

**FINAL REPORT No.4-02/8-12/5-13
ON THE AIRCRAFT SERIOUS INCIDENT**

**LOSS OF SEPARATION STANDARD BETWEEN THE KLM AIRCRAFT B737-800,
flight KLM903, REGISTRATION PH-BXN and FINAIR AIRCRAFT E190, flight
FIN746L, REGISTRATION OH-LKH IN THE VICINITY OF THE POINT ATRAK
ON OCTOBER 20, 2012**

The Transport Accident and Incident Investigation Bureau of the Republic of Latvia is a governmental, independent of all aviation authorities' organization, established by law to investigate and determine the cause or probable cause of accidents and serious incidents that occurred in the civil aviation, as well, if necessary for enhancing flight safety, incidents.

The sole purpose of such investigation is to prevent accidents and incidents in accordance with Annex 13 to the Convention on International Civil Aviation and REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC. If Bureau finds it appropriate, to issue safety recommendations. The purpose of an investigation conducted under the responsibility of the Transport Accident and Incident Investigation Bureau Republic of Latvia is not to apportion blame or liability.

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Abbreviations

ATCC - Air Traffic Control Centre

ACC - Area Control Center

ATRACC- ATC System for Riga Area
Control Centre Guidance and Control
System

ACFT - Aircraft

ARCC -Aeronautical Rescue Co ordination
Centre

ATC - Air Traffic Control

UTC - Universal Time Coordinated

AoR - Area of Responsibility

CWP- Controller Working Position

RVSM -Reduced Vertical Separation
Minimum

NM - Nautical mile

FT - Feet

FIR - Flight Information Region

ATS - Air Traffic Services

ESARR- Eurocontrol Safety and
Regulatory Requirement

PANS-ATM- Procedures for Air
Navigation Services – Air Traffic
Management

STCA - Short-Term Conflict Alert

CTR- Control Zone

FL - Flight Level

TCAS- Traffic Alert and Collision
Avoidance System

Glossary

Air-ground communication - Two-way communication between aircraft and stations or locations on the surface of the earth.

Flight information region (FIR)-An airspace of defined dimensions within which flight information service and alerting service are provided.

Heading - The direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from North (true, magnetic, compass or grid).

Radar separation- The separation used when aircraft position information is derived from radar sources.

Synopsis

Unless stated otherwise the time in this Report is UTC

On Monday, October 22, 2012 TAIIB (Transport Accident Investigation Bureau of the Latvian Republic) received from ARCC a notification an incident had taken place (separation minima infringement) in Riga Flight Information Region (FIR) airspace on Saturday, October 20, 2012 at 11:48 UTC involving a scheduled flight of FINNAIR, EMBRAER 190, aircraft call sign FIN746L and KLM BOEING 738, aircraft call sign KLM903 in the vicinity of point ATRAK (56°35'28"N; 023°50'35"E).

FINNAIR, EMBRAER 190, registration OH-LKH was en route from Warsaw (EPWA) to Helsinki (EFHK).



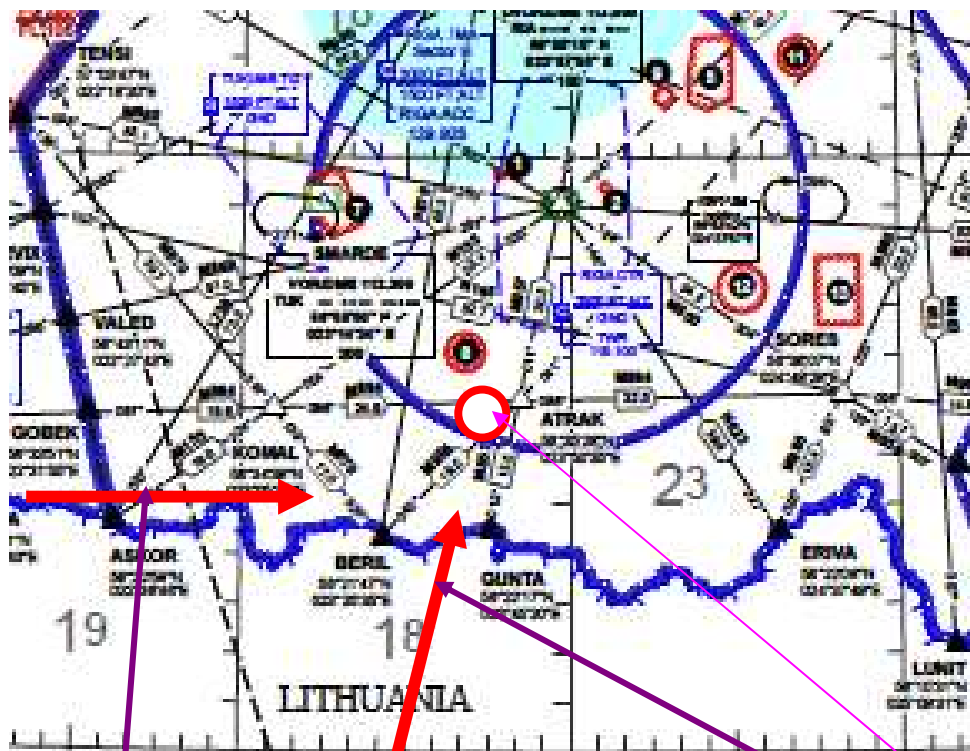
Picture 1

KLM BOEING 738, registration PH-BXN was en route from Amsterdam (EHAM) to Moscow-Sheremetyevo (UUEE).



Picture 2

Aircraft were flying on crossing tracks, FINNAIR, EMBRAER 190, aircraft call sign FIN746L with 86 passengers on board was cruising at FL390 to North, KLM BOEING 738, aircraft call sign KLM903 with 157 passengers on board was cruising eastbound at FL380.



KLM903, FL380; Figure 1 Crossing tracks of aircraft FIN746L, FL390; point ATRAK

Traffic KLM903 also was cleared to climb at FL390 where it was in conflict with a second locally-based aircraft FIN 746. FIN 746 received TA (Traffic Advisory) first, on the Multi Function Display was seen traffic proceeding eastbound and climbing. After short while FIN 746 got TCAS RA. KLM903 received TCAS RA and followed TCAS instructions. According to the radar data the closest proximity was 4.2 Nautical Miles (NM) horizontally and approximately 700 FT vertically, respectively. The minima for the separation of aircraft was 5 NM horizontally and 1,000 ft vertically.

Both aircraft were equipped with an anti-collision warning system, TCAS2, and both were activated during the occurrence.

Notification

The Transport Accident and Incident Investigation Bureau of the Republic of Latvia (TAIB) were notified after 2 days of the incident, on Monday, October 22, 2012 from ARCC.

Investigation

TAIB Authorities classified the occurrence as a serious incident and initiated an investigation under the provisions of Annex 13 to the Convention on International Civil Aviation (Chicago 1944) and the REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation, as well as forwarded request to air traffic service provider LGS for providing any relevant available information regarding to the incident and personnel data of controller involved in the serious incident.

1. Factual information

1.1. History of the Flight

At the time of incident at the Riga ATCC, in sector EAST for controller with operational role “EAST Executive” AoR were 9 (nine) aircraft.

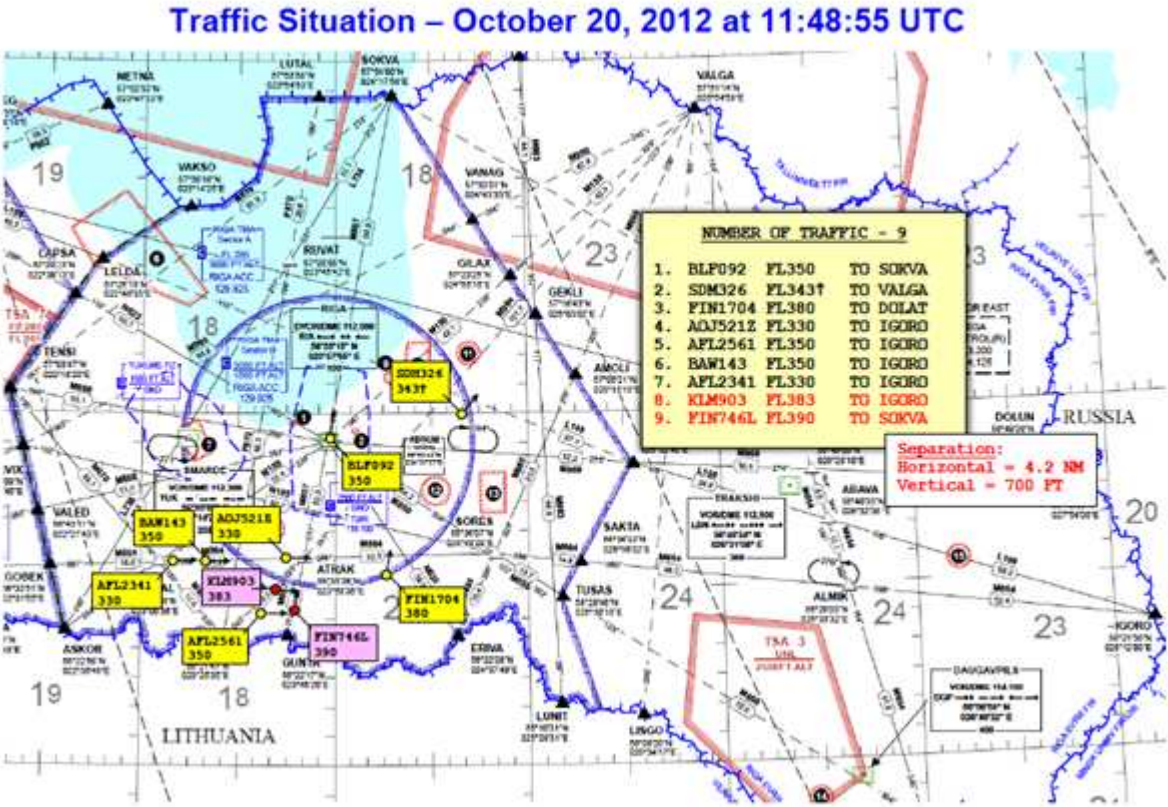


Figure 2 Traffic situation in sector EAST

According to ATCC roster for October 2012, sector EAST controller working shift was No2 from 11:30 to 19:00 UTC, 7 working hours.

Sector EAST controller has logged in ATRACC+ system with user name “SERA” at **11:34:01** UTC.

At **11:43:19** involved in the incident Boeing B738, KLM903 coming from Amsterdam at FL380 established radio contact with the sector EAST controller executive on frequency 133,2MHz. Controller identified KLM903.

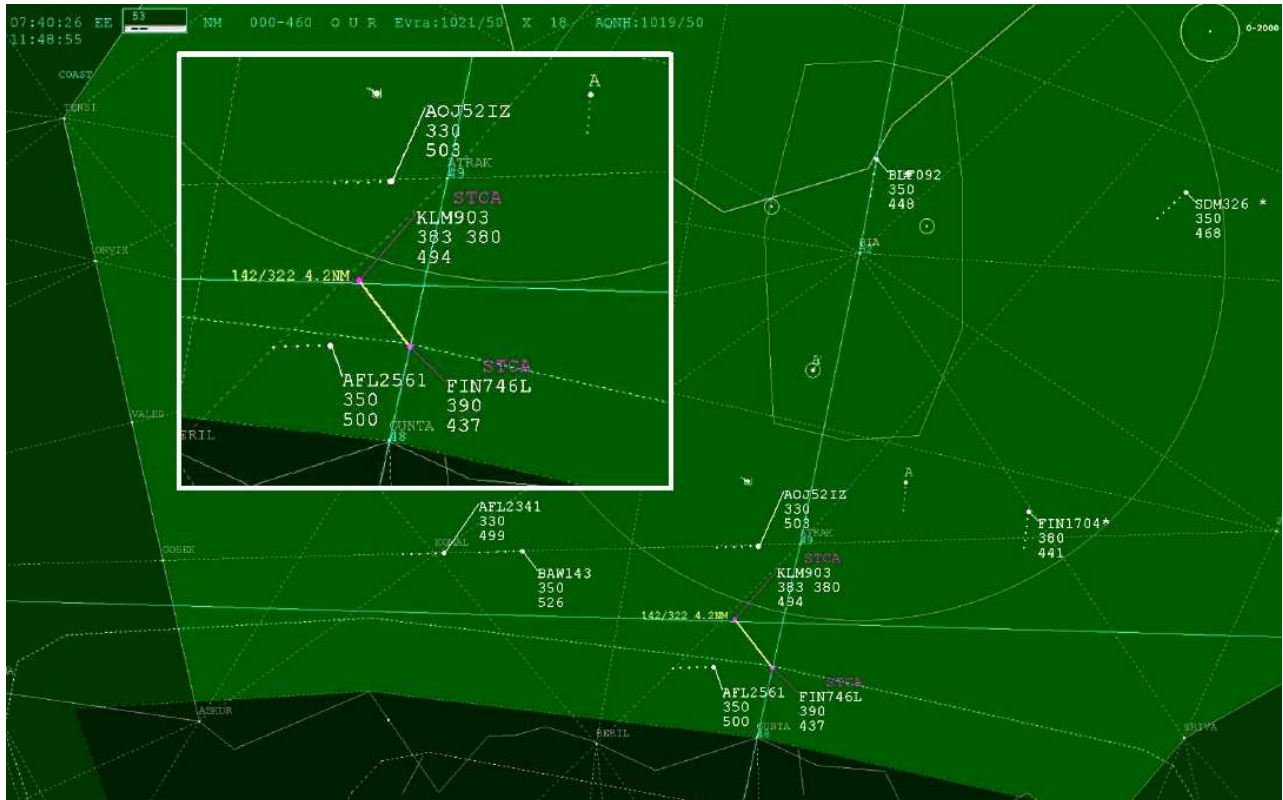


Figure 3 Aircraft at the AoR of sector East controller (radar recording)

From **11:44:09** to **11:47:18** controller was busy with providing separation between aircraft flying almost on the same heading - AFL 2561 flying at FL350 and requesting direct to point IGORO and BAW 143 also flying at FL350 as well as coordinated flights with adjacent ATCC - Tallinn, Vilnius and Velikiye Luki.

Controller wanted to change flight level of AFL 2561 and offered to take level FL370. The pilot of AFL 2561 answered: “If possible request 330 AFL 2561.” Controller cleared AFL 2561 to maintain level 350 because level 330 was occupied.

Then controller offered BAW143 to except flight level 370 for cruise, BAW143 affirmed readiness but controller could not to give such level immediately because from south was flying aircraft at FL 360.

At **11:47:18** involved in the incident EMBRAER190, FIN 746L cruising at FL 390 by route M857 (VAKAL-GUNTA-ATRAK-RIA-SOKVA) established contact with sector EAST Controller.

Controller identified FIN 746L. According to the statement of sector East controller, KLM 903 before entering in his AoR at FL380 from West, the crew requested to sector WEST controller to climb to FL 390. Using ATRACC system sector WEST controller agreed climbing to FL390.

Affirmative Recordings such information did not submit at disposal of investigation.

At **11:47:44** controller issued clearance for Boeing B738, KLM903 cruising at FL380: **“KLM903 climb FL390”**. The crew of KLM903 confirmed clearance and commenced to climb to FL 390.

According to explanation of sector East controller during interview, after while perceived cruising FIN746L at FL390 from south he called by phone the sector WEST controller and declared him to left FIN746L at FL380.

Records of such communication between controllers did not submit at disposal of investigation.

At **11:47:59** sector EAST controller instructed KLM903: “KLM903 disregard last command, descend to FL 380”.

Pilot of KLM903: “OK, returning now level 380 and we have traffic on TCAS now KLM903.”

EAST controller: “KLM 903 traffic at your 2 o’clock distance 5NM”.

At **11:48:22** KLM903 was at FL381 climbing, at ground speed 487KN.

FIN746L was at FL390 at ground speed 437KN. Separation between traffic was 9,7NM.

At **11:48:27** sector when EAST controller stopped climbing for KLM903 and gave order to descend to FL 380 KLM903 was at FL 381 climbing, vertical rate of climb was 500FT/min.

FIN746L was at FL390 at ground speed 437KN.

At **11:48:33 STCA triggered on**, KLM903 was at FL 383, FIN746L was at FL390. Separation between traffic was 7,9NM.

Instruction to descend back was done when KLM903 was at FL 381 climbing and when instruction was received and repeated KLM903 was at FL383 already.

At **11:48:34** pilot of KLM903 reported that had traffic on TCAS and descending to FL380.

At **11:48:45** pilot of KLM 903 declared: “KLM 903 we have **Resolution Advisory** now, descending back level 380”.

*This information was not transmitted to main receiver on frequency 133.2 MHz due to communication technical individualities – **single channel simplex operation**, simplex using the same frequency channel in each direction, therefore this information was not heard by the controller.*

KLM 903 started descend from FL383 at ground speed 494KN on heading 092 degrees,

FIN746L was at FL390 at ground speed 438KN on heading 013 degrees. Separation between traffic was 5.6NM. After a while pilot of KLM 903 repeated: “Now descending back FL380”

At **11:48:55** KLM 903 was at FL383 at ground speed 494KN on heading 092 degrees,

FIN746L was at FL390 at ground speed 437KN on heading 012 degrees. Separation between traffic was **4,2NM**.

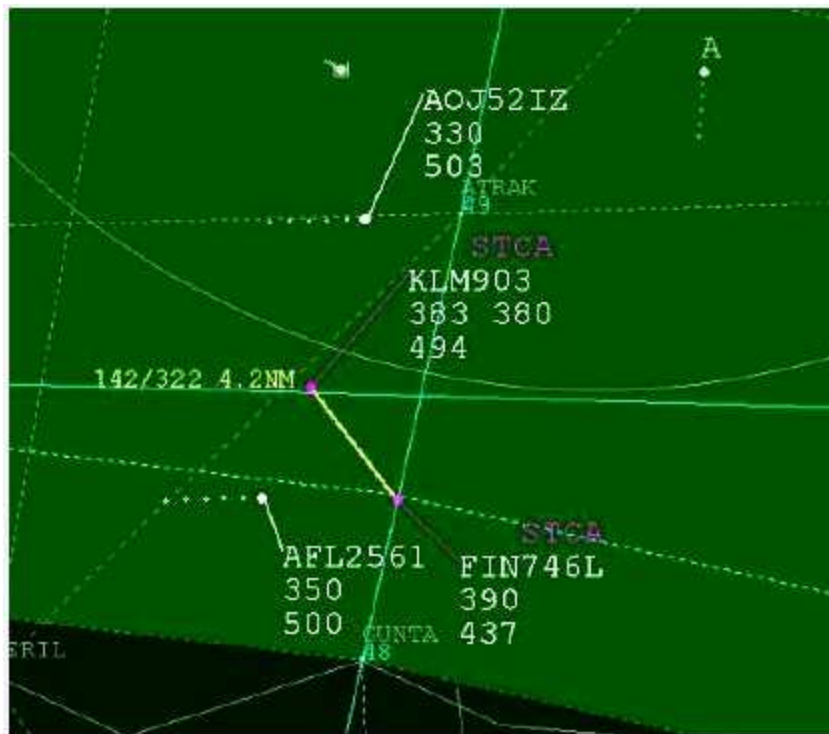


Figure 4 Radar data

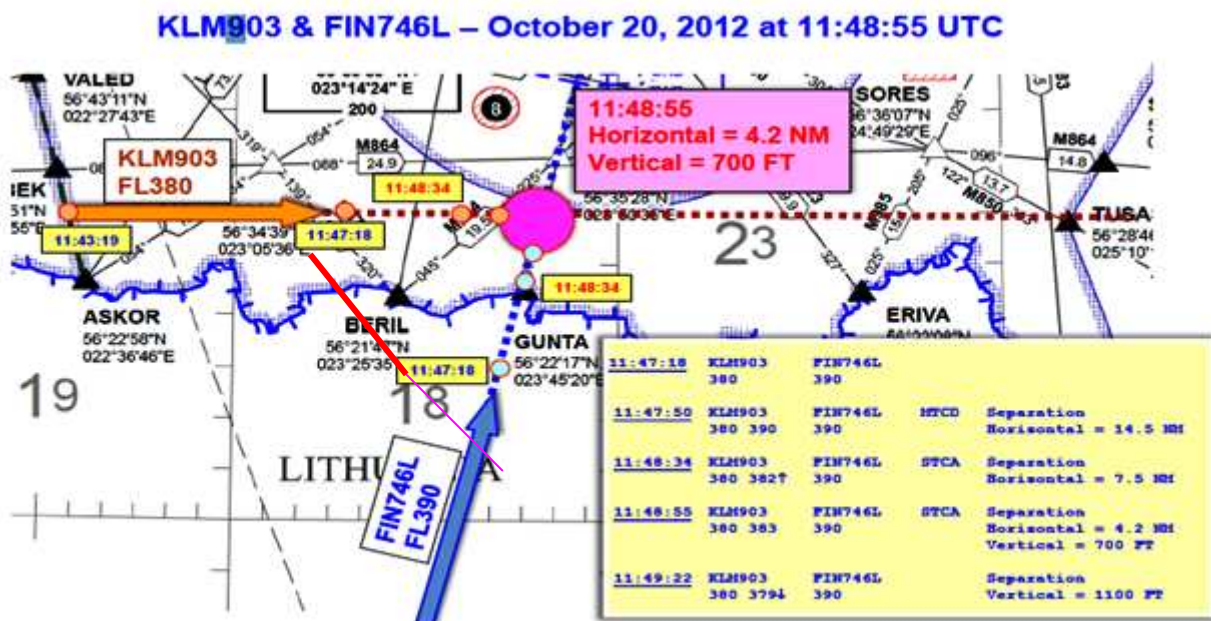


Figure 5 Traffic situation during incident

At 11:48:58 “STCA” was on, KLM903 with ground speed 495KN at FL 382 descending, vertical rate of descend 600FT/min.

FIN746L was at FL390 at ground speed 437KN on heading 012 degrees. Pilot of FIN746L reported: “FIN746 we have also been ... (unreadable) RA at 390”

The sector EAST controller asked: “Station calling, say again please.”

The pilot of FIN746L: “FIN746L maintain 390 but we have also file report”

The controller answered:” That’s copied Riga Control”

At **11:49:00** KLM903 with ground speed 495KN at FL 382 descending, heading 092 degrees
FIN746L was at FL390 at ground speed 437KN on heading 012 degrees.

At **11:49: 06** KLM903 crossed FL 381 by descending.

FIN746L was at FL390.

At **11:49:14** KLM903 crossed FL 380 on descent.

At **11:49:26** pilot of KLM903 reported that conflict was over.

At **11:51:15** EAST controller instructed KLM 903:”KLM903 now clear of traffic, climb FL390”

The pilot of KLM 903 confirmed clearance.

Conflict situation was resolved now, but separation standards were infringed between aircraft.

Horizontal separation between aircraft was **4.2NM**, vertical **700FT**.

1.2. Injuries to persons

There were no injuries.

1.3. Damage to aircraft

Not damage occurred.

1.4. Other damage

Objects other than aircraft not damaged.

1.5. Personnel information

Air traffic controller:

Male, 26 years old

Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid);

Medical Certificate Class 3- valid.

Captain of Boeing 737:

male, 49 years old

Total flight time:11873 hours; B737 flight hours: 5904 hours (all as captain)

Flight Officer: male, 38 years

Total flight time: 6355 hours; B737 flight hours: 4427 hours 737 hours

1.6. Aircraft information

Aircraft type – Boeing B738, Model 737-8K2 registration PH-BXN, owner of aircraft- KLM Royal Dutch Airlines, serial No.30356, date of manufacturing: 2000.

Aircraft type – Embraer E190, model ERJ-190-100LR, registration OH-LKH, owner of aircraft – FINNAIR, serial No. 19000086, date of manufacturing: 2007.

1.7. Meteorological information

MET REPORT EVRA 200950Z WIND RWY 18 TDZ 160/9KT END 160/9KT CAVOK T14 DP10 QNH 1020HPA TREND NOSIG=

METAR EVRA 200950Z 17009KT CAVOK 14/10 Q1020 R18/090070 NOSIG=

MET REPORT EVRA 201020Z WIND RWY 18 TDZ 160/9KT END 160/8KT CAVOK T14 DP11 QNH 1021HPA TREND NOSIG=

METAR EVRA 201020Z 18008KT CAVOK 14/11 Q1021 R18/090070 NOSIG=

MET REPORT EVRA 201050Z WIND RWY 18 TDZ 170/10KT END 180/8KT CAVOK T15 DP11 QNH 1021HPA TREND NOSIG=

METAR EVRA 201050Z 17008KT CAVOK 15/11 Q1021 R18/090070 NOSIG=

MET REPORT EVRA 201120Z WIND RWY 18 TDZ 170/11KT END 170/10KT CAVOK T14 DP11 QNH 1021HPA TREND NOSIG=

METAR EVRA 201120Z 18010KT CAVOK 14/11 Q1021 R18/090070 NOSIG=

MET REPORT EVRA 201150Z WIND RWY 18 TDZ 170/13KT END 170/11KT CAVOK T15 DP11 QNH 1020HPA TREND NOSIG=

METAR EVRA 201150Z 18012KT CAVOK 15/11 Q1020 R18/090070 NOSIG=

MET REPORT EVRA 201220Z WIND RWY 18 TDZ 170/10KT END 160/11KT CAVOK T15 DP12 QNH 1020HPA TREND NOSIG=

METAR EVRA 201220Z 18011KT CAVOK 15/12 Q1020 R18/090070 NOSIG=

ATIS information

Date & Time	Data
2012-10-20 09:50:18	EVRA ARR ATIS U 0950Z EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50 BIRD ACTIVITY IN THE VCY OF THE AD WIND 160/9KT CAVOK T 14 DP 10 QNH 1020 TREND NOSIG
2012-10-20 10:20:18	EVRA ARR ATIS V 1020Z EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50 BIRD ACTIVITY IN THE VCY OF THE AD

	WIND 160/9KT CAVOK T 14 DP 11 QNH 1021 TREND NOSIG
2012-10-20 10:50:16	EVRA ARR ATIS W 1050Z EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50 BIRD ACTIVITY IN THE VCY OF THE AD WIND 170/10KT CAVOK T 15 DP 11 QNH 1021 TREND NOSIG
2012-10-20 11:20:18	EVRA ARR ATIS X 1120Z EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50 BIRD ACTIVITY IN THE VCY OF THE AD WIND 170/11KT CAVOK T 14 DP 11 QNH 1021 TREND NOSIG
2012-10-20 11:50:18	EVRA ARR ATIS Y 1150Z EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50 BIRD ACTIVITY IN THE VCY OF THE AD WIND 170/13KT CAVOK T 15 DP 11 QNH 1020 TREND NOSIG
2012-10-20 12:05:25	EVRA ARR ATIS Z 1205Z EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50

	WIND 170/13KT CAVOK T 15 DP 11 QNH 1020 TREND NOSIG
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1.8. Aids to Navigation

1.8.1. ATRACC system

Air Traffic Control System ATRACC+ (Manufacturer' s serial No N SI P 101.1) is an ATM system for area, approach and tower Control of the Riga FIR.

The main function of the system is processing of radar data and flight plan data and presentation of related information.

From a functional point of view, the system consists of two main components:

- a Primary System;
- a Radar Bypass System.

A *Primary System* providing multi radar tracking advanced flight plan data integration, predicted flight trajectories, OLDI (On-Line Data Interchange), silent co-ordination and paperless HMI.

Radar data is received from 4 radar stations and processed by means of a multi radar tracking function. Flight plan data is received via AFTN, OLDI, RPLs or manually entered.

A *Radar Bypass System* for use if the primary system should fail. The Radar Operator Workstation is common for the Primary System, and the Radar Bypass System. Four main functional blocks are defined:

- The Flight Plan Data Management block
- The ATC Functions
- The Support Functional block and the ATC-Simulator

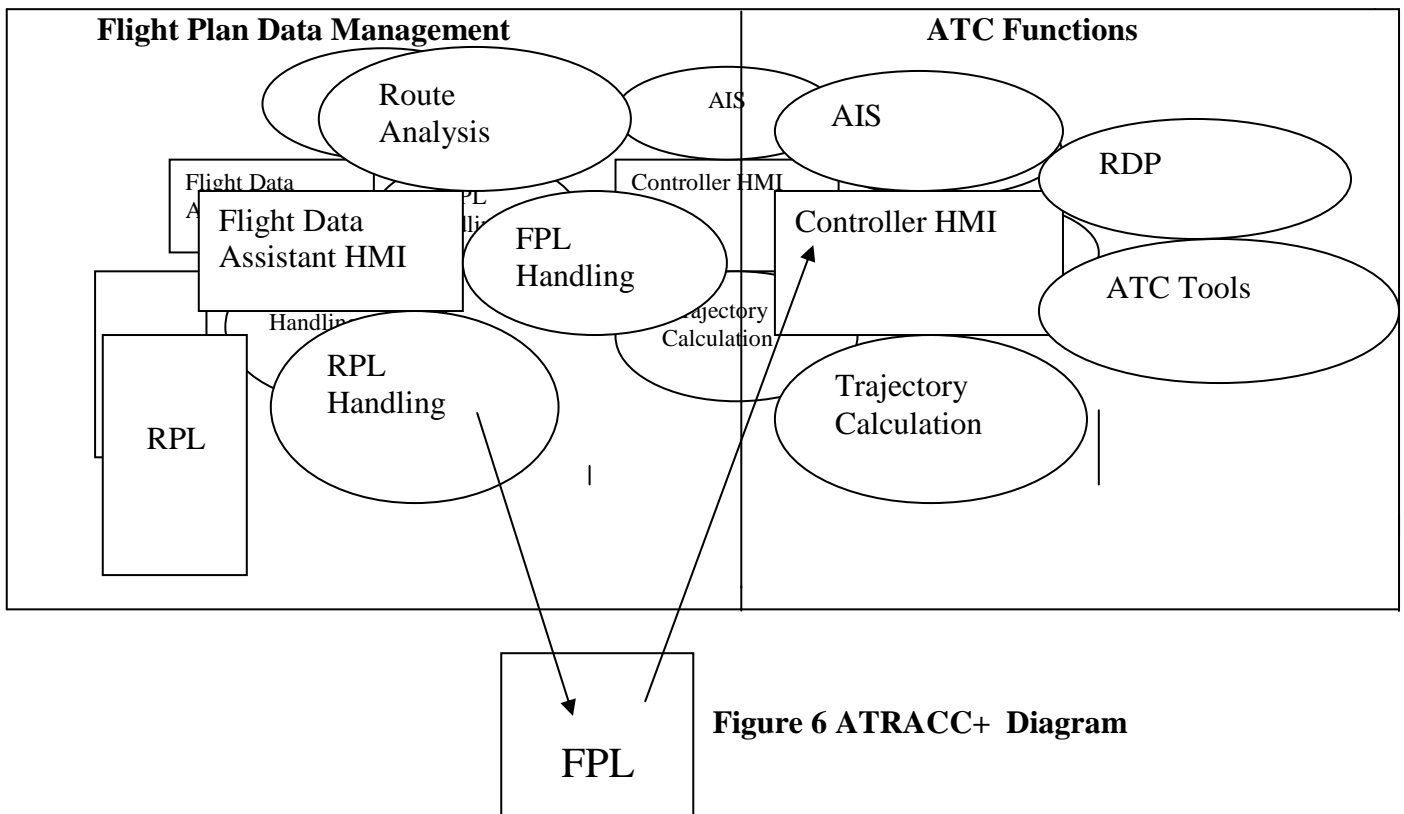


Figure 6 ATRACC+ Diagram

From a functional point of view the system provides the following main functions:

- Radar data processing
- Flight plan data processing
- Information handling
- Operator support
- System monitoring and control
- History function
- AAAF functions (ATRACC ATM Added Functions)

ATRACC has the capability to receive and present information from a weather system called ATIS as well as AWOS (sensors) and from a time system.

The operator work position consists of:

- A Computer
- Two monitors;
- A keyboard;
- A mouse.

Screen presentation is done by use of windows. A window is a rectangular field. There are two types of windows:

- radar windows;
- dialogue windows.

The radar window shows symbols representing real objects that have a geographical position. They are presented in a window position that corresponds to the actual geographical position of the object. A dialogue window contains text boxes, list boxes and buttons.

1.9. Communications

Riga sector “EAST” controller provides communication with a computerized voice communication system using pre-set switching and distribution of various aeronautical frequencies and direct communication lines. Frequency 133.2 MHz “EAST” controller use for pilot - controller communication. Co-ordination within Riga FIR shall be performed using available “ATRACC+” system functionality.

For the investigation the “EAST” Controller console recordings on the frequency 133.2 MHz were used. The quality of the recordings was good.

The “EAST” controller and crew members of KLM903 and FIN746L used standard phraseology and there had not principal errors in the used phraseology.

At 11:48:45 the crew of KLM903 reported that they have Resolution Advisory on TCAS, but controller did not get this report on working place due to simultaneous transmission him and pilot of KLM903 on the same frequency 133.2MHz.

According to Item 15.6.1.3 “BLOCKED FREQUENCY” of Doc 4444 ATM/501 Air Traffic Management, Procedures for Air Navigation Services in the event that the control frequency is **inadvertently blocked by an aircraft transmitter**, the following additional steps should be taken:

- attempt to identify the aircraft concerned;
- if the aircraft blocking the frequency is identified, attempts should be made to establish communication with that aircraft, e.g. on the emergency frequency 121.5 MHz, by SELCAL, through the aircraft operator’s company frequency if applicable, on any VHF frequency designated for air-to-air use by flight crews or any other communication means or, if the aircraft is on the ground, by direct contact;

- if communication is established with the aircraft concerned, the flight crew shall be instructed to take immediate action to stop inadvertent transmissions on the affected control frequency.

For voice communication there was SCHMID Telecom Communication module. The transcription of information recorded on tape recorder during incident did not submit at investigation disposal.

Within the framework of Quality Management System (QMS) Riga ATCC are worked out “Regulations and procedures on ground-to-air radiotelephony” PR-GSV/AvDN-01/ 2 which are applicable for the provision of Air Traffic Services within RIGA FIR/UIR. The provisions of this document are based on ICAO SARPs, ICAO Regional procedures. The provisions of this document are mandatory for ATS personnel conducting direct ground-to-air radio communications.

1.10. Aerodrome information

The airport had not any significance for the incident.

1.11. Flight recorders

The incident reconstruction was based on radar information and voice communications transcript between sector EAST controller of Riga ATCC and both aircraft crew members involved in incident.

1.12. Wreckage and impact information

Not damage

1.13. Medical and pathological information

Not relevant to this incident

1.14. Fire

There was no fire

1.15. Survival aspects

Not necessity to survey

1.16. Tests and research

Were not performed

1.17. Organizational and management information

According to Law on Aviation of the Republic of Latvia the authority responsible for activities of the utilizations of the airspace of the Republic of Latvia for civil and military needs and the flight of aircraft shall be controlled by the Air traffic control unit - the State Joint-Stock Company – “Latvijas Gaisa Satiksme - LGS” which is the air traffic service provider in the Republic of Latvia. Air traffic control has provided in the airspace of Riga FIR, by Latvian Air Navigation Services (LGS) staff.

Riga FIR airspace division

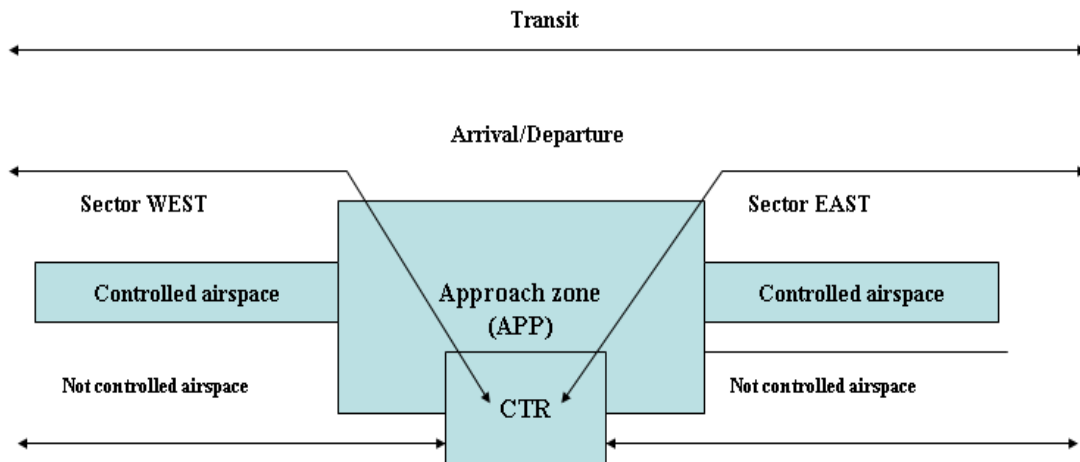


Figure 7

1.18. Additional information

Not applicable

1.19. Useful or effective investigation techniques

NIL

2. Analysis

2.1. Introduction

The analysis concerned the activities of FIN 746L and KLM903 crew's, radio communications, radar recording, Air traffic service's procedures and sector EAST controller's actions.

An occurrence is usually the result of a sequence of events. All causes together form the necessary and sufficient adverse events or conditions for a particular occurrence. Therefore the investigation of the serious incident – infringement of separation standards between the two aircraft Boeing 737 and EMBRAER 190 is based that at least one ATM event was judged to be directly in the causal chain of events leading to this serious incident. Without that ATM event (or if there was a different order of events), the occurrence would not have happened.

The purpose of this investigation is reconstruction of the circumstances of flight in order to analyze, determine causal factors and develop recommendations on preventive actions.

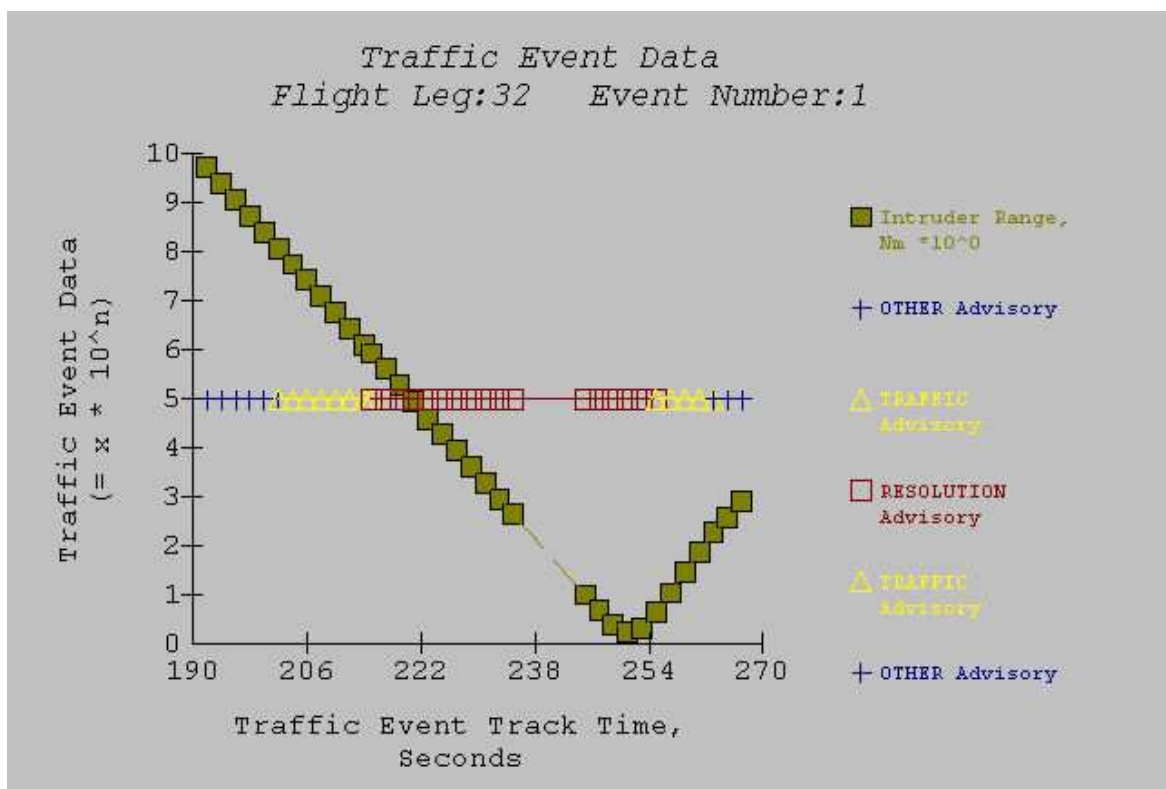
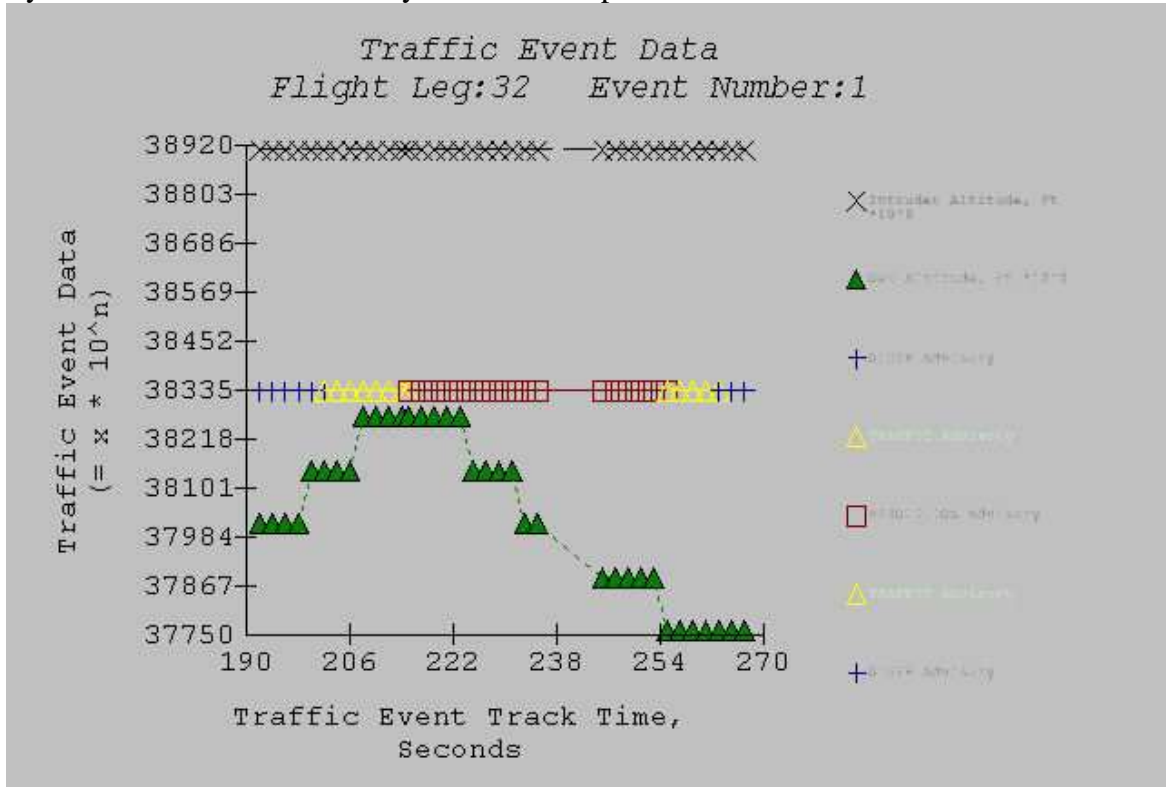
2.2. The FIN 746L crew

During cruise flight at FL390 in Riga FIR the FIN 746L got TCAS **Traffic Advisory**. On Multi Function Display traffic was seen at approx at ten o' clock proceeding eastbound and climbing. F/O was pilot flying and he put his hands on control column and thrust levers therefore was prepared to adjust the flight path if required and also wing landing lights set on.

From the radio the crew heard that it was probably KLM-flight which caused this TCAS TA. After short while they got TCAS **Resolution Advisory** to maintain or monitor vertical speed (they couldn't remember exactly). The PF thought it would be safer to let the autopilot maintain level flight unless they would have some further TCAS instructions and he also said this to the Captain and they both agreed to this. From ATC frequency they heard that KLM started descend to

FL380. PF didn't have any visual contact with KLM during this event. During the event there was no communication between us and ATC because they didn't want to disturb communication between KLM and ATC as it seemed them to be more important.

According to the statement of crew members their actions were based on the static nature of the flight phase and altitude of the flight. They had been on cruise at FL390 when received the traffic advisory, eventually the TCAS RA and there was no command to change the flight path. TCAS advised to maintain current vertical speed. Conflicting flight descended to lower altitude. When they first received traffic advisory the vertical separation was 600ft.



To PF observation other traffic was climbing to same altitude or above. When they received TCAS RA and opposite traffic started descending according to the RA so that when it passed below the altitude separation was about 1000FT. The crew of FIN746L did not have visual contact of the other traffic.

They monitored the development of the situation and TCAS commands were followed during the whole process. They had verbal communication at flight desk about the traffic and their actions. When separation was reestablished and confirmed the crew communicated ATC. As well as had afterwards brief conversation with sector EAST controller about the event.

2.3. The KLM903 crew

According to statement of sector East controller, KLM 903 before entering in his **AoR at FL380** from West requested to sector WEST controller to climb to FL 390 and using ATRACC system sector WEST controller agreed to request climbing to FL390.

Later following sector EAST controller clearance **“KLM903 climb FL390”**. KLM903 cruising at FL380 confirmed clearance and commenced to climb to FL 390.

When KLM 903 was at FL 381 climbing and controller perceiving possible conflict with other traffic gave instruction to descend back to FL 380 disregard previous command the crew of KLM 903 confirmed instruction and declared that they have traffic on TCAS. After that the controller informed crew about traffic at their 2 o'clock at distance 5 miles.

When crew declared that they have Resolution Advisory already there occurred transmitting blocking by an aircraft transmitter because controller and crew used the same frequency channel simultaneously and ATCC radio communication system “air-ground” is based on “simplex operation” concept.

Therefore until controller's instruction to KLM903 to return back to FL 380 and instruction read back KLM903 was at FL383 already and vertical separation between aircraft was 700FT, horizontal 4,2NM.

2.4. Air traffic service's procedures

2.4.1. Within EAST sector the following services are provided:

- Area control services and Flight information services within EAST AoR;
- Alerting services;

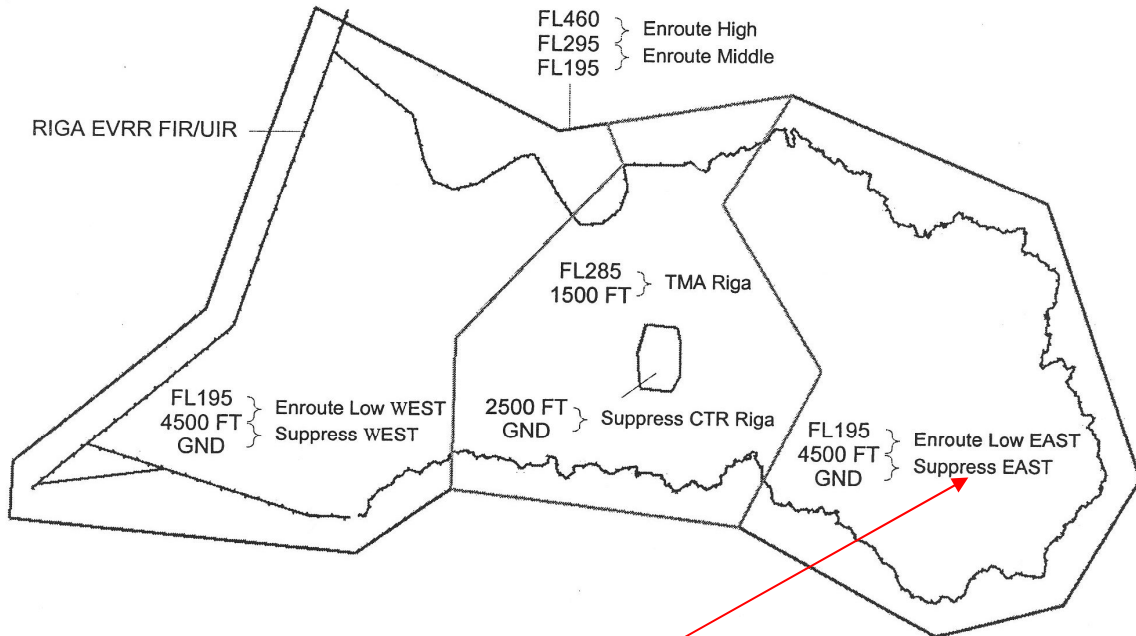
2.4.2. In order to provide area control services, controller shall:

- Be provided with information on the intended movement of each aircraft, or variations therefrom, and with current information on the actual progress of each aircraft;
- Determine from the information received, **the relative positions of known aircraft** to each other;
- Issue clearances and information **for the purpose of preventing collision between aircraft under its control** and of expediting and maintaining an orderly flow of traffic;
- Coordinate clearances as necessary with other units:

1. Whenever an aircraft might otherwise conflict with traffic operated the control of such other units;
2. Before transferring control of an aircraft to such other units.

Control Sector EAST includes:

- Riga Sector EAST AoR;
- Riga TMA (sector A and sector B) could be transferred to Control Sector EAST when Control Sector Riga APPROACH is out of operation.

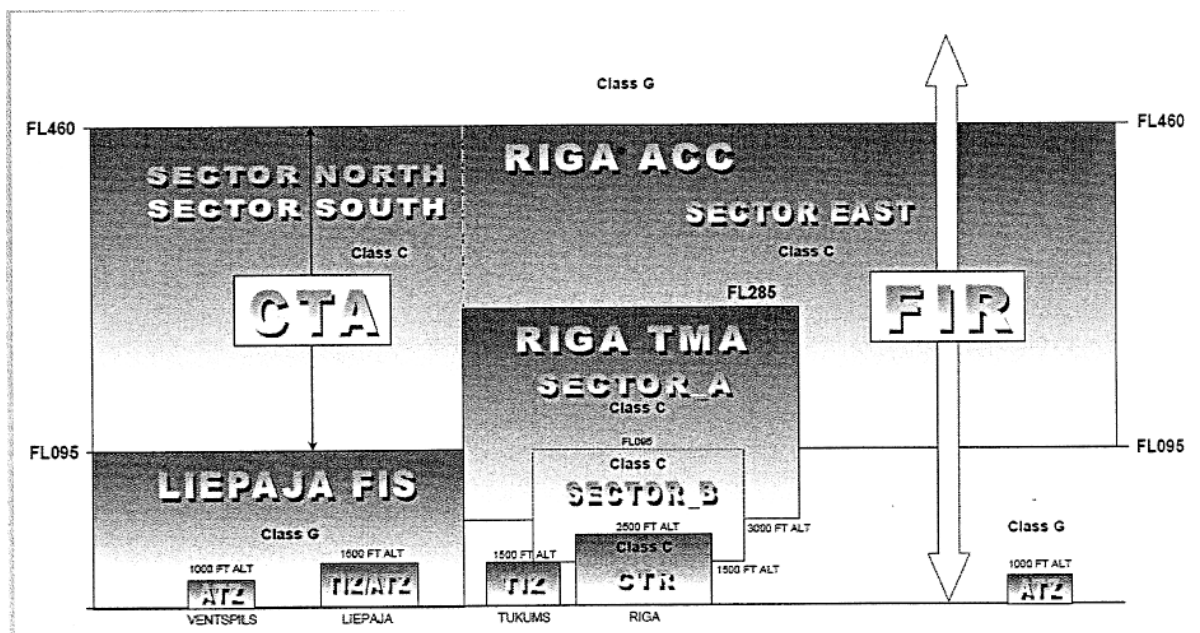


Area of Responsibility

The actual sectorisation and frequencies in use shall be transmitted to the controller of the adjacent FIR Minsk, Tallinn, Velikye Luki and Vilnius:

- "Sector East" - 133.200 MHz;
- Alternative frequency - 134.125 MHz;

Receive information about the actual sectorisation and frequencies in use from the controllers of the adjacent FIR - Minsk, Tallinn, Velikye Luki and Vilnius.



Air space classification

Air traffic control service within airspace of class “C” is provided at flight levels from FL100 till FL 460.

Vertical separation is carried out according to ICAO Annex 2 Table of Cruising levels 3a.

Horizontal separation between identified, controlled aircraft at the same flight level when double SSR coverage is provided radar separation **not less than 5NM** shall be applied.

2.4.3. STCA Procedures

The generation of Short Term Conflict Alerts is a function of an ATC radar data processing system. If the distance between the three-dimensional position of two aircraft is predicted to be reduced to less than the defined applicable separation minima within a specified time period, the visual alert will be generated to the radar controller within whose jurisdiction area the aircraft is operating.

All types of flight transponder-equipped aircraft with Mode C are eligible for generation of STCA.

Riga FIR/UIR STCA WORK AREAS

Item/ Area of Airspace	Look Ahead Time ¹	Hsep ² (NM)	Vsep ³ (feet)	Hsep ⁴ ATC (NM)	Vsep ⁵ ATC (feet)
Enroute High Above FL295	120 sec	4,2	870	5,0	1000
Enroute Middle FL195-FL295	120 sec	4,0	800	5,0	1000
Enroute Low East 4500FT-FL195	90 sec	4,0	800	5,0	1000
Enroute Low West 4500FT-FL195	90 sec	4,0	800	5,0	1000
Tma Riga 1500FT-FL255	90 sec	4,0	700	5,0	1000
Ctl Riga GND - 2500 FT (suppress)	-	-	-	-	-

Tabulation 1. The parameters for generation of STCA alert as well as alert warning time

¹- The maximum predicted time;

²-The minimum horizontal separation between ACFT;

³- The minimum vertical separation between ACFT;

⁴- The horizontal ATC separation Standard used between ACFT;

⁵- The vertical ATC separation Standard used between ACFT.

- The STCA function can not be inhibited for individual radar tracks;
- A procedure applicable in respect of flights for which STCA has been inhibited is not determined.
- In the event an STCA generated in respect of controlled flights, the controller shall without delay take action to ensure that the applicable separation minimum will not be infringed.

2.4.4. PROCEDURES IN REGARD TO AIRCRAFT EQUIPPED WITH AIRBORNE COLLISION AVOIDANCE SYSTEMS (ACAS)

ACAS - an aircraft system based on secondary surveillance radar (SSR) transponder signals, which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponder.

Note 1. In this context the term “independently” means that ACAS operates independently of other system used by ATS.

Note 2. SSR transponders referred to above are those operating in Mode “C” or Mode “S”.

ACAS II provides two types of conflict advisories to flight crew:

- Traffic Advisories (TAs) are indications showing the approximate position of transponding aircraft in the vicinity which may become a threat;
- Resolutions Advisories (RAs) recommend manoeuvres or manoeuvre restrictions in the vertical plane to resolve conflicts with aircraft transponding SSR altitudes reports.

2.4.4.1. Procedures

The procedures to be applied for the provision of ATS to aircraft equipped with ACAS shall be identical to those applicable to non-ACAS equipped aircraft. In particular, the prevention of collisions, the establishment of appropriate separation and the information, which might be provided in relation to conflicting aircraft and to possible avoiding action shall conform with the normal ATS procedures and shall exclude consideration of aircraft capabilities dependent on ACAS equipment.

Traffic Advisories (TAs)

On being informed that flight crew receive a TA, controller should acknowledge information and provide traffic information if necessary.

In this case controller is continue **to be responsible** for the provision of ATS separation.

Note. Pilots are not obligated to inform ATS unit about TAs. There is no associated phraseology.

Resolution Advisories (RAs)

When a pilot reports a manoeuvre induced by an ACAS Resolution Advisory (RA), the controller:

- shall acknowledge information;
- **Must not issue instructions** to that aircraft which are contrary to the RA as communicated by the pilot, until the pilot returning to the terms of the current ATC instruction or clearance;
- Should endeavour to provide traffic information to aircraft affected by the manoeuvre;
- May issue a heading instruction to provide a separation.

2.4.4.2. ATC CLEARANCES BASED ON ACAS INFORMATION

- Controller shall not issue the clearance to any aircraft to maintain or establish standard ATC separation based on information provided by ACAS.

Note. The information provided on ACAS display is basic and **only shows the approximate relative position of adjacent aircraft**, and the risk of misinterpretation is great.

Both TAs and RAs should be treated as genuine unless the intruder has been positively identified and assessed as constituting neither a threat nor a hazard.

2.4.4.3. RESPONSIBILITIES

- The use of ACAS **does not alter the respective responsibilities** of pilot and controllers for safe operation of aircraft;
- Once an aircraft departs from assigned ATC clearance in compliance with an RA, the controller **cease to be responsible for providing separation** between that aircraft and other aircraft affected as direct consequence of the manoeuvre induced by the RA;

The controller’s responsibility for providing separation for all affected aircraft resumes when:

- The controller acknowledges a report from the pilot that the aircraft has resumed it’s assigned clearances; or
- The controller acknowledges a report from the pilot that the aircraft is resuming its assigned clearance and issues an alternative clearance, which is acknowledged by the pilot.

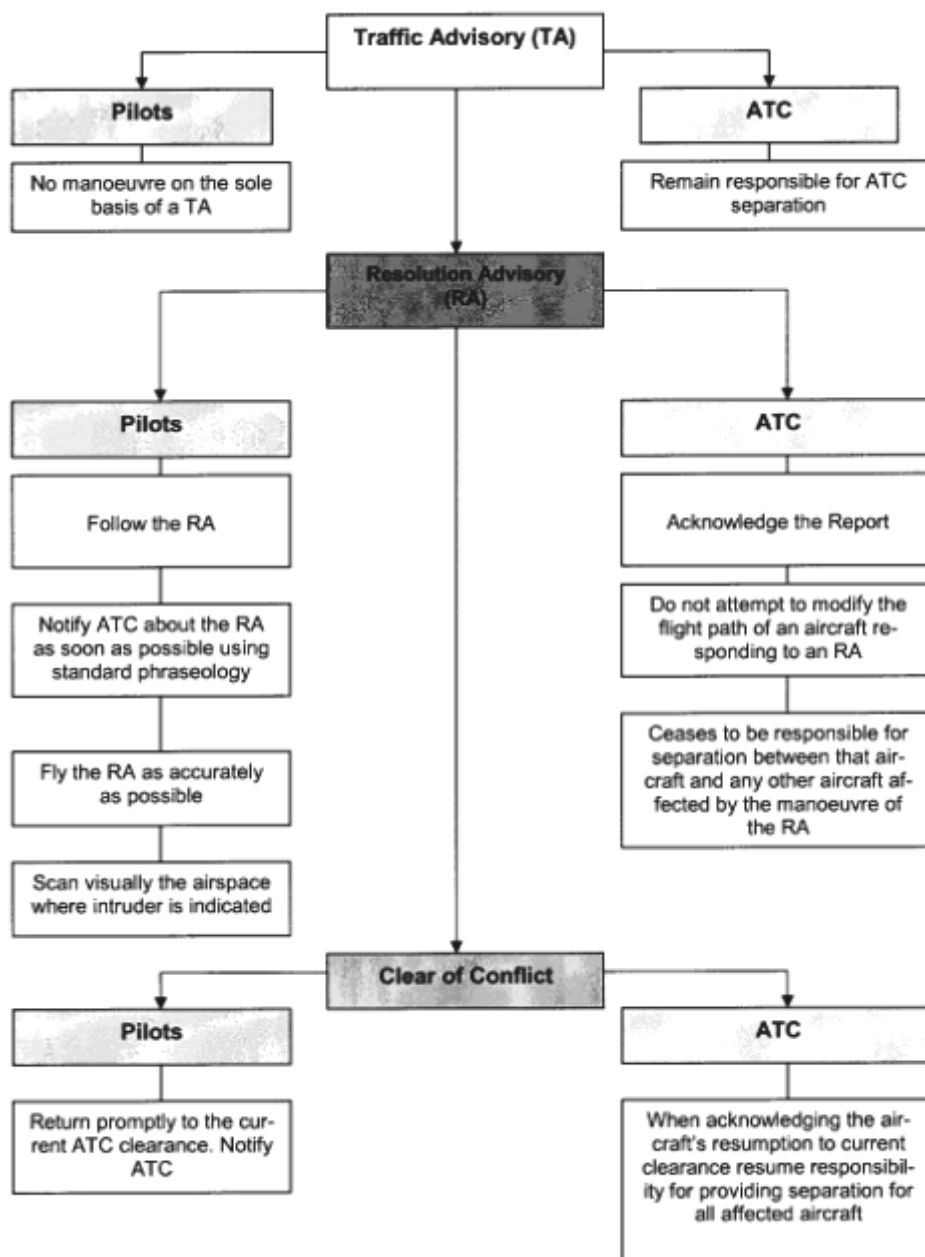


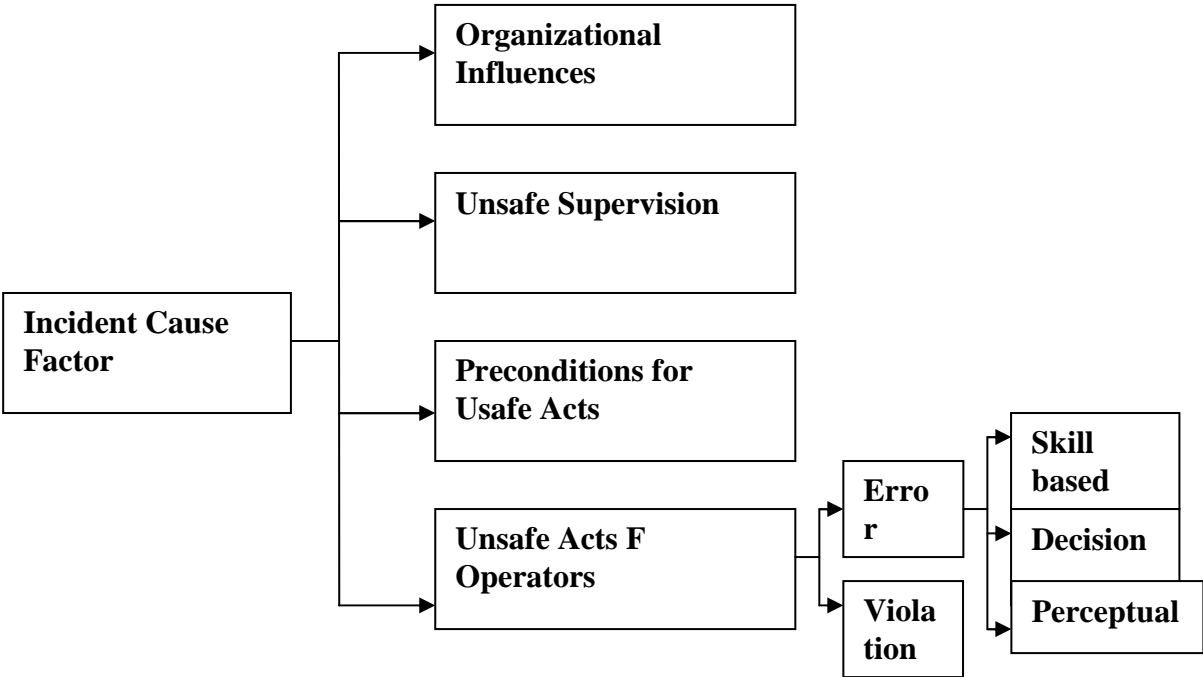
Figure8 Interaction of ATC and Pilots during ACAS event

2.5 Underlying Human Factors problems associated with incident

For revealing causation of this incident investigation has tried to put into practice the taxonomy of the Human Factors Analysis and Classification System (HFACS) that describes the human factors that contribute to an incident. It is based on a sequential or chain-of-events theory of accident causation. The human contribution don't build on the person approach, that focuses on the errors or violations of individuals but is based on the system approach, that traces the causal factors back into the system as a whole. Such approach to providing investigation is not that Human Error is a cause of incident, but that Human Error is a symptom of trouble deeper inside a system.

Of the opinion of investigation Human factors played the major role in the cause of this incident and this further reinforces the requirements to examine the role of human factors in the Air Traffic Control

For analysis investigation has considered that the classification system has following four levels, each of which influences the next level:



2.5.1. Sector EAST controller’s actions

Investigation has classified the fact that the controller cleared aircraft to climb at FL390 where it was in conflict with a second locally-based aircraft FIN746L and this controller’s action clearly was unsafe act. The next investigating step involves determining weather the unsafe act was an error or violation.

At 11:37:51 the sector EAST controller coordinated flight level 380 for KLM903 with WEST sector controller, due to crossing traffic FIN-746L from Vilnius at FL 390.

At 11:38:42 controller coordinated flight KLM903 with Velikye Luki (adjacent sector) at FL390.

Analyzing radar information it was stated that at sector EAST area was **1**traffic at **11:42** but within 6 min situation was developing from **1** to**10** traffic on sector EAST frequency at **11:48**.

When KLM903 established radio contact at FL380 with EAST controller he identified it as well as 4 min later FIN- 746L at FL390.

Investigation has stated that EAST controller identified potential conflict with KLM903 and FIN746L because he coordinated flight level 380 for KLM903 with WEST sector controller.

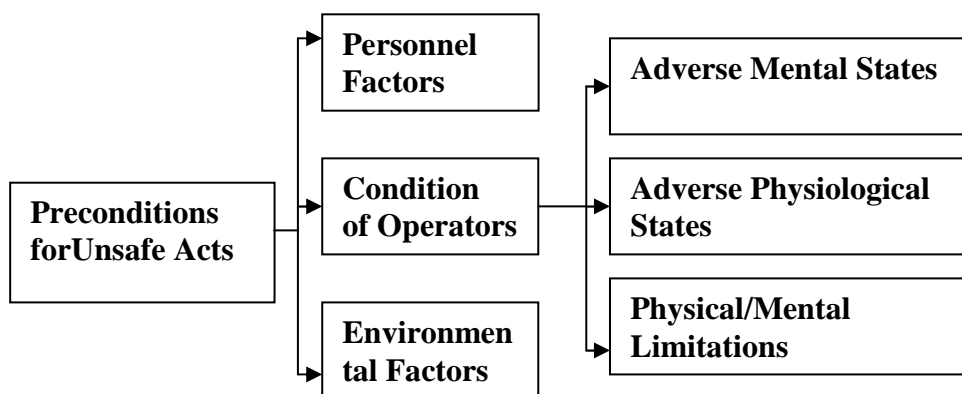
Investigation has no evidence that the controller's decision **violated any rules or regulations** and therefore **classified it as an error**.

Next one investigation has to determine which type of error (skill based, decision error, or perceptual error) was committed.

Of the opinion of investigation the choice to give instruction to climb at FL390 it was not skill based error or perceptual, therefore investigation has classified it as **decision error** according to HFACS framework.

The next question what investigation tried to determine and get answer is why did the errors occurred?

Investigation has focused deeper into why the unsafe act occurred, analyzing preconditions of unsafe act, which includes the condition of operators, environmental and personnel factors.



The condition of an individual-in this case sector EAST controller, can and often does, influence performance on the job. There are three conditions of operator that directly impact performance: Adverse Mental States, Adverse Physiological States and Physical/Mental Limitations.

The category of adverse mental states was taking into account for those mental conditions that affected performance. Principal among these are **loss of situational awareness**.

Taking into account that controller have tried to resolve several operational tasks - adjustment of traffic flow from west to east, flight coordination with adjacent as well as developing workload from light to high in short time period of the opinion of investigation EAST controller in this situation before occurrence lost **situation awareness and instructed KLM903 to climb to flight level FL390**, that means appreciating all he need to know about what is going on if the full scope of his task is taken into account.

For an air traffic controller, situation awareness means knowing about current aircraft positions and flight plans and predicting future states so as to detect possible conflicts. Therefore,

in operational terms, situation awareness means having an understanding of the current state and dynamics of a system and being able to anticipate future change and developments.

Situation awareness includes the following four specific pieces of information:

- extracting information from the environment;
- integrating this information with relevant internal knowledge to create a mental picture of the current situation;
- using this picture to direct further perceptual exploration in a continual perceptual cycle; and
- anticipating future events.

For a Controller, situational awareness means acquiring and maintaining a mental picture of the traffic situation being managed and an appreciating all the potential for unexpected progressions in this scenario.

The EAST controller cleared an aircraft to a level where it was in conflict with a second locally-based aircraft. Analyzing the situation in the sector and stating the wrong decision controller ordered KLM903 to descend back to FL380 when KLM was crossing FL381 already. Controller did not take into consideration the inertial motion of climbing aircraft and his instruction for KLM903 pilot to descend was not strict.

2.6. Severity Classification for Safety Occurrences in ATM

According to EUROCONTROL guidance material (ESARR 2 Guidance to ATM Safety Regulators, EAM 2/GUI 1, Severity Classification Scheme for Safety Occurrences in ATM, Edition 1.0, edition date 12-11-1999), see tables I, II, this incident is classified as **Major incident -B-** an ATC instruction allowed to reduce the risk, without eliminating it, as safety margins were still infringed.

Major incident -an incident associated with the operation of an aircraft, in which safety of aircraft may have been compromised, having led to a **near collision between aircraft**, with ground or obstacles (i.e., safety margins not respected which is not the result of an ATC instruction).

Taking into account the Severity Classification this incident is classified as **B2**

SEVERITY	A	Serious incident	A1	A2	A3	A4	A5
	B	Major incident	B1	B2	B3	B4	B5
	C	Significant incident	C1	C2	C3	C4	C5
	D	Not determined	D1	D2	D3	D4	D5
	E	No safety effect	E1	E2	E3	E4	E5

1	2	3	4	5
Very Frequent	Frequent	Occasional	Rare	Extremely rare
FREQUENCY				

Tabulation 2 Severity Classification Scheme for Aircraft Incidents

SEVERITY	AA	Total inability to provide safe ATM services	AA1	AA2	AA3	AA4	AA5
	A	Serious inability to provide safe ATM services	A1	A2	A3	A4	A5
	B	Partial inability to provide safe ATM services	B1	B2	B3	B4	B5
	C	Ability to provide safe but degraded ATM services	C1	C2	C3	C4	C5
	D	Not determined	D1	D2	D3	D4	D5
	E	No effect on ATM services	E1	E2	E3	E4	E5
			1	2	3	4	5
		Very Frequent	Frequent	Occasional	Rare	Extremely rare	
Frequency							

Tabulation 3. Severity Classification Scheme for ATM specific occurrences

DEFINITION	FREQUENCY
Has never occurred yet throughout the total lifetime of the system.	Extremely rare
Only very few similar incidents on record when considering a large traffic volume or no records on a small traffic volume.	Rare
/Several similar occurrences on record - Has occurred more than once at the same location.	Occasional
A significant number of similar occurrences already on record - Has occurred a significant number of times at the same location.	Frequent
A very high number of similar occurrences already on record- Has occurred a very high number of times at the same location.	Very Frequent

Tabulation 4. Definitions of Accident/Incident Frequency

According to the Severity of their Effect on the ability to provide Safe ATM Services this serious incident is classified as **B2**.

3. Conclusions

During process of investigation were made the following conclusions:

3.1. Findings

- In order to maintain an overview traffic, the Air Traffic Control radar system ATRACC+ was in use;
- At the time of the incident the traffic was handled by sector EAST Controller;
- The sector EAST Controller held valid licence and ratings and was qualified and current at the position;

- KLM903 received the instruction from EAST controller to climb from flight level FL 380 to FL 390, which it confirmed;
- KLM903 commenced to climb to FL390, which was consistent with the confirmed Instruction;
- When controller, perceiving possible conflict with other traffic, gave instruction to descend back to FL 380 disregard previous command KLM 903 was at FL 381 climbing;
- The crew of KLM 903 confirmed instruction to descend back to FL380;
- When crew of KLM903 declared that they have Resolution Advisory already there occurred transmitting blocking by an aircraft transmitter because controller and crew used the same frequency channel simultaneously.
- ATCC radio communication system “air-ground” is based on “simplex operation” concept;
- Both aircraft monitored conflict traffic on TCAS;
- Before the incident the workload of the controller changes from light to high;
- Within 6 min situation in the EAST sector was developing from **1 to 10** traffic on sector EAST frequency;
- Sector EAST controller identified potential conflict with KLM903 and FIN746L coordinated flight level 380 for KLM903 with WEST sector controller;
- Until controller’s instruction to KLM903 to return back to FL 380 and instruction read back KLM903 was at FL383 already;
- Vertical separation between aircraft was 700FT, horizontal 4,2NM;
- Radio communications on the sector EAST frequency 133.2.1 MHz between the pilots of KLM903 and FIN746L took place in English;
- According to EUROCONTROL ESARR 2 this incident is classified as **Major Incident**;
- According to EUROCONTROL ESARR 2 Severity Classification table this incident is classified as **B2**;
- According to the Severity of their Effect on the ability to provide Safe ATM Services this serious incident is classified as **E2**;
- There was fixed decision errors of sector EAST controller to give pilot KLM903 instruction to climb to flight level 390;
- There was fixed decision based errors of sector EAST controller due to inadequate assessing existing traffic situation in the sector;
- Before incident sector EAST controller lost of situational awareness;

- There was not fixed violations of the EAST CONTROLLER'S OPERATIONAL MANUAL rules.
- Within the context of this incident there were not find lack of human resources, budget resources, deficient planning, as well as were not find any adversarial or conflicting or when they are supplanted by unofficial rules and values and confusion abounds that could to have influence on creation of this serious incident;
- At the time of incident Visual Meteorological Conditions (VMC) prevailed.

3. 2. Causes

3.2.1. Main Cause

The source or origin of an event that played the major role that caused this incident - infringement the separation minima between an aircraft EMBRAER 190, aircraft call sign FIN746L and Boeing BOEING 738, aircraft call sign KLM903 was controllers decision error issuing clearance to KLM903 to climb to FL 390.

3.2.2. Contributing causes

Inadequate assessment traffic situation in the sector due to loss of situational awareness;
Rapid change of the controller's workload before the incident from light to high;

3.3. Primary cause

The event after which incident became inevitable.

Controller's underestimation the inertial motion of climbing aircraft.

4. Safety Recommendations

It is recommended that the authority responsible for air navigation services in the Latvian airspace VAS Latvijas Gaisa Satiksme (LGS):

Recommendation - 6-2013

To consider opportunity as much as possible working out company awareness and training program for ATC personnel including operational requirements (e.g., aircraft deceleration characteristics or performance limitations).

Riga

October 16, 2013

Investigator in charge

Visvaldis Trūbs

Director of Transport Accident and Incident Investigation Bureau

Ivars Alfreds Gaveika