



LATVIJAS REPUBLIKA
**TRANSPORTA NELAIMES GADĪJUMU UN INCIDENTU
IZMEKLĒŠANAS BIROJS**

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**FINAL REPORT Nr.1/2010
OF THE AIRCRAFT SERIOUS INCIDENT**

**INFRINGEMENT OF SEPARATION STANDARDS BETWEEN THE AIRBALTIC
AIRCRAFT BOEING 733, REGISTRATION YL-BBJ, FLIGHT BTI16C AND JAPAN
AIRLINES AIRCRAFT BOEING 777, REGISTRATION JA-733J, FLIGHT JAL 407
IN THE VICINITY OF THE POINT RUTEK ON AUGUST 31, 2009**

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 in accordance with Annex 13 of the Convention of Chicago, as well as the Directive 94/56/EC of 21 November 1994, establishing the fundamental principles governing the investigation of civil aviation accidents and incidents of the Council of the European Union, to prevent accidents and incidents and, if the 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	SAR	- Search and Rescue
ACC	- Area Control Center	CISM-	Critical Incident Stress Management
ACFT	- Aircraft	SSR	- Secondary Surveillance Radar
SSR	- Secondary Surveillance Radar	CWP	- Controller Working Position
ARCC	-Aeronautical Rescue Co-ordination Centre	ESARR-	Eurocontrol Safety and Regulatory Requirement
ATC	- Air Traffic Control	PANS-ATM-	Procedures for Air Navigation Services – Air Traffic Management
UTC	- Universal Time Coordinated	STCA	- Short-Term Conflict Alert
UTA	- Upper (Traffic) Control Area	CTR-	Control Zone
CTA	- Control Area	FL	- Flight Level
AoR	- Areas of Responsibility	SA	- Situation awareness
NM	- Nautical mile	CRM	-crew/cockpit resource management
FT	- Feet	TIA-	Traffic Information Area
Z – Zulu	= Universal Coordinated Time (UTC)	TIZ-	Traffic Information Zone
FIR	- Flight Information Region	TMA-	Terminal Control Area
UIR	- Upper (flight) Information Region	ATZ-	Aerodrome Traffic Zone
ATS	- Air Traffic Services	MOR System-	Mandatory Reporting System
FPL	- Filed Flight Plan (ICAO format)	EA TCHTP-	European Air Traffic Control Harmonisation and Integration Programme
HMI	- Human Machine Interface		
METAR	- Meteorological Aviation Routine Weather Report		
CAVOK	- Ceiling and Visibility OK		

Synopsis

Unless stated otherwise the time in this Report is UTC

On Monday, August 31, 2009 the two passenger aircraft entered RIGA ATCC controlled airspace. Aircraft were being controlled by Riga ATCC controller responsible for the ATCC North sector. An airBaltic Boeing 733 (model 737-36Q), registered YL-BBJ, flight BTI16C was Eastbound to Riga International airport (EVRA), Latvia on a scheduled passenger service from Oslo Gardermoen Lufthavn (ENGM), Oslo, Norway.



Picture 1

Japan Air Boeing 77W, (model 777-346ER), registered JA-733J, flight JAL407 was on route from Narita/New Tokyo International airport (RJAA), Japan on a scheduled passenger service flight to Frankfurt International airport (EDDF), Germany.



Picture 2

Entering in Riga ATCC airspace, sector North at FL370 BTI16C requested controller stand by for descend and was cleared to descend to FL350. At this time Japan Air Boeing 777 was flying on convergent track to BTI16C4 at FL360, at distance 19NM. At 14:09:40 UTC a serious aircraft incident took place in the RIGA ATCC controlled airspace -loss of separation between airBaltic Boeing 733, flight BTI16C and Japan Air Boeing 777, flight JAL407 (geographical

location 57:50:34N 020:55:09E). Both aircraft had approximately equal flight level, when BTI16C was crossing FL362 there was Japan Air Boeing 777 on level FL 358. Two aircraft passed each other and the separation standard between the two aircraft was infringed. Minimal horizontal separation between aircraft was 3.9NM, vertical separation was 400FT.

Notification

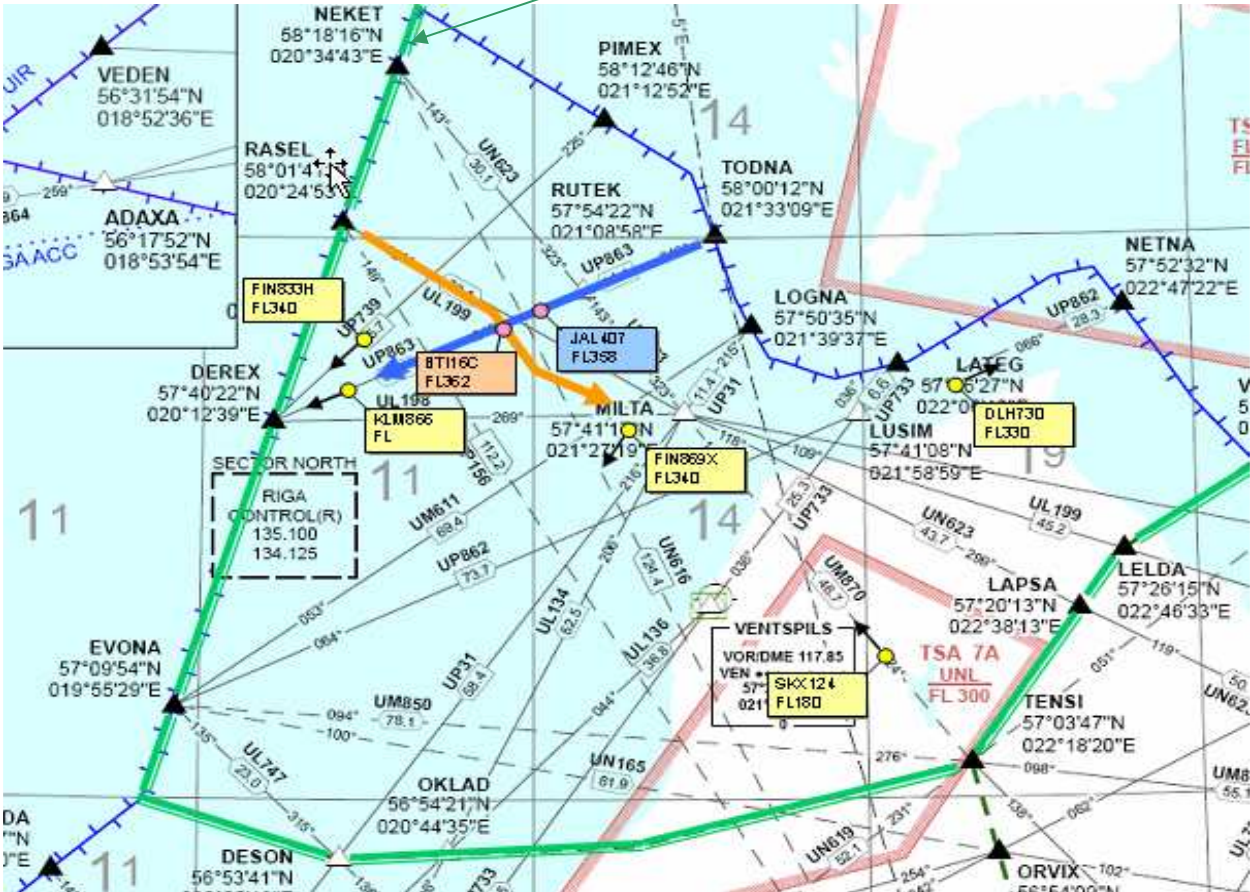
The Transport Accident and Incident Investigation Bureau of the Republic of Latvia was notified about the incident on Tuesday, September 01, 2009 at 12:27 local time by the duty officer of ARCC Riga, a structural part of LGS responsible for co-ordination of SAR operations within Riga FIR, Riga International Airport.

In accordance with the standards set in ICAO Annex 13, the Latvian Republic was the State of Occurrence. TAIIB Authorities had evaluated the received information relevant to that case and initiated formal investigation into this serious incident, under the provisions of Annex 13 to the Convention on International Civil Aviation (Chicago 1944) and the Republic of Latvia Cabinet Regulation No 660, Adopted 25 November 2003 as well as forwarded notification to Investigation Authorities of the State of Registry, State of Operator, State of Design, State of Manufacture and the ICAO.

1. Factual information

1.1. History of the the incident

Area of Responsibility



Picture 3 Traffic situation on August 31, 2009 at 14:09:40 UTC

The two aircraft involved in this incident were flying on converging routes to their destinations, respectively BTI16C from the eastbound to airport Riga International, and Jal 407 westbound to Frankfurt International airport. JAL 407 proceeded on heading 245° from compulsory reporting point TODNA to DEREK, BTI16C on heading 121° from compulsory

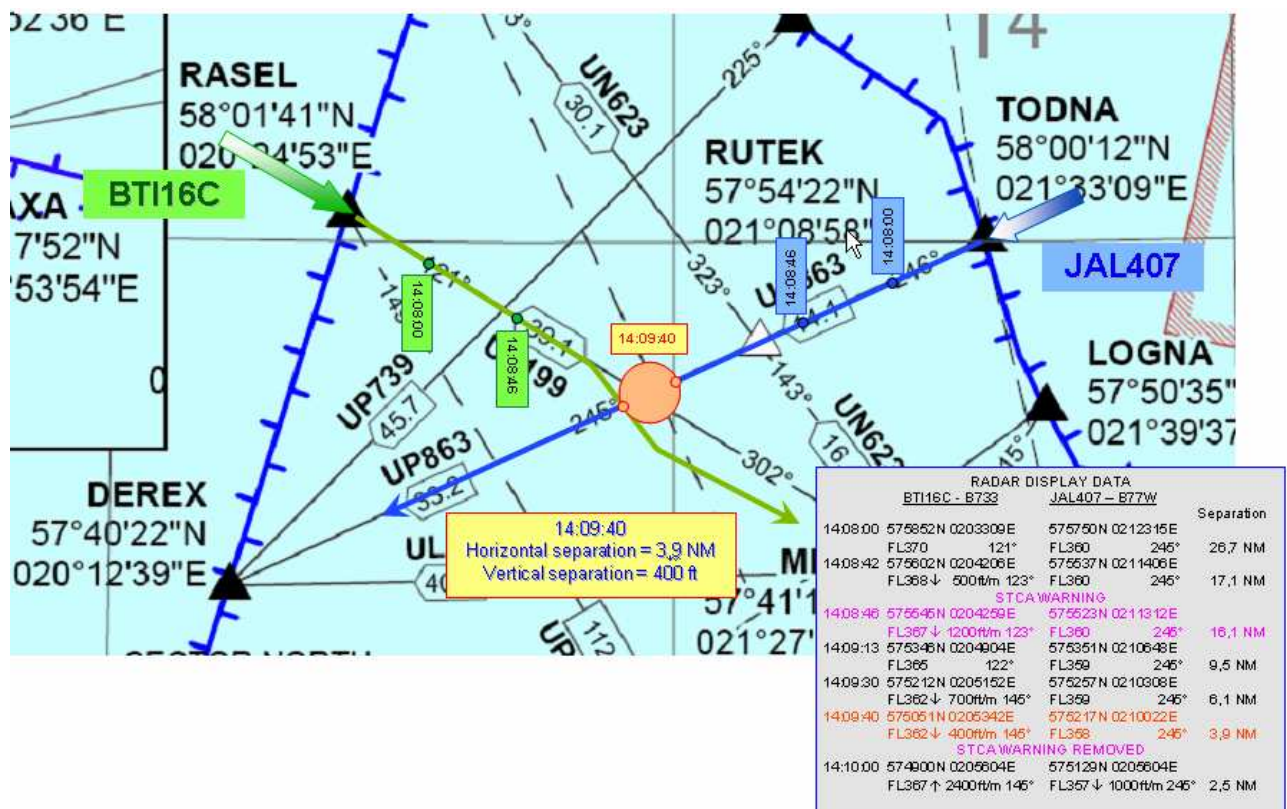
reporting point RASEL to reporting point on request MILTA. At this time in the Sector NORTH controller area of responsibility were 7 aircraft.

At **14.06.19** JAL 407 entered in Riga ATCC controlled airspace through compulsory reporting point TODNA (575750N 0212315E) at FL 360 and established radar contact with sector Nord controller Riga Control (hereinafter ATC 1).

At **14.08.06** BTI16C entered in Riga ATCC airspace at FL 370 and short after compulsory reporting point RASEL (580141N 0202453E) of its first contact with Riga ATCC sector Nord controller ATC1 the crew requested stand by for descend. They were cleared by ATC 1 to descend to FL 350.

At **14.08.46** when BTI16C was crossing FL 367 with descending rate 1200ft/m separation between aircraft was 16.1 NM, the system STCA detected the potential conflict and warning activated.

The air traffic controller (ATC1) responsible for the North sector was performing the functions of radar executive (RE) and NORTH sector controller radar planner (RP), observed this development on his radar monitor.



Picture 3 BTI16C & JAL 407 conflict situation

At **14.08.50** the controller ATC1 saw that the spacing between two aircraft was decreasing and directed BTI16C: “Air Baltic 16C for spacing turn right 30 degrees immediately.” The crew of BTI16C asked to repeat:” Heading again for Air Baltic 16C?”, whereupon ATC 1 repeated instruction:”16C, 30 to the right immediately.” The crew read back instruction:”30 to the right immediately Air Baltic 16C”

At **14.09.07** ATC 1 issued just the same instruction for JAL 407:” Japan Air 407 for spacing immediately turn right 30 degrees” therefore the crew asked to repeat it again:” Japan Air 407 say again, please.” The controller repeated instruction:” Japan Air 407 for spacing immediately **right 30 degrees**” whereupon the crew answered following:” **Left to 30** Japan Air 407”. After that the controller repeated instruction for JAL 407 to turn 30 degrees right third time:” Japan Air 407 right, to the right 30 degrees” and only after repeating instruction to turn right for the third

time the crew of JAL 407 understood controller's instruction and read back:" Right to 30 degrees Japan Air 407"

At **14.09.13** when BTI16C was crossing FL 365 with descending rate 700ft/m separation between aircraft was 9.5 NM.

At **14.09.25** controller warned BTI16C about traffic and issued instruction:" Air Baltic 16C be advised, traffic crossing right to left...right to right FL 360 at 9-o'clock, 6 miles"

At **14.09.30** when BTI16C was crossing FL 362 with descending rate 700ft/m, heading 145 degrees separation between aircraft was 6.1 NM.

At **14.09.40** BTI16C descending crossed FL362 with descending rate 400 ft/m, heading 145 degrees when JAL 407 was at FL 358. At that moment infringement of separation standards occurred and at **14.09.42** the crew of JAL 407 declared TCAS activation: „Riga Control, Japan Air 407 "TCAS descend"". Respectively BTI16C started TCAS RA "Climb" maneuver. The crew of BTI16C did not inform controller ATC1 of TCAS commands.

Note: The minimum distances between the aircraft were: **3.9 NM lateral and 400 FT vertical.**

The required vertical separation minima within Riga CTA/UTA and ATS routes must be carried out according to ICAO Annex 2 Table of Cruising levels 3a. Horizontal radar separation between identified, controlled aircraft if double SSR is provided in the same, opposite or crossing track at the same level not less than **5 NM**, whereas separation minima standard existed in this case was **5 NM lateral and 1,000 feet vertical**. The requirement to separate aircraft is detailed in ICAO Annex 11, Air Traffic Services, which contains the relevant Standards and Recommended Practices (SARPS) for Air Traffic Control.

After performing TCAS maneuver the crew of JAL 407 asked ATC1:" Japan Air 407 confirm right to 30 degrees" whereupon ATC1 issued instruction:" Japan Air 407 negative, resume navigation to DEREK".

BTI16C after climbing maneuver informed controller ATC1:"Air Baltic 16C ...(unreadable) complete, descending to FL 370 again". Controller acknowledged information.

At **14.10.28** BTI16C contacted Controller ATC1 and asked:" Air Baltic 16C confirm present heading descent FL 350" whereupon controller issued following instruction:" Air Baltic 16C resume own navigation to LAPSA, resume 350, maintain 350". The crew of BTI16C read back clearance.

Because there was clear of conflict already at **14.12.26** controller instructed JAL 407 to contact on frequency 128.055 MHz ACC of Sweden before entering in adjacent airspace.

BTI16C step by step continued descending and at **14.16.52** controller issued instruction: „Air Baltic 16C contact Approach on 127,3".

Some supervision was being provided by a Controller planner located in the operations room before incident occurred. Controller planner noticed Controller ATC1 about JAL 407 cruising at FL 360.

1.2. Injuries to persons

NIL

1.3. Damage to aircraft

NIL

1.4. Other damage

NIL

1.5. Personnel information

1.5.1. Air traffic controller

Job function	ACS	
Age	21	
Gender	Male	
Day on duty	1	
Duty duration (hours)	From beginning of workshift including breaks	2h 25min
	From the latest duty rotation to incident	1h 09min
Practice (years)	1	
Qualification good till	14.03.2012	
Medical Certificate Class 3	02.03.2011	

1.5.2. The crew of JAL 407

NIL

1.5.3. The crew of BTI16C

NIL

1.6. AIRCRAFT INFORMATION

1.6.1. BTI16C

Manufacturer: Boeing Aircraft Company, USA

Aircraft type: Boeing 733

Model: 737-36Q

Registration: YL-BBJ

Year of manufacture: 1999

cn/lr: 30333/3117

MTOW: 62823

Engine type: CFM56-3C1

1.6.2. JAL 407

Manufacturer: Boeing Aircraft Company, USA

Aircraft type: B77W

Model: 777-346ER

Registration: JA733J

Year of manufacture: 2005

cn/lr: 32432/521

Engine type: GE90-115B

1.7. Meteorological information

Weather conditions on August 31, 2009 (12:50 -15:20 UTC) in the Riga international airport:

METAR EVRA 311250Z 23008KT 180V270 9999 FEW049 SCT120 20/09 Q1018 N0S1G=
METAR EVRA 311320Z 22007KT 150V310 9999 FEW049 SCT120 20/09 Q1018 N0S1G=
METAR EVRA 311350Z 23006KT 170V280 9999 FEW049 BKN081 19/09 Q1018 N0S1G=
METAR EVRA 311420Z 23006KT 160V280 9999 SCT046 BKN081 20/09 Q1018 N0S1G=
METAR EVRA 311450Z 22007KT 170V300 9999 SCT046 BKN081 20/09 Q1018 N0S1G=

METAR EVRA 311520Z 21008KT 170V240 9999 SCT046 BKN078 19/10 Q1018 NOS1G=

TAF EVRA 311100Z 3112/0112 21010KT 9999 SCT040 PROB40 TEMPO 3112/3115
SCT030CB PROB40 TEMPO 0103/0109 5000-RA BR BKN015=

1.8. Aids to Navigation

Navigation aids had no effect to the incident.

1.9. Communications

Communications between crews BTI16C, JAL 407 and the air operation services were on frequency 134.750 MHz. For the investigation the ATCO console recordings on the frequency 127.3 MHz was used. The quality of the recordings was good.

ATC 1 and crew members of BTI16C as well as JAL 407 have used standard phraseology and there had not principal errors in the used phraseology. In Communication Transcript there has some inaccuracies in radio communications on all sides.

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 personal conducting direct ground-to-air radio communications.

Date: 31.08.2009, **Time:** 14.06.19–14.17.10, Frequency 134.750MHz, Riga ATCC, North sector

TIME (UTC)		THE RADIOTELEPHONY
14.06.19	P(Pilot)	Riga Control, Japan Air 407 good afternoon, FL 360
	C (Controller)	Good afternoon Japan Air 407,Riga, radar contact
14.08.06	P	Riga Control good evening, Air Baltic 16C, FL 370,stand by for descend
	C	Air Baltic 16C good afternoon, Riga, radar contact, descend FL 350
	P	Say again Air Baltic 16C
	C	Air Baltic 16C, radar contact, and descend FL 350
	P	Descending FL 350, Air Baltic 16C
14.08.50	C	Air Baltic 16C for spacing turn right 30 degrees immediately
	P	Heading again for Air Baltic 16C?
	C	16C, 30 to the right immediately
	P	30 to the right immediately Air Baltic 16C
14.09.07	c	Japan Air 407 for spacing immediately turn right 30 degrees
	p	Japan Air 407 say again, please
	c	Japan Air 407 for spacing immediately right 30 degrees
	p	Left to 30 Japan Air 407
	c	Japan Air 407 right, to the right 30 degrees
	p	Right to 30 degrees Japan Air 407
14.09.25	c	Air Baltic 16C be advised, traffic crossing right to left...right to right FL 360 at 9-o'clock, 6 miles
	p	...(unreadable) ..right

14.09.42	p	Riga Control, Japan Air 407 "TCAS descend"
	c	Roger
	p	Japan Air 407 confirm right to 30 degrees
	c	Japan Air 407 negative, resume navigation to DEREK
	p	Air Baltic 16C ...(unreadable) complete, descending to FL 370 again
	c	16C
14.10.28	p	Air Baltic 16C confirm present heading descent FL 350
	c	Air Baltic 16C resume own navigation to LAPSA, resume 350, maintain 350
	p	Descend 350, left turn, direct LAPSA, Air Baltic 16C
14.11.40	c	Air Baltic 16C continue descend FL 150..., correction 190
	p	150, Air Baltic 16C
	c	Air Baltic 16C, 190
	p	Descend FL 190, Air Baltic 16C, confirm
	C	Affirm, 190
	P	190, Air Baltic 16C
14.12.06	C	Japan Air 407 contact Sweden 128,055 and sorry for trouble
	P	128,055, Japan Air 407
14.15.12	C	Air Baltic 16C now continue down to FL 150
	P	150, 16C
14.16.52	C	Air Baltic 16C contact Approach on 127,3
	P	127,3, Air Baltic 16C
	C	Air Baltic 16C sorry for trouble
	P	Say again
	C	Sorry for trouble
	P	Ee, OK, 16C, bye

Table 1 Ground –to-air radiotelephony communication record

1.10. Aerodrome information

The airport did not have any significance for the incident.

1.11. Flight recorders

The incident reconstruction was based on the radar records and voice communications transcript between controller ATCO1 of Riga ATCC and aircraft crew members. The investigation members did not have a CVR transcript BTI16C or JAL 407 recordings at their disposal.

1.12. Wreckage and impact information

NIL

1.13. Medical and pathological information

NIL

1.14. Fire

NIL

1.15. Survival aspects

NIL

1.16. Tests and research

NIL

1.17. Organizational and management information

NIL

1.18. Additional information

NIL

1.19. Useful or effective investigation techniques

The incident has been investigated in accordance with Annex 13.

2. Analysis

General

The analysis concerned the activities of BTI16C and JAL 407 crew's, radio communications, radar recording, air operation service's instructions as well as Statements of the Controller Executive and Controller Planner.

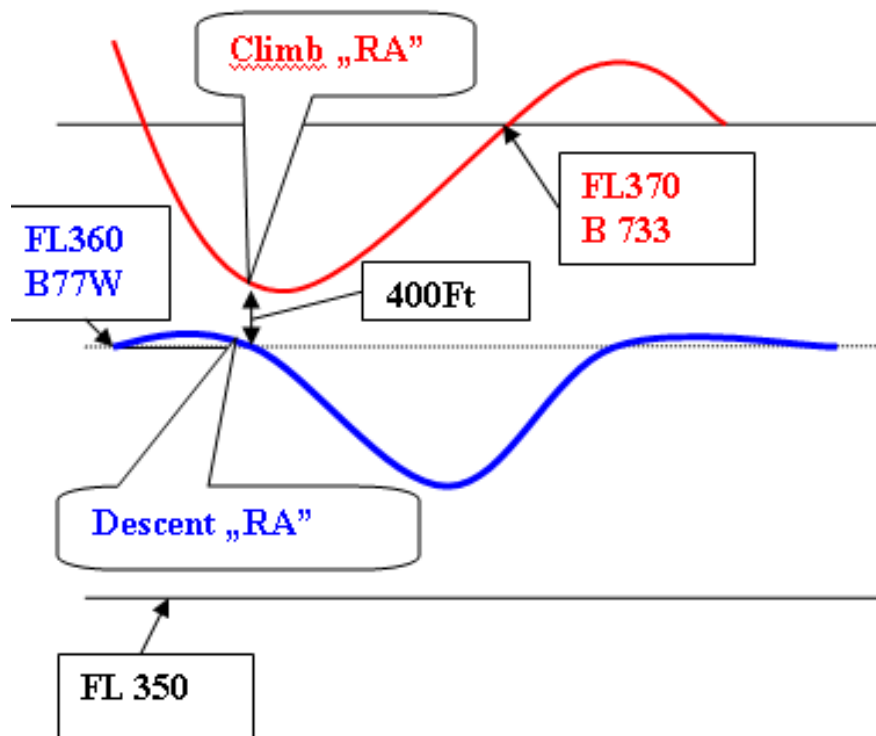
2.1. The BTI6C crew

The BTI6C crew requested descending from FL 370 and was cleared to descend to FL 350, which it confirmed. The controller ATC1 did not issue for BTI16C any restrictions of airspeed or descending rate as well as to stop descending. When controller ATC1 issued instruction for spacing to turn right 30 degrees immediately the crew read back instruction and comply with instructions. After a while they were advised of crossing traffic at converging track at FL 360. When triggered TCAS warning and the crew of BTI16C received TCAS coordinated „RA” CLIMB they correctly follows RA but they **in conflict with PANS-OPS did not inform controller about RA**. Accordingly to ICAO Doc 8168 OPS/611 Procedures for Air Navigation Services “Aircraft Operations” Volume I Flight Procedures para 3.2 in the event of an RA, **pilots shall:**

- respond immediately by following the RA as indicated, unless doing so would jeopardize the safety of the aeroplane;
- follow the RA even if there is a conflict between the RA and an air traffic control (ATC) instruction to manoeuvre;
- not manoeuvre in the opposite sense to an RA;
- as soon as possible, as permitted by flight crew workload, notify the appropriate ATC unit of any RA which requires a deviation from the current ATC instruction or clearance;**

Unless informed by the pilot, ATC does not know when ACAS issues RAs. It is possible for ATC to issue instructions that are unknowingly contrary to ACAS RA indications. Therefore, it is important that ATC be notified when an ATC instruction or clearance is not being followed because it conflicts with an RA.

- promptly return to the terms of the ATC instruction or clearance when the conflict is resolved; and notify ATC when returning to the current clearance.

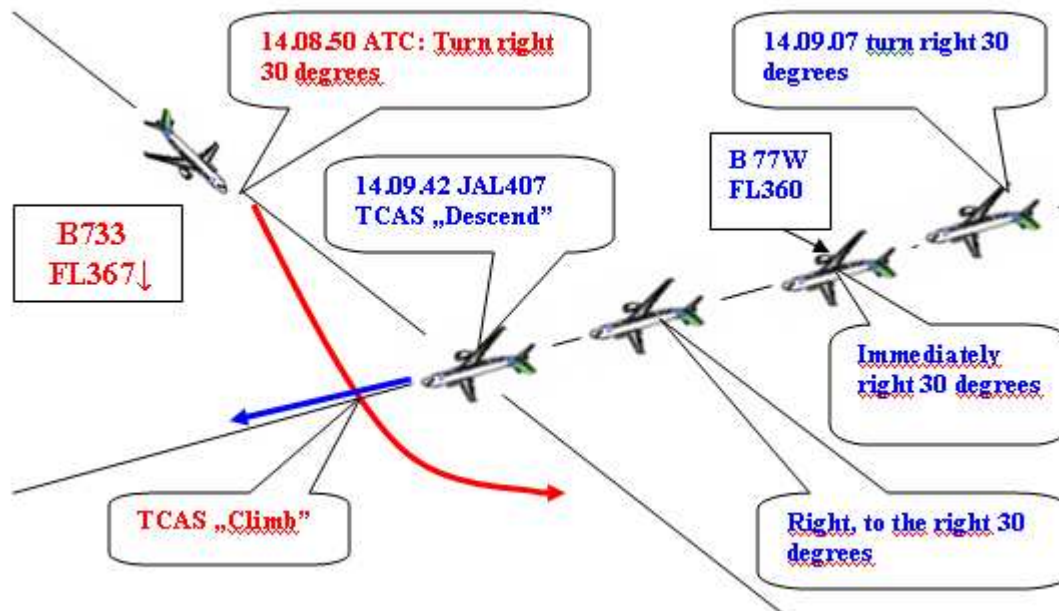


Picture 4 Aircraft reaction to commands of TCAS

After the response to an ACAS RA is completed and a return to the ATC clearance or instruction is initiated the Report of crew to ATC according to PANS ATM must be following: „CLEAR OF CONFLICT, RETURNING TO (*assigned clearance*);”

2.2. The JAL 407 crew

The crew flew at FL 360 to the point DEREK (574022N 0201239E) subsequently it received the instruction to change the heading by 30 degrees to the right. There occurred failure to understand controller’s instructions by crew. To controller’s first instruction to turn right the crew asked for repeating instruction. To controller’s reiterative instruction to turn right the crew understood as instruction to turn 30 degrees left although quality of communication was good and instruction was given according to requirements of PANS ATM, ICAO Doc 4444 Chapter 12 ATC Phraseologies. Only after repeating by controller instruction third time the crew affirmed it adequately: „Right to 30 degrees, Japan Air 407” (See Picture 5). After a while when TCAS triggered and generated RA “Descend” the crew reacted properly and followed TCAS instruction to descend as well as notified controller ATC1.



Picture 5

The Key for maximum safety benefits from TCAS is to follow all RAs promptly and accurately. PANS-OPS states that visual acquisition is no longer an acceptable reason not to follow an RA.

2.3. Air Traffic Control procedures, operations and instructions, air traffic controller actions.

Accordingly to air control unit Air Traffic Control Services procedures, operations and instructions the investigation had stated following:

- Procedures, operations and instructions of air control unit - the State Joint Stock Company Latvijas Gaisa Satiksme (LGS) have complied with the requirements of ICAO Doc 4444-ATM/501 Procedures for Air Navigation Services “AIR TRAFFIC MANAGEMENT” 15 Edition as well as has a quality management system which covers all air navigation services it provides;
- The scope of the Air Traffic Control Services procedures, operations and instructions had not essential influence to incident.

Fundamental to ATC operations are three interlinked elements of aircraft separation, namely - *Flight Level, Time, and Airspeed*. If any one of these elements is missing then the operation’s safety is compromised until corrective action is taken by the system, i.e. by Air Traffic Controllers or by electronic means or both.

The chain of events that led to this incident was following:

At **14.08.06** BTI16C at FL 370 contacted Riga ATCC sector Nord controller ATC1 and reported requested stand by for descend. The controller issued the descent clearance to FL 350 overlooking B77W JAL 407, level at FL360, on converging track. The controller did not appoint descending rate or airspeed restrictions for crews of aircraft.

In order to facilitate a safe and orderly flow of traffic, aircraft may, subject to conditions specified by the appropriate authority, be instructed to adjust speed in a specified manner. Flight crews should be given adequate notice of planned speed control. Speed adjustments should be limited to those necessary to establish and/or maintain a desired separation minimum or spacing. Instructions involving frequent changes of speed, including alternate speed increases and decreases, should be avoided. The flight crew shall inform the ATC concerned if at any time they are unable to comply with a speed instruction. In such

cases, the controller shall apply an alternative method to achieve the desired spacing between the aircraft concerned.

According to given clearance the BTI16C starts to descend and at **14.08.46** when it reached FL367 with descending rate 1200Ft/min a Short Term Conflict Alert (STCA) triggered.

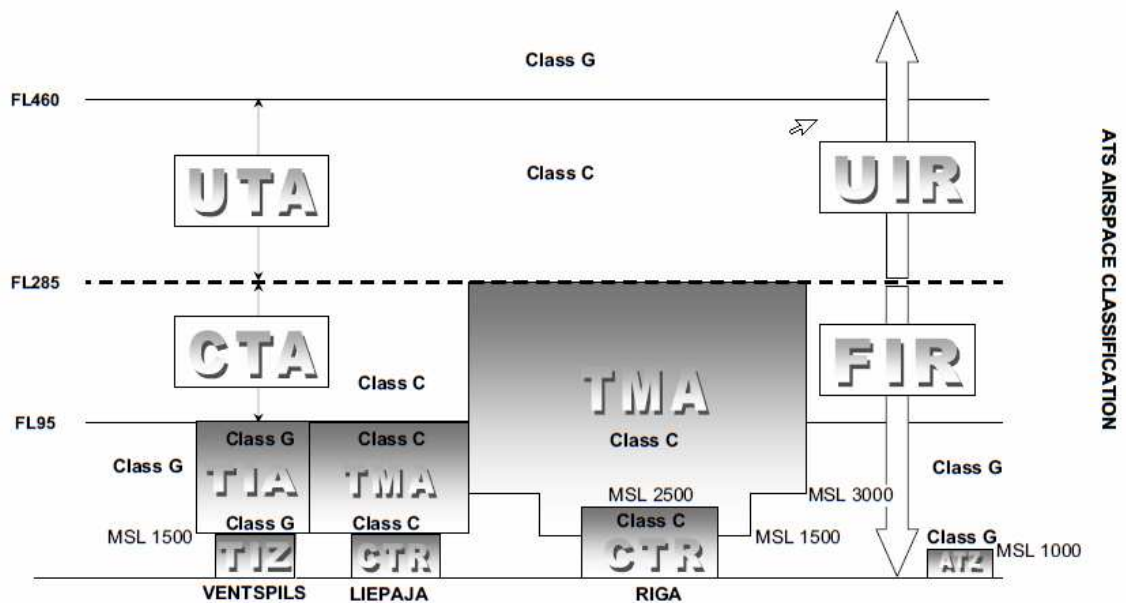
In order to facilitate a safe and orderly flow of traffic, aircraft may be instructed to adjust rate of climb or rate of descent. Vertical speed adjustments should be limited to those necessary to establish and/or maintain a desired separation minimum. Instructions involving frequent changes of climb/descent rates should be avoided. The flight crew shall inform the ATC unit concerned if unable, at any time, to comply with a specified rate of climb or descent. In such cases, the controller shall apply an alternative method to achieve an appropriate separation minimum between aircraft, without delay.

An aircraft may be instructed to expedite climb or descent as appropriate to or through a specified level, or may be instructed to reduce its rate of climb or rate of descent. Descending aircraft may be instructed to maintain a specified rate of descent, a rate of descent equal to or greater than a specified value or a rate of descent equal to or less than a specified value.

In this case at **14.08.50**, in consideration of there is unsafe situation, the controller for securing separation minima made decision to turn both aircraft 30 degrees right. The crew of BTI16C began to change its heading immediately. The crew of second aircraft JAL 407 did not understand controller's instruction to turn 30 degrees right. They understood and affirmed instruction to turn right only after third repetition but did not time to make maneuver because TCAS "Descend" triggered already at **14.09.42**.

When both aircraft entered in the sector North area of responsibility there were not unsafe situation if an adequate avoidance actions would have been taken in time. Clearing BTI16C to FL 350 despite that there was JAL 407 cruising at FL 360 on converging track created unsafe situation as a result infringement of separation standards - a situation in which prescribed separation minima were not maintained between aircraft occurred.

Both aircrafts involved in the incident were flying in Class C controlled airspace. The horizontal radar separation minimum within Riga FIR/UIR, in accordance with technological procedures of Riga ATCC, if double radar coverage is provided between both identified, controlled aircraft shall be 5.0 NM (9.3 km) and vertical separation is carried out according to ICAO Annex 2 Table of Cruising levels.



Picture 6 ATS Airspace classification

Any actual or potential hazard related to the provision of ATS within an airspace or at an aerodrome, whether identified through an ATS safety management activity or by any other

means, shall be assessed and classified by the appropriate ATS authority for its risk acceptability.

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** -Loss of separation (*separation higher than half the separation minima/e.g., 4NM*) which is not fully under ATC control.

According to ICAO Annex 13 this occurrence is classified as serious incident - Near Collisions requiring an avoidance manoeuvre to avoid a collision or an unsafe situation or when an avoidance action would have been appropriate.

Taking into account the Severity Classification Scheme that specifies five qualitative frequency categories this incident is classified as **B3**.

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				

Table 5, Severity Classification Scheme for Aircraft Incidents

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

Table 2, Definitions of Accident/Incident Frequency

2.4. Underlying Human Factors problems associated with incident

For revealing causation of this incident it was put into practice the taxonomy of the Human Factors Analysis and Classification System 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 and violations of individuals but is based on the system approach, that traces the causal factors back into the system as a whole. The investigation view is not that Human Error is a cause of incident but that Human Error is a symptom of trouble deeper inside a system. The classification system has four levels, each of which influences the next level. These four levels are called:

- organizational influences;
- unsafe supervision;
- preconditions for unsafe acts;
- unsafe acts of operators;

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.

2.5. Unsafe acts of operators

The unsafe acts can be loosely classified into two categories: errors and violations.

I. Errors

During investigation here were fixed following errors that ultimately led to the serious incident:

1. Skill- Based error

- Air traffic controller on duty of North Sector failed to take into account all factors for correctly evaluation of aircraft that could to have an influence on guarantee the regulatory radar separation. Due to lack of experience controller did not evaluated the current situation. Situation awareness (SA) needs to include 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.

Taking these four elements into account, SA is defined as the continuous extraction of environmental information, the integration of this information with previous knowledge to form a coherent mental picture, and the use of that picture in directing further perception 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.

Due to insufficient experience the controller can not to integrate all information with relevant internal knowledge to create a mental picture of the current situation and anticipate future events – the way in which situation will develop.

2. Decision errors

- Poor decision of air traffic controller was issuing the descent clearance to FL 350 for BTI16C overlooking B77W JAL 407 cruising at FL360, on converging track.

II. Violations

- Investigation didn't reveal any violations such as willful disregard for the rules and regulations that govern safe flight.

2.6. Preconditions for unsafe acts

Two major unsafe subdivisions of unsafe conditions are developed:

- substandard conditions of operators;
- substandard practices of operators.

I. Substandard conditions of operators

Investigation didn't reveal any substandard conditions of operators such as adverse mental states, physiological states as well as physical/mental limitation.

II. Substandard practices of operators

Generally speaking, the substandard practices of operators can be summed up in two categories:

- resource mismanagement;
- personal readiness.

Within the context of this incident this includes coordination both within and between aircraft with air traffic control facilities. There not revealed poor coordination among aircrew and air traffic controller.

Personal readiness failures occur when individuals fail to prepare physically or mentally for duty. Within the context of this incident there not revealed personal readiness failures when operators fail to prepare physically or mentally for duty.

2.7. Unsafe supervision

Exist four categories of unsafe supervision:

- inadequate supervision;
- planned inappropriate operations;
- failure to correct a known problem;
- supervisory violations.

Within the context of this incident there was not revealed any inappropriate supervision of operations.

2.8. Organizational factors influencing incidents

Fallible decisions of upper-level management directly affect supervisory practices, as well as the conditions and actions of operators. The most elusive of latent failures revolve around following issues of organizational influences:

- Resource management;
- Organisational climate;

- Operational process.

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.

3. Conclusions

During process of investigation were made the following conclusions:

3.1. Findings

- The incident was reported according to the MOR System;
- The incident occurred within the Riga ATCC sector North AoR;
- At the time of the incident the traffic was handled by an air traffic controller of sector North with operational role “Executive”;
- The air traffic controller held valid licence and ratings and was qualified and current at the position;
- At the time of incident within sector North was a low traffic intensity;
- The flights were under Radar control;
- Both aircraft involved were in radio contact with Riga ATCC;
- The radio communication between the aircrafts and ATC1 North Sector was held on the frequency 134,750 MHz in English;
- Both aircraft involved were flying in Class C controlled airspace;
- Both aircraft involved were operating on IFR flight plans;
- Both aircraft involved were equipped TCAS;
- The controller issued the descent clearance to FL 350 overlooking B77W JAL 407 at FL360, on converging track;
- The controller did not appoint descending rate or airspeed restrictions for crews of aircraft;
- When BTI16C reached FL367 with descending rate 1200Ft/min a Short Term Conflict Alert (STCA) triggered;
- The controller issued instruction to turn right 30 degrees for both aircraft;
- The crew of BTI16C complied with controller instruction to turn right immediately;
- The failure occurred in understanding controller instructions by the crew of JAL 407;
- The crew of JAL 407 understood controller’s instruction to turn right 30 degrees after third repetition;
- The crew of JAL 407 was short in time to execute turn right before TCAS RA “Descend” triggered;
- TCAS RA triggered on both aircraft, respectively RA “climb for BTI16C” and RA “descend” for JAL 407;
- The crew of BTI16C in conflict with PANS-OPS did not inform controller about RA.
- Within Riga FIR/UIR vertical separation is carried out according to ICAO Annex 2 Table of Cruising levels 3a -1000ft (300m);
- Horizontal separation (radar separation) if double SSR coverage is provided between identified, controlled aircraft not less than 5NM;
- According to EUROCONTROL guidance material (ESARR 2 Guidance to ATM Safety Regulators this incident is classified as Major Incident;
- Taking into account the Severity Classification Scheme that specifies five qualitative frequency categories this incident is classified as **B3**.
- Procedures, operations and instructions of air control unit - the State Joint Stock Company Latvijas Gaisa Satiksme (LGS) have complied with the requirements of ICAO

Doc 4444-ATM/501 Procedures for Air Navigation Services “AIR TRAFFIC MANAGEMENT”, 15 Edition;

- Some supervision was being provided by a Controller planner located in the operations room before incident occurred;
- During investigation here were fixed skill based errors that ultimately led to the serious incident;
- Investigation didn't reveal any violations such as willful disregard for the rules and regulations that govern safe flight;
- Sector North controller was self-reliant that situation is safe as a result lost of situation awareness and did not appreciated all the potential information or unexpected progressions in this scenario;
- The safety of BTI16C and JAL407 was seriously compromised by the failure of the sector North controller to provide a safe separation between the two aircraft. There were no electronic/technical reasons which contributed to this failure. This was a human error.

3.2. Causes

Causes of the serious incident - infringement the separation minima between Air Baltic Boeing 733, registered YL-BBJ, flight BTI16C and Japan Airlines B77W registered JA-733J, flight JAL 407, were the following:

3.2.1. Root Cause

- The source or origin of an event that played the major role that caused this incident was the fact that the air traffic controller who handled an air traffic issued the descent clearance to FL 350 for BTI16C overlooking B77W JAL 407 cruising at FL360, on converging track;

3.2.2. Contributing causes

- delayed execution controller's instruction due to poor Standard communication phraseology skills by JAL407 crew. Potentially incident may not occur if JAL 407 executed controller instruction to turn right immediately;
- controller's self-reliance that situation is safe as a result lost of situation awareness;

3.2.3. Primary cause

The event after which incident became inevitable.

Controller did not make actions to stop or change descending rate of BTI16C to FL 350 as a result both aircraft approached closely.

4. Safety Recommendations

It is recommended that the authority responsible for air navigation services in the Latvian airspace - State Joint Stock Company Latvijas Gaisa Satiksme (LGS):

Recommendation - 1-2010

- should include in training plans of Air Traffic Control Center staff and provide additional training to controllers with length of service less than 3 year based on ICAO and EuroControl (EA TCHIP) recommendations.

Recommendation - 2-2010

It is recommended that the airline JSC “Air Baltic Corporation” should:

- provide TCAS manoeuvre training for pilots on flight simulator equipped with an TCAS display and CRM aspects of responding to TAs and RAs should be practiced during this training.

Recommendation - 3-2010

It is recommended that the airline Japan Airlines should:

- considered opportunity to provide within framework of Crew Resource Management training program communication and coordination inside and outside the cockpit.

Comments of Japan Transport Safety Board:

1. The statements from JAL crew regarding the incident should be taken.

It is very important to obtain statements from JAL crew in order to make a well balanced analysis into the causes and/or contributing factors of the incident. Especially, since Recommendation-3-2010 refers to the JAL's CRM training, what actually have happened in the cockpit should be fully analyzed through the statements from JAL pilots (in particular communication between the controller and the pilots and communication within the cockpit).

2. Para 3.2.2 Contributing causes, draft page 19 reads as "Potentially incident may not occur if JAL 407 executed controller instruction to turn right immediately „Our view is that the reason why the TAIIB considers that the incident would not have occurred if JAL 407 executed controller’s instruction immediately is not clearly given. Therefore, we would like to recommend you to add relevant analysis to make the basis of our statement clear.

August 09, 2010

Director of Transport Accident and Incident Investigation Bureau

Ivars Alfreds Gaveika

Head of Aircraft Accident and Incident Investigation Department

Visvaldis Trubs