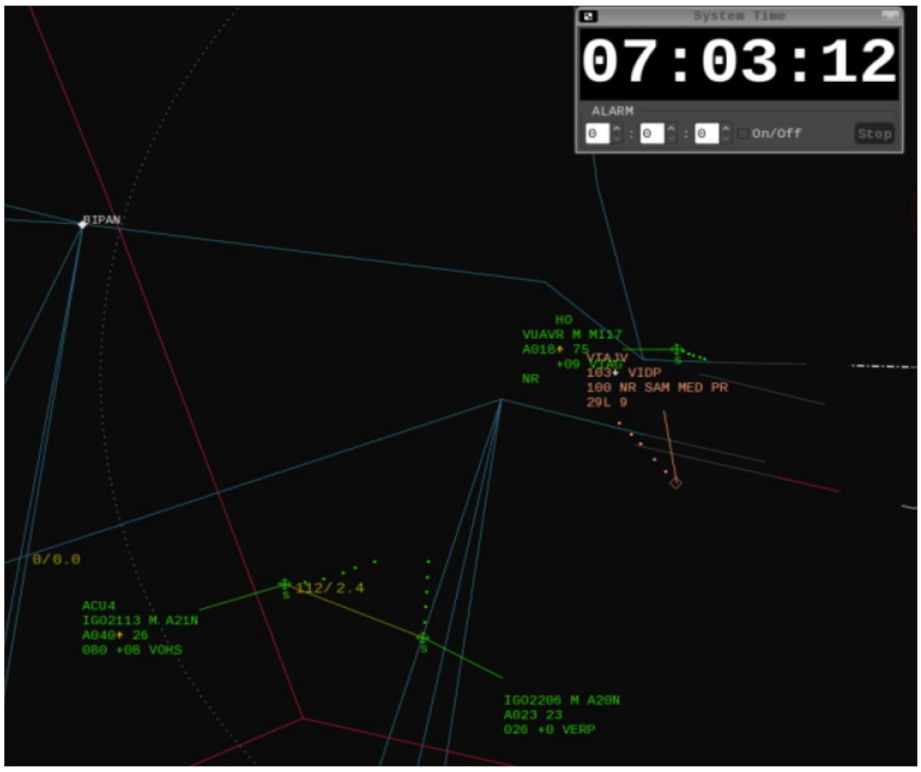

Figure 7 Disappearance of TRA Alert

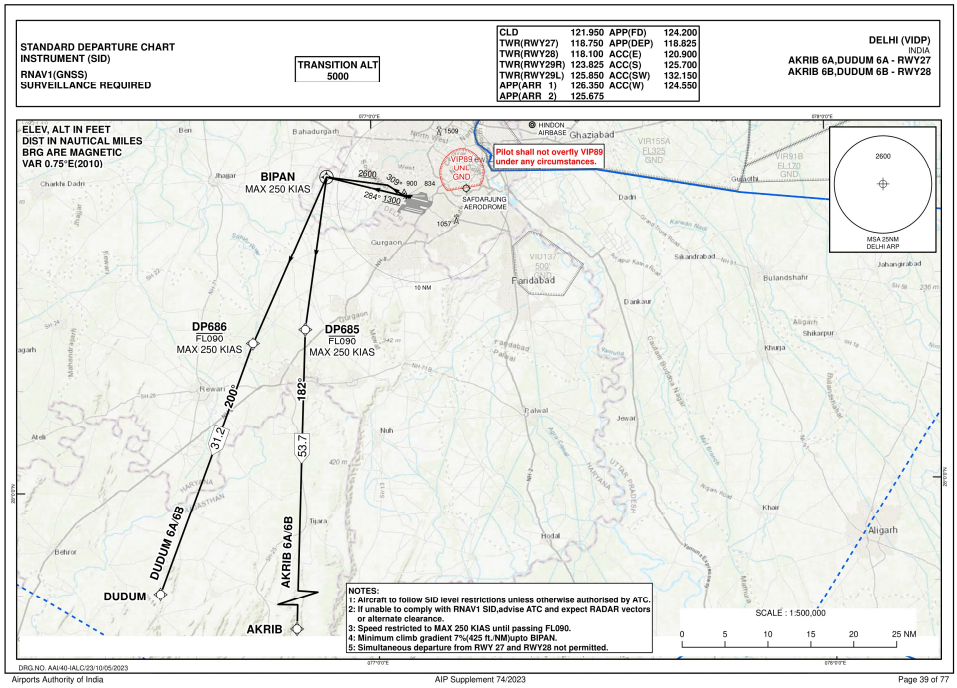

Figure 8 SID AKRIB 6A RWY27 given to IGO2113)

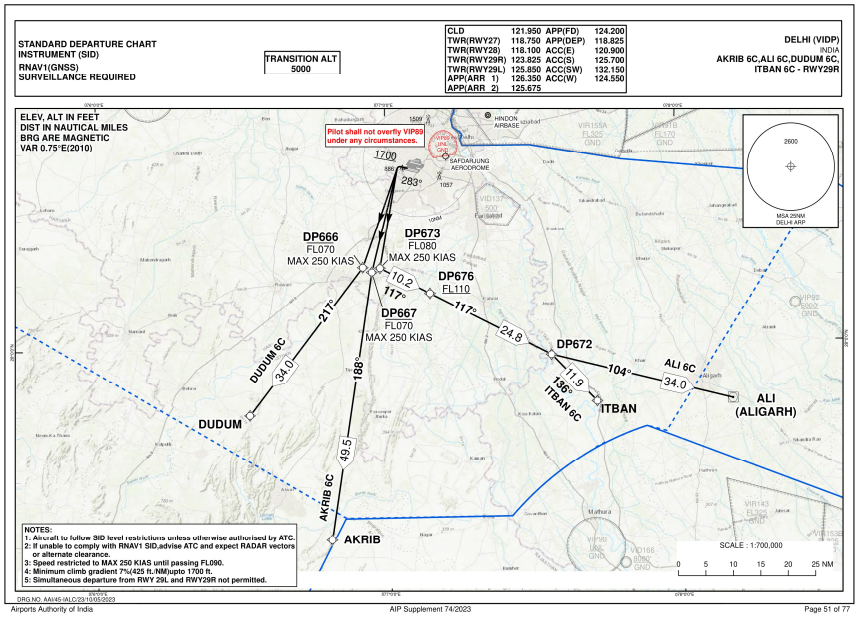

Figure 9 SID ITBAN 6C given to IGO2206