



Transporta nelaimes  
gadījumu un incidentu  
izmeklēšanas birojs

## Final report Nr.1/2008

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## Final report No.1/2008 of the aircraft serious incident

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

ACC - Area Control Center

ATRACC - ATC System for Riga Area Control Centre

A-SMGCS - Advanced-Surface Movement Guidance and Control System

ACFT - Aircraft

TCAS - Traffic Alert and Collision Avoidance System

SSR - Secondary Surveillance Radar

PSR - Primary Surveillance Radar

ARCC - Aeronautical Rescue Co-ordination Centre

ATC - Air Traffic Control

UTC - Universal Time Coordinated

UTA - Upper (Traffic) Control Area

CTA - Control Area

TMA - Terminal Control Area (ICAO)

TIA - Traffic Information Area

TIZ - Traffic Information Zone

AoR - Areas of Responsibility

CWP - Controller Working Position

ODS - Operator input and Display System

VOR - VHF Omni Directional Range

ILS - Instrument Landing System

DME - Distance Measuring Equipment

RA - Resolution Advisory

NM - Nautical mile

FT - Feet

FIR - Flight Information Region

UIR - Upper (flight) Information Region

FIS - Flight Information Services

FPL - Filed Flight Plan (ICAO format)

RPL - Repetitive Flight Plan

HMI - Human Machine Interface

EHSI - Electronic Horizontal Situational Indicator

OSUP - Operational Supervisor

SAR - Search and Rescue

SSR - Secondary Surveillance Radar

ESARR - Eurocontrol Safety Regulatory Requirement

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

STCA - Short-Term Conflict Alert

FL - Flight Level

SARPs - Standards and Recommended Practices

RBPS - Radar Bypass System

VMC - Visual meteorological conditions

## Synopsis

*Unless stated otherwise the time in this Report is UTC*

On Monday, 20 August, 2007 at 08:34 UTC a serious aircraft incident took place in Riga FIR, near of Reporting Point on Request LASMA (N56:26:07; E018:53:54) in the vicinity of Liepaja. A "RYANAIR", Ireland, Boeing 738 flight number RYR26UP on a scheduled passenger flight from Riga to [London \(Stansted Airport\)](#), cruising at FL 380 and opposite aircraft "AIRBRIDGE CARGO AIRLINES", Russia, Boeing 742, flight number ABW226A cruising at FL 370 Eastbound from Amsterdam to Sheremetyevo passed each other with opposite headings and the separation was lost. Visual meteorological conditions (VMC) prevailed. The crew of Boeing 738, flight RYR26UP received the traffic alert and collision-avoidance system (TCAS) resolution advisory (RA) to climb as a result of the Boeing 742, flight ABW226A traffic ahead of them. Boeing 738 flight RYR26UP started shallow climb (deviation was about 300ft ~FL383) and reported to WEST-COMBINED sector controller (hereinafter ATCO1) of Latvian Air Navigation Services (LGS), providing the control in the airspace of Riga FIR: "TCAS RA RYR26UP, climbing". The Boeing 742 flight ABW226A respectively received a short-term traffic alert and collision-avoidance system (TCAS) resolution advisory (RA) to descend. The circumstances leading to this serious incident were following: Outbound aircraft Boeing 738, flight RYR26UP contacted ATCO1 and requested FL 380. ATCO1 informed the crew Boeing 738: "Clear of traffic, continue climb FL 380". Boeing 738 continued climbing to FL380. After a while ATCO1 contacted Boeing 738, and informed about cruising at FL 370 Boeing 742 ABW226A to the East direction by following phraseology: "RYR26UP, for information, there is opposite traffic, flight level 370, 35 miles ahead of you". Shortly after that, taking into account oncoming opposite Boeing 742 ABW226A at FL370, ATCO1 instructed Boeing 738: "RYR26UP, expedite climb to flight level 380". Information was read back by the crew of Boeing 738.

Respectively for caution about opposite aircraft Boeing 738 flight RYR26UP ATCO1 contacted Boeing 742 flight ABW226A cruising at FL370 and transmitted information using following phraseology: "ABW226A, for information, there is opposite traffic ahead of you 21 miles, climbing to flight level 380,". The crew read back of Boeing 742 flight ABW226A was following: "Climbing flight level 380, ABW226A" and not immediately but approximately after 30 (thirty) seconds started climbing to FL 380 with initial rate of climb 400 ft/m. ATCO1 did not ascertain that the instruction had been correctly confirmed by the crew of Boeing 742 flight ABW226A and has not took immediate measures for stoppage unauthorized climbing.

As a result, at the time of the incident, vertical separation between the two opposite aircrafts decreased to 400 feet, horizontal separation was to 2.4 nautical miles. The conflicting traffic was in sight for aircrafts crews, so Boeing 738 flight RYR26UP and Boeing 742 flight ABW226A passed each other by left side. Although there was no risk of collision because the flight paths were diverging and also visual meteorological conditions existed at the time.

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) this incident is classified as A3.

## Notification

The Transport Accident and Incident Investigation Bureau of the Republic of Latvia was notified about the incident on Tuesday 21 August 2007 (12:40), 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. A written Latvian Aviation Authority (CAA) Incident/Accident Message Form was

transmitted by fax to the TAIIB. According to Incident/Accident Message information at 08:34 RYANAIR aircraft Boeing 737-800 EI-DAD, flight RYR26UP reported to ATC center about TCAS RA "Climb Climb" alert and that horizontal separation between opposite aircraft AIRBRIDGE CARGO AIRLINES Boeing 747-100/200, Flight ABW226A at this moment was 9NM.

On Wednesday 22 August 2007 (13:32) was received e-mail from Air Accident Investigation unit Department of Transport, Ireland with enclosed Safety Occurrence Tracking System Report No 6895. According to Report information after receiving TCAS RA "Climb Climb" alert RYANAIR aircraft has started shallow climb, reported RA Climb to Riga ATC and saw opposite Boeing 747-100/200 on left less than 1NM at FL 380, but there were no ATC instructions received.

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 Air Accident Investigation unit Department of Transport, Ireland and Russian Airline "Air Bridge Cargo" about initiating investigation including request of providing any relevant available information regarding the aircraft and personal data of flight crew involved in the serious incident.

## 1. Factual information

### 1.1. History of the incident

On August 20, 2007, at 08:24:27 UTC outbound from Riga RYANAIR aircraft Boeing 738 flight number RYR26UP on a scheduled passenger flight to [London \(Stansted Airport\)](#) contacted ATCO1 of Riga ATC WEST-COMBINED sector on frequency 135,1 MHz and reported: "Riga, good morning, RYR26UP, climbing FL 320, Ninta" in the vicinity of Reporting Point on Request NINTA. Air traffic controller reported radar contact.

At 08:26:23 UTC "AIRBRIDGE CARGO AIRLINES" Boeing 747-100/200, Flight ABW226A contacted Riga ATC center on frequency 135,1 MHz and reported: "Riga Control, ABW226A, good morning, flight level 370". ATCO1 confirmed radar contact.

At 08:27:25 UTC Boeing 738 approaching FL 320 requested FL 380 when available. Air traffic controller cleared Boeing 738 FL360. Clearance was read back by the crew of Boeing 738.

At 08:28:16 UTC ATCO1 contacted Boeing 738 and declared: "RYR26UP, for information expect further climb in 3 minutes due to crossing traffic at FL 370". Information was confirmed by crew.

At 08:29:59 UTC ATCO1 cleared Boeing 738 FL380. Clearance was read back by the crew of Boeing 738.

At 08:30:17 UTC Boeing 738 FL380 contacted ATCO1 and requested confirmation its clearance. ATCO1 informed the crew: "RYR26UP, clear of traffic, continue climb FL 380". Clearance was read back by the crew of Boeing 738.

At 08:32:01 UTC ATCO1 contacted Boeing 738 RYR26UP and declared: "RYR26UP, for information, there is opposite traffic flight level 370, 35 miles ahead of you". Information was read back by the crew of Boeing 738.

At 08:32:44 UTC ATCO1 contacted Boeing 738 RYR26UP and transmitted instruction – "RYR26UP expedite climb to flight level 380". The crew of Boeing 738 RYR26UP confirmed - Expedite RYR26UP.

At 08:33:02 UTC ATCO1 contacted Boeing 747-100/200 ABW226A and transmitted information: "ABW, for information, there is opposite traffic at a, a, a, ahead of you 21 miles, climbing to flight level 380".

At 08:33:14 UTC the crew of Boeing 747-100/200 ABW226A contacted Riga ATC center and reported: "Climbing flight level 380, ABW226A" and after a while started to climbing. At the same time Boeing 738 RYR26UP continued climbing to FL 380 and at 08:33:20 UTC contacted Riga ATC center and reported - "RYR26UP level 380".

ATCO1 of Riga ATC WEST-COMBINED sector confirmed the Boeing 738 RYR26UP report.

At 08:33:58 UTC the crew of the Boeing 738 RYR26UP reported: "TCAS RA, RYR26UP, climbing", whereupon ATCO1 of Riga ATC WEST-COMBINED sector asked – "RYR26UP, say again, please" and crew repeated report – "TCAS RA, RYR26UP, climbing up 380."

At 08:34:17 UTC ATCO1 of Riga ATC WEST-COMBINED sector asked – "RYR26UP, what is a reason?"

At 08:34:22 UTC the crew of Boeing 738 RYR26UP reported: "Aircraft conflict is any 500 feet below, registering at 378."

At 08:34:27 UTC ATCO1 of Riga ATC WEST-COMBINED sector inquired Boeing 747-100/200 ABW226A: "ABW226A, Riga, report your flight level."

At 08:34:30 UTC the crew of Boeing 747-100/200 ABW226A reported – "380 and conflicting traffic cause TA, RA comment of TCAS."

At 08:34:38 UTC ATCO1 of Riga ATC WEST-COMBINED sector issued instruction – "ABW226A you have to stay at flight level 370", whereupon at 08:34:43 UTC the crew of Boeing 747-100/200 ABW226A reported – "Negative, sorry, now we are at 380 flight level".

At 08:34:48 UTC ATCO1 of Riga ATC WEST-COMBINED sector reported – "Roger."

At 08:34:51 UTC Pilot announced : "Was too close".

At 08:35:04 UTC the crew of Boeing 738 RYR26UP reported: "RYR26UP, clear of conflict, return flight level 380", whereupon ATCO1 confirmed – "RYR26UP, roger" and after that issued instruction for Boeing 747-100/200: "ABW226A, descend back to flight level 370." Clearance was read back by the crew of Boeing 747-100/200: "Descending 370, ABW226A".

According to radar records, the closest distance between RYR26UP and ABW226A was 2.4 NM, and vertical separation between the aircrafts was 400 FT at the same time. At that moment RYR26UP was at flight level of 38300 feet and ABW226A was climbing with rate of climb 1400ft/m passing through the altitude of 37900 feet.

Air Traffic Controller (ATCO1) was in charge for ATS provision in the WEST-COMBINED sector of Riga FIR at the moment when the incident occurred. According to the time-table PL-GSV/GSVC-01 for August, 2007 of Latvian ATC (GSVC), ATCO1 working shift No1 on August 20, 2007 began at 7:30(local time), 4:30 (UTC). Actually ATCO1 started to operate (login time in the system) at 05:30:21 (UTC). Total working - time up to incident (at 08:34:30) is 03 hr 04. Total working-time at the display 2 hr 04. Rest pause during the Morning shift 57min, (06:32:48 -07:32:45) before the incident occurred.

## 1.2. Injuries to persons

There were no injuries.

## 1.3. Damage to aircraft

No damage occurred.

## 1.4. Other damage

Objects other than aircraft not damaged.

## 1.5. Personnel information

Air traffic controller: Female, 26 years Licence: Air traffic controller, valid during the validity period of Medical Certificate

Medical certificate: Air traffic controller Medical Certificate valid until September 22, 2007

Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid until November 03, 2007).

Captain of Boeing 738 RYR26UP: 49 years old

Certificate: ATPL AT 256970 AA IE; Data of last medical: April 19, 2007

Total flight experience – 13 800 hours; Total hours last 90 days - 251 hours

Flight time last 24 hours – 9.56 hours

First officer of Boeing 738 RYR26UP: 38 years old

Certificate: ATPL AT 2572 13 C; Data of last medical: April 19, 2007

Total flight experience - 1274 hours; Total hours last 90 days - 260 hours

Flight time last 24 hours – 9.56 hours

Captain of Boeing 747-100/200 - ABW226A: 33 years old

Total flight experience - 5157 hours; Total flight experience on Boeing 747 - 2295 hours

First officer Boeing 747-100/200 - ABW226A: 31 years old

Total flight experience - 2539 hours; Total flight experience on Boeing 747 - 1821 hours

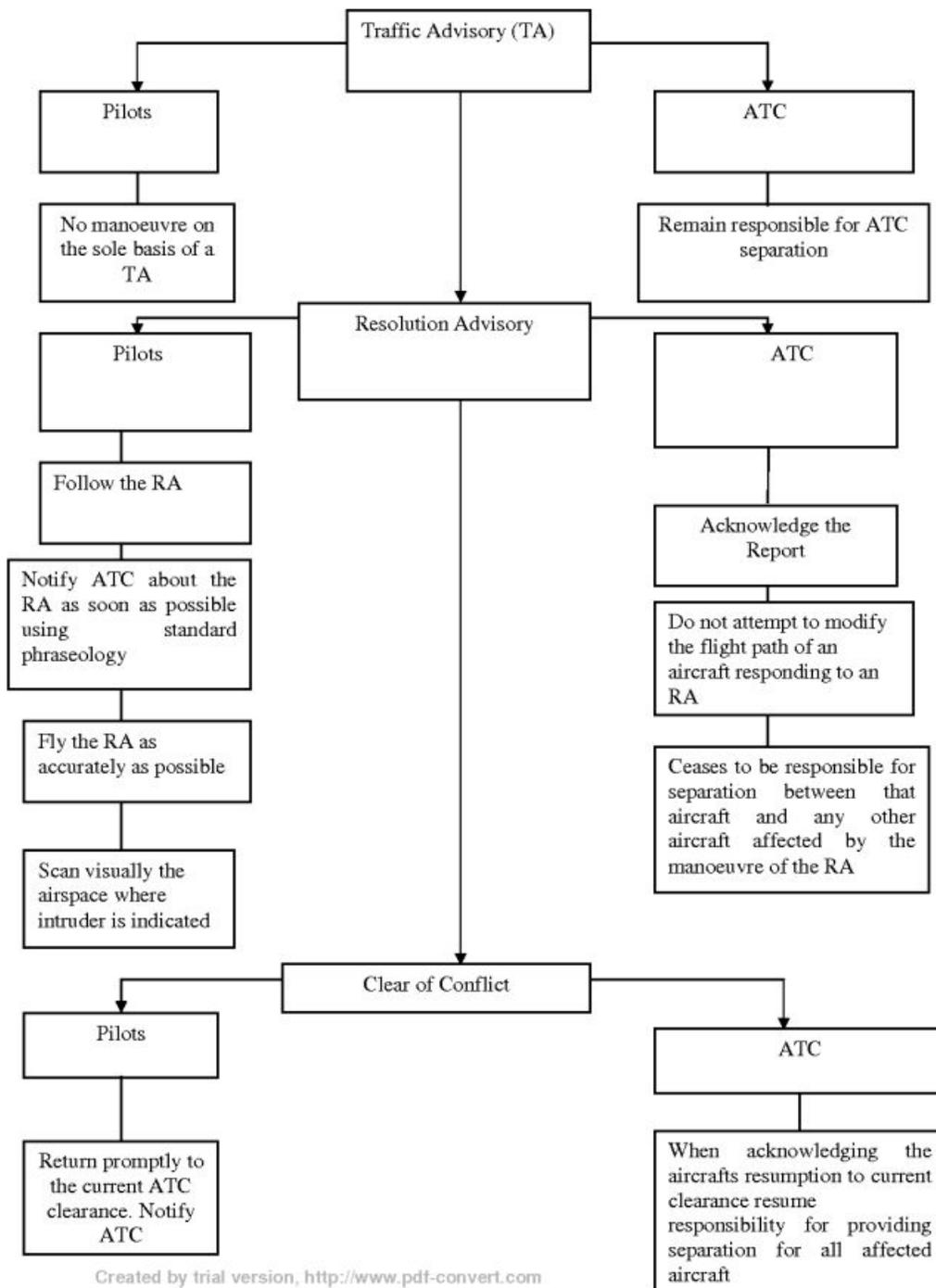
## 1.6. Aircraft Information

Both aircrafts were equipped with Traffic Alert and Collision Avoidance System. Traffic Alert and Collision Avoidance System (also known as Airborne Collision Avoidance System) is based upon the use of aircraft transponder equipment to provide warnings of possible collision with other transponding aircraft. TCAS alerts the crew to possible conflicting traffic. TCAS interrogates operating transponders in other airplanes, tracks the other airplanes by analyzing the transponder replies, and predicts the flight paths and positions. TCAS provides advisory and traffic displays of the other airplanes to the flight crew. Neither advisory, guidance, nor traffic display is provided for other airplanes which do not have operating transponders. TCAS operation is independent of ground-based air traffic control.

To provide advisories, TCAS identifies a three dimensional airspace around the airplane where a high likelihood of traffic conflict exists. The dimensions of this airspace are based upon the closure rate with conflicting traffic. TCAS equipment interrogates the transponders of other airplanes to determine their range, bearing, and altitude. Traffic advisory (TA) is generated when the other airplane is approximately 40 seconds from the point of closest approach. If the other airplane continues to close, a resolution advisory (RA) is generated when the other airplane is approximately 25 seconds from the point of closest approach. The RA provides aural warning and guidance as well as maneuver guidance to maintain or increase separation from the traffic. Non-transponder equipped airplanes are invisible to TCAS. RAs can be generated if the other airplane has a mode C transponder. Coordinated RAs require both airplanes to have TCAS. TAs are indicated by the aural "TRAFFIC, TRAFFIC" which sounds once and is then reset until the next TA occurs. The TRAFFIC message appears on the EHSI. The TA symbol appears at the proper range and relative bearing of the other airplane. Altitude and vertical motion are included with the symbol if the other airplane is using transponder mode S or C. RAs are indicated by one or more aural listed in the RA aural table. The TRAFFIC message and RA

symbol which depicts the traffic's relative bearing, range, altitude, and vertical motion are on the EHSI similar to the TA symbol. Additional symbols are proximate traffic and other traffic. Proximate traffic is within six miles and 1200 feet vertically, but is not expected to cause a TA or RA alert. Other traffic is beyond the six mile and 1200 feet vertical criteria. Traffic symbols are revised as the TCAS system constantly reevaluates the motion of other airplanes. If the range selected does not permit the display of a TA or RA an OFFSCALE message appears on the EHSI.

### An interaction of ATC and Crew during ACAS event



## 1.7. Meteorological information

Daylight, VMC

## 1.8. Aids to Navigation

The flights were under Radar control. 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. From a functional point of view, the system consists of two main components: a Primary System, and 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. 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

▫The distinct border is between the Flight Plan Data Management block and the ATC Functional block. A Flight Data Assistant, (FDA) is working with Repetitive Flight Plans, (RPLs) and passive Flight Plans, (FPLs) in the Flight Plan Data Management block while the ATC controller is working with active FPLs in the ATC Functional block. Flight plan data management is available at flight data assistant working positions. The Flight Data Assistant HMI has efficient support for editing, browsing, queue handling and specification of complex search criteria.

RPLs can be searched, created, modified and deleted manually, but also automatically based on airline time schedules on data media. FPLs are normally created automatically from RPLs or received from AFTN. They can also be searched, created, modified and deleted manually. Received AFTN and OLDI messages are processed and checked automatically and produce updates of concerned FPLs. Billing data is automatically submitted to external systems at FPL termination. For RPLs and FPLs both, route analysis is done and route details are examined against the local airspace structure for compliance with ICAO rules.

The airspace structure is defined by means of system parameters. ATC functions are available at controller working positions. Controller interaction with flights is performed through extensive use of lists and flight symbols. A trajectory describing the flight path in airspace is calculated with consideration to aircraft performance characteristics and current weather data. The trajectory's coverage of ATC sectors determines the distribution of flight data to working positions. Data from PSR and SSR radar stations is processed by means of an advanced centralized true multi-radar tracker. The resulting system tracks are associated with FPLs. Flight symbols comprising surveillance and flight plan information are presented to controllers.

*AIS data is received, processed, stored and presented to controllers.*

The Support functional block contains a parameter system making the system easily adaptable to any operational environment by means of extensive use of system parameters. In the Recording and Playback data is continuously recorded and at playback, operational scenarios are recreated at a controller work position.

System Monitoring and Control is performed by means of graphical presentation and tools for diagnostics and configuration control.

Event Analysis provides tools for technical analysis, traffic analysis, statistics and prognosis.

The Simulator is a so-called high fidelity simulator, which means that the trainee functionality is an exact simulation of the operational system's ATC functions.

Efficient tools are available for the definition of airspace structure and the preparation and execution of exercises.

## 1.9. Communications

The radio communication between the aircrafts and ATCO was held on the frequency 135,1 MHz in English. For the investigation the ATCO console recordings on the frequency 135,1MHz was used. The quality of the recordings was good.

### Read – Back clearances

The flight crew shall read back to the ATCO safety –related parts of ATC clearances and instructions which are transmitted by voice. The following items shall always be read back:

- ATC route clearance;
- Clearances and instructions to enter, land on, take off from, hold short of, cross, taxi and backtrack on any runway;
- Runway in use, altimeter settings, SSR codes, level instructions, heading and speed instructions and whether issued by the controller or contained in automatic terminal information service broadcasts, transition levels.

Other clearances or instructions, including conditional clearances, shall be read back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

The controller shall listen to the read back to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the read back.

ATCO and crew members of Boeing 747-100/200 ABW226A as well as Boeing 738 RYR26UP sometimes have used non-standard phraseology and there were some principal errors in the used by the phraseology.

Communication Transcript there was not inaccuracies in radio communications on all sides.

## 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 aircrafts crew members. The investigation members did not have the CVR transcript and RYR26UP FDR recordings at their disposal.

Data from Boeing 747-100/200 ABW226A flight data recorder at the time of incident enclosed in Attachment.

## 1.12. Wreckage and impact information

No damage

## 1.13. Medical and pathological information

Not relevant to this incident

#### 1.14. Fire

There was no fire

#### 1.15. Survival aspects

Not necessary 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 air navigation services in the Latvian airspace is State Joint Stock Company Latvijas Gaisa Satiksme (LGS) Air traffic control was provided in the airspace of Riga FIR, by Latvian Air Navigation Services (LGS) staff. For the ATS provision the following areas of responsibility (AoR) are established within Riga FIR/UIR: Sector EAST, Sector SOUTH, Sector NORTH, Riga TMA, Riga CTR, Liepaja TMA, Liepaja CTR, Ventspils TIA and Ventspils TIZ. Sector WEST provides ATS within NORTH AoR, SOUTH AoR, Liepaja TMA AoR, and Ventspils TIA AoR.

According to WEST-COMBINED Sector controller technological procedures DI-GSV/GSVC-02 of Riga ATCC, working position of the sector WEST-COMBINED is shareable between a controller with operational role "WEST Executive" and a controller with operational role "WEST Planner" appointed by the Operational Supervisor (OSUP) during the highest intensity hours. When traffic intensity permits one Controller may provide the service at WEST Sector with operation role "WEST Executive". According to "Sector capacity recalculation and the control of the air traffic demand" (*Attachment A of Sector controller technological procedures DI-GSV/GSVC-02 of Riga ATCC*) maximal allowed capacity per hour for WEST-COMBINED Sector when employed 1(one) controller is 31 and respectively the air traffic demand 30. If the capacity per hours is forecasted to be more than allowed for employing 1(one) controller and there is not possible to organize of 2 (two) controllers or if the capacity per hours is forecasted to be more than allowed for employing 2(two) controllers, OSUP during the shift shall to determine the capacity of the sector depending from the number of the controllers and shall to warn the adjacent control centres about capacity restrictions for the centres.

Within Riga CTA/UTA vertical separation is carried out according to ICAO Annex 2 Table of Cruising levels 3a and applied between FL 290 and FL 410 inclusive -1000ft (300m). Horizontal separation (radar separation) if double SSR coverage is provided between identified, controlled aircraft not less than 5NM. Sector WEST-COMBINED provides services within sector SOUTH AoR and sector NORTH AoR. ATS is provided at flight levels from FL 100 till FL 460. FIS is provided at and below FL 95 and above FL 460. Sector WEST-COMBINED controller provides ATS using VHF radio station on frequency 135,1 MHz, re-transmitter Liepaja and Spare on frequency 135,1MHz, ATS systems ATRACC+, pilot's reports.

According to technological procedures of Riga ATCC at the start of the shift controller has to login in the ATRACC+ system. The start of the shift is determined by the login time. All temporary substitutions shall be performed via login procedure. Substitution of the controller is determined by the operational or the administrative supervisor. A temporary leaving of the working position during the shift requires a substitution.

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.



## 1.18. Additional information

Not applicable

## 1.19. Useful or effective investigation techniques

The incident has been investigated in accordance with Annex 13.

## 2. Analysis

### 2.1. General

The investigation of the serious incident – infringement of separation between RYANAIR Boeing 738 and AIRBRIDGE CARGO AIRLINES Boeing 742 on August 20, 2007 was orientated essentially around the following questions:

- Did Air Traffic Control Services procedures, operations and instructions have an influence on the incident?
- Did Flight crew actions have an influence on the incident?
- Did Radio communication language have an influence on the incident?
- Were the human errors the cause of incident?

The analysis concerned the activities of RYANAIR and AIRBRIDGE CARGO AIRLINES crew radio communications, radar recording and air operation service instructions.

### 2.2. Explanation of the situation

At 08:34:30 in the controlled airspace of Riga FIR/UIR WEST-COMBINED Sector has not been very high traffic activity. Total number of controllable aircrafts to direction WEST –EAST –WEST in WEST-COMBINED Sector were 11(eleven). According to technological procedures DI-GSV/GSVC-02 of Riga ATCC at the time of incident was working just onecontroller (ATCO1). Both aircrafts were controlled by the ATCO1 with operational role "WEST Executive" just before and at the actual time of the incident. The incident occurred within the Riga ATCC in Class A controlled airspace (See Attachment), were operating under IFR and were on radio contact with Riga ATCC WEST-COMBINED Sector on VHF frequency 135,1 MHz. *The classifications adopted by ICAO are: Class A- All operations must be conducted under [Instrument Flight Rules \(IFR\)](#) or [Special visual flight rules \(SVFR\)](#) and are subject to ATC clearance. All flights are separated from each other by ATC.*

Both aircrafts where on the opposite track and radar contact. Boeing 738 EI-DAD, flight RYR26UP was en-route from Riga to [London \(Stansted Airport\)](#). Boeing 747-100/200 ABW226A was en-route from Amsterdam to Sheremetyevo. Both aircrafts were equipped with Traffic Collision and Avoidance System (TCAS).

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

The Controller- Pilot Data Link communications (CPDLC) application provides a means of communication between the controller and pilot, using data link for ATC communication. This application includes a set of clearance/ information /request message elements which correspond to the Phraseologies used in the radiotelephony environment.

The controller shall be provided with the capability to respond to messages, including emergencies, to issue clearances, instructions and advisories and to request and provide information, as appropriate.

The pilot shall be provided with the capability to respond to messages, to request clearances and information, to report information and to declare and cancel an emergency.

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

ABW226A was cruising at FL-370. RYR26UP was approaching to FL-320, requesting FL 380 when available and was cleared to continue FL-360. RYR26UP read back the clearance correctly.

At 08:28:16 UTC ATCO1 contacted Boeing 738 and informed the crew – “For information expect further climb in 3 minutes due to crossing traffic at FL 370.” At 08:29:59 UTC ATCO1 gave instruction to RYR26UP – “RYR26UP, clear of traffic continue climb FL-380”. Clearance was read back by the crew of Boeing 738.

At 08:28:16 UTC ATCO1 informed the crew of Boeing 738 to expect further climbing in 3 minutes due to crossing traffic at FL 370. At 08:29:59 UTC ATCO1 gave instruction to RYR26UP - RYR26UP, clear of traffic and approved continue climbing to FL-380. Clearance was read back by the crew of Boeing 738.

At 08:30:17 UTC Boeing 738 FL380 contacted ATCO1 and requested to confirm its clearance. ATCO1 informed the crew about the clearance of traffic and cleared climbing to FL 380. Clearance was read back by the crew of Boeing 738.

At 08:32:01 UTC ATCO1 informed the crew of Boeing 738 RYR26UP about opposite traffic at FL 370 and 35 miles ahead. Information was read back by the crew of Boeing 738.

At 08:32:44 UTC ATCO1 instructed Boeing 738 RYR26UP to expedite climb to flight level 380. The crew of Boeing 738 RYR26UP confirmed the following: “Expedite RYR26UP”.

At 08:33:02 UTC ATCO1 according to traffic information procedures informed Boeing 747-100/200 flight number ABW226A concerning opposite traffic following: “There is opposite traffic at a, a, a, ahead of you 21 miles, climbing to flight level 380.”

No clearances by ATCO1 were given which may lead to a separation infringement.

According to Air Navigation Service procedures in ATC level changes standard phraseology “CLIMB or DESCEND” follows as necessary by “TO” (level).

The crew of Boeing 747-100/200 ABW226A understood controller traffic information as level instruction and confirmed to ATCO1 traffic information following: “Climbing flight level 380, ABW226A” and started climbing to FL380.

According to requirements and procedures for Air Navigation Services, after receiving traffic information from controller, crew must confirm (acknowledge) traffic information following: “LOOKING OUT” or “TRAFFIC IN SIGHT” or “NEGATIVE CONTACT (with specifying reasons)”. On ground-air voice communication clearance instructions as well as conditional clearances read back (acknowledgment) should clearly indicate that they have been understood correctly and will be complied.

The controller should listen the read back, understand correctly and ascertain that the transmitted clearance or instruction had been correctly confirmed (acknowledged) by the flight crew and should be able to take immediate action to correct any discrepancies revealed by the read back.

In this case the crew of Boeing 747-100/200 flight number ABW226A had not confirmed the traffic information according to PANS ATM requirements. ATCO1 did not ascertain that the traffic information had been understood correctly, also the crew did not require the acknowledgement that they(crew) had understood the given instructions in right manner.

At 08:33:45 ABW226A was passing flight level 372 with climbing rate 400ft/m. (See Radar Display Data, Attachment1).

At the same time Boeing 738 RYR26UP continued climbing to FL 380 and at 08:33:20 UTC reported to Riga ATC center about reaching FL 380.

ABW226A continued climbing to the same flight level 380 with accelerating climbing rate. (See Radar Display Data, Attachment 1). ATCO1 had not stopped climbing flight number ABW226A and as a result at 08:33:58 aircrafts were too close that the resolution advisory (RA) was generated by TCAS and RYR26UP declared to ATCO1 – TCAS RA, RYR26UP, climbing.

At 08:34:30 the closest distance between RYR26UP and ABW226A was 2.4 NM and vertical separation was 400 FT.

That conflict situation – infringement of separation mainly issued as a result, that controller had not prevented unauthorized climbing of the flight number ABW226A from FL 370. Imperative and timely instructions by the controller if he had recognized that the ABW226A was not at flight level as prescribed, he could be able to prevent the developing traffic conflict. If he had made imperative instructions when the crew due to misunderstanding declared climbing to FL 380, especially when had started climbing, the incident would have not occurred.

When RYR26UP declared about TCAS RA the ATCO1 did not understand given information and requested “say again” and after that RYR26UP declared again - TCAS RA, RYR26UP, climbing up 380. On the controller request about the reason, the crew of RYR26UP reported that the conflict aircraft was about 500 feet below, registering at flight level 378 and only after that at 08:34:27 requested ABW226A to report its flight level, whereupon the crew reported - 380 and conflicting traffic cause TA, RA comment of TCAS. In evidence of Radio Communication records at 08:34:30 the crew of ABW226A reported: “FL380 and conflicting traffic cause TCAS TA, RA.” And only after that ATCO1 transmitted the following: “ABW226A you have to stay at flight level 370, whereupon logically at 08:34:43 followed report of ABW226A: “Negative, sorry, now we are at 380 flight level”. (See Radio Communication records in Attachment) This is a documentary evidence that ATCO1 did not control actual situation in the airspace between abovementioned aircraft. At 08:35:04 RYR26UP declared: “RYR26UP, clear of conflict, return flight level 380” ATCO1 read back information and transmitted the instruction for ABW226A: “ABW226A, descend back to flight level 370”. ABW226A read back was correct.

The conflict was solved.

## 2.3. Flight crew actions

### 2.3.1. RYR26UP

RYR26UP was operated by RYANAIR, Ireland on a scheduled passenger flight from Riga to [London \(Stansted Airport\)](#). Because examination of the CVR transcripts for the investigation was not available all radio communications between crew and ATCO were examined on basis of Radio communication records of RIGA ATCC-WEST - COMBINED SECTOR, time period 08:24 – 08:36 UTC on August 20, 2007. In this period of time the crew read back information correctly and communication conform to procedures of PANS ATM and CPDLC. When TCAS generated RA the actions of the crew conformed to Operating procedures of PANS-OPS. The crew of aircraft could see the conflicting aircraft not only on TCAS display but also visually.

### 2.3.2. ABW226A

ABW226A was operated by AIRBRIDGE CARGO AIRLINES, Russia, on a commercial flight in the East direction from Amsterdam to Sheremetyevo. At 08:33:02 ATCO1 transmitted the traffic information to the crew that there were opposite traffic 21 miles ahead climbing to flight level 380. There occurred misunderstanding of communication. ATCO1 informed the crew that opposite traffic climbs to flight level 380, but crew understood ATCO1 information as clearance instruction to climb FL380, reported confirmation that ABW226A climbing to flight level 380 and after a while started climbing. According to PANS ATM Chapter 12 Item 12.3.1.2. level changes phraseology is the following: CLIMB (or DESCEND) followed as necessary by: TO (level). ATCO1 had not given such instruction to crew ABW226A. In case of receiving traffic information the crew must confirm (acknowledge) traffic information in following phraseology: “LOOKING OUT” or “TRAFFIC IN SIGHT” or “NEGATIVE CONTACT (with specifying reasons)”. In

this case the crew reported answer to ATCO1 traffic information in the following phraseology: "Climbing flight level 380, ABW226A". There is not available CVR transcript of flight number ABW226A for the investigation. According to Radio communication records of RIGA ATCC-WEST- COMBINED SECTOR, time period 08:24 – 08:36 UTC on August 20, 2007 the crew of ABW226A declared about TCAS generation TA, RA after ATCO1 request of their flight level. The crew of the aircraft was able to see the conflicting aircraft not only on TCAS display but also visually.

#### 2.4. Human errors of the air traffic controller (ATCO1)

The Human Factors Analysis and Classification System is a taxonomy that describes the human factors that contribute to an accident or incident. It is based on a sequential or chain-of-events theory of accident causation. 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 Air Traffic Control as well as in the

Flight Crew Operations. In many cases though, controllers of all experience levels sometimes completely overlook an aircraft when clearing another in the direct vicinity. Common elements found in the separation infringement incidents:

- Most happen in low or medium traffic situations. The risk is increased after a peak or during the period after a handover (when you think you've 'settled in' on the sector).
- Descending or climbing aircraft are often involved: inbound traffic often needs to meet certain restrictions. Coupled with aiming for the top-of descent point, this sometimes results in an incomplete scan of the affected traffic. In occasional climbing situations, a crew's request is acted on immediately without a proper scan of its immediate vicinity.
- The conflicting traffic may be in the immediate vicinity of the cleared aircraft. Typically, the controller spots potential problems that are further away, but doesn't detect the traffic that is closest to the aircraft that he/she is clearing.

The occurred Serious Incident was caused by Human Errors of the air traffic controller (ATCO1). The ATCO1, by human error, did not predict potential conflict between ABW226A cruising at FL 370 and RYR26UP climbing to FL 380 and did not take necessary actions to avoid infringement of the separation minima after misunderstanding controller's traffic information of ABW226A crew.

### 3. Conclusions

During process of investigation were made the following conclusions:

#### 3.1. Findings

- The duty officer of ARCC Riga, a structural part of LGS responsible for co-ordination of SAR operations within Riga FIR, did not provided proper information in Incident/Accident Message about occurrence. According to given information occurrence can not classified as serious incident.
- Authentic information about occurrence were received from Air Accident Investigation unit of Department of Transport, Ireland.

- The incident occurred within the Riga FIR/UIR WEST-COMBINED SECTOR.
- At the time of incident in the controlled airspace of Riga FIR/UIR WEST-COMBINED Sector has not been very high traffic activity.
- Both aircrafts involved were flying in Class A controlled airspace.
- The aircrafts were flying on opposite tracks.
- Both aircrafts involved were operating on IFR flight plans.
- The flights were under Radar control.
- Both aircrafts was equipped with Traffic Collision and Avoidance System (TCAS).
- 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.
- Within Riga CTA/UTA vertical separation is carried out according to ICAO Annex 2 Table of Cruising levels 3a and applied between FL 290 and FL 410 inclusive -1000ft (300m).
- Horizontal separation (radar separation) if double SSR coverage is provided between identified, controlled aircraft not less than 5NM.
- At the time of incident Visual Meteorological Conditions (VMC) prevailed.
- Both aircrafts involved were in radio contact with Riga ATCC.
- The radio communication between the aircrafts and ATCO1 Riga FIR/UIR WEST-COMBINED Sector was held on the frequency 135,1 MHz in English.
- 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.
- Just before the incident and at the actual time of the incident in the Riga FIR/UIR WEST-COMBINED SECTOR worked one controller (ATCO1) with operational role "WEST Executive" that conform to requirements "Sector capacity recalculation and the control of the air traffic demand" established in WEST – COMBINED Sector controller technological procedures DI-GSV/GSVC-02 of Riga ATCC.
- Both aircrafts were being managed by the ATCO1.
- ATCO1 of RIGA ATCC-WEST-SECTOR was fully qualified, held valid licence and ratings and capable to do the job.
- Working experience of ATCO1 is 2 years.
- Requirements of WEST – COMBINED Sector controller technological procedures DI-GSV/GSVC-02 of Riga ATCC conform to PANS ATM and did not have an influence on the incident.
- The ATCO1 warned the crew of Boeing 747-100/200 ABW226A about opposite traffic. No clearances by ATCO1 were given which may lead to a separation infringement.
- The crew of Boeing 747-100/200 ABW226A did not understand controller information properly.

- The crew did not confirm traffic information in phraseology according to requirements of PANS ATM – “LOOKING OUT” or “TRAFFIC IN SIGHT” or “NEGATIVE CONTACT (with specifying reasons)”. In this case the crew read back to ATCO1 on traffic information in the following phraseology – “climbing flight level 380, ABW226A”.
- The ATCO1 did not return the aircraft ABW226A to the determined flight level FL 370 when it have started to climbing.
- Imperative and timely made instructions by the controller, if he have been recognized that the ABW226A was not flying as determined, would have prevented the developing traffic conflict situation,
- ATCO1 did not perceive that ABW226A started climbing as well as did not ascertain that the clearance or instruction (in this case instruction) has been correctly acknowledged by the flight crew, when crew read back ATCO instruction in following phraseology – “Climbing flight level 380, ABW226A”.
- ATCO1 did not fully control actual situation in the airspace (report of RYANAIR about TCAS RA took controller a surprise), that lead up to a separation infringement between aircrafts and generating TCAS RA of both aircrafts.
- The closest distance between RYR26UP and ABW226A was 2.4 NM at when the vertical separation between the two aircrafts was 400 FT.
- At the time of the incident, the vertical separation was 40 % of the determined minimum separation, and horizontal separation was 48% of the determined minimum separation. Since the safety of the aircraft in question were not put on risk (the planes were on parallel airways), the occurrence is classified as a “Significant incident” according to ESARR 2.

### 3.1.1. The RYR26UP crew

- The RYR26UP crew was fully qualified, held valid licences and ratings and airworthy.
- Receiving the clearances or instruction from ATCO1 read back in accordance with CPDLC procedures.
- When TCAS generated RA the actions of the crew relevant to Operating procedures of PANS-OPS.
- The crew actions have not an influence on the incident.

### 3.1.2 The ABW226A crew

- The ABW226A crew was fully qualified, held valid licences and ratings and airworthy.
- Receiving the warning instruction from ATCO1, that there is opposite traffic 21 miles ahead climbing to flight level 380 did not acknowledged in a manner to clearly indicate that they have been understood and will be complied with.
- When TCAS generated RA the actions of the crew relevant to Operating procedures of PANS-OPS.
- The crew of ABW226A reported about TCAS generation TA, RA after controller’s request of it flight level.

## 3.2. Causes

Causes of the serious incident - reducing the separation minima infringement between RYANAIR Boeing 737-800 flight number RYR26UP and AIBRIDGE CARGO Airlines flight number ABW226A, were the following:

### 3.2.1. Root Causes

The source or origin of an event that played the major role in the cause of this incident was human factor - the fact that the air traffic controller ATCO1 did not ascertain that the information concerning opposite traffic had been correctly acknowledged by the ABW226A flight crew, that why unauthorized climbing occurred.

### 3.2.2. Contributing causes

- Misunderstanding of the crew of given information by ATCO1;
- Failed radiomonitoring by the crew of ABW226A;
- Infringement of the standard phraseology and incorrect read back by the crew of ABW226A;
- Insufficient experience of ATCO1.

### 3.2.3. Primary cause

ATCO1 did not observe thoroughly enough air traffic in the Radar controlled airspace and as a result was unable to prevent unauthorised climbing to FL 380 by the crew of ABW226A.

## 4. Flight 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):

- Should provide Human Factors training to all controllers based on ICAO Human Factors digests (*Human Factors in Air Traffic Control - Circular 241*) and in accordance with EuroControl (EA TCHIP) recommendations;
- The most attention in controllers training should be paid to the use of standard phraseology;
- Evaluate and if necessary improve company Quality Management System as well as perform corrective actions for air traffic controllers training, improving qualification skills, eliminate deficiencies and its potential causes;
- Should study necessity for en route control sectors to be dual-operated, i.e. by one radar executive and one radar planner respectively when there are operated inexperienced operator;
- Considered opportunity to establish a Critical Incident Response Programme for ATC personnel for decreasing post traumatic stress of staff involved in incidents.

March 18, 2008

Director of Transport Accident and Incident Investigation Bureau

Ivars Alfreds Gaveika

<https://www.taiib.gov.lv/lv/final-report-nr12008>