



COPY Nr.

MINISTÉRIO DAS OBRAS PÚBLICAS, TRANSPORTES E COMUNICAÇÕES
GABINETE DE PREVENÇÃO E INVESTIGAÇÃO DE ACIDENTES COM AERONAVES
GPIAA

FINAL AIR TRAFFIC INCIDENT REPORT

BHP-1914 - BLUE-83
Boeing B-767/3Q8 - Boeing KC-135

HB-ISE - UNKNOWN

Sta Maria Oceanic Control Area (N37°53' W017°56')

31st of January 2008

ESTÁ CONFORME O ORIGINAL



FINAL INCIDENT REPORT Nr. 01/INCID/2008



NOTE

This report states the technical findings regarding the circumstances and probable causes which led to this incident.

In accordance with Annex 13 to the International Civil Aviation Organisation Convention, Chicago 1944, Council Directive 94/56/EC, 21st NOV 1994, and article 11th n^o 3 of Decree-Law n^o 318/99, 11th AUG 1999, the sole purpose of this investigation is to prevent aviation accidents. It is not the purpose of any such accident investigation and the associated investigation report to apportion blame or liability.

The only aim of this technical report is to collect lessons which may help to prevent future accidents.

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SYNOPSIS

On the 31st of January, 2008, by 13:30 UTC¹, a Boeing 767 aircraft, Swiss registration HB-ISE, flying from Zurich (LSZH) to Punta Cana (MDPC), at position 37° 53' N 017° 56' W (in Sta. Maria OCA²) got a possible lack of separation warning (TCAS TA), followed by a resolution advice with an altitude change command (TCAS RA "CLIMB"), due the proximity of a military aircraft, flying at same altitude and convergent track, which got a similarly warning and a TCAS RA "DESCEND" command.

Both aircraft responded promptly and positively to TCAS command and crossed each other with a horizontal separation of ±1NM and a vertical separation of 1000'.

GPIAA was notified by Swiss BFU, in the 04th of February, followed by NAV, E.P. (ATM provider) later the same day.

***This report has been released in Portuguese and English Languages.
In case of conflict, Portuguese version will take precedence.***

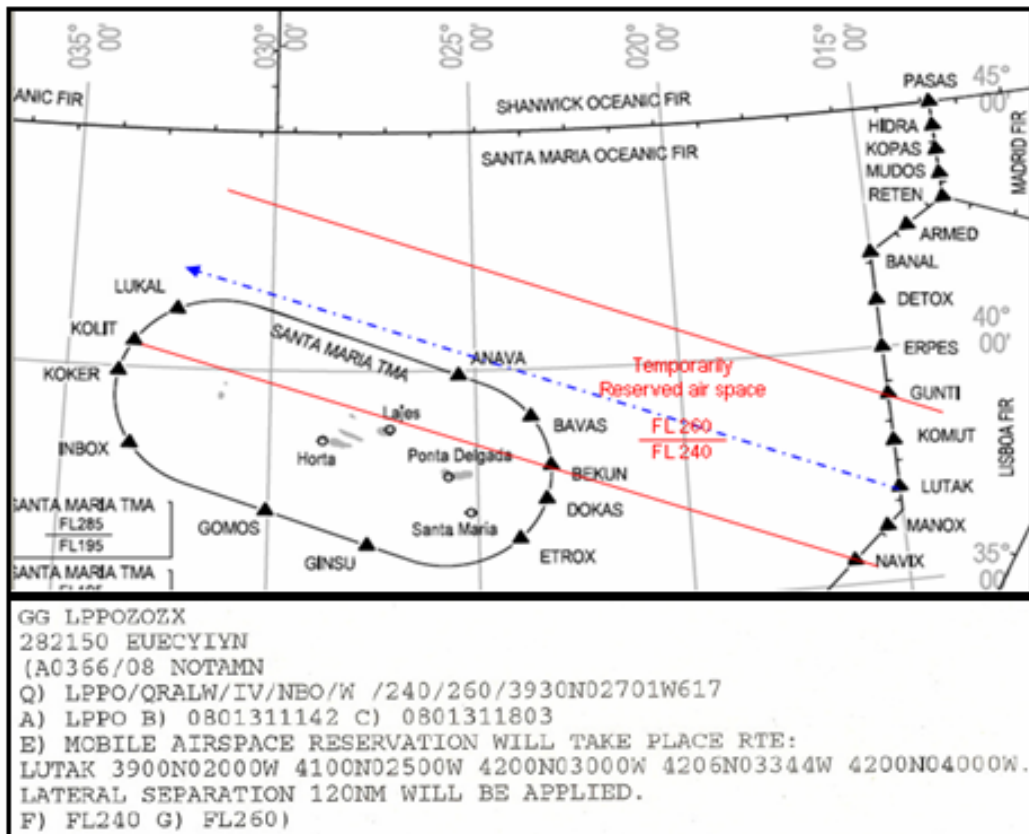
¹ - All time references made in this report, unless other specified, are UTC (Universal Time Coordinated) timings. By that time of the year, in Portugal (continent) official local time was equal to UTC time. In Azores local time was equal to UTC-1.

² - Oceanic Control Area (OCA).

1. FACTUAL INFORMATION

1.1 History of the Flight

On the 31st of January, 2008, there were military operations in course north-easterly of Azores islands, with a special airspace reservation (a corridor of 240NM width along a centre line joining positions LUTAK – N39W20 – N41W25 – N42W30 – N42W40), between 11:42 and 18:03 and FL240 / FL260 (picture nr. 1).



Picture Nr. 1

In such operations, several aircraft would be involved. Among them an air-refuelling aircraft, call-sign "BLEU-83", should depart Moron Air Force Base (LEMO), following the specified plan, as per operational message (picture nr. 2), landing at Mildenhall Air Force Base (EGUN).

REFERENCE OUR MESSAGE: 231053

MISSION HAS DELAYED. NEW ETD: 31 JAN 08

SUBJ: ALTRV APREQ CORONET EAST 005 LEG 2/7

A) CUBE 31-34/BLUE 81-83
CUBE 41-44/BLUE 91-93

B) LEMO

C) BUDDY DPRT CLMB TO FL240B260 VJF 0010 LVLOF BY ORTOP 0020 SONAP 0038
LUTAK 0112 3900N 2000W 0149 (BLUE 83,93 DPRT ALTRV IFFFP) 4100N 2500W 0226
4200N 3000W 0259 4206N 3344W 0322 (BLUE 82, 92 DPRT ALTRV IFFFP) 4200N
4000W 0403 4207N 4500W 0434 4200N 5000W 0508 4206N 5500W 0535 4200N 6000W
0614 DOVEY 0701 ACK 0721 CLMB FL260B280 LVLOF W/I 20NM (BLUE 81, 91 DPRT
ALTRV IFFFP) RIFLE 0739 SWL 0809 SAWED 0814 ORF 0820 WEAVER 0831 GSB
0839 LAND.

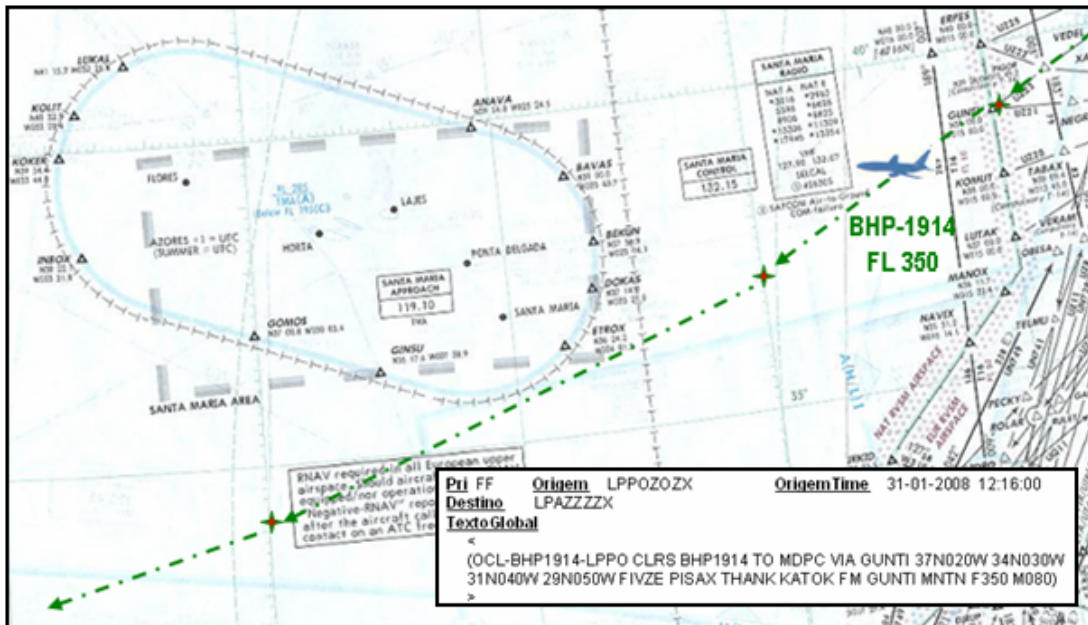
D) KGSB (CUBE, BLUE 81, 91)/ KWRI (BLUE 82, 92)/ EGUN (BLUE 83,93)

E) ETD: 31 JAN 08 CELL 1: 1100Z
CELL 2: 1130Z AVANA 1330Z

G) TAS: 445 KTS. MARSA ALL CE 005 LEG 2 ACFT. TNKRS MNPS CERT. IFFFP RTE
REQ FROM ALTRV] (81,91) FL340 ACK RIFLE SWL SAWED ORF WEAVER KGSB. (82,92)
FL340 4206N 3343W 4200N 4000W 4200N 5000W 4200N 6000W DOVEY ACK J62 SHELPH J121
MANTA CYN KWRI. (83,93) 3900N 2000W LUTAK UZ19 BUSEN UN870 MAGUN UP600
BEGAS T9 LASNO UT8 GAPLI UR8 LND MAMLAND.

Picture Nr. 2

Swiss operator **BELAIR AIRLINES, AG** flight, BHP-1914, from Zurich to Punta Cana, has been cleared to fly Sta. Maria FIR, maintaining FL350, from “GUNTI” to “FIVZE”, via N37W20, N34W30, N31W40, N29W50 (*Picture nr. 3*).



Picture Nr. 3

BHP-1914 reported “GUNTI” at 13:13, maintaining FL350, estimating N37W20 at 13:46.

By 13:18:20, Sta. Maria received a call from BLUE-83, informing “...levelling at FL350, estimating LUTAK at 13:47, wishes to change flight plan route, because it's not possible to proceed with initially expected route”.

Sta. Maria radio operator couldn't clearly understand such message, asked the crew to change frequency and, at 13:25:47, issued the following clearance: “**Sta. Maria clears BLUE-83 to climb and maintain FL280, report when leaving present level and when reaching assigned level**”, to which BLUE-83 replied “**BLUE-83 will descend to FL280, actual FL350, as per FLTPLN, estimating LUTAK at 13:51**”.

After confirming actual Flight Level, Sta. Maria radio operator instructed BLUE-83 to remain on frequency and keep FL350 until further notice. BLUE-83 acknowledged the message and informed he had traffic in sight at 30NM, coming to 28NM.

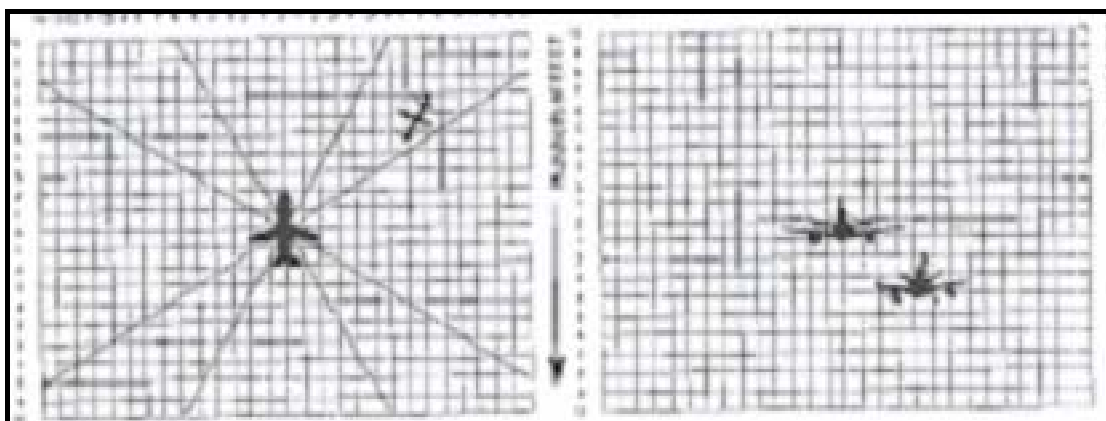
By 13:29:09 Sta. Maria requested present position information and BLUE-83 replied N38°06' W017°39'.

When, at 13:29:50, Sta. Maria instructed BLUE-83 to descend to FL345 and insisted to get the report he was maintaining that Flight Level, BLUE-83 replied “...was climbing back to FL345, after reacting to a TCAS RA “DESCEND”, confirming that, by then (13:30:45), he was cleared of traffic”.

At 13:41:25 BLUE-83 has been cleared to proceed to LUTAK, to climb & maintain FL350 and, by 13:42:53, transferred to Lisbon Control and told to request route change with Lisbon ACC.

At 13:42, BHP-1914 informed Sta. Maria he had to react to a TCAS RA "CLIMB" and climb to FL355, when passing N37°53' W017°56', but he was now back to FL350 and he would report the occurrence.

According BHP-1914 report, at 13:29, both aircrafts crossed at a horizontal distance of 1NM, approximately, and a vertical separation of 1000' (*picture nr. 4*).



Picture Nr. 4

1.2 Injuries

No injuries were reported on both aircrafts.

1.3 Aircraft Damage

There was no damage to the aircrafts.

1.4 Other Damage

There was no third party damage reported.

1.5 Persons Involved

It was collected no data referring flight crews on both aircrafts.

clh

1.6 Aircrafts

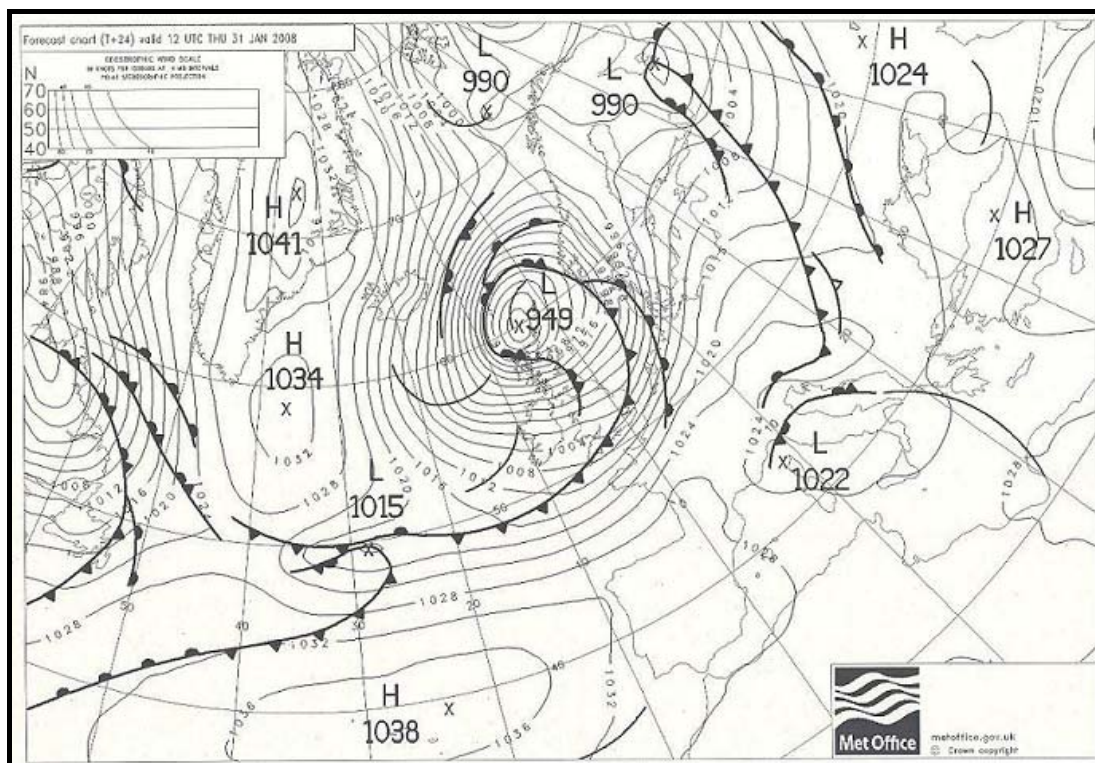
Data available, concerning aircrafts involved as per table below:

Reference	BHP-1914	BLUE-83
Manufacturer:	Boeing	Boeing
Model:	B-767/3Q8	KC-135
Serial Nr.:	27600	N/A
Year of Manufacture:	1997	N/A
Registration Marks:	HB-ISE	N/A

1.7 Meteorology

According meteo charts, covering the period occurrence took place, weather in that area was fine, with a high pressure over Azores, and no significant phenomenons were registered, which allowed the crews to have visual contact with each other.

To the north, the situation was influenced by a Low Pressure, over British Islands, with vertical development clouds formation and strong westerly winds, associated with moderate to heavy turbulence (*picture nr. 5*).



Picture Nr. 5



1.8 Navigation Aids

Not applicable.

1.9 Communications

The use of “HF” radio frequencies, for information & air traffic control, within Sta. Maria FIR, is very sensitive to interferences caused by atmospheric phenomenon, which makes radio contact between aircrafts and ground stations difficult, causing misunderstandings.

1.10 Aerodrome

Not applicable.

1.11 Flight Recorders

Even if both aircraft were equipped with voice and data recorders, they were not available for investigation.

Radio and phone conversations recorded by Sta. Maria were used for analysis of the occurrence.

1.12 Wreckage & Impact

Not applicable.

1.13 Medical or Pathological

Not applicable.

1.14 Fire

There was no fire.

1.15 Survival Aspects

Not applicable.

1.16 Tests & Research

Not applicable.

1.17 Organizational & Management

1.17.1 Airspace Classification

In accordance with Annexe 11 to the Chicago Convention on International Civil Aviation Organization (ICAO), airspace has been divided in the following classes, to which respective access conditions and services are allocated, subject to regulations and procedures as referred in ICAO Annexes and Documents, namely Annexes 2 & 11 and Docs 4444 & 9689:

Class	Allowed Traffic	Service Available
A	IFR Traffic only	Control service and traffic separation between aircraft is provided.
B	IFR & VFR Traffic	Control service and traffic separation between aircraft is provided.
C	IFR & VFR Traffic	All traffic is controlled. Provided separation between IFR/IFR, IFR/VFR & VFR/IFR traffic. Flight information is provided to VFR/VFR traffic.
D	IFR & VFR Traffic	All traffic is controlled. Provided separation between IFR/IFR, with VFR traffic information. Flight information is provided to IFR/VFR, VFR/IFR & VFR/VFR traffic.
E	IFR & VFR Traffic	IFR traffic is controlled and separation granted. All other aircraft receive traffic information as possible.
F	IFR & VFR Traffic	IFR traffic receives traffic information. VFR traffic receives flight information on demand.
G	IFR & VFR Traffic	Only on demand flight information is available.

1.17.2 Sta. Maria Oceanic FIR

1.17.2.1 Limits & Classifications

Sta. Maria Oceanic FIR covers a huge area over North Atlantic Ocean, limited by parallel N45° (north boundary) and N17° (south boundary), and meridians W014 (east boundary) and W040 (west boundary) (*picture nr. 6*).

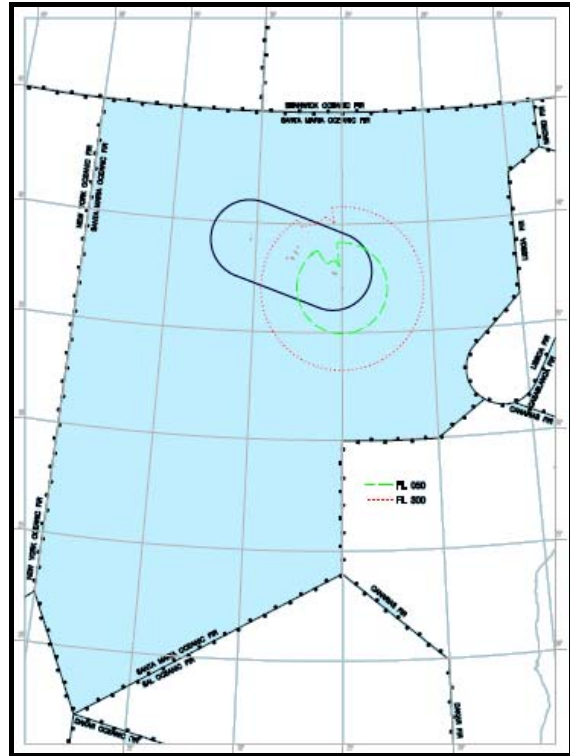
This area is classified as airspace class “**A**” (Sta. Maria OCA – above FL55) and airspace class “**G**” (Sta. Maria FIR – below FL55, except Sta. Maria TMA and Lajes Military CTA).

Radar coverage was limited to a maximum 250NM radius (*red circle*), at FL300, reducing for lower altitudes (*green circle*) at FL50.

Within these areas aircraft minimum lateral separation was 10NM, until 100NM and FL245, and 20NM, inside the area remaining, until 200NM.

Inside Sta. Maria OCA (airspace class "A") no VFR flights were allowed and it was mandatory to get a flight clearance before entrance.

BHP-1914 flight received a flight clearance, issued by Sta. Maria ACC, and was proceeding in accordance with it.



Picture Nr. 6

1.17.2.2 Communication's Proceedings

Due its extension, Sta. Maria OCA was not covered by VHF radio communications but inside radar coverage areas and TMA, roughly. By that reason, the main communication system was based on HF frequency communications (NAT A and NAT E) and aircraft separation minima increased outside radar coverage area, following the procedural control principle.

Like other oceanic areas, these HF communications were not handled by Air Traffic Controllers (ATC), but by Radio Operators (RO), instead. Those operators received aircraft messages and then forwarded them to the operating area controller, who passed them the answer to transmit to the aircraft.

This time consumer process makes more difficult to provide an effective Air Traffic Management Service.

1.17.3 Airspace Special Reservation

Anytime it became necessary, especially for military operations, a special airspace reservation would be drawn and limitations and/or restrictions to civil traffic would be imposed.

When the occurrence took place, a special airspace reservation was implemented and a respective NOTAM issued, preventing civil aircraft the access to an area with 120NM to Gabinete de Prevenção e Investigação de Acidentes com Aeronaves



each side of a line connecting points LUTAK – N38W20 – N41W25 – N42W30 – N4206W3344, between FL240 and FL260, from 11:42 to 18:03 (*picture nr. 1*).

USAF BLEU-83 was flying inside that special airspace reservation area and left the area, climbing to higher level (FL350), entering Sta. Maria OCA, without previous contact and no ATC clearance.

1.18 Additional Information

There's no other relevant information to refer.

1.19 Special Investigation Techniques

No special investigation techniques have been used during this investigation.

2. ANÁLISIS

2.1 Air Traffic Management

All aircraft movements involved in this occurrence, evolved outside Sta. Maria radar coverage and area controller had no direct radio contact with aircraft's crews, communicating in HF frequencies through ROs, nor had a visual picture of aircraft's positions, depending on a mental computation based on information passed to him.

2.2 BELAIR AIRLINES, AG flight BHP-1914

Belair Airlines, AG flight BHP-1914, departed Zurich at 10:38, submitted a Flight Plan and has been cleared to fly Sta. Maria OCA, maintaining cruising level 350FL and cruising Mach .80M, from point "GUNTI" to point 31N40W, via 37N20W and 34N30W, having Punta Cana as final destination (*picture nr. 3*), following established procedures for operation within Sta. Maria OCA/FIR (*MNPS and RVSM*).

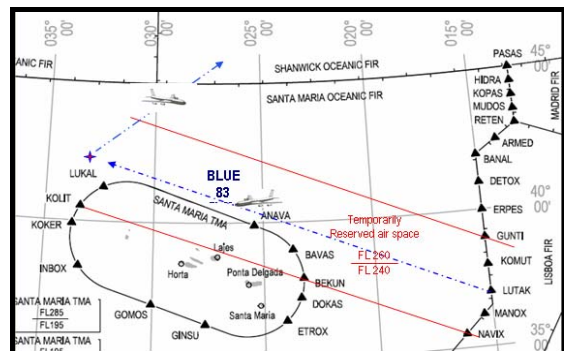
At 13:15, Sta. Maria Air Control Centre (ACC) registered a position report from BHP-1914 "...checking position GUNTI at 13:13, FL350, Mach 0.80, estimating position 37N20W at 13:46, 34N30W next". Sta. Maria radio operator confirmed this message and didn't add any alert message or request any non-routine procedure.

By 13:29, BHP-1914 reacted to a TCAS RA "**CLIMB**" message, climbed to FL355 and returned to his assigned level, after cleared of traffic. At 13:42 reported such situation to Sta. Maria and informed he would file a report.

BHP-1914 complied with all established procedures for traffic operating inside Sta. Maria OCA/FIR.

2.3 USAF Tanker BLUE-83

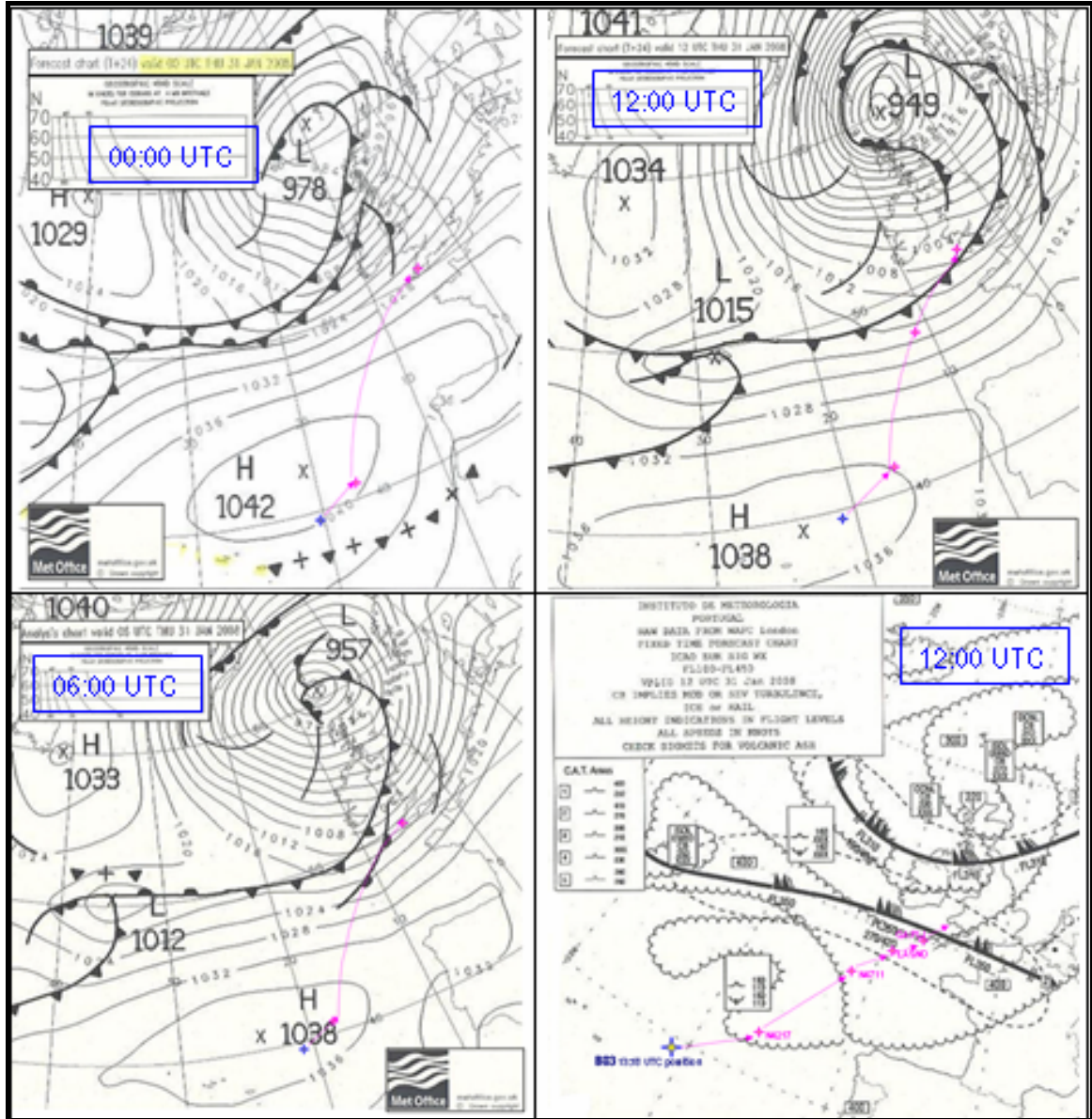
BLEU-83, was part of a group of six air refuelling platforms and eight fighters, involved in an air refuelling mission, inside a special air-space reservation area (as defined before) and was expected to leave the operation area through point 42°06'N 033°44'W, proceeding northerly to destination Mildenhall Air Force Base (EGUN) in UK (*picture nr. 7*).



Picture Nr. 7

CLH

Due meteorological conditions (which have been deteriorating in the mean time) prevailing in the area along the expected exit route (*picture nr. 8*), BLEU-83 opted for an alternative routing and flew back to the entry point (LUTAK), proceeding than along standard routes to destination.



Picture Nr. 8

Before leaving reserved operation area and enter airspace class “A” (Sta. Maria OCA), BLEU-83 should have contact Sta. Maria Control and request a clearance³ to enter controlled airspace and climb to higher flight level, stating requested changes to his routing.

³ - AIP Portugal – ENR 1.4.1;
 - ICAO Annex 2 – 3.6.1 / 3.6.3;
 - ICAO Annex 11 – 2.6.3 ; Appendix 4;
 - ICAO Doc 4444 – 4.5.2.1; 4.5.7;
 - ICAO Doc 9689 – 2.3.2; 2.3.3.

BLEU-83 didn't request a clearance and inverted his routeing, climbing outside reserved airspace, reporting only when levelling at 350FL.

Flying at 350FL and estimating position LUTAK at 13:47, BLEU-83 would interfere with civil traffic, flying same level in convergent track (BHP-1914).

In effect, by 13:28 he reported approaching traffic at 30NM and, next minute, was reacting to a TCAS RA "*DESCEND*" message.

Trough diplomatic channels we tried to get USA Air Force comments but we were not successful, even extending closure date of this report.

2.4 Conflict Resolution

When BLEU-83 first contact Sta. Maria (13:18:20), informing he was levelling at FL350 and estimating LUTAK at 13:47, Sta. Maria RO was unaware of the presence of such flight.

Communicating in HF frequencies (6628kHz), he felt some difficulties in perceiving crew message and requested a frequency change (8825kHz).

Even so, he was not sure of aircraft position and intentions, as suggested by the primary clearance issued (13:25:47) "... ***climb & maintain FL280, report leaving present level and reaching new level***", which seems to be a pre-arranged clearance, in coordination with Shannon ACC.

BLEU-83 replied with "...***we will descend to FL280, current FL350, as filled, estimating LUTAK at 13:49***". RO asked to confirm present FL and instructed him to "...***standby on frequency***" (13:26:45), while trying to establish contact with ATC by phone and inform the situation, asking him about action to be taken (13:27:40).

ATC didn't know about BLEU-83, either, but hearing about FL350 inbound LUTAK, estimated at 13:49, figured out an unsafe scenario and requested urgent confirmation of present position and FL, "***maximum priority***" (13:29:00).

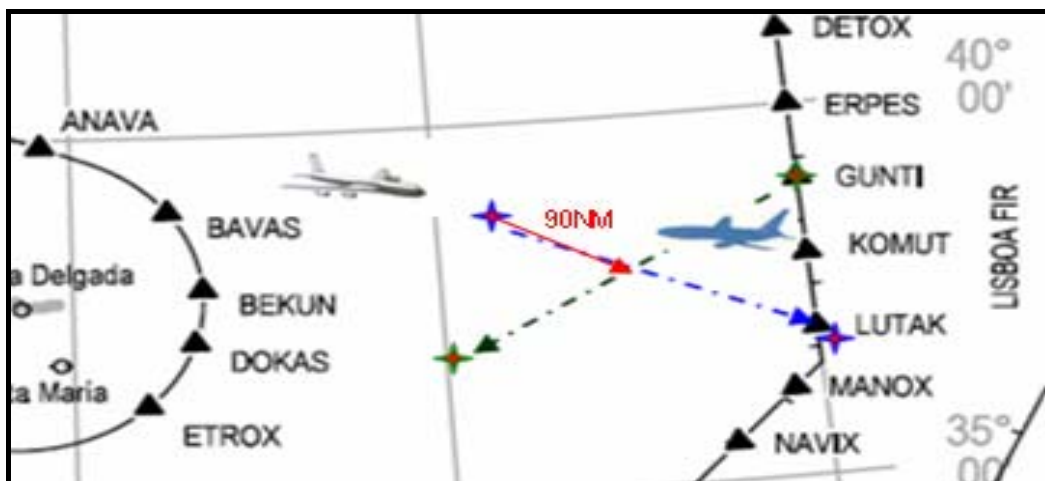
By 13:29:39, BLEU-83 confirmed his present position "...***38°06'N 017°39'W***" adding "...***traffic at 30NM, coming to 28***".

In the mean time BLEU-83 was in "***standby***", maintaining FL350 and flying to LUTAK.

Once his doubts were cleared ATC delivered an "***immediately descend***" command to FL345 (13:29:45).

When RO finally contacted BLEU-83 and ordered him to "...***descend now to FL345!***" (13:29:50), "...***descend now!***" (13:30:19), both aircrafts had reacted to a TCAS RA.

BLEU-83 descended below FL345 and BHP-1914 climbed to FL355 clearing the conflict (13:30:45).



Picture Nr. 9

By the time of first contact with Sta. Maria, BLEU-83 was ± 90 NM far from interception point with BHP-1914, same level (*picture nr. 9*).

When RO contacted ATC, both aircraft were coming inside traffic advisory area.

When ATC issued descent order for BLEU-83, both aircrafts were coming inside resolution advisory area.

When RO transmitted ATC order to BLEU-83, both aircraft were recovering from conflict avoiding action commanded by TCAS.

From first contact to conflict resolution twelve minutes have passed.

Considering that such time frame should be enough for issuing of necessary collision avoidance instructions, we must conclude that aircraft/control information exchange system in place at Sta Maria was responsible for that untimely response.

With the implementation of new systems & technologies, under reliability test's phase, it is expected that similar situations will be avoided.

3. CONCLUSIONS

3.1 Findings

Based on what has been exposed, we may conclude that:

- 1st Flight BHP-1914 got necessary clearance to over-fly Sta. Maria Oceanic Control Area (OCA) and complied with FLTPLN and ATC clearances;
- 2nd Flight BHP-1914 has never been informed of conflicting traffic (altitude & track) and didn't receive any FLTPLN change instruction;
- 3rd Tanker BLEU-83 was engaged on a military mission, taking place inside a special airspace reservation area, operating according his sphere of competency;
- 4th Once military operation was terminated, BLEU-83 should proceed northerly (via Shannon FIR) towards his final destination (EGUN);
- 5th Instead, BLEU-83 reversed track towards LUTAK and left his reserved flight levels (FL240/FL260), climbing to FL350;
- 6th When leaving military operation's area, BLEU-83 didn't comply with operational procedures requested for airspace class "A", changing his altitude and routeing without previous ATC clearance;
- 7th Both aircrafts were evolving outside Sta. Maria radar and VHF frequency radio communications coverage area, being subject to contact on HF frequency, with all its inconveniences;
- 8th Communication System between BLEU-83, Sta. Maria Radio Operator and Sta. Maria Air Traffic Controller was unable to provide the last one with required and updated information, in time, for him to create the necessary mental picture that could allow him to issue required and timely evasive actions, in order to prevent the conflict;
- 9th Combination of factors referred in 5th to 8th caused great disturbance on controller's perception of situation and took about twelve minutes to be clarified, delaying the delivery of corrective messages and letting aircrafts to enter inside TCAS resolution area and causing the activation of the system, which solved the conflict;
- 10th Prompt reaction of both aircraft crews to TCAS RA, cleared the conflict and avoided the possibility of aircraft's collision.

3.2 Causes of the Accident

3.2.1 Primary Cause

BLEU-83 non-compliance of Flight Plan, as previously filed, changing of flight level and tracking, without getting required ATC clearances, when leaving a specially reserved air-space and entering class "A" airspace, is considered the primary cause for this incident.

BLEU-83 failed to comply with ICAO regulations and procedures, namely:

- a) ICAO Annex 2 – 3.6.1 / 3.6.3;
- b) ICAO Annex 11 – 2.6.3 and Appendix 4;
- c) ICAO Doc 4444 – 4.5.2.1; 4.5.7;
- d) ICAO Doc 9689 – 2.3.2; 2.3.3;
- e) AIP Portugal – ENR 1.4.1.

3.2.2 Contributory Factors

The following were considered as Contributory factors:

- 1st Flying outside radar coverage area;
- 2nd Flying outside VHF radio communications coverage area;
- 3rd Deterioration of meteorological conditions along the intended track;
- 4th Difficult understanding between aircraft and radio operator, with consequent time consumption;
- 5th Slow and inefficient communication transfer process between aircraft, radio operator, air traffic controller and vice-versa.



4. SAFETY RECOMMENDATIONS

No safety recommendations were issued.

Lisbon, the 27th of May 2009

The Investigator In Charge,



António A. Alves