



**FINAL INVESTIGATION REPORT  
OF  
AIRPROX INCIDENT BETWEEN  
FLIGHT HK053 and IGO647 IN  
CHENNAI ACC  
ON 21/05/2018**

**AIRCRAFT ACCIDENT INVESTIGATION BUREAU  
MINISTRY OF CIVIL AVIATION  
GOVERNMENT OF INDIA**

## **FOREWORD**

This document has been prepared based upon the evidences collected during the investigation and opinion obtained from the experts. The investigation has been carried out in accordance with Annex 13 to the convention on International Civil Aviation and under Rule 11 of Aircraft (Investigation of Accidents and Incidents), Rules 2017 of India. The investigation is conducted not to apportion blame or to assess individual or collective responsibility. The sole objective is to draw lessons from this accident which may help in preventing such incidents in future.

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## LIST OF ABBREVIATIONS

AAI	Airport Authority of India
ACC	Area Control Centre
AIDC	Inter-facility Data Communications
ATC	Air Traffic Control
ATCOs	Air Traffic Controllers
ATS	Air Traffic Service
CA	Conflict Alert
CVR	Cockpit Voice Recorder
ETA	Estimated Time Arrival
FDD	Flight Data Display
FDR	Flight Data Recorder
ILS	Instrument Landing System
MAA	Madras
MATS	Manual of Air Traffic Services
MTC	Mid-Term Conflict
MTCD	Mid-Term Conflict Detection
ND	Navigation Display
NOTAM	Notice to Airmen
OCC	Operation Control Centre
PLC	Planning Controller
RA	Resolution Advisory
RSR	Route Surveillance Radar
SDD	Situation Data Display
TLI	Temporary Local Instructions
UMM	Upper Chennai
UTC	Coordinated Universal Time
VHF	Very High Frequency
VOBL	Bangalore Airport
VOMM	Chennai Airport
VOVZ	Vizag Airport

## **1.0 FACTUAL INFORMATION**

### **1.1 History of Flight**

On 21/05/2018, at 1618 UTC, there was an Airprox incident between flight HK053 (Vizag to Vizag) and IGO647 (Vizag to Bangalore) where both flights received Resolution Advisory (RA). Flight HK053 had departed from Vizag for carrying out touch and go exercise at Vijaywada. At the time when incident of RA occurred, flight HK053 was climbing to FL 250 with Vizag control as destination and flight IGO647 was on the reciprocal track maintaining FL 240.

Before HK053 got airborne from Vizag, Vizag ATC had coordinated estimate of HK053 as Vizag- Overhead Vijaywada – Vizag with outbound FL260 and inbound FL250. However, as per flight plan, HK053 was carrying out practice diversion to Vijayawada (including touch and go) and had requested Vijayawada Tower for a practice ILS approach for RWY 26. Vijayawada Tower had approved the practice ILS approach RWY 26 and thereafter coordinated with Chennai ACC for climb of HK053 to FL250.

HK053 was displayed on Controller Situation Data Display (SDD) as synthetic track based on flight plan data until 161728 UTC. Thereafter, it was displayed as surveillance track on real time basis. After ILS approach practice on RWY 26 at Vijayawada, at 1608 UTC, HK053 was climbing to FL250. As the separation (Vertical) between the two aircraft was reducing, the Chennai Automation System generated Mid Term Conflict Detection (MTCD) warning in Red on SDD between HK053 and IGO647. In addition, Airspace Warning (AS) was also displayed for HK053 and IGO647.

The minimum vertical separation between these aircraft reduced to 200 feet while no horizontal separation existed thereby causing airprox incident with proximity categorization as "A". Evasive action was taken by both aircraft as per the command given for resolving the conflict.

The sectors UMM (North) and UMM (South) were combined and traffic density observed was medium to high. It was observed that surveillance controller after the incident was not responding to the call by IGO647, HK053 and IGO342 (relaying for IGO647), however, during the said period, other aircraft were issued instructions. IGO647 did not return to the original clearance (FL240) once clear of conflict and maintained FL245 until cleared to climb to FL340.

## **1.2 Injuries to persons**

Nil

## **1.3 Personnel Information**

Flight crew of both aircraft was having appropriate qualification and experience to undertake the respective flights.

## **1.4 Damage to aircraft**

Nil

## **1.5 Other damage**

Nil

## **1.6 Aircraft information**

Both aircraft were Jet engine powered aircraft.

## **1.7 Meteorological information**

Not Applicable

## **1.8 Aids to Navigation**

All navigational aids on the aircraft and at airport were working satisfactorily.

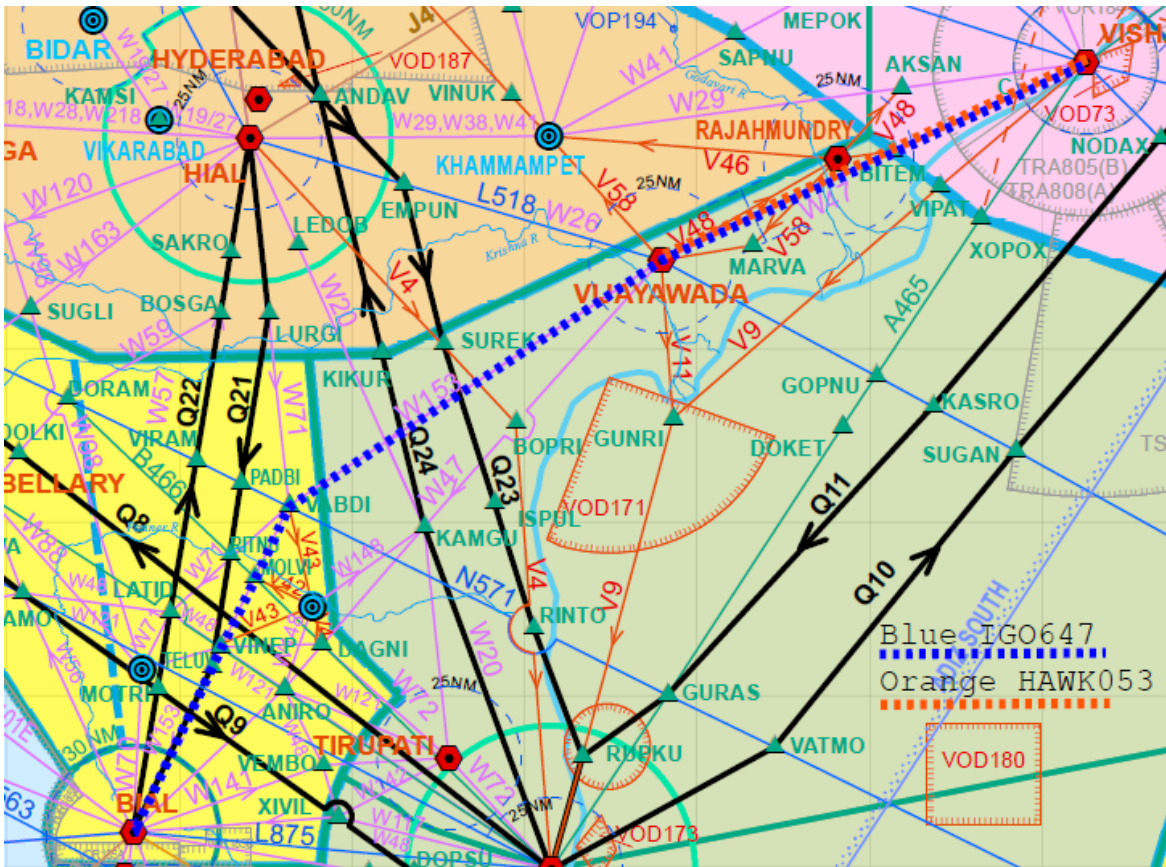
## **1.9 Communication**

There was two way communication between the aircraft and ATC. The transmission from MAA ATC, as heard in cockpit of IGO647 had some scratching sound. As per the crew, they were having difficulty in understanding the

transmission. Due to heavy traffic density, at times, there was overlapping of transmission.

### 1.10 Aerodrome information

The flight IGO647 had taken off from Vizag with Bangalore as destination. HK053 after carrying out ILS approach at runway 26 of Vijayawada was returning to Vizag. The airspace jurisdiction and the flight paths are as shown below.



### 1.11 Flight recorders

Both aircraft were fitted with CVR and FDR.

### 1.12 Wreckage and impact information

There was no damage to any of the aircraft.

### **1.13 Medical and pathological Information**

Nothing adverse was reported regarding the pre-flight medical of the pilots.

### **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**

Flight IGO647 was operated by a scheduled airlines. The flight HK053 was operated by Indian Navy Aircraft. The Air Traffic Control was provided by the Airports Authority of India (AAI). The incident occurred when the aircraft were in the jurisdiction of Chennai control. Normally, one rated Surveillance Controller (RSR) and one rated Planning (PLC) controller assisted by Flight Data Assistant (A) are deployed in an ACC Sector.

The duties and responsibilities of ATCOs deployed in Area Control Unit/ Sectors as contained in Manual of Air Traffic Services (MATS) Part 2 (Vol 1) for Chennai Airport and relevant to the present incident are as below:-

#### **✚ Duties and responsibilities Of ATCOs deployed in Area Control Unit/ sectors**

- **SURVEILLANCE CONTROLLER** shall be responsible for
  - Providing Surveillance based Service as per the coverage limitation/availability of surveillance sensor, using the SDDs, within the jurisdiction of respective Sectors, consistent with procedures specified in MATS Part 1.



- Coordinating with adjacent sector for resolving traffic when aircraft from own sector may conflict with traffic in the adjacent sector.
- Providing Flight Information Service and alerting service to all flights operating within the jurisdiction of respective Sectors.
- Co-ordinate with the Planning Controller any modification of clearance to adhere to the procedural requirement as and when necessary.
- **Relevant procedures to be followed by Surveillance Controller while handling the traffic are**
- In case of failure of SDD / VHF in one sector, the other bifurcated sector will cater to traffic in both sectors till alternate arrangement is completed to operate the sector from another position or another frequency.
- In case of total surveillance failure, respective sectors will continue to provide procedural control.
- With a view to reducing unnecessary RA triggers, controllers may provide 2000 ft separation instead of 1000 ft in situation where the climb and descent of aircraft takes place in close proximity.
- **PLANNING CONTROLLER shall**
- Maintain & update FPS. Display & Modify relevant FDE for the sector.
- Co-ordinate with the Radar Controller on the tasks required, e.g. level change, time required over exit way point fixes etc., and assist in meeting the situation objective;
- Allot flight levels to adjacent ATS units for aircraft prior to departure as per coordination procedures;
- Level clearance/estimate revision for all other flights transitioning from UMM to OCC.
- Alerting the surveillance Controller on conflicting traffic;
- Monitor the VHF frequency when Radar service is provided and ensure co-ordination with adjacent ATS units whenever required.

- Ensure that the applicable separation exists at the sector exit points and the Coordination is effected with adjacent ATC Centers through AIDC or voice as applicable in respect of all flights in accordance with LOA.
- **FLIGHT DATA ASSISTANT shall**
  - Operate FDD/intercom/ telephones/ DSC and if unserviceable inform SSO;
  - Coordinate the current clearances with adjacent ATS Centers/ Sectors.
  - Maintain close watch on the AIDC window in respect of Inbound & Outbound messages and assist the Planning Controller in updating the FTL.
  - Process flight plan/estimates as per Chapter 5 of the manual and manage FPS on automated printer or manually as required.

## 1.18 Additional information

### 1.18.1 Chronology of Events (As per ATC tapes replay)

TIME	EVENT
15:32:02	Vizag ATC passes estimate of HK053 to UMM: that it is a local flying from VOVZ to VOVZ and confirms that “ <i>overhead Vijaywada jayega</i> ”. Expected departure time was given as 1535 with a request for FL260 outbound and FL250 inbound. Vizag ATC checks the FL and UMM-A reconfirms the level as FL260.
15:41:21	Vizag ATC asks for clearance of IGO647 VOVZ to VOBL requesting FL380. UMM-A clears FL240 for IGO647.
15:48:13	Vizag ATC calls UMM and informs that HK053 airborne 1540; Estimate BITEM 1554; KM 1606 & BBZ 1620. UMM-A reads back the estimates.
16:00:55	UMM controller calls Vizag ATC and asks what level HK053 is climbing to. Vizag ATC informs that HK053 is climbing to FL260. UMM controller wants to know whether IGO647 is airborne and what level it will be climbing to. Vizag ATC informs that IGO647 is airborne and climbing to FL240.

- 16:07:04 IGO647 calls Chennai UMM-R and reports airborne from VOVZ and passing FL146 for FL240. UMM-R advises IGO647 to report when released by Vizag ATC.
- 16:08:01 IGO647 calls UMM-R and reports released by Vizag ATC and requests for FL380. UMM-R advises IGO647 to Standby.
- 16:08:55 UMM calls Vizag ATC and asks current position & level of HK053. Vizag ATC asks whether HK053 is not in contact with UMM. UMM controller says HK053 not in contact with them and asks to whom the aircraft was changed over by Vizag ATC. Vizag ATC informs that they changed over HK053 to Vijaywada.
- 16:10:25 UMM-A calls Vijaywada ATC and enquires about HK053. Vijaywada ATC says HK053 making Touch & Go at Vijaywada. UMM-A asks what is his current position. Vijaywada ATC informs Touch & Go at time 1608 and aircraft is on track to VOVZ requesting FL250. UMM-A asks him to hold and as per the statement of the Alpha controller the line got disconnected at that stage.
- 16:10:55 Snapshot of UMM-R shows IGO647 passing FL218 and the synthetic track of HK053 now outbound from BBZ to VOVZ with assigned level FL260.



16:11:16 UMM-P calls Vijaywada ATC and enquires about HK053. Vijaywada ATC informs HK053 is now outbound from Vijaywada to Vizag requesting level FL250.

UMM-P asks if HK053 is in contact with Vijaywada. Vijaywada ATC confirms.

UMM-P checks for the availability of the requested level i.e. FL250, which Vijaywada ATC confirms.

UMM-P informs Vijaywada ATC that FL250 is approved. Vijaywada ATC passes ETA VOVZ of HK053 as 1640 and UMM-P reads back the ETA.

16:12:50 Snapshot of UMM-R shows IGO647 reaching FL240 and since the assigned level was still wrongly showing as FL380, the system generated MTCD warning between IGO647 and HK053 & IGO3869.



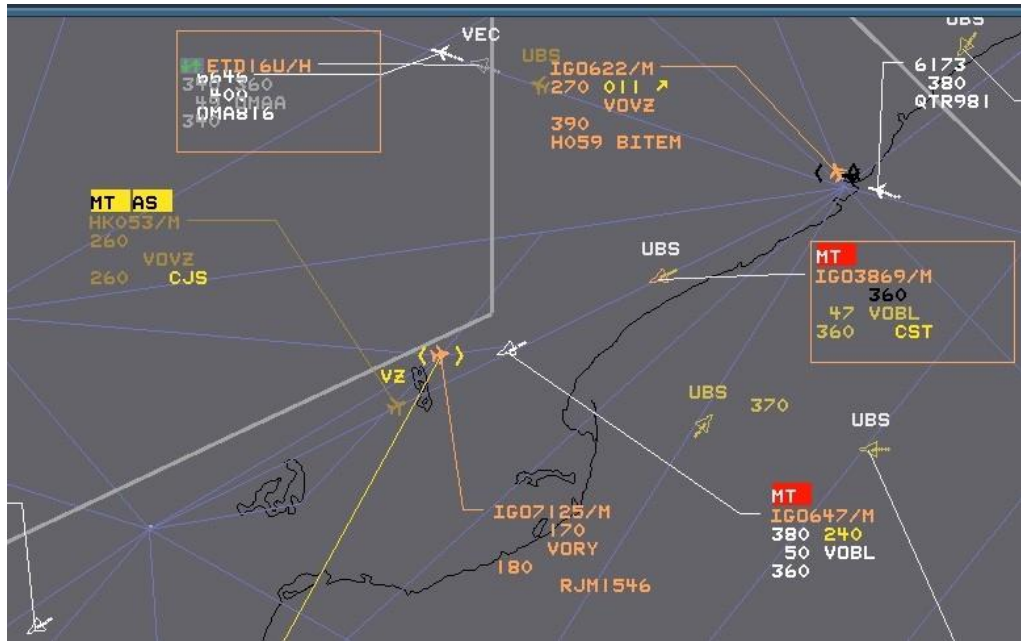
16:12:55 IGO647 requests for radio check and UMM-R reports readability five.

16:14:27 IGO647 asks whether UMM-R is reading him. UMM-R reports reading five and advises aircraft to go ahead.

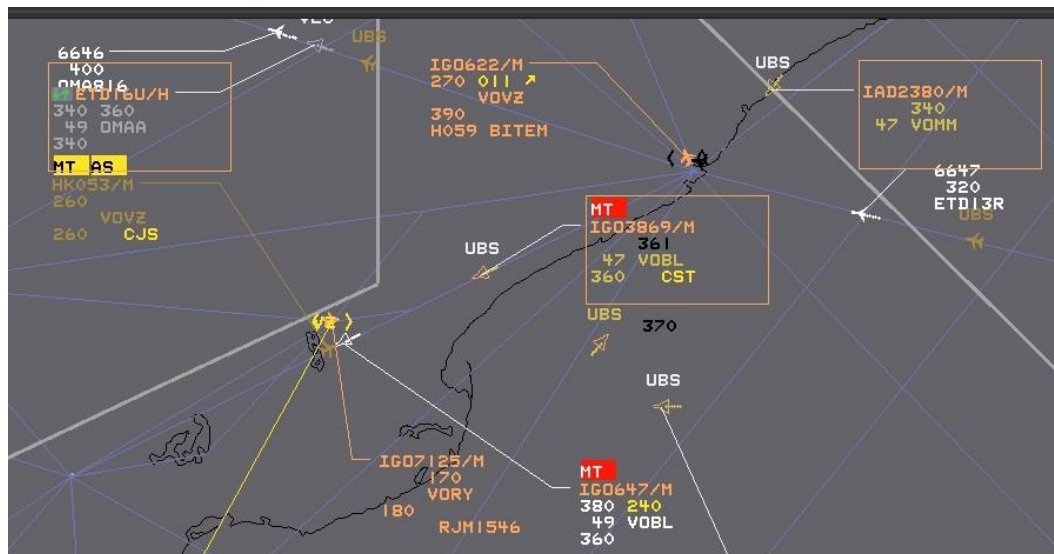
IGO647 reports passing BITEM maintaining FL240 and requesting FL380  
UMM-R advises aircraft to Standby.

IGO647 reports that he is unable to read UMM-R. UMM-R once again advises aircraft to Standby. IGO647 reports unable to understand.

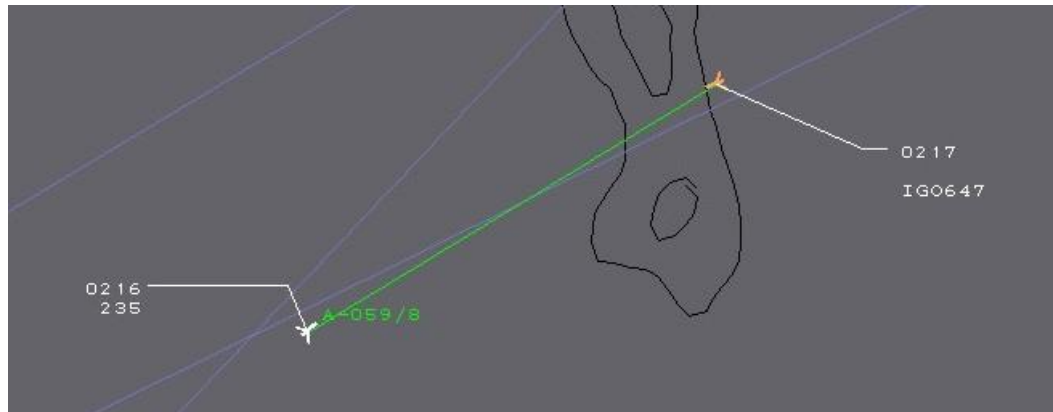
16:15:21 Snapshot of UMM-R shows IGO647 maintaining FL240



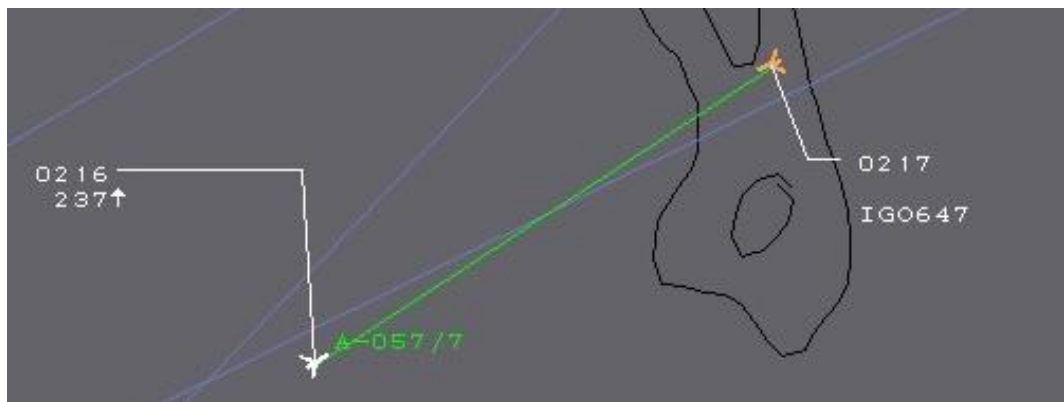
- 16:15:39 UMM-P calls Vijaywada ATC and wants to know radial & distance of HK053. Vijaywada ATC reports ETA Vizag is 1631, Radial 067 and aircraft has been changed over to Chennai and aircraft also just now reported he is in contact with Chennai.
- 16:16:29 IGO342 calls Chennai and informs that company aircraft behind is maintaining FL240, position BITEM and requesting higher level up to FL380. UMM-R replies copied and advises aircraft to stand by.
- 16:16:50 Snapshot of UMM-R shows IGO647 maintaining FL240 and system track of reciprocal HK053 right in front of him.



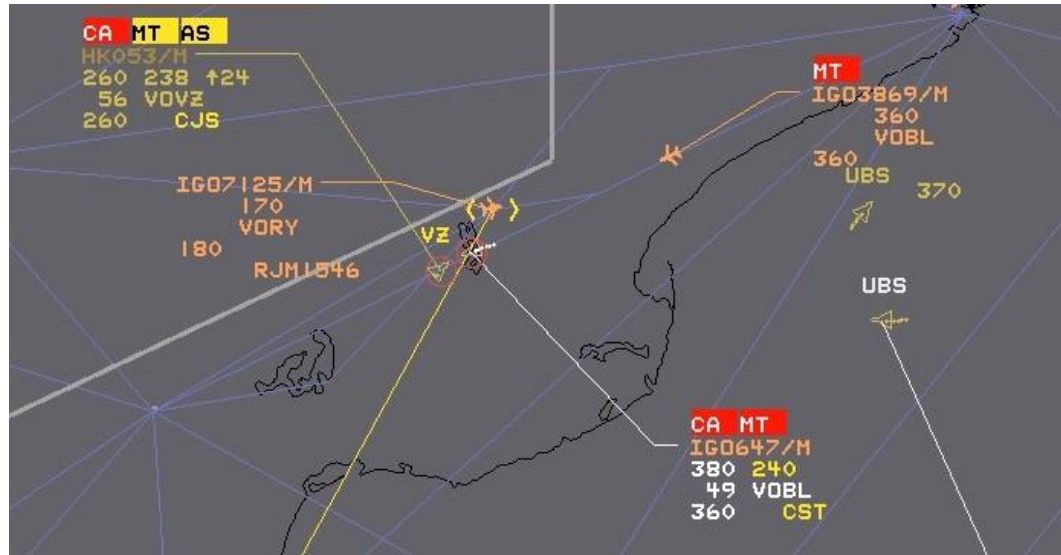
- 16:17:18 UMM controller calls Vizag ATC and passes ETA VOVZ of HK053.
- 16:17:19 IGO647 informs IGO642 about receipt of traffic advisory at FL240.
- 16:17:28 Hawk 053 calls UMM-R and reports proceeding from Vijayawada to Vizag climbing FL250. No response from UMM-R
- 16:17:30 Snapshot of active replay of UMM-R shows HK053 now picked up by Radar, passing FL235 and 8NM reciprocal to IGO647.



- 16:17:32 Snapshot of active replay of UMM-R shows HK053 passing FL237 and 7NM reciprocal to IGO647.



- 16:17:36 Snapshot of UMM-R shows system has started generating Conflict Alert (CA) between HK053 now passing FL238 (climbing at the rate of 2400 feet per minute) and IGO647 maintaining FL240.

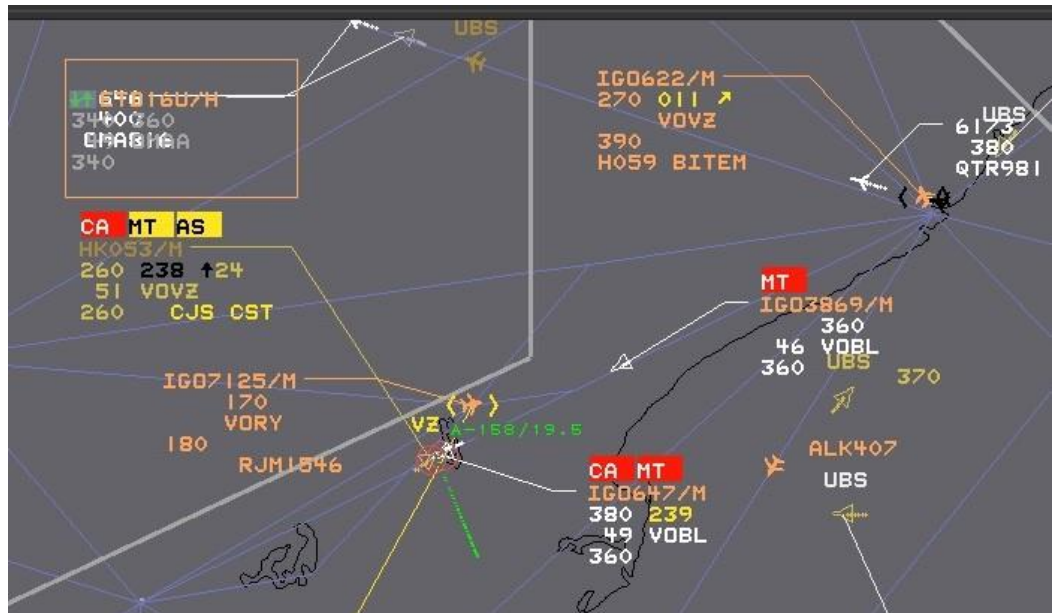


16:17:37 Hawk once again tries to call UMM-R. Again no response from UMM-R

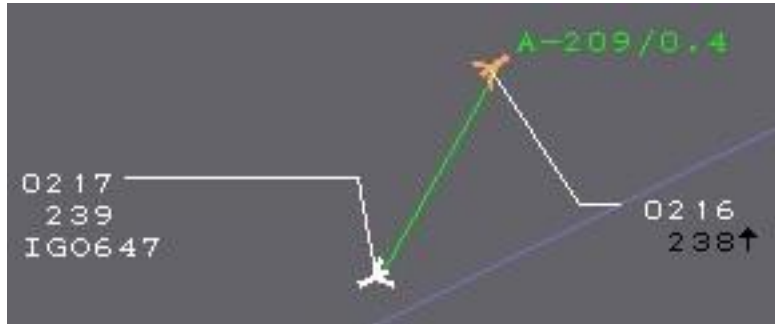
16:17:53 UMM-R tries to call IGO647 but there is no response from IGO647.

16:17:55 HK053 reports released by Vijayawada ATC and climbing to FL250

16:17:56 Snapshot of UMM-R shows tracks of HK053 & IGO647 crossing each other and Mode-C level of IGO647 is FL239. The Mode-C level of HK053 was not updated.



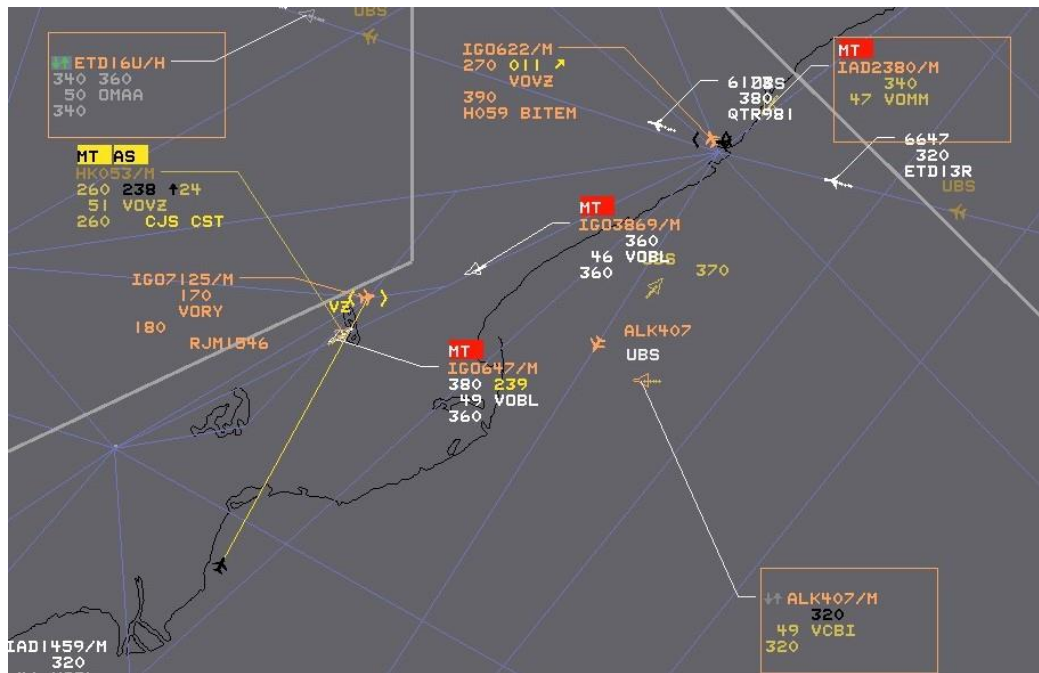
16:18:02 Snapshot of active replay of UMM-R shows HK053 had passed abeam IGO647 with both aircraft to the right of each other and IGO647 at FL239 and Mode-C level of HK053 not updated.



16:18:05 IGO342 informs UMM-R that IGO647 is unable to read UMM-R and Hawk053 is climbing FL 250.

16:18:07 UMM controller calls Vizag ATC and asks whether HK053 is in contact. Vizag ATC replies in negative. UMM Controller advises Vizag ATC to hold IGO647. Vizag ATC informs IGO647 is not in contact.

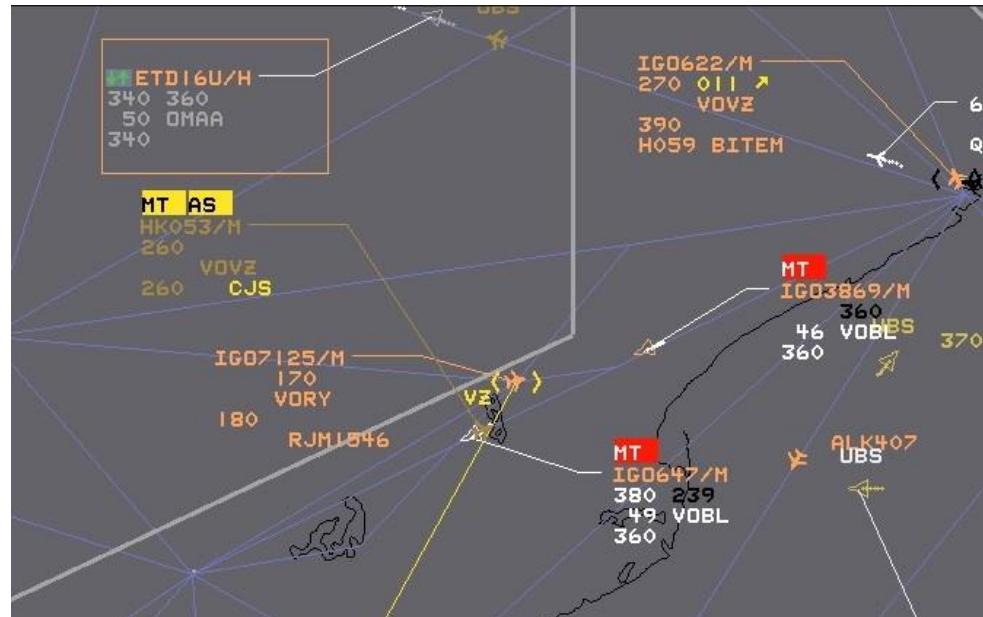
16:18:09 Snapshot of UMM-R shows CA has stopped and tracks of HK053 & IGO647 had passed each other with IGO647 at FL239 and Mode-C level of HK053 still not updated.





16:18:12 IGO647 calls Chennai and reports TCAS RA. No response from UMM-R.

16:18:20 Snapshot of UMM-R shows that the radar track of HK053 has now dropped



16:18:21 IGO 342 reports that IGO647 has got an RA, acknowledged by UMM-R

16:18:27 Hawk 053 reports crossing (IGO647) and climbing passing FL240 for 250 and that it has been released by Vijayawada. No response from UMM-R.

16:18:40 IGO647 asks UMM-R to check the transmitter as it is not able to hear the transmission of UMM-R. IGO647 also reports maintaining level 246 and having received TCAS RA

16:19:02 IGO342 informs UMM-R, that there is another aircraft HK053 which is reporting RA and that IGO647 also received RA because of HK053, which is not acknowledged by UMM-R

16:19:28 IGO342 requests UMM-R to come on standby transmitter as there is a squeaky background noise.

16:19:38 HK053 calls UMM-R but does not get any response

16:19:42 IGO342 offers to relay and HK053 requests IGO342 to relay to UMM-R that it was cleared to FL250 and they have received RA, also they have taken action to avoid 642 (IGO647) at FL240 when it was passing FL230.

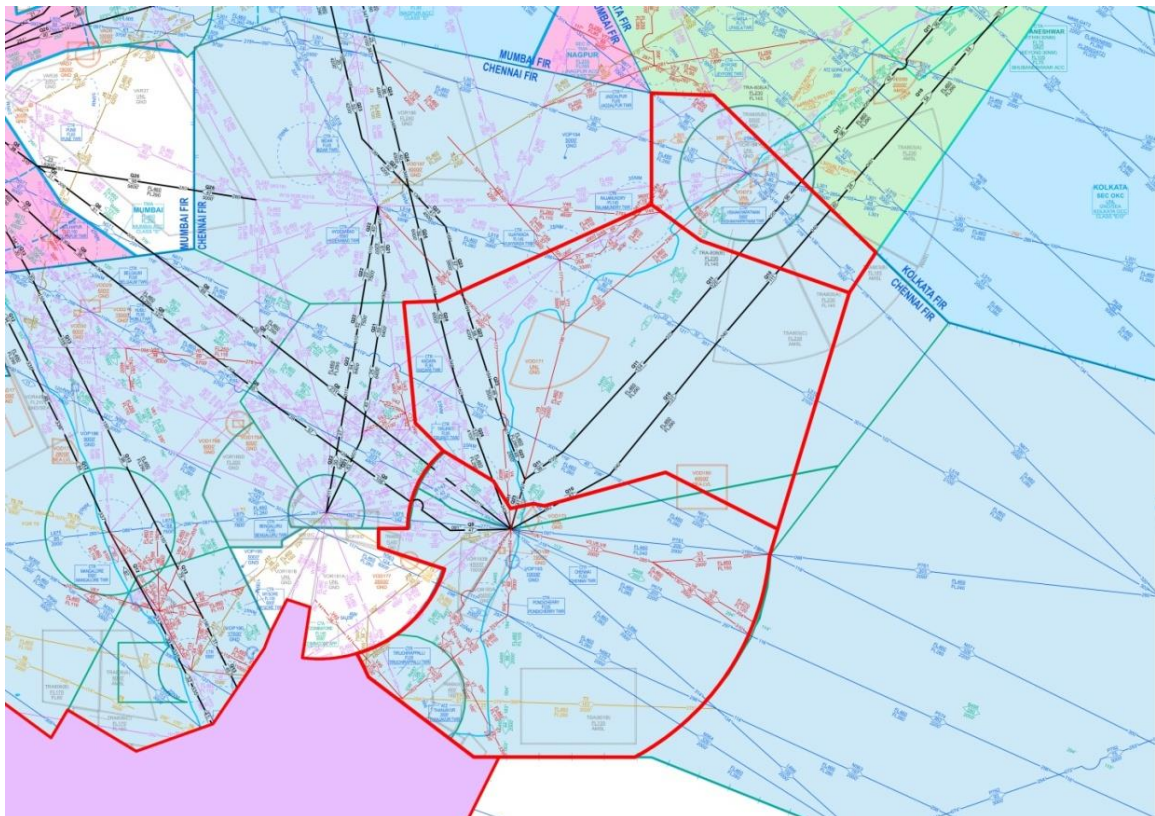
- 16:20:02 IGO647 calls Chennai but there is no response from UMM-R
- 16:20:29 IGO342 informs UMM-R that both aircraft had taken avoiding actions. HK053 and IGO647 received RA which is acknowledged by UMM-R.
- 16:21:27 UMM-P calls Vijaywada ATC and wants to know why HK053 was descending when he had given him FL250. UMM-P controller seems to have been expecting HK053 to descend overhead BBZ from FL260 to FL250 and return back to VOVZ. He seems to have completely missed Vijaywada ATC telling him earlier that HK053 had made a touch & go at Vijaywada and also Vijaywada having given him the airborne time.
- 16:21:49 IGO647 reports maintaining FL245 and requests further instruction which is not received by UMM-R
- 16:22:06 IGO647 reports that it is still not able to read UMM-R
- 16:22:30 HAWK 053 requests UMM-R for changeover and to maintain flight plan Route which is not acknowledged by UMM-R
- 16:23:03 HK053 reports 60 NM inbound to Vizag and requests descent which is again not acknowledged by UMM-R
- 16:24:33 IGO647 requests climb which is not acknowledged by UMM-R
- 16:24:38 HK053 requests descend to Vizag which is not acknowledged by UMM-R
- 16:24:43 IGO647 calls UMM-R
- 16:24:56 IGO647 again calls and requests climb.
- 16:25:03 UMM call Vizag ATC and asks for lower level for HK053. Vizag ATC clears FL230 for HK053. UMM controller reads back the level cleared.

### **1.18.2 Indigo IGO647**

At 1601 UTC, IGO647 was on climbing phase after take-off from VOVZ. After reporting two-way communication with Chennai on 134.25, IGO647 was released by VOVZ approach to VOMM Control at FL240. Till crossing "BITEM" on airway W47, IGO647 hadn't received further climb clearance from Chennai, and it continued cruising at FL240. At that point, as there was disturbance in transmission & frequency congestion, the crew couldn't understand if any transmission was intended for them.

Just after BITEM, an intruder was observed on ND which was approximately 2000 ft. below at 12 'o clock, closing in fast and in climbing. IGO647 received TA which was immediately followed by RA. At that moment, First Officer was PF, and at the TA stage, it was reconfirmed and acknowledged that he had controls. The RA required him to initially maintain level flight, and then a corrective RA to descend (at > 4000 fpm) and subsequent additional corrective RA to climb at (>4000 fpm), which was done. ATC was informed of "TCAS RA", to which response received was "STANDBY". Subsequently, "CLEAR OF CONFLICT" was also conveyed, to which response was again "STANDBY". Due to lack of clarity on further clearance, the crew took a decision to level off at FL245.

### 1.18.3 UMM Sector Bifurcation



AAI after carrying out due process of Safety Assessment & Validation started UMM sectorization trials. Temporary Local Instructions (TLI) 13/2016 was issued by which UMM sectorization was carried out by making two Sectors UMM (North)

and UMM (South) named UMN and UMS respectively. The two sectors UMN and UMS with the lateral and vertical boundaries were described in the NOTAM and depicted in the maps displayed in the ATC units. As per the TLS, UMN and UMS sectors shall be manned by one Radar controller and one Planner each.

AAI has also issued a NOTAM effect from 29/03/2018 to 02/07/2018 which mentions that during high density traffic dynamic bifurcation of UMM sector into UMM-NORTH and UMM-SOUTH on trial basis will be in progress. The frequency for UMS was 125.3 MHZ and for UMN it was 134.25 MHZ. Further flight level limits of the lower and upper sectors were fixed as FL145 and FL460.

#### **1.19 Useful or Effective Investigation Technique**

Nil

## 2.0 ANALYSIS

Before HK053 got airborne from Vizag, Vizag ATC had coordinated its estimate as flying overhead Vijaywada with inbound FL250 and outbound FL260. Flight plan however indicated practice diversion to Vijayawada and return FL250 which was missed by both Surveillance Controller and Planning Controller at Chennai. Vijayawada Tower had approved the practice ILS approach RWY 26 and thereafter had coordinated with Chennai ACC for climb of HK053 to FL250.

The analysis of available evidences revealed that, HK053 was getting displayed on Controller Situation Data Display (SDD) as synthetic track based on flight plan data until 161728 UTC. Thereafter, it was displayed as surveillance track on real time basis. After ILS approach practice on RWY 26 at Vijayawada, at 1608 UTC, HK053 was climbing to FL250. Lack of surveillance pickup of HK053 on return from Vijayawada to Vizag climbing to FL250 led to loss of situational awareness of surveillance controller.

IGO647 had called UMM-R at 1608 UTC informing that they have been released by Vizag ATC and requested for FL380, to which ATC replied "Stand By". At 1611 UTC IGO647 was passing FL218 and the synthetic track of HK053, at that time was outbound from BBZ to VOVZ with assigned level FL260. At 161250 UTC, IGO647 was at FL240, but the assigned level on UMM Radar for it was still showing as FL380, so the system generated Mild Term Conflict Detection (MTCD) warning between IGO647, HK053 & IGO3869.

At 161427, when IGO647 was passing BITEM while maintaining FL240, it requested FL380 to which UMM replied "Stand By". IGO647 at this stage was unable to read UMM-R. At 161629, another flight IGO342 called Chennai and informed that IGO 647 is requesting for higher level up to FL380 to which UMM-R replied copied and instructed again to be Stand By.

Snapshot of UMM-R at 161650 showed that while IGO647 was maintaining FL240, the system track of reciprocal HK053 was right in front of IGO647. After 8 seconds, IGO647 received Traffic Advisory while flying at FL240. Snapshot of

UMM-R of 161736 showed that system has started generating Conflict Alert (CA) between HK053 when passing FL238 (climbing at the rate of 2400 feet per minute) and IGO647 maintaining FL240. HK053 in the meantime kept on calling UMM-R but there was no response from UMM-R.

Snapshot of UMM-R of 161756 showed tracks of HK053 & IGO647 crossing each other with Mode-C level of IGO647 as FL239. 13 seconds later, CA stopped and tracks of HK053 & IGO647 had passed each other with IGO647 at FL239 and Mode-C level of HK053 still not updated. At 161812, IGO647 reported TCAS RA without any response from UMM-R.

### **3.0 CONCLUSION**

#### **3.1 Findings**

3.1.1 Based on the available records and discussions, following are the findings relevant to the incident:

3.1.1.1 Flight crew of both aircraft was having appropriate qualification and experience to undertake the flights.

3.1.1.2 Both aircraft were Jet engine powered aircraft.

3.1.1.3 The sectors UMM (North) and UMM (South) were combined and at the time of incident, traffic density observed was high.

3.1.1.4 The flight plan of HK053 indicated practice diversion to Vijayawada with return flight level as FL250 which was missed by both Surveillance Controller and Planning Controller at Chennai.

3.1.1.5 Chennai Planning controller even though approved the climb to FL250 for HK053, was under the wrong impression that HK053 would only descend from FL260 to FL250 overhead BBZ, whereas the Vijayawada controller repeatedly informed that after touch and go, aircraft is requesting climb to FL250 on return to Vizag.

3.1.1.6 Lack of surveillance pickup of HK053 on return from Vijayawada to Vizag climbing to FL250 led to loss of situational awareness of surveillance controller.

- 3.1.1.7 Surveillance Controller also overlooked MTCD warning for HK053 and IGO647 generated by Chennai Automation system.
- 3.1.1.8 Combining of sectors UMM (N) and UMM (S) resulted in medium to high traffic density which further led to increased RT load and frequent stepping on/blocking of transmission.
- 3.1.1.9 The minimum vertical separation between these aircraft got reduced to 200 feet while no horizontal separation existed thereby causing airprox incident with proximity categorization as "A".
- 3.1.1.10 It was observed that surveillance controller after the incident was not responding to the call by IGO647, HK053 and IGO342 (relaying for IGO647), however, during the said period, other aircraft were issued instructions.
- 3.1.1.11 IGO647 did not return to the original clearance (FL240) once clear of conflict and maintained FL245 until cleared to climb to FL340, as IGO647 was not able to get any response from UMM to their earlier requests.

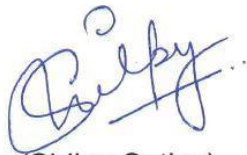
## **3.2 Probable Cause**

IGO647 which was flying at FL240 came in very close proximity of HK053 resulting in generation of RA on both flights due to

- Oversight by Chennai Planning Controller of approval given to HK053 to climb to FL250.
- Lack of surveillance pickup of HK043 leading to loss of situational awareness of surveillance controller.
- Overlooking MTCD warning generated by Chennai Automation System by Surveillance Controller.
- High traffic density due to combining of UMN & UMS sectors.

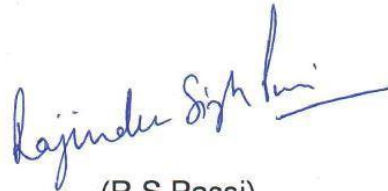
#### 4.0 RECOMMENDATIONS

1. AAI may review the existing UMM sectorization so that low level surveillance and VHF coverage is ensured.
2. AAI should ensure that sectors remain bifurcated during identified peak traffic period.
3. Surveillance controllers should give due importance to system generated predicted conflict alerts and initiate timely action to resolve the conflict.
4. Planning Controller while issuing clearances should take into account the information provided in the filed Flight Plan and that provided by coordinating ATC units.



(Shilpy Satiya)  
Investigator

Aircraft Accident Investigation Bureau



(R S Passi)  
Investigator-in-Charge

Aircraft Accident Investigation Bureau

Date: 20/11/2019

Place: Delhi