Investigation Report on

Incident of Communication Failure

'Enroute Air India Flight AI-171'

on 10/03/17

O/o Director Air Safety(WR)
Mumbai

Disclaimer

“In accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and Rule 3 of Aircraft (Investigation of Accidents and Incidents), Rules 2012, the sole objective of the investigation of an accident shall be the prevention of accidents and not apportion blame or liability. This document has been prepared based upon the evidences collected during the investigation, opinion obtained from the experts and laboratory examination of various components. Consequently, the use of this report for any purpose other than for the prevention of future accidents could lead to erroneous interpretations.”

ABBREVIATIONS

ADF	Automatic Direction Finder
AI	M/s Air India Ltd
AME	Aircraft Maintenance Engineer
AMM	Aircraft Maintenance Manual
AOC	Air Operator Certificate
ARC	Airworthiness Review Certificate
ASDA	Accelerate Distance Available
ATC	Air Traffic Control
ATIS	Air Traffic Information Services
ATPL	Air Transport Pilot's License
CAS	Calibrated Air Speed
CB	Cumulonimbus clouds
CSI	Cycles Since Inspection
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
DGCA	Director General of Civil Aviation, India
DME	Distance Measuring Equipment
DP	Dew Point
EASA	European Aviation Safety Agency
EGLL	London Heathrow
FAA	Federal Aviation Administration, United States of America
FBL	Feeble
FCOM	Flight Crew Operating Manual

FCTM	Flight Crew Training Manual
FDR	Flight Data Recorder
FDTL	Flight and Duty Time Limitations
FIM	Fault Isolation Manual
FMS	Flight Management System
FO	Co-Pilot/ First Officer
FRTO	Flight Radio Telephone Operator
IATA	International Air Traffic Association
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IR	Instrument Rating
IST	Indian Standard Time
LDA	Landing Distance Available
LIH	Light Intensity High
MEL	Minimum Equipment List
NEF	Non-Essential Equipment and Furnishing
NOTAM	Notice to Airmen
Operator	AOP holder of the incident aircraft
OVC/OC	Overcast
PF	Pilot Flying
PIC	Pilot in Command
PM	Pilot Monitoring
POH	Pilot Operating Handbook
PPC	Pilot Proficiency Check
QNH	Pressure setting to indicate elevation
QRH	Quick Reference Handbook

RA	Radio Altitude
RADAR	Radio Detection and Ranging
RESA	Runway End Safety Area
RH	Right Hand
ROD	Rate of Descent
SCT	Scattered
SOP	Standard Operating Procedures
TCAS	Traffic Collision Avoidance System
TORA	Take-off Run Available
TODA	Take-off Distance Available
Tower	ATC Tower
TSI	Time Since Inspection
TSN	Time Since New
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VAAH	Ahmedabad Airport
VOR	Very high frequency Omni Range

Contents

Investigation Report on Incident of Communication Failure Enroute Air India Flight AI-171 on 10/03/17

1	Aircraft	Type	B787-8
		Nationality	Indian
		Registration	VT-ANT
2	Owner & Operator		M/s Air India Ltd.
3	Pilot in Command (PIC) Extent of Injuries		Licence: ATPL Nil
4	First Officer (F/O) Extent of Injuries		Licence: ATPL Nil
5	Date & Time of incident		07:45 to 08:54 UTC
6	Place of Incident		Romanian-Hungarian Airspace
7	Last point of departure		Ahmedabad Airport (VAAH)
8	Intended landing place		London Heathrow Airport (EGLL)
9	No. of Passengers on board		152
10	Type of Operation		Scheduled
11	Phase of Flight		Cruise
12	Type of incident		LOSS OF COMMUNICAION

(All timings are in UTC)

Synopsis:

Air India B787 aircraft VT-ANT was operating the flight AIC-171 on 10th March 2017 from Ahmedabad to London with 152 passenger on board. During the cruise, PIC took two control rests. During the 2nd controlled rest, as per requirements, the First Officer was on duties for pilot flying & pilot monitoring. While flying over the Hungarian airspace, sometime after the 2nd controlled rest, the PIC observed a fighter airplane on the right side. The PIC immediately put on the headset & noted that both the speakers were off. After communicating with fighter airplane, it became evident that the Air India airplane had NOT been communicating with ATC for quite some time that led to the deployment of fighter airplane. Another fighter jet escorted the Air India flight till descent for landing at London (EGLL). The scrutiny of records indicated no airworthiness issue with the airplane or any contribution due to weather.

The DGCA instituted an investigation into the incident to find the cause of the incident by appointing inquiry officer vide order No. AV 15020/5/2017-AS dtd 14-03-2017 under rule 13(1) of Aircraft (Investigation of Accident and Incidents), Rules 2012.

The investigation revealed, “The inadvertent operation of speaker volume control switches, probably by the First Officer has resulted in the loss of communication between the aircraft and the ATC.

1. Factual Information:

1.1 History of flight:

Air India B787 aircraft VT-ANT was operating the flight AIC-171 on 10th March 2017 from Ahmedabad (VAAH) to London (EGLL) with 152 passengers on board. Flight took off at 0141Z from Ahmedabad and was uneventful till cruise phase. During the cruise the PIC undertook 2 controlled rests 35 minutes each as under:

	From (UTC)	To (UTC)	Duration	Airspace
First Controlled rest	0655	0730	35 min.	Turkey
2nd Controlled rest	0800	0835	35 min.	Romania-Hungary

The first control rest was from 0655-730Z. PIC was woken up by F/O to perform the climb. He performed climb with Turkish control at approx. 0735Z to FL400.

During the cruise over Romanian Airspace, PIC opted for 2nd controlled rest & First Officer was on dual duty for Pilot flying & Pilot Monitoring as per procedures during control rest. Shortly after finishing the 2nd controlled rest, the PIC observed a fighter airplane escorting on the right side. The PIC immediately put on the headset, “But noted that the speakers were OFF”. After switching them ON, PIC communicated with fighter airplane on emergency frequency 121.5MHz and inquired if anyone was calling for AI171. The Fighter Pilot responded & advised him to contact Budapest Control. PIC contacted Budapest Control and they informed that they had been trying to contact AI171 for some time and also asked why AI171 was not in contact earlier. PIC told him that he might have missed a frequency change and apologized. A few minutes later the Fighter Jet on RHS went away.

About 10-15 minutes later, another Fighter Jet came on LH Side. By now PIC had changed over to Praha Control. He contacted Praha Control and asked them as to why was a fighter following them again, then referring the earlier loss of contact, the ATC asked "why did you disappear from the frequency?" PIC told him that he was monitoring his frequency constantly since he had been changed over from previous control. ATC asked the PIC the previous frequency, which he read back. He was told that the Fighter Jet will be informed. However, the Fighter continued to escort. PIC called 121.5MHz again to contact the Fighter Pilot directly to which Bucharest responded and told him that his fighter was already on ground. Later when contacted Praha Control informed PIC that the Fighter Jet would continue to escort. All subsequent ATCs periodically kept checking with PIC if everything was alright. The fighter went away after the aircraft began its Descent to London.

1.2 *Injuries to the persons.*

Injuries	Crew	Passengers	Others
Fatal	**Nil**	**Nil**	**Nil**
Serious	**Nil**	**Nil**	**Nil**
Minor/None	**Nil/10**	**Nil/152**	

1.3 ***Damage to the aircraft:*** **Nil**

1.4 ***Other Damage:*** **Nil**

1.5 Personnel Information:

Pilot in command (PIC)

He joined Air India on 06-10-2003 and flew A310 and B777 as F/O. Got PIC endorsed on B737 on 23-03-2012. Got upgraded as LTC on B737 on 09-11-2014. Gained uneventful PIC. Also has training experience of 3100 hrs on B737. Subsequently upgraded to PIC endorsement on B787 on 17-10-2016.

Details	PIC
Licence	ATPL
Valid up to	15-12-2020
Age	47 Years
Gender	Male
Endorsement as PIC	17-10-2016
Experience on Type	386 HRS
Experience as PIC on Type	350 HRS
Total Flying Experience	8460 HRS
FRTOL Validity upto	20-12-2021
Medical Validity upto	21-06-2017
Hours in last one year	387.39
Hours in last six months	355.19
Hours in last one month	75.07
Hours in last seven days	09.40
Hours in last 24 hours	00.00
Rest prior to incident	31 Hrs 54 min.
Incident History	NIL

First Officer (F/O)

Joined Air-India on 30-07-2007 Airbus A320 family fleet. Got upgraded to Boeing 787 Dreamliner on 13-11-2013 with training in Singapore.

Details	First Officer
Licence	ATPL
Valid up to	03-07-2020
Age	29 years
Gender	Female
Endorsement as PIC	02-01-2013
Experience on Type	2662.00 hrs
Experience as PIC on Type	NIL
FRTOL Validity upto	18-05-2017
Medical Validity	22-01-2018

Total Flying Experience	5462.00 hrs
Hours in last one year	874.02
Hours in last six months	417.29
Hours in last one month	79.15
Hours in last seven days	09.40
Hours in last 24 hours	00.00
Rest prior to incident	32 Hrs 52 min.
Incident History	NIL

1.6 Aircraft information:

i. Manufacturer	:	BOEING
ii. Type	:	B787-8
iii. Serial No.	:	36291
iv. Date of Manufacture	:	17/02/2015
v. Date of Import into India	:	23/02/2015
vi. Certificate of Airworthiness	:	6670
vii. Airworthiness Review Certificate	:	ANT/6670/ARC/1ST/2015/056, Validity-01.03.2018
viii. Aircraft Empty Weight	:	115205 Kg
ix. Maximum Take-Off Weight	:	227930 Kg
x. Maximum Landing Weight	:	172365 Kg
xi. Certificate of Registration	:	4560/2 dated 23/02/2015 validity- 25/04/2028
xii. First Operation after Indian C of A	:	05/03/2015

The A1 check was done on aircraft on 13 to 14 Feb 2017. There was no snag reported or component replaced in communication system in 6 months prior to incident flight.

There was no snag or MEL existing related to communication systems as on date of incident. Also no Aeronautical Directive/Service Bulletin was pending for compliance.

1.7 Meteorological information:

The incident occurred during the cruise at FL400 with visibility 5000m, OAT-09°C with no cloud/precipitation/turbulence as per records.

1.8 Aids to Navigation: Not Applicable.

1.9 Communication:

1.9.1 The aircraft is equipped with following Communication Equipment**:**

DESCRIPTION	TYPE	PART NO.
VHF # 1 & VHF # 2	**VHF-2100**	**822-1287-180**
HF # 1 & HF #2	**HFS-900D**	**822-0990-120**

1.9.2 <u>ATC TapeTranscript</u> from Aeronautical Risk Assessment Authority Department (Légügyi Kockázatértékelési hatósági Főosztály) of Ministry of National Development (Nemzeti Fejlesztési Minisztérium), Hungary

Subject: **10th March 2017. BUD FIR** call sign **AIC171**

<u>Official record of transmissions</u>		
Unit	**Time**	**Radio transmission**
10.03.2017. COMLOSS **AIC171 Budapest-EL-EC**		
Record open	*08.25.19*	
	08.42.17	*AIC171 entering into Hungarian airspace*
EL-EC	08.44.05	AIC171 Budapest
EL-EC	08.44.23	AIC171, AIC171 Budapest is calling you on guard if u read me contact me on 132,790.
EL-EC	*08.44.45*	*Kuwaiti KAC171 turn holding 290- (because of no contact with AIC171)*
EL-EC	08.45.21	AIC171, AIC171 Budapest is calling you on guard if u read me contact me on 132,790.
EL-EC	08.45.23	AIC171, AIC171 Budapest is calling you on guard if u read me contact me on 132,790.
AIC171	08.55.54	Budapest control AIC171.
EL-EC		AIC171 good to have you. Hallo, radar contact.
AIC171		Thank you very much sir, and my profuse apologize.
EL-EC		For me sir it's not a problem
AIC171		Thank you so much, I appreciate that's all, thank you so much.
EL-EC	08.57.36	Kuwaiti 171 contact Bratislava radar 127… correction AIC171 contact Bratislava radar 127, 090, bye-bye sir.
AIC171	08.57.48	127,090 bye-bye (hard to read a woman's voice)
	08.57.39	*AIC171 leaved Hungarian airspace*
AIC171	09.06.48	Hungarian Airforce AIC171 on guard (*AIC171 is above LALES in Slovakia, intercepted by Slovak fighters)*
CRC	09.07.03	AIC171 this is Hungarian Military control
CRC	09.07.42	AIC171, AIC171 this is Hungarian Military control
AIC171		Info mam we already answered AIC171 mam
CRC		Ok, copied
AIC171		Do you read this AIC171?
AIC171	09.08.00	Hungarian Airforce AIC171 121,5
AIC171	09.08.18	…garian AIC171, or airport AIC171 on guard
AIC171	09.08.34	Calling on guard
AIC171	09.08.40	On grad (*AIC171 is out of Hungarian radio availability)*
Record closed	*09.09.00*	

1.10 Aerodrome information: Not applicable

1.11 Flight recorders:

B787 aircraft is equipped with dual EAFR (one in forward and other in aft location) containing recordings of both CVR & DFDR data. Both EAFR are identical and records the same data of CVR & DFDR for redundancy.

The aircraft is equipped with CVR & DFDR as under:

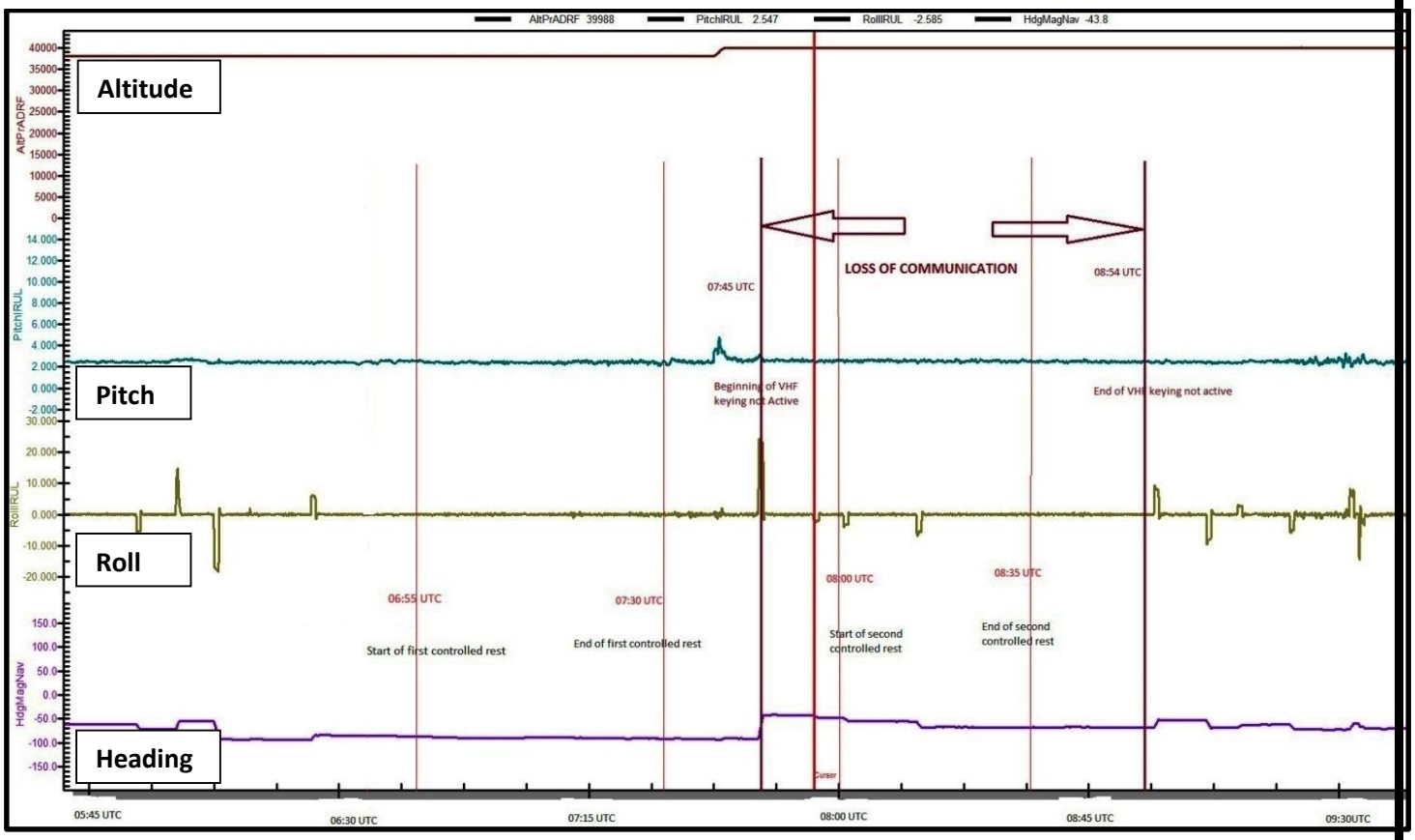
EAFR (CVR / FDR) Enhanced Airborne Flight Recorder

P/N :- 866-0084-101, S/N :- 41X3H0

EAFR (CVR / FDR)

P/N :- 866-0084-101, S/N :- 41X3GO

1.11.1 <u>DFDR Data</u>



Flight progress during the both the controlled rests in cruise

- DFDR data confirms that there was no keying on VHF communication systems from 07:45:25UTC to 08:54:09UTC, it is indicated in the plot above.
- The examination of data confirms that the aircraft was on autopilot during period of incident. During cruise there is no abnormality observed w.r.t. Heading, Roll, Pitch, Alt.

1.11.2. Cockpit Voice Recorder(CVR) Data: Not available. Due to non-availability of CVR recordings, the crew statements have been considered for evidence wherever required.

1.12 Wreckage & impact information: Not applicable

1.13 Medical & pathological information: PFME of crew was done at Origin & both were fit.

1.14 Fire: NIL

1.15 Survival Aspects: Incident was survivable

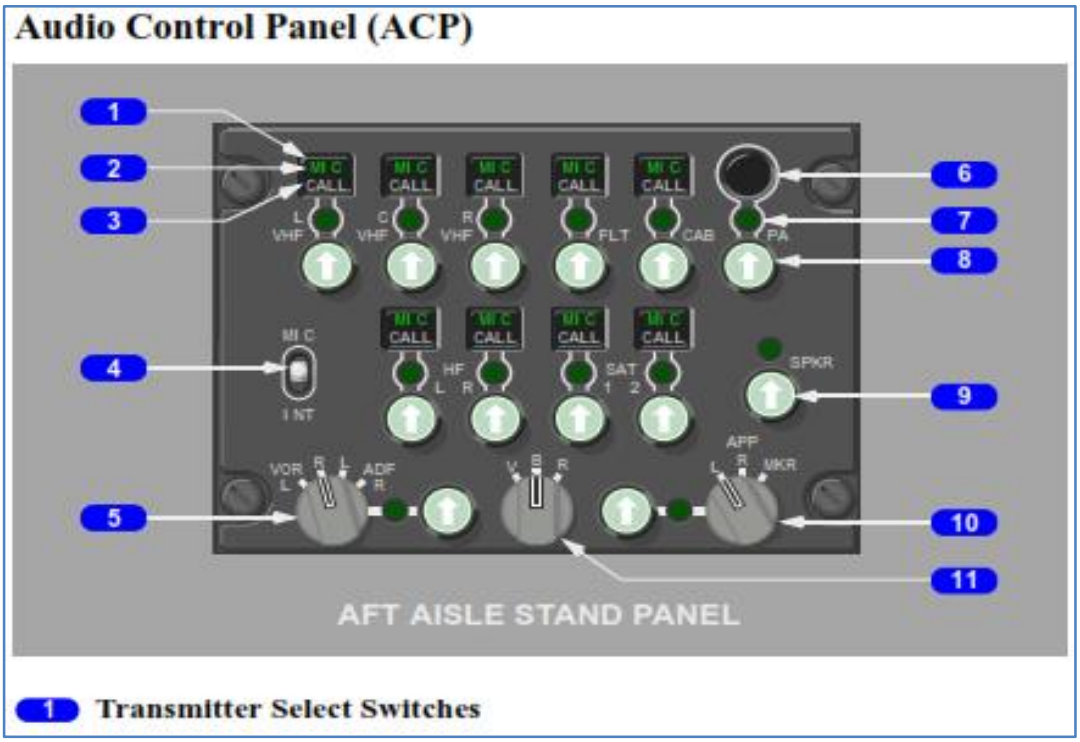
1.16 Test & research : Not applicable

1.17 Organizational information:

Air India is the flagship carrier airline of India. It is the fourth largest domestic airline in India in terms of passengers carried. It is owned by Air India Limited, a Government of India enterprise, and operates a fleet of Airbus and Boeing aircraft serving 90 domestic and international destinations. The airline was founded by J. R. D. Tata as Tata Airlines in 1932. On 29 July 1946 it became a Public Limited company under the name *Air India. It has 21 B787* airplanes with 12 on lease & 9 owned. Air India has its own Training setup for cockpit, cabin & ground Officers & staff.

1.18 Additional information:

1.18.1 Excerpts from FCOM:



The speaker volume control switches are shown above Button 9 is for the flight deck speaker. It's pushed to turn speaker On/Off (toggle switch) and rotated for Volume control.

1.18.2 Policy on control rest : Operations Manual Part A

As a part of Fatigue Management, the Para 2.20 of Operations Manual part-A which is purely based on Operations circular 8 of 2013 of DGCA on Controlled rest, permits the crew to have Controlled Rest on Flight deck. Controlled rest can be taken during the low workload periods for a maximum of 40minutes in a flight of more than 3 hours duration. Crew is permitted to have more than one Controlled rest depending on the duration of flight. It is clearly mandated that during the controlled rest, the non-resting pilot shall keep his/her seat belt & harness fastened. The non-resting crew will perform the duties as PF & PM and must wear a headset with the cockpit audio speaker adjusted to normal volume.

1.18.3 Crew Statements/Interview(Excerpts)

1.18.3.1 Pilot In Command:

- His first control rest was from 0655-730Z at FL 380 when F/O woke him up. He performed climb with Turkish control at approx. 0735Z to FL400.
- Prior to going for the 2nd controlled rest at 0800Z at FL400, the speaker volume position was normal & F/O had headset 'On'.
- After the second controlled rest, PIC got up on his own, took a briefing from F/O; but he didn't remember her informing him about 'the then' ATC control in use.
- After the 2nd controlled rest PIC went to washroom, after his return he noticed the fighter airplane thru' sunshades on RHS window. PIC put on his headset & noted that "both the speakers were OFF" with volume at 12 O' clock and he turned these ON.
- PIC contacted fighter airplane & fighter pilot advised to contact Budapest Control & gave him the frequency as well.
- PIC contacted the Budapest and they informed him that they had been trying to contact for some time & asked why he (*Air India 171*) was not on the frequency. PIC explained that he might have missed a frequency change and apologised for the same.

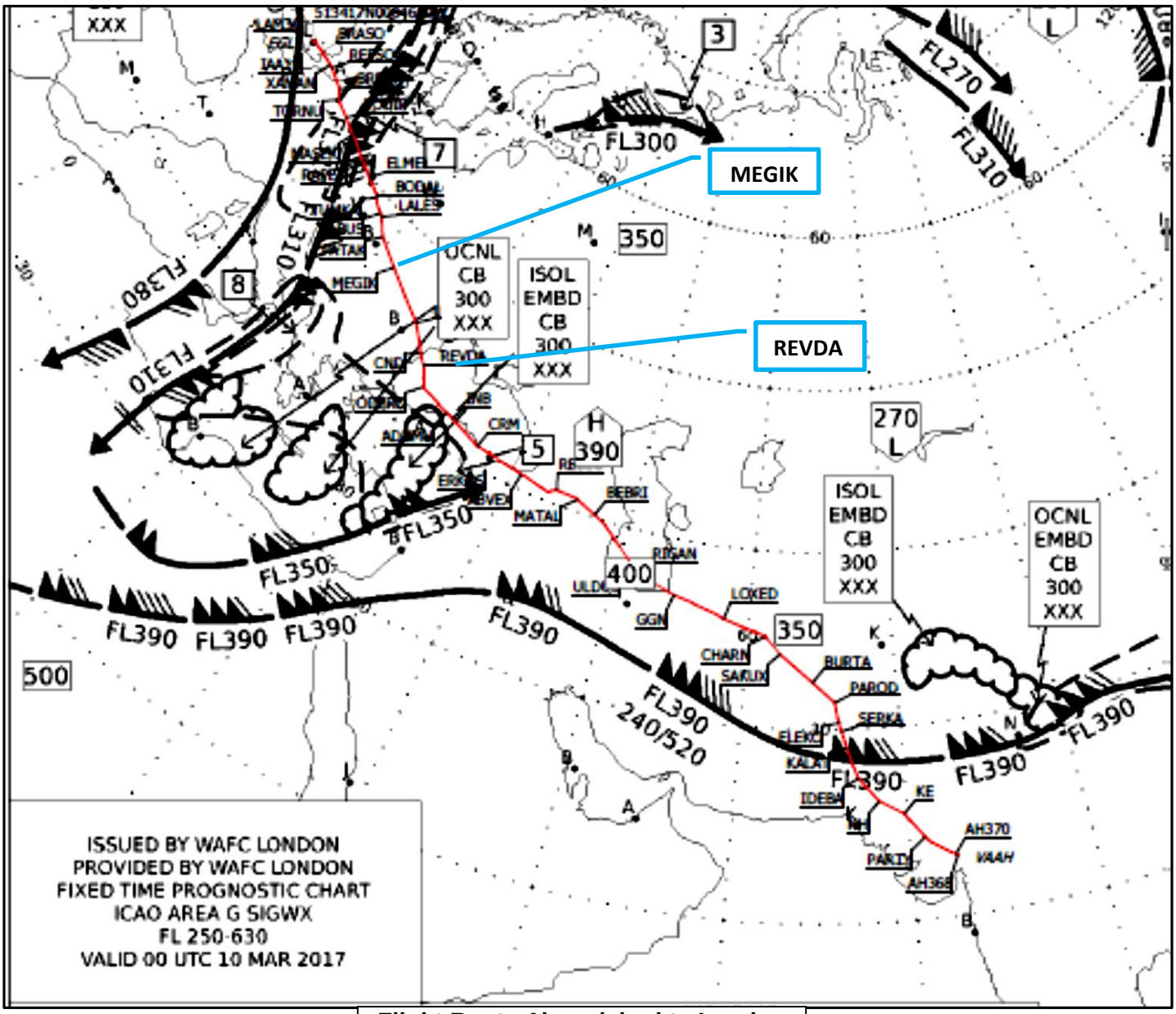
1.18.3.2 First Officer(F/O):

- F/O woke the PIC up after first controlled rest at 0730 for climb to FL400. PIC performed the climb with Turkish control at approx. 0735Z to FL400.
- During the second controlled rest of PIC the F/O claims to have been wearing the headsets & 'didn't touch' the speakers; she also didn't know how the speakers went OFF.
- She was not aware of any communication loss; she claims to be in touch with the ATC throughout & to have kept changing the frequencies. Since, she was constantly wearing headsets she could hear R/T chatter from other aeroplanes & ATC.
- She removed her Headset sometime after 2nd controlled rest of PIC, but didn't notice if the speakers were off.

- F/O claimed that she was changing the frequencies as advised by ATC but she wasn't noting the frequency changes in flight plan as per procedure and also she claims in her interview that that she didn't miss anything
- F/O was aware of procedures of controlled rest and has performed these duties earlier too more than once uneventfully.

1.18.4 Flight Progress:

FIR	Waypoint	Time	REMARKS
LBSR FIR – SOFIA - BULGARIA	ODERO	0738	-
LRRB FIR – BUCURESTI - ROMANIA	REVDA	0748	LOSS OF COMM.
LRRB FIR – BUCURESTI - ROMANIA	CND	0801	
LRRB FIR – BUCURESTI - ROMANIA	URELA	0814	
LRRB FIR – BUCURESTI - ROMANIA	TOC	0822	
LHCC FIR – BUDAPEST - HUNGARY	MEGIK	0841	
LZBB FIR – BRATISLAVA – SLOVAK REP.	PATAK	0857	-



Flight Route Ahmedabad to London

1.19. Useful & Effective investigative Technique: NIL

2.0 Analysis:

2.1 Airworthiness:

This airplane was delivered new to Air India and had first Operation after Indian C of A on 05/03/2015. There was no snag reported on communication system neither was any component replaced 6 months prior to incident. Also no Aeronautical Directive/Service Bulletin was pending. Contribution to incident due to the airworthiness issue is ruled out.

2.2 Weather:

The incident occurred during the cruise at FL400 with visibility 5000m, OAT-09°C. There was no cloud/precipitation/turbulence. The weather was not the contributing factor to the incident.

2.3 **Flight recorders:**

DFDR confirms that there were no keying on VHF communication systems from 07:45:25UTC to 08:54:09UTC indicates that during this period there was no communication between 'non resting pilot' that is F/O & ATC.

2.2 Operational Aspects:

As per records, PIC had had 31:54 Hrs of rest and F/O had had 32:52 Hrs of rest prior to operating the incident flight, so the crew were well rested. The aircraft took off from Ahmedabad at 0141Z uneventfully.

During cruise, the first control rest by PIC from 0655-730Z was uneventful. He performed climb with Turkish control at approx. 0735Z to FL400. Correlation of the controlled rest periods of PIC with the DFDR data Indicates that last communication was done around 15 minutes prior to PIC going for 2nd controlled rest at 0800Z – 0830Z at FL400. During the cruise over Romanian Airspace, PIC opted for 2nd controlled rest & First Officer was on dual duty for Pilot flying & Pilot Monitoring as per procedures during control rest. Soemtime after finishing the 2nd controlled rest, the PIC observed a fighter airplane escorting on the right side

Correlating the time of loss of communication with the flight progress timings, it's understood that loss of communication may have been between waypoint REVDA (Romania) & MEGIK (Hungary). Flight from LRRB FIR (BUCURESTI in ROMANIA) to LHCC FIR (BUDAPEST–HUNGARY) required a formal ATC changeover and that was not done. Further, the crew did not respond to the call by ATC and a relayed message by another traffic as per ATC tape transcript. This led to the deployment of the fighter jet.

F/O claims to be in touch with the ATC throughout & to have kept changing the frequencies. However, she wasn't noting the frequency changes in flight plan as per procedure and also she claims further that she didn't miss anything. She claims to have removed her Headset

only sometime after 2nd controlled rest of PIC, but didn't notice if the speakers were off till it was noticed by PIC. She didn't know how the speakers went OFF. However both the crew agree the speakers to be ON prior to PIC going for 2nd Controlled Rest.

Speaker have toggle switches that is push to turn On-Off. Thus highly probable that F/O may have turned the speakers OFF, inadvertently & couldn't notice till PIC noted when he intended to contact the fighter aircraft. On communicating with fighter pilot, the fighter pilot advised PIC to contact ATC.

After 2nd control rest PIC took briefing from F/O but doesn't remember whether she told him about the then ATC in use.

From the above, it is evident that the inadvertent operation of speaker volume control switches, probably by First Officer has resulted in the loss of communication between the aircraft and the ATC while cruising in the Hungarian Control. This is despite the fact that F/O had performed the duties as PF & PM when the PIC was on control rest earlier un-eventfully. This implies that she was aware of her responsibilities during control rest periods.

2.3 Hungarian ATC tape transcript:

The transcript of communication from Hungarian Military control & Budapest ATC revealed that they repeatedly tried to contact AI171. Also, an unknown traffic relayed the messages of Hungarian Military airplane to AI171 but there was no response from the crew of AI171.

3. Conclusions:

3.1 Findings:

1. The airplane was airworthy at the time of incident. There was no snag or MEL existing related to communication systems. There was no work done on airplane communication systems in last 6 months.
2. The crew were duly qualified for the flight.
3. PIC had had 31:54 Hrs of rest and F/O had had 32:52 Hrs of rest prior to operating the incident flight. Thus both the crew were well rested.
4. The first control rest was from 0655-730Z at FL 380. They performed climb with Turkish control at approx. 0735Z to FL400.
5. 2nd Control rest of PIC was between 800UTC to 0835UTC for 35 minutes in Romanian Airspace.
6. Both the crew assert that both the speakers were "ON" prior to PIC going for 2nd controlled rest.
7. As per DFDR data that there were no keying on VHF communication systems from 07:45:25UTC to 08:54:09UTC indicating that last communication was done around 15 minutes prior to PIC going to 2nd controlled rest.
8. F/O claims that she was wearing headset and changing the frequencies as advised by ATC, however she wasn't 'noting' the frequency changes in flight plan as per

procedure. F/O 'didn't touch' the speakers; she didn't know how the speakers went OFF.

9. After the 2nd controlled rest, during briefing F/O didn't inform PIC that which ATC control was in use.
10. After seeing fighter airplane, PIC tried to contact on RT, however observed that both the speakers were "OFF" with volume switch 12 'O Clock position. But the F/O did not know that how speakers went OFF, it points to her loss of situational awareness.
11. On communicating with fighter pilot it became evident that it has arrived due to loss of communication with ATC, also fighter pilot advised PIC to contact ATC.
12. This occurrence happened between (close to) Waypoints REVDA and MEGIK that involved ATC (FIR) changeover.
13. F/O had performed the duties as PF & PM when the PIC was on control rest earlier un-eventfully. This implies that she was aware of her responsibilities during control rest periods.
14. The inadvertent operation of speaker volume control switches, probably by First Officer has resulted in the loss of communication between the aircraft and the ATC while cruising in the Hungarian Control.

3.2 Probable Cause:

The inadvertent operation of speaker volume control switches, probably by the First Officer has resulted in the loss of communication between the aircraft and the ATC.

4 Safety Recommendations:

Action by DGCA, as deemed fit, in view of the findings.

Yashpal,
(Inquiry Officer)
Asst. Director of Air Safety,
O/o DAS(WR), Mumbai