

**FINAL REPORT OF SERIOUS INCIDENT BETWEEN M/s JET AIRWAYS B737
AIRCRAFT VT-JBE AND M/s AIR INDIA A320 AIRCRAFT VT-EDD AT DELHI ON
30th JANUARY 2016.**

1. Aircraft
Type : A320 (Air India) & B737 (Jet Airways)
Nationality : INDIAN
Registration : VT-EDD (Air India) & VT-JBE (Jet Airways)
2. Owner/ Operator : M/s Air India & M/s Jet Airways
3. Pilot – in –Command : ALTP Holder (Air India) & ATPL Holder (Jet Airways)
Extent of injuries : Nil
4. First Officer : ALTP Holder (Air India) & CPL Holder (Jet Airways)
Extent of injuries : Nil
5. Place of Incident : IGI Airport, Delhi
6. Date & Time of Incident : 30th January 2016; 06:15:00UTC(Approx.)
7. Last point of Departure : Shamshabad for Air India and Bengaluru for Jet Airways
8. Point of intended landing : Delhi for both Air India and Jet Airways
9. Type of operation : Scheduled Operation for both Air India and Jet Airways
10. Crew on Board : (02+05) Air India & (02+05) for Jet Airways
Extent of injuries : Nil
11. Passengers on Board : 134 (Air India) & 142 (Jet Airways)
Extent of injuries : Nil
12. Phase of operation : Landing for both Aircraft
13. Type of incident : Air Proximity due to attempt to land on unassigned RWY

(ALL TIMINGS IN THE REPORT ARE IN UTC)

SYNOPSIS:

On 30.01.2016 M/s Air India A320 aircraft was operating flight AIC543 (Shamshabad - Delhi) under the command of a pilot an ATPL holder and qualified on type. The Air India aircraft was cleared by Delhi Area Control Centre for arrival and was allotted Runway 11 of IGI airport.

M/s Jet Airways B-737 aircraft was operating flight JAI833 (Bengaluru - Delhi) under the command of an ATPL holder pilot qualified on type. And the Jet Airways aircraft was allotted Runway 10 for arrival at IGI airport.

The Air India aircraft was vectored for Runway 11 after she came in contact with Approach Control and was handed over to the Approach Arrival Controller for final interception. Air India aircraft reported on localizer of Runway 11 and reconfirmed that it was established on localizer of Runway 11. In the meantime, Jet Airways aircraft was vectored for Runway 10 and the aircraft confirmed interception of localizer 10 at time 0611.

The Arrival Approach Controller released Air India aircraft to Aerodrome Controller South at 8NM from touchdown when the aircraft was slightly south of the localizer of Runway 11 at time 0612. Subsequently, Jet Airways aircraft was released to Aerodrome Controller Middle at 9NM from touch down at time 0612 UTC. At that time, Air India aircraft had crossed the localizer of Runway 11 from south to north and was heading towards the localizer of Runway 10 on the last assigned heading. Subsequently, Air India aircraft came in conflict with the Jet Airways aircraft and the Current Conflict Warning (CCW) was generated twice by the system. The lateral separation was reduced to 1.2 NM approximately and vertical separation was reduced to 300 feet between both the aircrafts.

Although, landing clearance was not issued to Air India aircraft by Aerodrome Controller South but the aircraft continued approach to Runway 09 and later on executed missed approach on its own. ATC instructed Jet Airways aircraft to go around and aircraft took a left turn to avoid the conflict. There was no injury to any of the person on board on both the aircrafts.

Ministry of Civil Aviation constituted a committee of inquiry to investigate the cause of the Serious Incident under Rule 11 (1) of Aircraft (Investigation of Accidents and Incidents),

Rules 2012 comprising of Sh. N S Dagar, Jt. GM (ATM), AAIB as Chairman, Capt. Dhruv Rebbapragada as member and Sh. Dinesh Kumar, Air Safety Officer, AAIB as Secretary.

1. FACTUAL INFORMATION

1.1 History of the flight

On 30th January 2016, three runway easterly mode was in operation at IGI Airport which entails using Runway 11 and 10 for both arrivals & departures and Runway 09 for departures only.

M/s Air India A320 aircraft was operating flight AIC543 (Shamshabad - Delhi) under the command of a pilot an ATPL holder and qualified on type. The aircraft was cleared by Delhi Area Control Centre via SAPLO6B RNAV arrival and was allotted Runway 11 of IGI airport. The aircraft reported established on localizer Runway 11 at about 23NM from touchdown. The weather at the time of approach at Delhi was fine with visibility 1200 meters, winds 170°/04.

M/s Jet Airways B-737 aircraft was operating flight JAI833 (Bengaluru - Delhi). The aircraft was cleared by Delhi area Control Centre via SAPLO6B RNAV arrival and was allotted Runway 10 of IGI airport.

The Air India aircraft was vectored for Runway 11 after she came in contact with Approach Control on 126.35 MHz and was handed over to the Approach Arrival Controller on 124.2 MHz for final interception. Air India aircraft reported on localizer of Runway 11 and on being asked by the Approach Arrival Controller, VT-EDD confirmed that it was established on localizer of Runway 11. In the meantime, Jet Airways aircraft was vectored for Runway 10 and the aircraft intercepted localizer of Runway 10 at 14 NM at time 0611. Jet Airways aircraft was behind Air India in the landing sequence.

The Arrival Approach Controller released Air India aircraft to Aerodrome Controller South (125.85 MHz) at 8NM from touchdown when the aircraft was slightly south of the localizer of Runway 11 at time 0612. Subsequently, Jet Airways aircraft was released to Aerodrome Controller Middle (118.1 MHz) at 9NM from touch down at time 0612 UTC. At that time, Air India aircraft had crossed the localizer of Runway 11 from south to north and was

heading towards the localizer of Runway 10 on the last assigned heading. During the approach flight of Air India, the Current Conflict Warning (CCW) was generated twice by the system notifying that the required separation was less than the standard separation between the two aircrafts. After realizing that Air India aircraft is in conflict with Jet Airways aircraft under his jurisdiction on localizer of Runway 10, the Aerodrome Controller Middle (118.1 MHz) tried to change Jet Airways aircraft to Approach ARRIVAL Controller but the aircraft was changed back to him. Although, landing clearance was not issued to Air India aircraft by Aerodrome Controller South (125.85 MHz) but the aircraft continued approach to Runway 09. At time 0614 UTC the Aerodrome Controller Middle instructed Jet Airways aircraft to go around due to the conflict with Air India aircraft. The Jet Airways aircraft took a left turn on heading 070 and was changed over to Approach Controller at time 0615.

The Air India aircraft continued approach to Runway 09 and later on carried out missed approach for Runway 09 and was changed over to Approach controller by Aerodrome Controller at time 0616. In the meantime, Aerodrome Controller North (118.75 MHz) did not allow his departure to line up on Runway 09.

The lateral separation was reduced to 1.2 NM approximately and vertical separation was reduced to 300 feet between both the aircrafts and there was no injury reported to any of the person on board on both the aircrafts.

1.2 Injuries to persons.

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR/NONE	(02+05) Air India (02+05) Jet Airways	134 Air India 142 Jet Airways	Nil

1.3 Damage to aircraft: Nil

1.4 Other damage: Nil

1.5 Personnel information: (Air India Crew details)

Pilot-in-Command:

Age : 55 Years 04 Months 15Days (As on 30.01.2016)
License : ALTP
Date of Issue : 07-Oct-2015
Valid up to : 06-Oct-2020
Category : Aeroplane
Class : Single/ Multiengine land
Endorsements as PIC : A319/A320/A321
Date of Med. Exam : 18-Dec-2015
Med Exam Valid up to : 17-Jun-2016
FRT0 License : Valid
Date of Issue : 20-Oct-2006
Valid up to : 19-Oct-2016
Total Flying Experience : 18904:05 as on 30.01.2016
Experience on Type : 15029:35 Hrs.
Experience as PIC on Type : 9803:39 Hrs.

As on 30.01.2016 (Flying Hrs.)

Total Flying Experience during last 180 days : 325:30
Total Flying Experience during last 90 days : 174:58
Total Flying Experience during last 30 days : 39:58
Total Flying Experience during last 07 days : 20:52
Total Flying Experience during last 24 Hours : 06:14

Co- Pilot:

Age : 41 Years 01 Month (Age as on 30.01.2016)
License : ALTP
Date of Issue : 10-Aug-2015
Valid upto : 09-Aug-2020
Category : Aeroplane
Class : Single/ Multiengine Land
Endorsements as PIC : A319/A320/A321
Date of medical Examination : 04-Aug-2015
Med. Exam Valid up to : 03-Aug-2016
FRT0 License : Valid
Date of Issue : 15-Feb-2012
Valid up to : 14-Feb-2017
Total Flying Experience : 8714:01 as on 30.01.2016
Experience on type : 8493:35 Hrs.
Experience as PIC on type : 4005:45 Hrs.

As on 30.01.16 (Flying Hrs.)

Total Flying Experience during last 180 days : 476:15

Total Flying Experience during last 90 days : 252:13

Total Flying Experience during last 30 days : 70:21

Total Flying Experience during last 07 days : 07:40

Total Flying Experience during last 24 Hours : 04:50

1.6 Personnel information: (ATC Controllers)

1.5.1 Approach Controller (TAR)

STATION	UNIT	Date of start of Double banking	Date of RATING
IGI AIRPORT	DC/SMC/ASMGCS	07.10.2002 (Initial)	13.03.2003
	ACC/FIC	30.04.2005	11.12.2003
	ADS/CPDLC	19.03.2006	31.05.2006
	ARSR	22.05.2006	31.07.2006
	ASR	09.04.2005	03.03.2006
PREVIOUS AIRPORT RATINGS	Rating records of previous station are not available.		

1.5.2 TWR (North) Controller

STATION	UNIT	Date of start of Double banking	Date of RATING
IGI AIRPORT	ADC/SMC/ASMGCS	30.04.2011 (Initial) 07.09.2015(Revalidation)	07.10.2011(Initial) 11.12.2015 (Revalidation)
	ACC/FIC:	23.06.2012 (Initial) 25.01.2016(Revalidation)	27.08.2013(Initial) 25.04.2016 (Revalidation)
PREVIOUS AIRPORT RATINGS	ADC/SMC/ASMGCS ,ACC,ADS-CPDLC – MUMBAI and ADC/SMC & APP- IMPHAL		

1.5.3 TOWER (South) controller

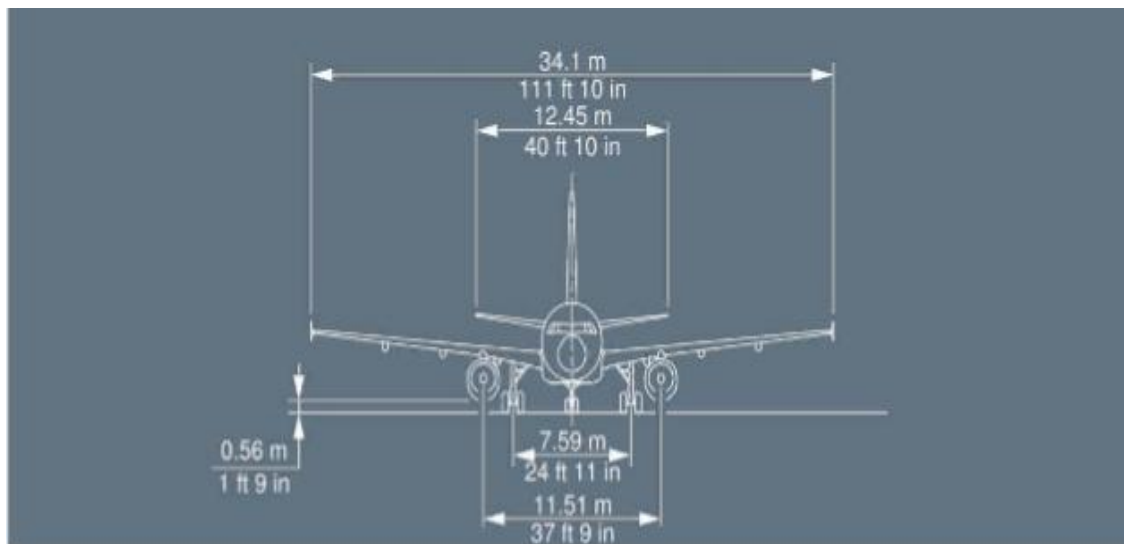
STATION	UNIT	Date of start of Double banking	Date of RATING
IGI AIRPORT	ADC/SMC/ASMGCS	05.02.2008(Initial) 31.07.2015(Revalidation)	22.05.2008(Initial) 08.10.2015(Revalidation)
	ACC/FIC:	04.01.2011(initial) 01.11.2015(Revalidation)	08.08.2011(initial) 04.04.2016(Revalidation)
	ADS/CPDLC:	28.07.2011(Initial)	25.01.2012(Initial)
PREVIOUS AIRPORT RATINGS	ADC/SMC- KULLU-MANALI		

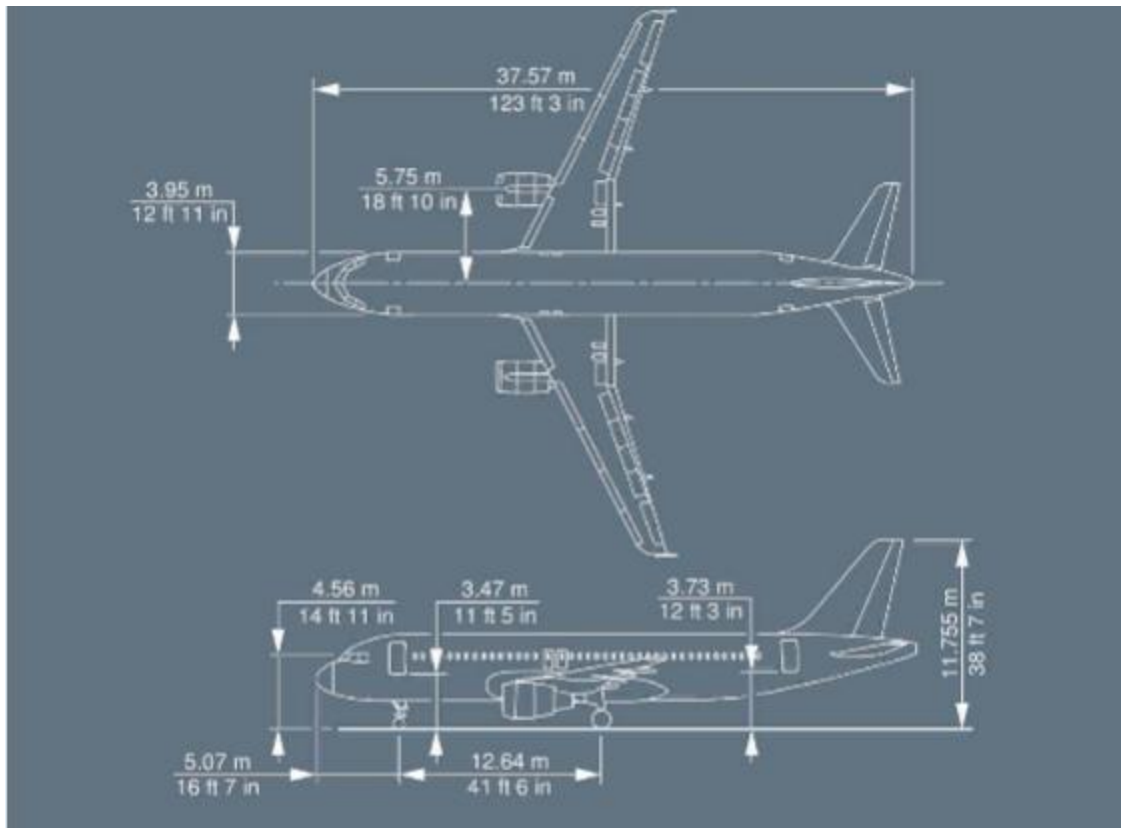
1.5.4 TWR (Middle) Controller

STATION	UNIT	Date of start of Double banking	Date of RATING
IGI AIRPORT	ADC/SMC/ASMGCS	07.04.2013	19.08.2014

1.6 Aircraft information:

The A320 is a subsonic, medium-range, civil transport aircraft. The aircraft has two high bypass turbofan engines manufactured by M/s CFM General. The aircraft is designed for operation with two pilots and has passenger seating capacity of 180.





The aircraft is certified in Normal (Passenger) category, for day and night operation under VFR & IFR. The maximum operating altitude is 39800 feet and maximum take-off weight is 73500 Kgs. The Maximum Landing weight is 64500 Kgs. The Aircraft length is 37.573 meters, wingspan is 34.100 meters and height of this aircraft is 11.755 meters. The distance between main wheel centers is 7.59 meters. The distance between engines is 11.5 meters and engine ground clearance is 0.56 meters.

Airbus A320 aircraft VT-EDD (MSN 4212) had been manufactured in year 2010. The aircraft was registered with DGCA under the ownership of M/s AIR INDIA LTD. The aircraft is registered under Category 'A' and the Certificate of registration No. 4068/4. The Certificate of Airworthiness Number 6177 under "NORMAL category" subdivision Passenger / Mail / Goods was issued by DGCA on 23/02/2010. At the time of incident the Certificate of Airworthiness was current and Airworthiness Review Certificate was valid up to 13/02/2016.

The Aircraft was holding a valid Aero Mobile License No. A-014/100-R LO (NR) at the time of incident. This Aircraft was operated under Scheduled Operator's Permit No. S-9 which is valid

up to 30/06/2018. As on 30.01.2016 the aircraft had logged 22179.05 airframe hours and 10589 cycles.

The Air India aircraft and its engines are being maintained as per the maintenance programme consisting of calendar period/ flying hours or cycles based maintenance as per maintenance programme approved by Regional Airworthiness office, Delhi.

Accordingly, the last major inspection 2250 FH/ 360 DAYS check was carried out at 19925.07 Hrs/9441 cycles on 01/06/2015. Subsequently all lower inspections (Preflight checks, Service Checks, Weekly Checks) were carried out as and when due before the incident.

The aircraft was last weighed on 25/02/2015 at Delhi, and the weight schedule was prepared and duly approved by the office of Director of Airworthiness, DGCA, Delhi Region. As per the approved weight schedule the empty weight of the aircraft is 38743 Kgs. Maximum usable fuel quantity is 19005 Kgs. Maximum payload with fuel tanks full is 10808 Kgs. Empty weight CG is 18.79 meters aft of datum. As there has not been any major modification affecting weight & balance since last weighing, the next weighing is due on 14/02/2020. Prior to the incident flight the weight and balance of the aircraft was well within the operating limits.

Transit Inspections are carried out as per approved Transit Inspection schedules and all the higher inspection schedules include checks 1 inspection as per the manufacturer's guidelines as specified in Maintenance Programme and are approved by the Continuing Airworthiness Manager (Post Holder for Continuous Airworthiness). All the concerned Airworthiness Directive, Mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine has been complied with as on date of event.

The left engine S/N 697812 had logged 22180.20 Hrs. and 13312 cycles and the right engine S/N 69940 had logged 19535.09 Hrs. and 12333 cycles. There was no defect reported on the engine on the previous flight.

1.7 Meteorological information:

MET Report Delhi Aerodrome

Information: U

Time of Observation: U

Date: 30th January, 2016

Wind: 170 Degrees 04 knots

Wind Rwy 10 & 11: 170/05 & 160/05

Visibility: 1200 meters

RVR Rwy 10 & 11: Above 2000 m & 2000 m

Weather: FU (Smoke)

Cloud: NSC (No Significant Cloud)

Temperature: 23 °C

Dew Point: 13 °C

QNH: 1017 Hpa

QFE: 990 Hpa

Trend: NOSIG

1.8 Aids to Navigation:

ILS Runway 09; ILS Localizer frequency 108.5 MHz

ILS Runway 10; ILS Localizer frequency 109.5 MHz

ILS Runway 11; ILS Localizer frequency 111.3 MHz

Other navigation aids installed include DVOR and DME with Precision and Non Precision approach procedures.

1.9 Communications:

During the period of occurrence the Air India aircraft was in contact with ATC on Aerodrome Control Tower south frequency 125.85 MHz and Jet Airways aircraft was in contact with ATC on Aerodrome Control middle frequency 118.1 MHz.

There was always two way communications between the ATC and both aircraft.

1.10 Aerodrome information:

Indira Gandhi International Airport (IATA: DEL, ICAO: VIDP) is the primary international airport of the National Capital Region of Delhi operated by Delhi International Airport Private Limited (DIAL) with a current capacity of handling more than 46 million passengers.

The elevation of the airport is 777 ft, and it has three near-parallel runways: runway 11/29, 4,430 m × 60 m (14,534 ft × 197 ft) with CAT IIIB instrument landing system (ILS) on both sides, runway 10/28, 3,810 m × 45 m (12,500 ft × 148 ft), and an auxiliary runway 09/27, 2,813 m × 45 m (9,229 ft × 148 ft). Runway 28 and runway 11/29 have been equipped with the CAT III-B ILS.

The other Navigation aids installed include Cat I ILS DME, DVOR and NDB with precision and non-precision approach procedures for Runways 11/29, 10/28 and 09/27. IGI Airport has Category 10 rescue and firefighting capabilities with all ARFF personnel trained in rescue and fire-fighting as well as medical first-aid.

At the time of incident three runway easterly mode of operation was in progress wherein runway 09 is used for departure, runway 10 for arrival and runway 11 for mixed mode i.e both arrival and departure.

1.11 Flight recorders:

The ATC tape transcripts are as under:

TAPE TRANSCRIPT

DATE: 30th -JAN-2016

Unit: APPROACH ARRIVAL (APST)

FREQUENCY: 124.2 MHz

Aircraft Involved: Air India AIC 543, Jet Airways JAI833

TIME	UNIT	TRANSCRIPT
060033-37	RADAR	AIC543 DESCEND TO FLIGHT LEVEL 70
	AIC543	DESCEND 70 AIC 543
060100-15	RADAR	AIC546 STOP DESCEND TO 5000 FEET
	AIC543	CONFIRM WE ARE CLEARED 2600 FEET AIC 543
	RADAR	NEGATIVE THIS WAS FOR AIC 546. AIC 546 STOP DESCEND AT 5000 FEET
060136-38	JAI833	RADAR GOOD MORNING JAI 833 PASSING 93

060157-0201	RADAR	JAI833 RADAR GOOD MORNING CONTINUE AS CLEARED
	JAI833	CONTINUE AS CLEARED JAI833
060235-40	RADAR	AIC 543 DESCEND TO FLIGHT LEVEL 60
	AIC543	DESCEND 60 AIC 543
060241-47	RADAR	JAI 833 RADAR DESCEND TO FLIGHT LEVEL 70 SPEED 190
	JAI833	DESCEND 70 SPEED 190 JAI 833
060418-25	RADAR	JAI833 RADAR EXPECT RUNWAY 10
	JAI833	EXPECT RUNWAY 10 JAI 833
060455-060501	RADAR	JAI 833 DESCEND TO FLIGHT LEVEL 60
	JAI833	DESCEND LEVEL 60 JAI 833
060554-060605	RADAR	AIC543 DESCEND TO 4000 FEET ,QNH 1017, TURN RIGHT HEADING 015
	AIC543	RIGHT HEADING 015 AND DESCEND 4000, QNH 1017, AIR INDIA FOUR CORRECTION FIVE FOUR THREE
060613-19	RADAR	AIC 543 CONTINUE DESCEND TO 2600 FEET
	AIC543	CONTINUE DESCEND 2600 AIC543
060622-59	AIC543	SIR WHAT IS THE RUNWAY FOR US AIC543?
	RADAR	YOU ARE GETTING 11 SIR
	AIC543	OK
	RADAR	JUST TO REDUCE THE DELAY ITS ALTERNATE 10 11
	AIC543	SAY AGAIN
	RADAR	JUST TO REDUCE THE DELAY. WE HAVE LOT OF HOLDING. RUNWAY 10 11
	AIC543	OK. YOU ARE TAKING US ACROSS?
	RADAR	NEGATIVE SIR NOW TURN RIGHT HEADING 075 CLEARED FOR ILS 11 REPORT ESTABLISH ON LOCALIZER
	AIC543	RIGHT HEADING 075, CLEARED ILS APPROACH RUNWAY 11, CALL YOU ESTABLISHED. NOW ESTABLISHED LOCALIZER AIC543
060735-39	RADAR	JAI833 RADAR TURN RIGHT HEADING 015
	JAI833	RIGHT HEADING 015 JAI 833
060741-45	RADAR	JAI 833 YOU ARE COMING FOR RUNWAY 10 NO CONFUSION
	JAI833	COPIED SIR 10.
060842-55	RADAR	JAI 833 SPEED 190
	JAI 833	MAINTAINING SIR JAI 833
	RADAR	ROGER TURN RIGHT HEADING 075 TO INTERCEPT LOCALIZER RUNWAY 11 CORRECTION 10
	JAI833	RIGHT HEADING 075 LOCALIZER 10 JAI 833
060902-17	RADAR	JAI 833 DESCEND TO 2600 FEET, QNH 1017, CLEARED FOR ILS 10, REPORT ESTABLISHED ON LOCALIZER
	JAI833	DESCEND 2600 FEET, QNH 1017, CLEARED LOCALIZER 10, WILCO JAI 833
061042-50	AIC543	WE ARE ON LOCALIZER RUNWAY 11 AIC543 CONFIRM CLEAR ILS APPROACH
	RADAR	CLEARED FOR ILS APPROACH BREAK GOW 319 TURN RIGHT HEADING 345
061139-46	RADAR	AIC 543 RADAR CONFIRM ON LOCALIZER
	AIC 543	AFFIRM AIC 543
	RADAR	ROGER
061145-50	RADAR	JAI 833 SPEED 160
	JAI 833	SPEED 160 JAI833
061151-56	RADAR	AIC 543 8 MILES FROM TOUCHDOWN CONTACT DELHI TOWER 125.85
061157-	RADAR	AIC 543 8 MILES FROM TOUCHDOWN CONTACT DELHI TOWER 125.85

061207	AIC543	12585 AIC 543 HAVE A NICE DAY
061208	RADAR	BYE SIR
061233-40	RADAR	JAI 833 RADAR 9 MILES FROM TOUCHDOWN CONTACT DELHI TOWER 118.1
	JAI 833	1181 JAI 833 GOOD DAY
061348-49	JAI 833	JAI 833
061352-57	CALL INITIATED BY ADC(M) TO APPROACH ARRIVAL(APST),	
061350-	RADAR	JAI 833 GO AHEAD SIR
061400	JAI 833	SIR WE WERE ASKED FOR CHANGE OVER TO YOU
	RADAR	NEGATIVE SIR JAI 833 CONTACT TOWER 118.1
	JAI 833	1181
061411	CALL INITIATED BY ADC(S) TO APPROACH ARRIVAL (APST) ON INTERCOM	
	ADC(S)	AIR INDIA 543
	APST	NOT IN CONTACT?
061429-32	RADAR	AIC 543 RADAR, JAI 833 DELHI
061432	ADC(S)	SIR YE 09 PE LAGA HUA LAGTA HAI SIR, 11 PE TO NAHIN AA RAHA HAI.
061433	CALL INITIATED BY APPROACH ARRIVAL (APST) TO ADC (M) ON INTERCOM. CALL REMAINED ACTIVE WHILE TOWER (M) CONTROLLER TRANSMITTED ON VHF IN BETWEEN THE ONGOING CONVERSATION.	
	ADC(M)	SIR JAI833 KO GO A.....
	APST	JAI833 IMMEDIATELY LEFT TURN..
061443-45	RADAR	JAI 833 RADAR
	UNKNOWN	SIR THEY ALREADY CHANGED OVER
061503	CALL INITIATED BY APPROACH ARRIVAL(APST) TO ADC(N) ON INTERCOM	
061505-13	ADC(N)	YES SIR?
	APST	AIC543 PROBABLY LANDING ON RUNWAY 09.
	ADC(N)	OK SIR
	APST	KEEP A TRACK ON THAT.
061544-49	JAI 833	RADAR JAI 833 2600 FEET ON HEADING OF 070
061527	ADC(N) INITIATED A CALL TO APPROACH ARRIVAL(APST) ON INTERCOM	
061530-061600	APST	YES?
	ADC(N)	HE IS GOING AROUND SIR. NOT IN CONTACT, GOING AROUND.
	APST	AIC543 WHERE IS HE GOING
	ADC(N)	HE IS GOING AROUND, CLIMBING UP.
	ADC(N)	NOT IN CONTACT WITH ME, NEITHER WITH....[CALL DISCONNECTED]
061554-06	JAI 833	DELHI CONTROL JAI 833
	RADAR	JAI 833 TURN LEFT HEADING 360 AND CLIMB TO FLIGHT LEVEL 60
	JAI833	CONFIRM LEFT HEADING 360?
	RADAR	CORRECT SIR LEFT HEADING 360.
	JAI 833	LEFT HEADING 360 CLIMBING 60 JAI 833
061608	RADAR	AIC 543 RADAR
061625	RADAR	AIC 543 RADAR
061630	RADAR	AIC 543 DELHI RADAR
061633-43	AIC 543	GO AHEAD AIC 543 MAINTAINING HEADING 090
	RADAR	AIC 543 TURN RIGHT HEADING 110 IMMEDIATELY
	AIC543	RIGHT HEADING 110 AIC 543
061655-	RADAR	AIC543 CLIMB TO FLIGHT LEVEL 60 TURN RIGHT HEADING 180.

061705	AIC543	CLIMB 60, RIGHT HEADING 180,AIC543
061716-061721	RADAR	AIC543 SIR YOU WERE ESTABLISHED ON RUNWAY 09 CONFIRM LANDING ON RUNWAY 09?
061725-36	AIC543	SIR THERE WAS CONFUSION AIC 543
	RADAR	CONFUSION FROM YOUR SIDE?
	AIC543	AFFIRM AIC543
	RADAR	ROGER BUT IT WAS A VERY DANGEROUS SITUATION CUTTING ACROSS THE RUNWAY RUNWAY 10 .JET WAS LANDING RUNWAY 10 JUST CROSSED I MEAN THEN IT WAS A MARGINAL
	AIC 543	THAT IS FINE ALSO SIR AND I BELIEVE WE ARE BEING MONITORED BY YOU ALSO
	RADAR	CORRECT SIR BUT YOU WERE NOT IN CONTACT AND I COULD NOT GIVE YOU ANY HEADING. YOU DESCENDED ALSO.

Unit: TOWER MIDDLE
FREQUENCY: 118.1 MHz

TIME	UNIT	TRANSCRIPT
061246-56	JAI833	TOWER GOOD MORNING JAI 833 LOCALIZER RUNWAY 10
	TOWER	JAI 833 TOWER CONTINUE APPROACH RUNWAY 10 WIND 240 DEGREE 05 KNOTS
	JAI 833	CONTINUE APPROACH JAI833
061335-40	TOWER	JAI833 CONTACT 124.2
	JAI833	1242 JAI833
061352-57	CALL INITIATED BY ADC(M) TO APPROACH ARRIVAL(APST),	
061403	JAI833	TOWER JAI833 ILS RUNWAY 10
061407	JAI833	DELHI TOWER JAI 833
061415-18	TOWER	JAI 833 CONTINUE APPROACH TRAFFIC AIR INDIA
	JAI 833	COPIED SIR CONTINUE APPROACH ON ILS
061427	JAI833	TOWER JAI 833
061433	CALL INITIATED BY APPROACH ARRIVAL (APST) TO ADC(M) ON INTERCOM.CALL REMAINED ACTIVE WHILE TOWER (M) CONTROLLER TRANSMITTED ON VHF IN BETWEEN THE ONGOING CONVERSATION.	
061433-42	TOWER	JAI 833 TURN , GO AROUND TURN LEFT
	JAI833	GOING AROUND JAI 833
061452-59	TOWER	JAI 833 TURN LEFT HEADING
	JAI 833	SAY AGAIN HEADING JAI 833
	TOWER	TURN LEFT HEADING
	JAI833	TURNING LEFT
061519-22	JAI833	JAI833 HEADING 070 2600 FEET
061524	TOWER	AIC833 CONTACT 124.2
061527-32	TOWER	JAI833 CONTACT 124.2
	JAI833	1242 JAI 833

Unit: TOWER SOUTH
FREQUENCY: 125.85 MHz

TIME	UNIT	TRANSCRIPT
061217	AIC543	DELHI TOWER AIC543 GOOD MORNING
061223-30	TOWER	AIC543 CONTINUE APPROACH RUNWAY 11 WIND 150 DEGREE 03 KNOTS
	AIC543	CONTINUE APPROACH RUNWAY 11 AIC543
061411	CALL INITIATED BY ADC(S) TO APPROACH ARRIVAL (APST) ON INTERCOM	
061420-061429	APST	YES
	ADC(S)	AIR INDIA 543
	APST	NOT IN CONTACT?
061516	AIC543	DELHI AIC543 WE ARE DISCONTINUING APPROACH
061523	TOWER	AIC 543 ROGER 543
061530	TOWER	AIC543 TRAFFIC JET AIRWAYS B738 PRESENTLY 2600 FEET GOING AROUND BEHIND YOU
061539-58	TOWER	AIC543 TOWER
	AIC543	GO AHEAD AIC543
	TOWER	CONFIRM TRAFFIC COPIED
	AIC543	SAY AGAIN
	TOWER	TRAFFIC JET AIRWAYS B738 ALSO GOING AROUND PRESENTLY 2600 FEET BEHIND YOU
	AIC543	WHAT HEIGHT YOU WANT US TO MAKE AIC 543
	TOWER	AIC543 CONTACT RADAR 126.35
	AIC543	12635 GOOD DAY
061558-061607	CALL INITIATED BY ADC(S) TO APPROACH (APAC)	
	APAC	HAAN?
	ADC(S)	AIC543 SIR CHANGE KIYA HAI. GOING AROUND.
	APAC	OK
061609-061620	CALL RECEIVED FROM APPROACH ARRIVAL (APST)	
	ADC(S)	YES SIR?
	APST	AIC543 WHERE SHE IS GOING?
	ADC(S)	AIC543 GOING AROUND SIR, 12635 KE PASS HAI

Unit: TOWER NORTH
Frequency: 118.75MHz

TIME IN UTC (HH:MM:SS)	UNIT	TRANSCRIPTS
061503	CALL INITIATED BY APPROACH ARRIVAL(APST) TO ADC(N) ON INTERCOM	
061505-13	ADC(N)	YES SIR?
	APST	AIC543 PROBABLY LANDING ON RUNWAY 09.
	ADC(N)	OK SIR
	APST	KEEP A TRACK ON THAT.
061527	ADC(N) INITIATED A CALL TO APPROACH ARRIVAL(APST) ON INTERCOM	
061530-061600	APST	YES?
	ADC(N)	HE IS GOING AROUND SIR. NOT IN CONTACT, GOING AROUND.

	APST	AIC543 WHERE IS HE GOING
	ADC(N)	HE IS GOING AROUND, CLIMBING UP.
	ADC(N)	NOT IN CONTACT WITH ME, NEITHER WITH....[CALL DISCONNECTED]

Unit: APPROACH (APAC)
FREQUENCY: 126.35 MHz
Aircraft Involved: AIC 543

TIME	UNIT	TRANSCRIPT
054641	AIC543	DELHI AIC543 GOOD MORNING.
	RADAR	AIC543 RADAR GOOD MORNING DESCEND TO FLIGHT LEVEL 160
	AIC543	DESCEND LEVEL 160 AIC543
054810	AIC543	RADAR AIC543 SIR WE CAN TAKE RUNWAY TWO SEVEN ALSO ...(UNCLEAR)....ZERO OR ZERO NINE
	RADAR	STATION CALLING
	AIC543	AIC543
	RADAR	AIC543 RUNWAY IN USE IS ONE ONE
061606-20	AIC543	OK
	AIC543	DELHI RADAR AIC543 WE ARE NOW MAINTAINING 2600
	RADAR	AIC 543 ROGER CONTINUE RUNWAY HEADING ...(UNCLEAR)....AND CONTACT RADAR 124.2
	AIC543	CONTINUE HEADING 1242 AIC 543 GOOD DAY

Unit: ACC (SE)-FOURTH SECTOR
FREQUENCY: 125.7 MHz
Aircraft Involved: AIC 543

TIME	UNIT	TRANSCRIPT
052002	AIC543	DELHI AIC543 GOOD MORNING LEVEL 320
052130	AIC543	DELHI AIC 543 GOOD MORNING
	RADAR	AIC 543 RADAR GOOD MORNING SAPLO SIX BRAVO ARRIVAL EXPECT RUNWAY 11
	AIC543	SAPLO SIX BRAVO RUNWAY 11 AIC543 AND REQUEST DESCEND NOW DUE TURBULENCE MODERATE TURBULENCE AT THIS LEVEL
052200	AIC543	AIC543 STAND BY
	RADAR	AIC543 DELHI RADAR STANDBY FOR DESCEND ,DESCEND TO FLIGHT LEVEL 300
	AIC543	DESCEND LEVEL 300 AIC 543
	RADAR	AFFIRM STANDBY FOR IDENTIFICATION DUE BLIP MERGING
052300-17	AIC543	DELHI AIC543 DESCENDING TO FLIGHT LEVEL 300
	RADAR	AIC543 DELHI RADAR IDENTIFIED SAPLO SIX BRAVO RUNWAY 11
	AIC543	ROGER SAPLO SIX BRAVO RUNWAY 11 AIC 543 AND REQUEST FURTHER DESCEND
	RADAR	AIC543 STANDBY

1.12 Wreckage and impact information.

There was no damage to either of the aircraft or to any ground facilities.

1.13 Medical and pathological Information:

Both the cockpit crew of Air India had undergone pre-flight medical check prior to the flight and found negative.

1.14 Fire:

There was no fire after the incident.

1.15 Survival aspects:

The incident was survivable.

1.16 Tests and research: Nil

1.17 Organizational and management information:

AIR INIDA:

Air India Ltd. is a scheduled airline with an Airbus fleet of 66 aircrafts and 43 aircrafts of Boeing fleet operating flights on domestic and international sector. Air India Headquarter is located at New Delhi. The Air operator permit is valid till 30/06/2018. The Company is headed by Chairman & Managing Director assisted by a team of professional of various departments. The Flight Safety Department is headed by Chief of Flight Safety approved by DGCA. The Chief of Safety is an Executive Director who reports directly to the Chairman. M/s Air India has a full established Operations training facility for the pilots. The training facility for the Airbus pilots is set up at Hyderabad and for the Boeing pilots it is in Mumbai. Both the training facilities are headed by the Executive Director Training who reports to Chairman directly. The Engineering training facility is established at Delhi and Mumbai. It is a public sector undertaking under the Ministry of Civil Aviation.

AIRPORTS AUTHORITY OF INDIA:

Airports authority of India (AAI) is a public sector undertaking under the Ministry of Civil Aviation. It was formed by an Act of Parliament and came into existence on 1st April 1995. AAI provides Air Navigation Services in air space measuring 2.8 million square nautical miles which cover entire Indian air space. The Air Traffic Services at IGI airport are provided by AAI which includes Approach Control Service and Aerodrome Control Tower.

JET AIRWAYS:

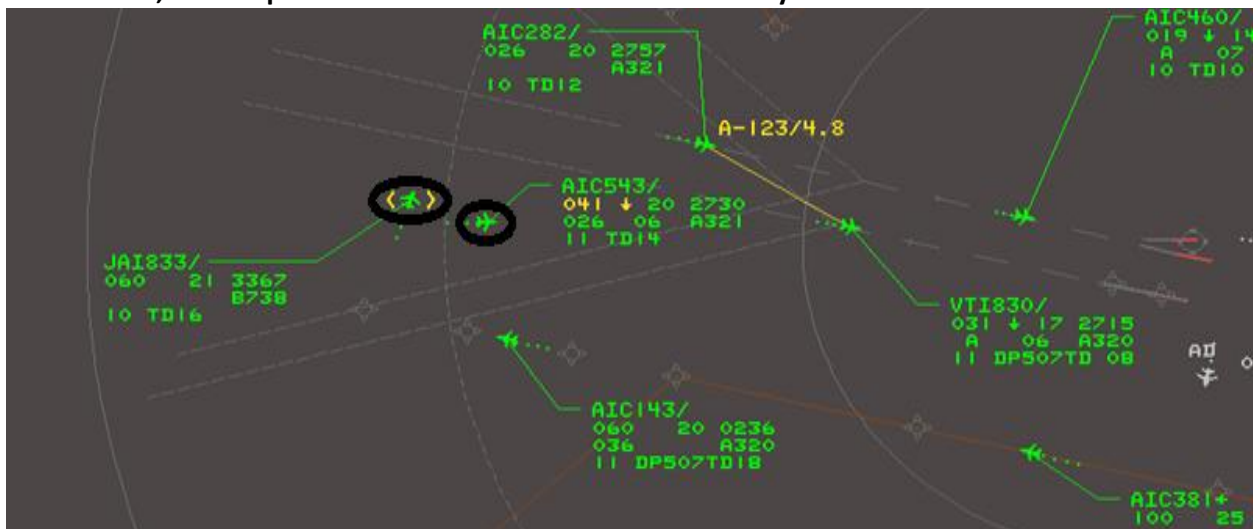
M/s Jet Airways (India) Ltd. is a Scheduled Airline having DGCA SOP No. S-6A in Category passenger and cargo, which commenced operation on 5th May, 1993. The airlines operates a fleet of 102 aircraft, which includes 05 Boeing 777-300 ER aircraft, 08 Airbus A330-200 aircraft, 67 next generation Boeing 737-700/800/900 aircraft and 18 ATR 72-500 turboprop aircraft. M/s Jet Airways operates 68 destinations (47 Domestic + 21 international) and having approx 13900 employees.

1.18 Additional information :

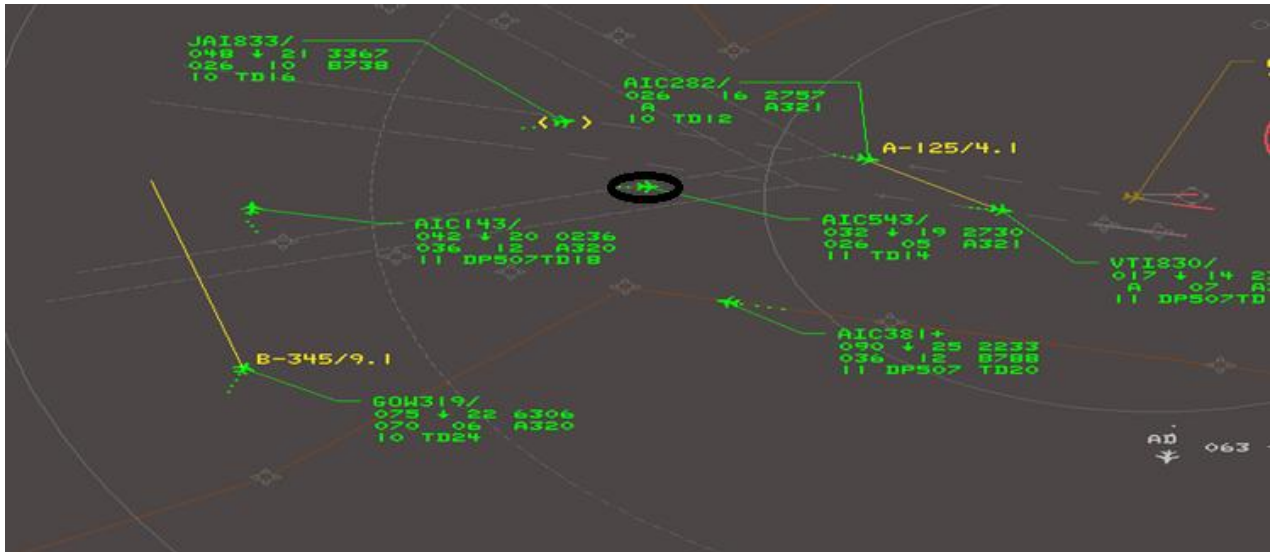
Complete Radar picture of Air India A320 aircraft VT-EDD as displayed in front of controller

Zoomed Radar picture of Air India Aircraft & Jet Airways aircraft as displayed in front of Approach controller Arrival

At time 0608, relative position of Air India AIC 543 and Jet Airways JAI833



At time 0611, AIC 543 reported established on localizer Runway 11



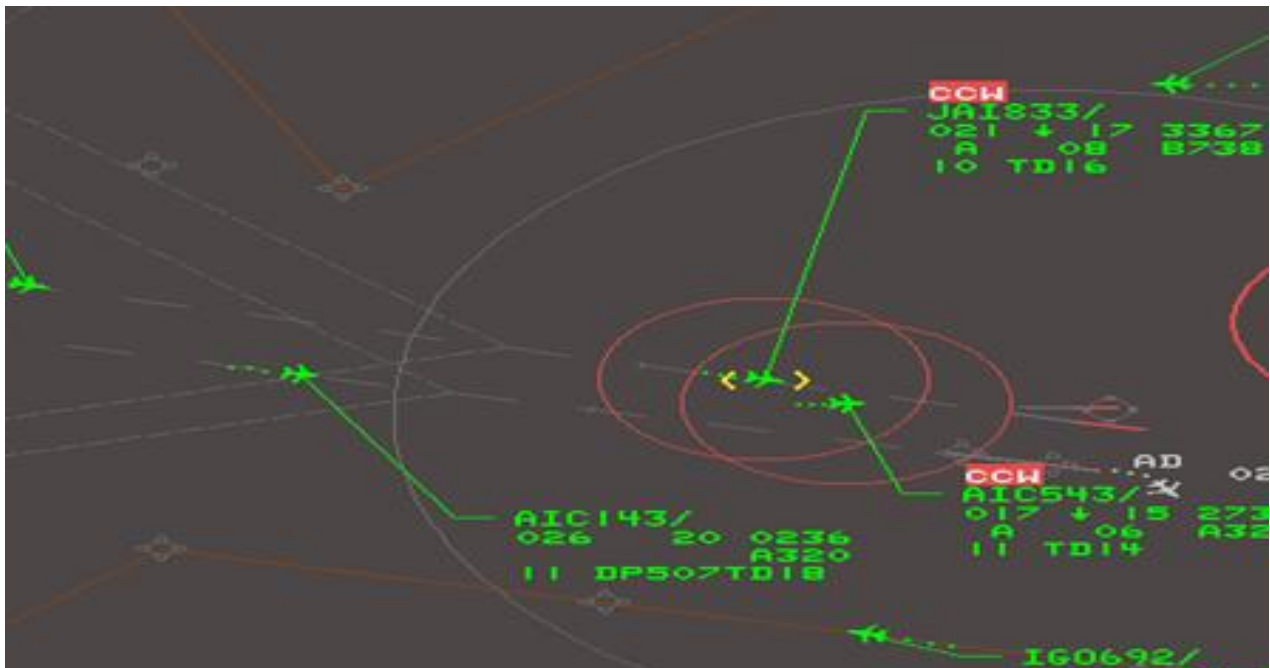
At time 0612, JAI 833 on localizer Runway 10



At time 0612, CCW warning generated



At time 0614, CCW warning still persisted and AIC543 aligned on runway 09



At Time 0615, AIC543 crossed the path of JAI833



At Time 0615, AIC543 discontinue approach and JAI833 initiated Go around



At time 0616, relative position of aircraft after Go around



1.19 Useful and Effective Techniques: Nil

2. ANALYSIS:

At the time of incident three Runway easterly mode of operation was in progress, wherein Runway 09 was being used for departure, Runway 10 for arrival and Runway 11 in mixed mode i.e. both arrival and departures. Due to the orientation of Runway 09 and 10 the extended centerline cross each other at a distance of 1.08 NM from Runway 09 and similarly extended centerline of Runway 09 and 11 intersects each other at a distance of 7.6 NM, west of DPN. The flights established on localizer of runway 09, 10 and 11 will cross the flight path of one another and there will be gradual reduction in lateral separation between them.

The jurisdiction of Approach Control (SA) is within the lateral limits of Approach Control, in the shape of trapezoid, symmetrically placed on either side of DPN VOR, aligned along the approach side, depending upon the direction of flow of width of 30 NM at DPN end and 40 NM from the far end and length of 30 NM (both sides) respectively, excluding the area under the jurisdiction of Approach Departure. When RADAR surveillance is available, the applicable separation minima in the airspace is 1000 ft vertical or 3NM laterally.

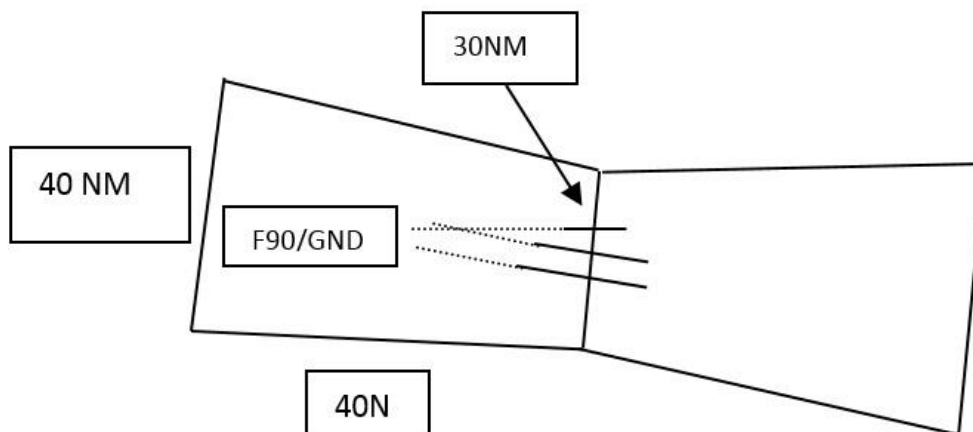


Figure: Jurisdiction of Approach Control (SA sector)

Air India aircraft came in contact with Delhi Area Control Centre at 052130 UTC i.e. 53 minutes prior to the incident, she was advised twice about the Runway 11 for her landing by the Area Control Centre and on both occasions she confirmed the runway by appropriate read back. The Area Control changed the aircraft to Approach Control when Air India aircraft showed her willingness to accept runway for arrival. The Approach Controller on contact with the aircraft confirmed the allocation of Runway 11 to Air India aircraft which was acknowledged by the flying crew. After being released to Approach Arrival from the Approach Controller the aircraft was clearly told that Runway 11 is allocated to her and accordingly the flight was cleared for ILS approach of Runway 11. At about 24 miles away from touch down the Air India aircraft reported established on localizer Runway 11 and further confirmed it at 12 miles from touchdown. After making a further third confirmation, from Air India aircraft about her being established on localizer Runway 11 Air India aircraft was released to Aerodrome Controller South on frequency 125.8 MHz at about 8 NM from touchdown. Upon initial contact with Aerodrome Controller South the Aerodrome Controller instructed Air India aircraft to continue approach for Runway 11 which was read back correctly by the aircraft. The Air India aircraft continued to deviate towards Runway 10 localizer and appeared to be heading for Runway 09 for arrival. The aircraft initiated a missed approach for Runway 09 at time 0615.

The Jet Airways aircraft on the final of Runway 10 was asked to go around due to the conflict of Air India aircraft heading towards Runway 09.

Although the jurisdiction of Approach Controller of all arrival lie with him, till touch down, the aircrafts are changed over to different Aerodrome Controllers depending upon the runway of their landing. These Tower Controllers work on different VHF frequency. There is no mechanism to ensure minimum separation of 3 NM after the aircraft are changed over to Aerodrome Controllers. The tower controllers are not trained in RADAR separations. In case of any conflict the only option left with tower controller is to change over the aircraft to the Approach Controller, or coordinate the instructions with Approach Controller thereby losing precious time for any corrective action to avoid a possible conflict. There is no overriding facility available with Approach Controller to guide the aircraft in case of any conflict after it has been changed over to Aerodrome Controller. AT IGI airport, an in-trail separation of 3 NM minimum radar separation is applied to aircraft established on localizer on adjacent runways, but there is no mechanism to ensure that it is not breached once an aircraft has been changed over to Aerodrome Controller.

A Standard Operating Procedures (SOP) is a set of written instructions that document a routine or repetitive activity followed by an organization. SOPs should be written in a concise, step-by-step, easy to read format and should not be overly complicated. The Standard Operating Procedures (SOP) for three runway operation at IGI airport have been issued as ATC Circular No. 1/2015. This circular covers all the mode of operations, including easterly and westerly mode and does not clearly indicate actions to be taken by various ATC units under different mode of operations. Their role and responsibilities in these conditions have also not been documented in Standard Operating Procedures. There are no instructions/ guidance to act in various contingencies that may arise out of the three runway operations/ mixed mode operations.

A safety assessment of three runway operation was carried out by ATS IGI Airport in the month of May 23, 2012 wherein the overall the magnitude of the change was assessed as MINOR and only three hazards were identified.

Further, three runway operations and even mixed mode operations are a very complex mode of operations and are followed by very few airports in such complex airspace structure as IGI Airport. There is no evidence of the mode of operation being reviewed/ vetted by the CHQ of AAI or the existing operational risks being reviewed by ATS IGI Airport.

ORGANISATIONAL ISSUES:

All the ATC incidents excluding serious incidents are investigated by Airprox Investigation Board (AIB) as constituted by the guidelines contained in DGCA CAR Section 5 (Air Safety) Series 'C' Part I issued on 20th October, 2015. The composition of AIB includes one member from DGCA as convener and two members from ANS service provider, one as member Secretary and the other as member. The members of this board include Director Air Safety/Regional Controller of Air Safety or his representative as DGCA representative; Joint General Manager (ATM-SQMS) and a Joint General Manager Officer from CNS directorate as AAI representative. The presence of Joint General Manager (ATM-SQMS) in this board as a member Secretary is against the established norms of Safety Management System, because the functions of setting the standards, ensuring their compliance at ATS units, and the investigation of ATS incident are vested in the same person. He is also a member of Rating Board of all the Air traffic controller posted at that station and is also responsible for their proficiency check. The role of Joint General Manager Officer from CNS directorate as AAI representative also needs to be clearly stated in CAR.SMS strongly recommends separation of enforcement functions with investigation functions.

There was no evidence or document suggesting the formation of SQMS section in ATM Directorate in Airports Authority of India. Its role and responsibilities have not been defined or documented. Certain safety functions have been appropriated by SQMS section on its own without any authorization. There is no formal or informal order of establishment of SQMS. The SQMS is performing the functions of setting the ATM standards, ensuring their compliance, carrying out the proficiency check of Air traffic Controllers, investigation of ATC incidents, suggesting corrective training to Air Traffic Controllers and finally re-rostering them after an incident which is contrary to the letter and spirit of SMS. They are also responsible for Safety

Review of ATS units in addition to the safety audits or safety review carried out by Aviation Safety Directorate. Evidence could not be gathered about the section which is responsible for the review of Safety Assessment documents for changes in ATM. Even the safety assessment of three runway operation was not reviewed by any section either on its own or during the brief safety review of ATS units.

In a letter No. AAI/ATM/SQMS/21-15/2016 dated 27.05.2016 from SQMS, CHQ to the General Manager, ATM, IGI Airport the following lapses of Approach Controller were identified:

- a. Inadequate surveillance
- b. Non detection of abnormal path of aircraft.
- c. Lack of priority and understanding of the emerging conflict.
- d. Changing aircraft from Control Tower when CCW was in progress.
- e. Unable to visualize the emerging conflict situation.
- f. Not considering the request of Aerodrome Controller Middle to remove Jet Airways aircraft from the approach.
- g. Ignoring the conflict alert from a long time.
- h. Passing instruction to Tower without specifying heading by the Radar Controller.

The above paragraph answers questions relating to – What, when and who? But does not answer the questions relating to – Why and How? The following paragraph will try to answer the questions relating to why and How?

The ignoring of conflict alert by the Approach Controller can be due to either the Approach Controller is incompetent or the system is generating false warnings frequently. Another reason could be that the system is generating frequent true warning when the separation between the two aircraft becomes less than the minimum requirement of 3 NM but it does not create an alarm to the Approach Controller as both the aircraft are established on the respective localizer of their arrival runway.

The Air Traffic Controllers are routinely checked for their proficiency by the local station and CHQ at regular intervals using an exhaustive template which is part of ATMC 6 of 2016. The proficiency check of Approach Controller was carried out by CHQ on 2.12.2012 which rates the

assessment as “Meets the requirements”. Hence, it is assumed that the Controller was competent to handle the Approach Control. The chances of false warning by the system are quite remote and can only happen occasionally. The breach of minimum separation of 3 NM between two arrivals on near parallel runways could be the only possible reason for generation of warning which is being ignored by most of the Controllers, as it does not lead to a serious incident. This violation is being accepted as a norm and doesn't draw the attention of the Controllers in abnormal circumstances. This is called a “Routine Violation”. When such violations happen over a long period of time, the Approach Controller tend to overlook these when an aircraft actually deviates from its localizer path.

The HMI of AT – III Automation System is very different from the HMI of the simulator installed at IGI Airport. A training on simulator might be a very good idea for a fresh Controller who is yet to acquire rating of IGI Airport but may not be appropriate for an experienced Controller undergoing corrective training. He has first to de-learn AT-III HMI, learn simulator HMI, de-learn simulator HMI and re-learn AT-III HMI for performing his TAR duties after the corrective training. The corrective training suggested is arbitrary and unreasonable and may not meet the desired results.

After rostering, a monthly report is required to be submitted to CHQ and DGCA about the performance of the Controller and in case of any significance deficiency in respect of surveillance skill, conflict resolution, AAI may reconsider his continuation as an active Controller. These observations will severely dent the confidence and the morale of the Controllers and points towards a “Blame Culture” where individuals alone are held responsible for the incidents and there is no contribution from the system deficiencies to an incident. This according to the principles of SMS points to an older system of managing safety, where only human errors are given the attention over systemic deficiencies.

On the careful examination of ATMC for the proficiency of Air Traffic Controller it was found that it was not possible to objectively fill the data in the attached template and the bandwidth of the Controllers not meeting the requirement is very large as compared to the bandwidth of the Controllers who meet the requirements. The measuring and assigning of negative marks for some of the elements like knowledge etc. was beyond comprehension and requires revision.

The ATC Circular No. 1/2015 issued by IGI Airport advises the Controller as what is to be done on different mode of operations but does not clearly tell as how it is to be done. The SOPs must contain detailed actions to be performed by each unit so that the instructions are clear and unambiguous. Also the switching off the ILS for runway 09 during three Runway operations in easterly mode should be included in the SOPs for three runways easterly mode of operation and should not have been issued separately.

SAFETY MANAGEMENT SYSTEM:

All organisations in India are required to have an established SMS as per DGCA CAR Section 1 Series C Part 1.

AIRPORTS AUTHORITY OF INDIA:

Effective Safety Management is not only to promulgate rules and set performance targets but also requires a genuine commitment to safety by all concerned. The attitude, behavior, values, beliefs and decisions in an Air Traffic Control (ATC) Unit demonstrate the level of maturity of SMS in an ATC organization. The principal criterion of measuring safety should not be mere absence of accidents and incidents but also must include creation of a conducive environment and positive safety culture where there is low risk taking behavior among all employees.

For the performance Appraisal Report of WSO/Ops Supervisor, TAR Radar Controllers, OJTIs , Air Traffic Controllers, non- rated-non double banker etc., the key performance Areas(KPAs) and Key Performance Indicator(KPIs) have been set for the year 2016-17 where some of the following terms have been used:-

- a. ATC induced Airprox Incidents
- b. ATC induced Runway Incursions
- c. ATC induced missed Approaches
- d. Co-ordination effectively done
- e. Followed all relevant SOP's
- f. Maintained the optimized ATC declared capacity
- g. Number of proficiency/ Performance checks conducted.

The term "ATC induced Airprox & Runway Incursions" could not be understood. The job of ATC is to keep aircraft separated and to provide safe and efficient Air Traffic Control. In no

way, it induces Airprox and Runway Incursions. These are rather aberrations in an otherwise safe system. However “ATC induces Missed Approaches” are possible and these are to prevent a potential unsafe situation and is generally resorted as a safety measures.

Worldwide, Controlled human error is considered as an integral part of an inherently safe system. These KPAs and KPIs do not recognize that human error is a normal component of a safe system including an ATC system. It is rarely that an individual alone is responsible for Airprox or Runway incursion incident rather it is a combination of human errors, system deficiencies, and work place conditions etc. which lead to incidents. Human error is just one of the element of Accident or Serious incident causation. It is job of the organization to develop systems which are tolerant to human error and to remove system deficiencies identified during normal operations or in any investigations.

KPAs/KPIs have been developed quantitatively and that to in percentages. It is extremely impracticable to find out percentage for each element. For example, “Coordination effectively done” will require calculation of total number of coordination done in a period of time and the total number of coordination done inefficiently during the same period. In fact, ineffective coordination is only highlighted in the aftermath of a serious incident and it is not possible to calculate it in otherwise a normal routine manner. Human performance especially for ATCOs should normally be assessed qualitatively.

All the KPAs/KPIs are outcome oriented and does not reflect the efforts of Air Traffic Controller in ensuring smooth, efficient and safe aircraft operations. All the KPAs/KPIs have negative connotations. All the negative outcomes are probably highlighted whereas the positive work is certainly being ignored. Absence of negatives is treated as positive. KPAs/KPIs for ATCOs captures all “what was not done by the controllers” but does not capture “what was done by the controller”. The number of Airprox in a system cannot be the metrics for the performance of ATCOs. It is based on the hypothesis that individual alone are responsible for “Airprox” and there is no contribution from other factors. This will deteriorate the safety culture in an organization.

Maintaining of capacity at any airport is essential to reduce congestion and for orderly flow of traffic but to link with the performance of an Air Traffic Controller is not desirable. Is it

possible to calculate optimize capacity for each hour for each controller at an airport? The controller is just one part or a sub-set of a larger system of Air Traffic Management where software, hardware and people interact in a particular controlled environment. Assigning percentages for each controller for maintaining capacity is not an easy task and will require a lot of trained human resources.

Holding WSO responsible for Airprox during his shift requires reconsideration as an Air Traffic Controller is rated after undergoing through training and on successful completion of arduous process, he/she is rated to perform or work in a unit independently without any outside interference. In a shift of 60 ATCOs, it is physically impossible to a WSO to monitor each and every rated controller. This challenges the very basics of awarding of rating to eligible controllers.

Standard Operating Procedures (SOPs) are important documents for maintaining safety and are required to be followed. The KPA of “Followed all relevant SOPs” and measuring it in percentages is not good idea and requires reconsideration.

An organization with no safety management system in place may not encounter any accident or incidents whereas an organization with a robust SMS may encounter some accidents/incidents. This certainly does not mean that an organization with no SMS is better than an organization with a robust SMS. KPS/KPIs of Air Traffic Controllers may be changed from outcome orientation to process orientation.

AIR INDIA:

Air India has an established SMS in the organization. While reviewing the SMS in the context of this specific occurrence, the flight crew after carrying out a “Missed Approach”, did not report the matter in the “Tech-Log” nor was this matter reported to the company in spite of being an “incident”. This lead to a situation that the CVR was not downloaded leading to loss of crucial evidence.

This would indicate that the organization needs to work on improving “Reporting Culture” which must be non-punitive in nature.

WORK PLACE CONDITIONS:

Although in-trail operations are followed in three runway operations at IGI Airport, Delhi and a minimum separation of 3 miles is to be ensured by the Approach Controller which is achievable since the Approach Controller is handling both the arriving aircraft on runway 10 and 11 on single Approach frequency. However, once an aircraft has been changed over to the Aerodrome Control Tower, the requisite separation of 3 miles cannot be ensured as both the aircraft are working on different frequencies and there is a loss of situational awareness to the other Tower Controller in case of deviations.

As per Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways SOIR Doc 9643 the Approach Controller should have an overriding facility over Tower frequency to take corrective action in such cases. This has not been provided at IGI Airport even in such complex and heavy traffic. The sequential Approach Controller is responsible for providing separation and sequencing the arrivals to their respective Runways as well as maintaining a watch on arrivals changed over to the Tower Controller. This seems very difficult to achieve in moderate to heavy traffic scenario considering human factor issues.

LATENT CONDITIONS:

The overall Safety magnitude of the change for the safety assessment of three runway operations which is one of its kind was assessed as MINOR for both mode of operations i.e. easterly and westerly. Only a few hazards were identified for both mode of operations. The hazard identified were generic in nature and do not specifically relate to three runway operations at IGI Airport. The Safety Assessment document was not reviewed by SQMS section although they have issued an ATMC for Safety Review of ATS units. The Safety Assessment of East and West modes should have been conducted separately as the hazards and associated risks for both modes will be different to devise a credible mitigation of each risk.

The only remedial action taken in the aftermath of this incident by IGI ATS, was to issue of a circular wherein the ILS for Runway 09 will be switched off during easterly mode of three runway operation. This may not be sufficient if the aircraft by mistake chooses Runway 10 or deviates inadvertently towards the other Localizer. An error can also be made by Air Traffic

Controller by giving wrong turn during the final approach for three runway operations. This hazard along with associated risks needs to be assessed by ATS IGI Airport.

ERRORS AND VIOLATIONS:

The Approach Radar Controller ignored the current conflict warning presented to him on Radar screen and continued to work with other aircraft.

As Aerodrome Control has no jurisdiction over arriving aircraft but only VHF contact, the only option left to him is to change the aircraft to Approach Controller. The Aerodrome Control Tower middle on his own cannot decide about the action to be taken nor could he suggest any heading to Jet Airways aircraft to resolve the situation.

The Aerodrome Control Tower south could not decide about the action to be taken even after noticing that Air India aircraft is heading towards runway 09 and aircraft on its own initiated the missed approach procedure.

DEFENCES:

The defense available to the Air Traffic Controller in the present scenario was the SOP of three runway operation which has been issued as an ATC Circular No. 01/2015, by ATS IGI Airport. Both the easterly and westerly mode of operations have been consolidated in this one ATC circular. It is a circular for conveying various mode of operations available along with their associated nominal spacing between arrivals and not Standard Operating Procedure which must contain actions specified for each ATC unit for various situations arising out in each mode of operations. There are no clear and unambiguous instructions either to the Approach Controller or Tower Controller in the circular. In the absence of these specific instructions, there was no credible defense available to the Air Traffic Controllers in Aerodrome Control Tower in case of deviation by any aircraft.

The other system defense was generation of current conflict warning. The reasons of ignoring current conflict warning by the Approach Controller could not be conclusively established. It could be either due to false generation of current conflict warning by the system or due to frequent breach of separation during final phase of landing during various mode of

operations wherein the Approach Controllers start ignoring these alerts as the aircraft are established on localizer. The generation of current conflict warning should immediately draw the attention of the Approach Controller for its being credible and effective.

Invoking of RBL (Range Bearing Lines) by the Aerodrome Controller is a useful tool for ascertaining the separation but does not provide any defense to the Aerodrome Controller in case of breach of separation. Valuable time will be lost by first ascertaining the separation between two arriving aircraft by using RBL and then changing the aircraft to Approach Controller for resolution of conflict. Moreover, it needs to be effected with prior coordination which also takes a little time. In the absence of overriding facility available to Approach Controller, immediate intervention by Approach controller to resolve the conflict is very low. Although the jurisdiction of Approach Controller extends till touchdown, it remains to be seen as to which unit is best suited to give the avoiding action.

Both the aircraft going around at the same time in these circumstances may not achieve the desired separation and this hazard needs to be analyzed during safety assessment process and credible defense needs to be put in place. Further, in spite of the fact that Delhi regularly faces issues of poor visibility and weather, they have not been taken into account while assessing the safety of the 3 Runway/mixed mode of operations. The Hazard of "Both Aerodrome Controller co-ordinating with Approach controller at the same time" during these situations also needs to be analyzed.

The ICAO Document of Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways SOIR Doc 9643 clearly states the requirements for operations of such kind. However, a lot of requirements are not being followed. The deviations from the established Doc 9643 need to be published. The recommendations of the Doc which specifically states the special care needs to be taken in case of operation where arrival paths are intersecting have been ignored. The Doc specifically gives the example of pilot selecting wrong ILS and intersecting the path of another aircraft and the importance of the need to safeguard against such errors. The 'in trail' separation of 3NM is in fact the minimum RADAR separation that can be applied at IGI Airport. So there is no 'margin of error'. The Doc also recommends that the Tower Controllers in such scenario be trained in the basics of RADAR.

DFDR ANALYSIS:

Airbus A320 "Auto Flight" Chapter 22 clearly details that when all the required arming conditions are met, aircraft automation (Auto-Pilot) will intercept the programmed ILS and descend on profile.

DFDR analysis as provided by Airbus based on the query raised by the committee (In bold are the replies from Airbus):

1) Localiser frequency at Top of Descent:

ILS frequency not valid at Time of Descend. Became valid at 31800ft: Frequency ILS1&2 =108.5 Mhz and does not change till go-around.

2) Localiser frequency at 25 DME: **No change**

3) Localiser frequency at 8 DME: **No change**

4) Flight Directors were on or off at 08 DME: **FD1+2 still selected ON.**

5) Flight Directors were on or off at the time of initiating Go-Around: **FD1+2 still selected ON.**

6) Auto Thrust was on or off at at 8 DME and at the time of Go-Around: **Auto-thrust engaged and active in SPEED mode.**

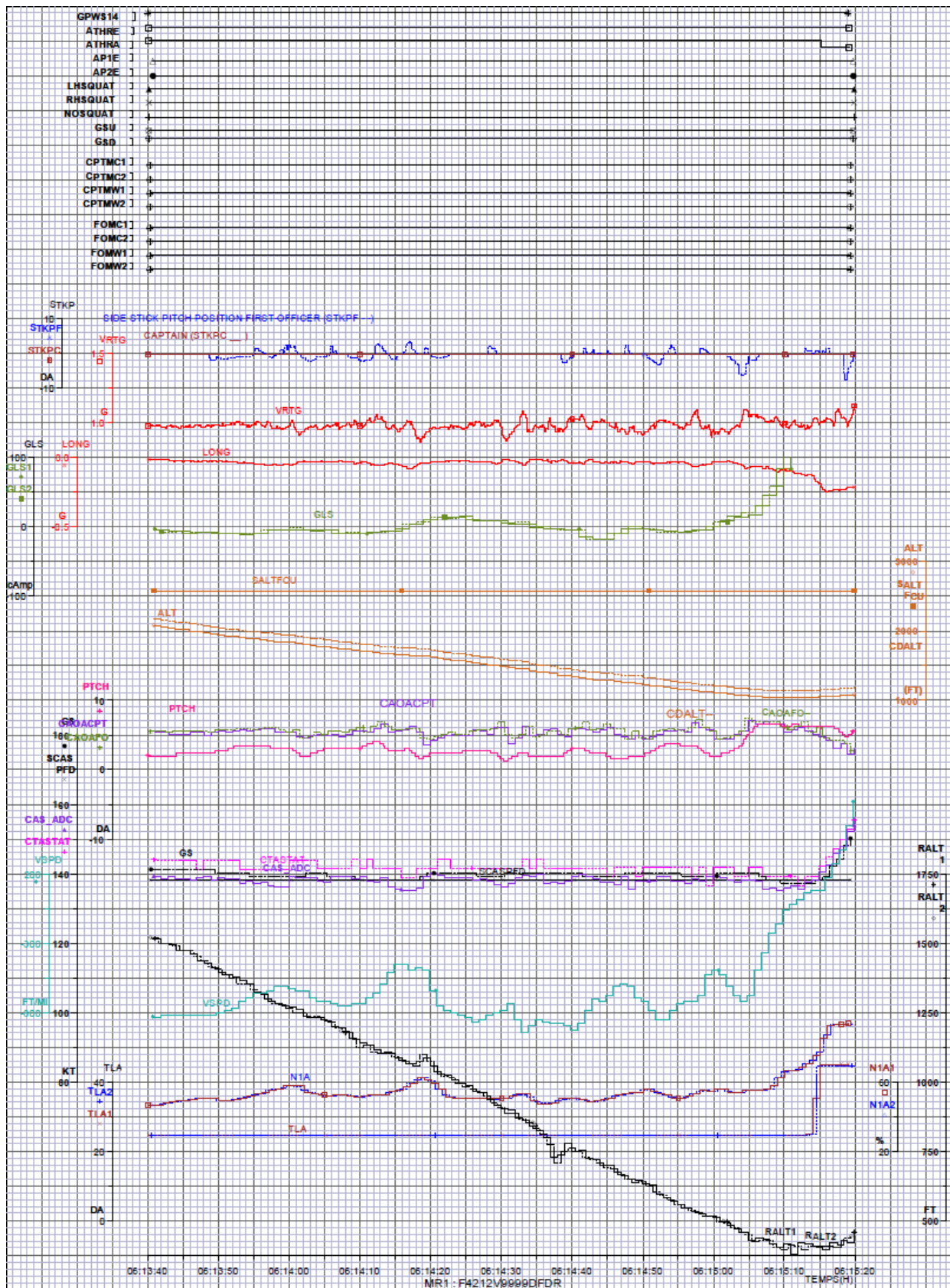
7) Auto-Pilot was on or off at 15 DME, 08 DME and at the time of Go-Around:

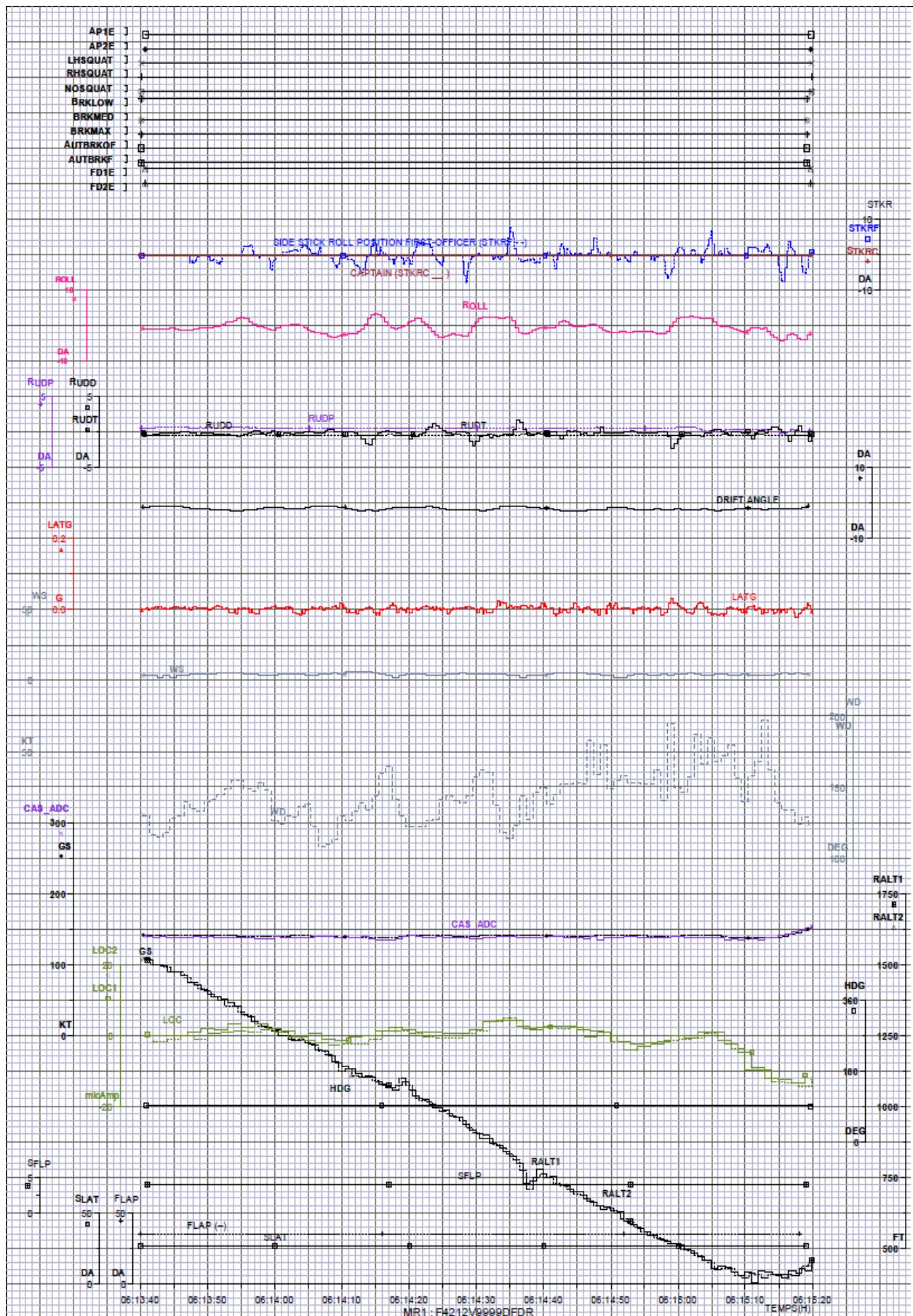
AP1 engaged during approach. AP2 engaged at 06:10:53 UTC for 2 sec. AP1+2 voluntarily disengaged at 06:13:26 UTC, 5NM DME and 2600ft QNH.

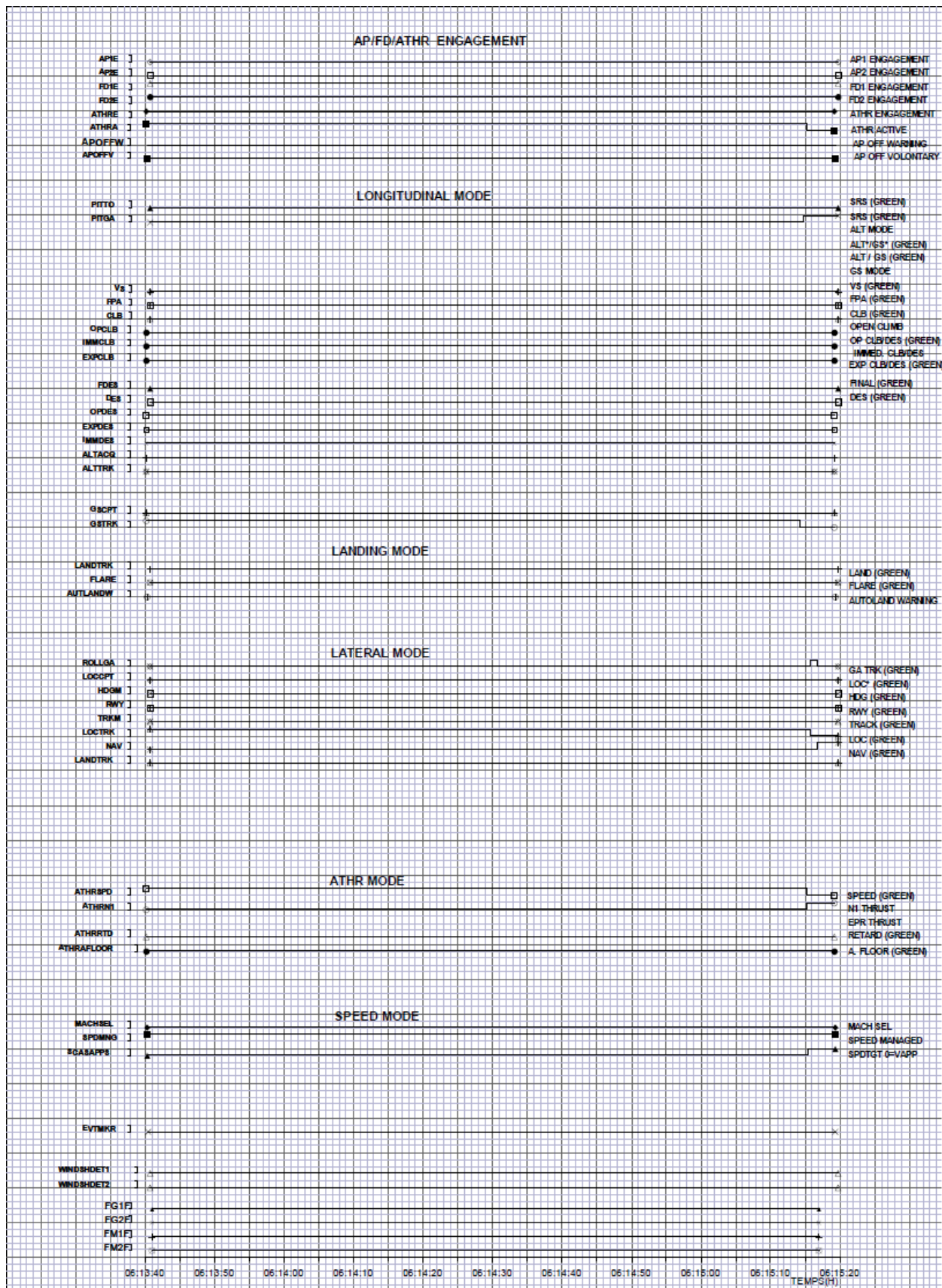
8) Pilot flying was from right or left seat: **PF was on First Officer.**

9) Heading & Track: **See plots and parameters definition in attachment.**

10) Ground Speed & Indicated Airspeed: **See plots and parameters definition in attachment.**







Post the flight data analysis by Airbus, it is now clear that the ILS frequency was 108.5 Mhz. i.e for ILS runway 09 at Delhi from 31800 feet till the aircraft carried out a go-around on runway 09 at Delhi. This would indicate that wrong runway was programmed in the “Flight Management System” (FMS) by “Pilot Flying” (PF) and same was not crossed checked by the “Pilot Monitoring” (PM). Hence the error remained undetected by either flight crew members. With the “Autopilots” engaged the aircraft would follow the FD commands which in turn were following the programming in the FMS.

Aircraft was vectored by the ATC (Delhi) for runway ILS 11, the aircraft continued on the last assigned heading 075 provided by the ATC and intercepted the ILS for runway 09 due to wrong programming of the FMS.

Flight crew at no stage realized the error and continued with the approach after intercepting the Localizer & thereafter the ILS (Glideslope) for runway 09.

SOP’s for the approach:

DESCENT PREPARATION	
PF	PM
	WEATHER AND LANDING INFORMATION..... OBTAIN
NAV CHARTS CLIPBOARD PREPARE	NAV CHARTS CLIPBOARD PREPARE
EFB SYNCHRO AVIONICS <A> CLICK	EFB SYNCHRO AVIONICS <A> CLICK
LDG PERFO CONFIRM	LDG PERFO CHECK
FMS..... PREPARE	FMS PREPARATION..... CHECK
	GPWS LDG FLAP 3..... AS RQRD
LDG ELEV..... CHECK	
AUTO BRK..... AS RQRD	
APPR BRIEFING..... PERFORM	
TERR ON ND <A> AS RQRD	TERR ON ND <A> AS RQRD
RADAR..... ADJUST AS APPROPRIATE	
	ENG ANTI ICE pb-sw..... AS RQRD
	WING ANTI ICE pb-sw..... AS RQRD
	DESCENT CLEARANCE..... OBTAIN
CLEARED ALTITUDE ON FCU..... SET	

As per the Airbus “Normal Procedures” as defined in the QRH, during “Descent Preparation”, PF is required to “prepare the FMS” (Preparation/ programming of the FMS would include the following: selection of the runway which the ATC confirms or ATIS relays & the approach associated with it ILS/ VOR/ NDB etc., tuning the correct navigation aid for the approach, wind, temperature, QNH, MDA). Post Preparation/ programming, these need to be crossed checked by the PM to ensure correct programming has done by PF.

During the interview with the flight crew, it was confirmed that the PM programmed the FMS and same was crossed by the PF, however with the flight data analysis provided by Airbus indicates that the error in programming was not trapped by the PF.

James Reasons Cheese Model of accident causation:

Organization:

Air India Operations manual Part “A” Para 23.1.2 was reviewed by the committee and it was observed that there was no mention about cross-checking of the FMS by the “Pilot Monitoring” after the FMS has been programmed by the PF. Although the Airbus SOP’s are clear about cross-checking the FMS after being programmed, but company policy does not endorse the same.

Air India Operations Manual Part “A” Para 29.01 “Crew Co-ordination” does clearly specifies the following “**All critical actions such as....., changes to FMS and Radio Nav aids during departure and /or approach phases of flight must be cross checked and confirmed**”. However it does not specify who will cross-check the same, but is assumed that the intent of the “Operations Manual” is that Airbus SOP’s is to be applied. i.e the PF will prepare the FMS and PM will cross-check the FMS entries.

Unsafe Supervision:

“Quality Control” at departmental level must trap such anomalies in the briefing or should have been detected during “Observation” flight by senior trainers.

Pre-Condition to unsafe acts:

Flying of two “Commanders” in the past has led to various incidents/ accidents due to a flat “Trans-Cockpit Authority Gradient”. Further “Flight Discipline” plays a major role in the how the flight deck is managed. It remains the responsibility of the senior pilot to ensure professionalism.

Airline if they wish to utilize two commanders for the same flight must have a robust program to ensure the authority gradient is not diluted.

Unsafe- Act:

Pilot Monitoring did not to check the FMS and the wrong programming of FMS went undetected.

Decision to Go-Around:

Flight crew decision to “Go-Around” was correct and there after flight crew followed ATC instructions leading to an uneventful landing at Delhi.

During the interview, flight crew mentioned that moment they realized they had aligned themselves to the wrong runway, they initiated “Go-Around”.

3 CONCLUSIONS:

3.1 Findings:

1. Air Traffic Controllers were not licensed as per Aircraft Rules 1937 (Schedule III), however were holding valid & current ATC ratings.
2. Three runway easterly mode of operation was in progress, wherein runway 09 was being used for departure, runway 10 for arrival and runway 11 in mixed mode i.e. both arrival and departures.

3. The Air India aircraft was on a scheduled flight (Shamshabad – Delhi) under the command of an appropriately licensed ATPL holder with another ATPL holder as FO.
4. The Jet Airways aircraft was on a scheduled flight (Bengaluru – Delhi) under the command of an appropriately licensed ATPL holder as Captain and CPL holder as FO.
5. The medical of Air India cockpit crew were valid. Both have undergone pre-flight medical checks before commencing the flight and BA test was found negative for both the crews.
6. Jet Airways aircraft went around due to ATC instructions.
7. No abnormalities were observed on the Air India flight from Hyderabad, enroute and the approach was stabilized.
8. Traffic density with Delhi Approach Arrival was moderate.
9. Weather was fine with a reported visibility 1200 meter and wind 170^o/ 04 knots.
10. Air India aircraft was allotted Runway 11 for arrival and Jet Airways aircraft was allotted Runway 10 for arrival.
11. Air India aircraft reported established on localizer of Runway 11 at time 0611 UTC.
12. Air India aircraft confirmed established on localizer of Runway 11 twice.
13. Jet Airways aircraft was vectored for ILS approach Runway 10 and was changed over to Aerodrome Control (Middle) at 9 miles from touchdown after establishing on localizer Runway 10.
14. Air India aircraft did not establish localizer of Runway 11.
15. Air India aircraft continued to deviate towards Runway 09 thereby on a conflict course with Jet Airways aircraft established on localizer Runway 10 and behind Air India aircraft.
16. Initially, the Aerodrome Controller Middle asked Jet Airways aircraft to continue approach & passed traffic information and immediately, thereafter asked her to go around.
17. Air India aircraft on its own discontinued approach at time 0615 and carried out a missed approach.

18. Although the jurisdiction of Approach Arrival extends till touchdown of the aircraft, there is no overriding facility available to him to contact aircraft in case of any exigency.
19. Aircraft on ILS approach Runway 11 and 10 are changed to Aerodrome Control Tower South and North on two different frequencies.
20. There is no mechanism in place to ensure a minimum separation of three miles between the aircraft once they are changed over to Aerodrome Control.
21. There was no doubt that the intended Runway for landing for Air India aircraft is 11 either by the Air Traffic Controllers or the pilots of the aircraft.
22. The incident was not logged by the Approach controller as per the standard procedures.

3.2 Probable cause of Incident

- The selection of wrong localizer runway by Air India pilot.


3.3 Contributory Factors

- 1) The localizer of Runway 09 was kept 'ON' position although Runway 09 was being used for departure only.
- 2) The crew of Air India aircraft did not re-check the localizer frequency in spite of being reminded a number of times about Runway 11 allotted to her.
- 3) The Approach Controller changed over Air India aircraft to Aerodrome Controller without visually ensuring on situation data display that aircraft is established on localizer of Runway 09.
- 4) Inadequate Hazard Identification and Risk assessment for mixed mode of operations.
- 5) Non- availability of appropriately and well documented Standard Operating Procedure in general and for three runway operation in particular.
- 6) The ATC Automation System annunciated Current Conflict Warning (CCW) did not draw the attention of the controller to the impending situation and lag in response by ATC member for corrective action.

4 SAFETY RECOMMENDATIONS

1. DGCA must review the issuance of licenses to “Air Traffic Controllers”. This has been a recommendation of previous accident investigation reports as well.
2. DGCA to review Civil Aviation Requirements (CAR) Section 5 (Air Safety) Series ‘C’ Part I issued on 20th October, 2015 on composition of Airprox Investigation Board to avoid conflict of interest.
3. AAI to clearly document functions of SQMS section. It should separate enforcement and investigation functions of SQMS section.
4. The safety assessment of easterly and westerly mode of three runway operation may be carried out again by AAI keeping the future air traffic growth in mind.
5. “Safety Risk Assessments” carried out by AAI & all operators must be realistic in nature and identify “Hazards” with appropriate mitigation procedures in place.
6. During “Easterly “ mode of operation, AAI must explore the possibility of using one runway for arrival & one runway for departure, considering the nature of risk involved due to substantial overlapping of vectoring areas of the three runways.
7. It should be ensured that safety is not jeopardized while preparing the Mode of operations for expeditious conduct of Air Traffic.
8. AAI may develop Standard Operating Procedures for ATS IGI Airport by clearing documenting the roles and responsibilities of various units. A standard format for SOP’s may be developed.
9. AAI must provide refresher training (periodical) on human factor issues to avoid such incidents in future.
10. The Tower Controllers in present scenario be trained in the basics of RADAR and authority be given to advise aircraft to discontinue the approach by giving specific headings to avoid any conflict in case of deviations from the final approach track.
11. Tower Frequency overriding facility may be provided to approach controller.

12. AAI & AI both must work on improving "Reporting Culture" (Mandatory/ Voluntary) in a non-punitive manner.
13. AAI to review the ATMC for the proficiency of Air Traffic Controllers and the Key Performance Area's & Key Performance Indicators for Air Traffic Controllers at IGI airport to ensure that they are not outcome oriented but process oriented.



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Place: New Delhi

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