Transporta nelaimes gadījumu un incidentu izmeklēšanas birojs

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FINAL REPORT No.4-02/6-14(5A-2015) OF THE AIRCRAFT SERIOUS INCIDENT LOSS OF SEPARATION BETWEEN THE AIRCRAFT Boeing B735, flight BTI97H and Piper 34L registration YL-GBS on OCTOBER 11, 2014

The Aircraft 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 objective of the safety investigation in accordance with Annex 13 to the Convention on International Civil Aviation, 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 as well as Cabinet Regulation No.423 of May 31, 2011 "Procedures of Civil Aviation Accident and Incident investigation" is the prevention of future accidents and incidents. The Report shall contain, where appropriate, safety recommendations. Safety investigation is separate from any judicial or administrative proceedings and investigation Report is not deal with purpose to apportion blame or liability but only for purpose of the safety enhancement. The Report shall protect the anonymity of any individual involved in the accident or serious incident.

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Incident Investigation Bureau Ivars Alfreds Gaveika

FINAL REPORT No.4-02/6-14(5A-2015)

OF THE AIRCRAFT SERIOUS INCIDENT

LOSS OF SEPARATION BETWEEN THE AIRCRAFT Boeing B735, flight BTI97H and PA34A/L, registration YL-GBS, ON October 11, 2014

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Abbreviations

IFR – Instrumental Flight Rules
RWY- Runway
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
SMR- Surface Movement Radar
ATIS –Automatic Terminal Information Service
AWOS -Automated Weather Observing System
ACFT - Aircraft
ARCC -Aeronautical Rescue Co-ordination Centre
APP - Approach
ATC - Air Traffic Control
UTC - Universal Time Coordinated
AoR - Areas of Responsibility
CWP - Controller Working Position
RVSM –Reduced Vertical Separation Minimum
ODS - Operator input and Display System
NM - Nautical mile
FT - Feet
Z – Zulu = Universal Coordinated Time (UTC)
STAR-Standard Instrument Arrival Route
ATS - Air Traffic Services
HMI - Human Machine Interface
ESARR- Eurocontrol Safety and Regulatory Requirement
PANS-ATM- Procedures for Air Navigation Services – Air Traffic Management

ATZ- Aerodrome Traffic Zone
CTR-Control Zone
STCA - Short-Term Conflict Alert
CTR- Control Zone
FL - Flight Level
RBPS - Radar Bypass System
OLDI -On-Line Data Interchange
COP - Coordination Point
TMA – Terminal Control Are
SID- Standard Instrument Departure
SSR-Secondary Surveillance Rada

Glossary

Radar approach - An approach in which the final approach phase is executed under the direction of a controller using radar.

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.

Vectoring - Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system.

VFR. The symbol used to designate the visual flight rules.

VFR flight. A flight conducted in accordance with the visual flight rules.

Synopsis

Unless stated otherwise the time in this Report is UTC

On Saturday, October 11, 2014 at 13:16 UTC a Boeing B735, operating by AirBaltic, flight No BTI-97H was arriving on final to RWY 18 on Riga International airport (EVRA). Piper P-34L, registration YL-GBS performed the training flight and after departure from uncontrolled airfield Spilve (EVRS) at 1500FT diverted from assigned turn on heading 30° and came close to arriving Boeing B735. Aircraft were flying on crossing tracks. Both aircraft at the moment of incident were being controlled by the "Tower" controller of Riga Area Control Center (ACC).The minimal vertical separation was 300FT, longitudinal 2NM.

Notification

The Transport Accident and Incident Investigation Bureau of the Republic of Latvia (TAIIB) was not notified about the incident immediately after occurrence. Notification about occurrence was sent to TAIIB on Wednesday, October 22, 2014 from Safety Department of ATC Service provider "Latvijas Gaisa Satiksme".

TAIIB Authorities evaluated the received information relevant to that case and initiated collecting data for investigation into this serious incident, 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

1.1.1. Sequence of events

Piper P-34L, registration YL-GBS departed from Spilve airfield (EVRS) according to submitted FPL at 13:00 (UTC).

OSV890 111016
FF EVRAZPZX EVRRZDZX EVRRZQZX
111015 EUCHZMFP
(FPL-YLGBS-ZX
-PA34/L-SDF/C
-EVRS1300
-N0120A015 SARPS/N0120A015 RIA/N0120A015 IFR STAYl/0200
RIA/N0120A015 VFR DOLLE 5659N02411E
-EVRS0215 EVRA EVJA
-DOF/141011 EET/SARPS0015 OPR/PRIV ORGN/KBLIHAEX RMK/CONT.
MOB.29463454 STAYINFOl/TRAINING FLT AT EVRA 7TGL 2LOCAPP 3ILSAPP
2VORAPP)
OSV162 111317
FF EVRAZPZX EVRRZDZX EVRRZQZX
111317 EUCHZMFP
(DEP-YLGBS-EVRS1317-EVRS-DOF/141011)
OSV388 111553
FF EVRAZPZX EVRRZDZX EVRRZQZX
111553 EUCHZMFP
(ARR-YLGBS-EVRS1300-EVRS1545)

At **13:09:48** the pilot of Piper PA34 established contact with Riga Tower Controller on frequency 118.1MHz and declared: "*Riga "Tower" YLGBS departing Spilve at one o'clock and request to enter via "SARPS" to climb to altitude 1500 Feet.*"

At **13:10:14** The Tower Controller gave the pilot following information: "*Y-BS information "JULIET", QNH1018 set squawk1615 and report 1500 feet over "SARPS"*."

At **13:10:25** the pilot of Piper PA34 confirmed: "*QNH1018 information "JULIET", set squawk1615 and will report at altitude1500 feet over "SARPS". YLGBS.*"

Shortly before that at **13:04:04** the crew of B735, flight BTI97H contacted Riga APP controller on frequency 129.925 and declared: "*Riga "Approach" Air Baltic 97H Good afternoon .descending flight level 110 with the "Juliet*".
"

APP Controller instructed BTI97H: "*Air Baltic 97H Good day Riga "Approach" radar contact proceed direct "GUDIN" expect vectors descent flight level 60.*"
The crew of BTI97 H confirmed instruction.

At **13:11:10** the pilot of BTI97H declared: **"***Baltic 97H ready for short approach.***"**

At **13:11:15** the APP controller cleared BTI97H: "*Baltic 97H roger descent altitude 2500 feet*."

At **13:13:38** the APP controller cleared BTI97H "*Baltic 97H descent altitude 1500 feet*".

The crew of BTI97H confirmed "*Will descent altitude 1500 feet .Air Baltic 97H*."

From **13:14:05 till 13:14:24** TWR Controller communicated with APP Controller about coordination regarding training airplane Piper PA34 from "Spilve" for further terms of flight.

At **13:15:00** APP Controller gave clearance to BTI97H: "*Baltic 97H. 9 miles from touch down, to right heading 150 .cleared ILS approach runway 18, report established on localizer.*"

At **13:15:08** the pilot of BTI97H confirmed clearance: "*Right to 150 degrees and cleared ILS 18 and will report establish. Baltic 97H*"

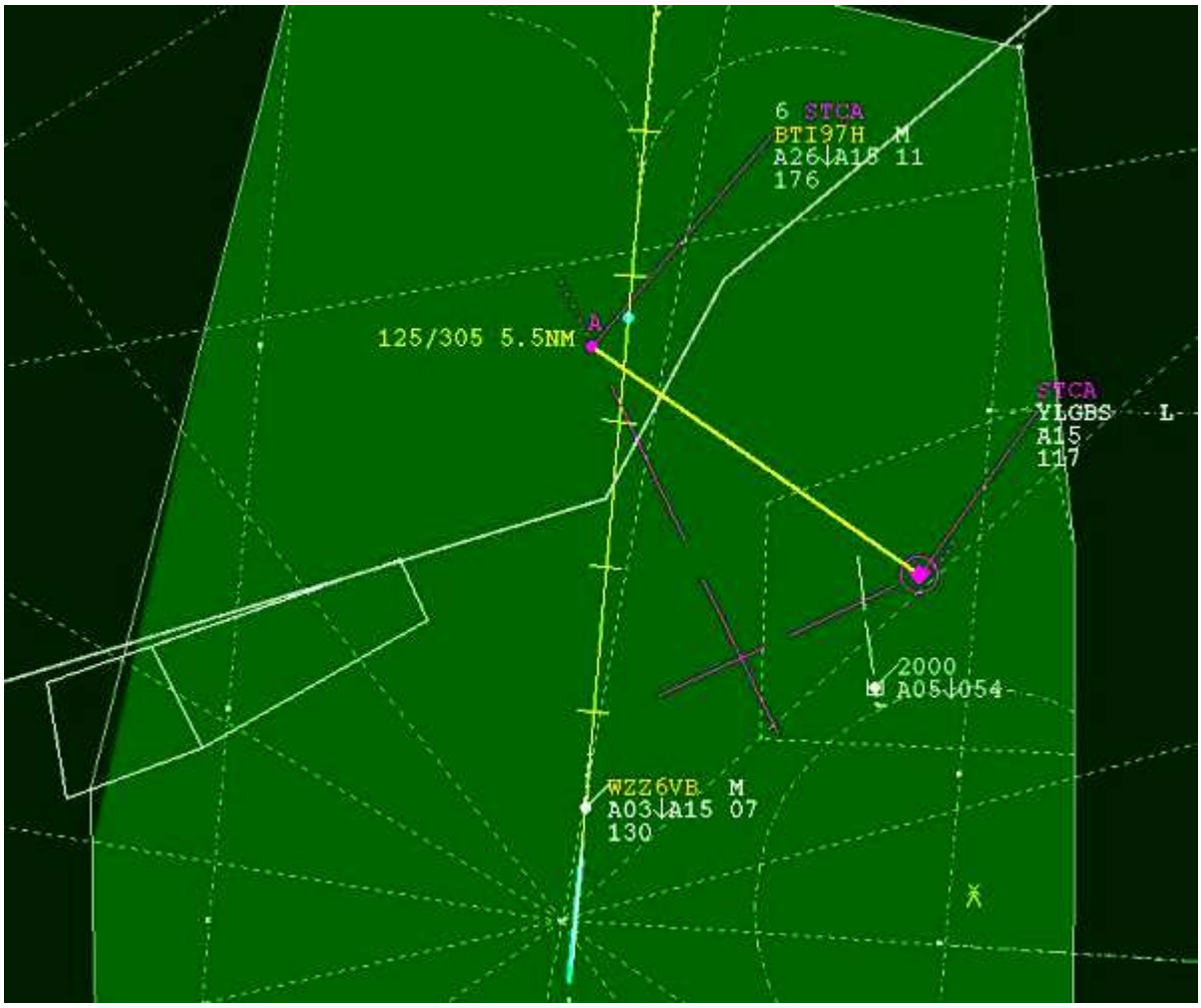
the pilot of BTI97H declared:" *Baltic 97H established localizer 18."*

At **13:16:08** the APP controller instructed BTI97H: "*Baltic 97H contact "Tower" 118,1*."

Since then BTI97H was transferred to Tower frequency 118.2 MHz thereby it was under Tower controller responsibility.

At **13:15:55 BTI-97H** with squawk 6645 descended to altitude **1500** feet and was crossing **2600** feet, with ground speed **176** knots on true track **154** degrees.

YLGBS with squawk 1615 was at altitude 1500 feet with ground speed 117 knots on true track 245 degrees.
Separation between traffic was 5.5NM, STCA signal about potential conflict was on.



At **13:16:04** STCA signal was "Off"

At **13:16:05** TWR Controller established contact with YL-GBS: "*Y-BS Tower*", the pilot of YL-GBS answered: "*Go ahead*"

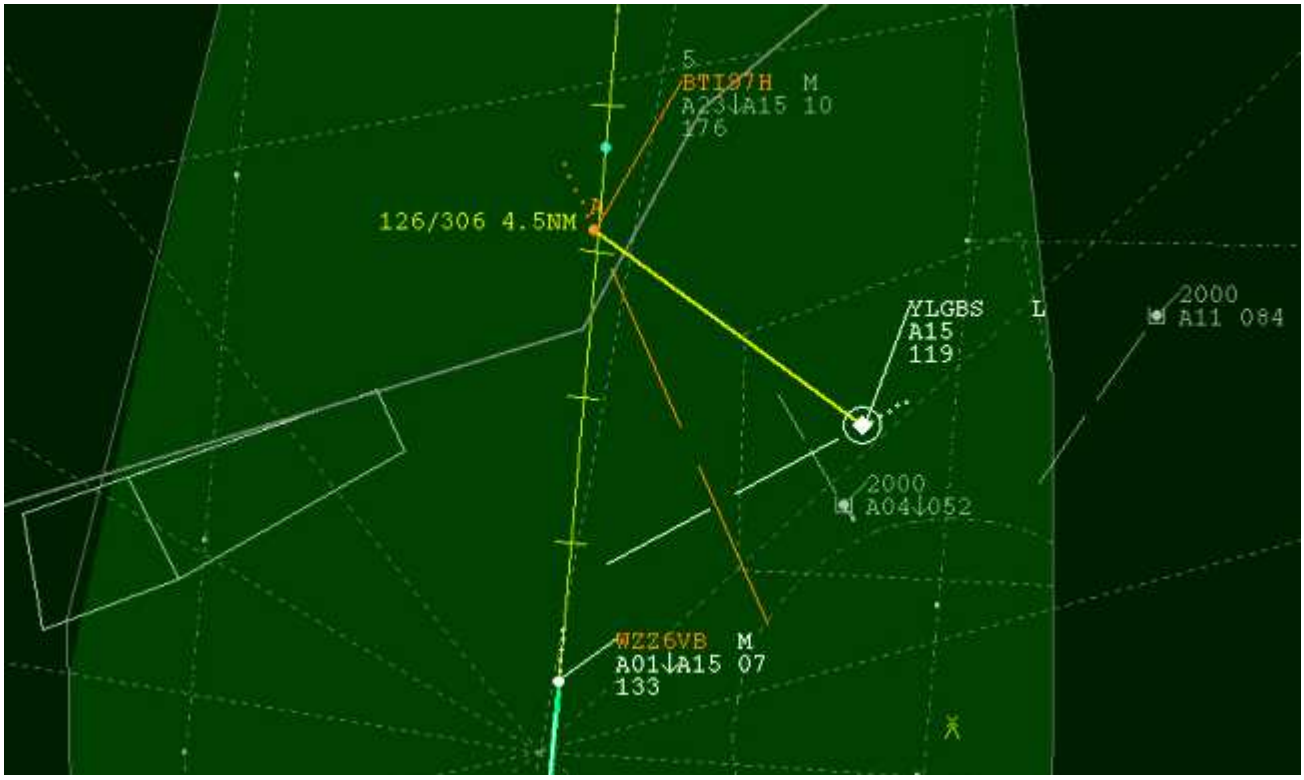
At **13:16:12** the Tower Controller instructed YL-GBS: "*Y-BS you are identified recommending heading 030 degrees, with a right turn and report your intentions.*"

At **13:16:23** the pilot of YL-GBS declared: "*Right heading 030 and ILS approach. Y-GBS.*"

BTI-97H descended to altitude 1500 feet was crossing 2300 feet with ground speed 176 knots on true track 156 degrees.

YLGBS was at altitude 1500 feet with ground speed 119knots on true track 242 degrees.

Separation between traffic was 4.5NM.



At **13:16:30** the pilot of BTI97H contacted TWR Controller and declared:"*Baltic-97H good afternoon establish 18.*"

At **13:16:35** the TWR Controller gave clearance to BTI97H: "*Baltic-97H Riga "Tower" good afternoon continue approach runway 18.*" The crew confirmed clearance.

BTI-97H descended to altitude 1500 feet was crossing 2000 feet with ground speed 174 knots on true track 182 degrees.

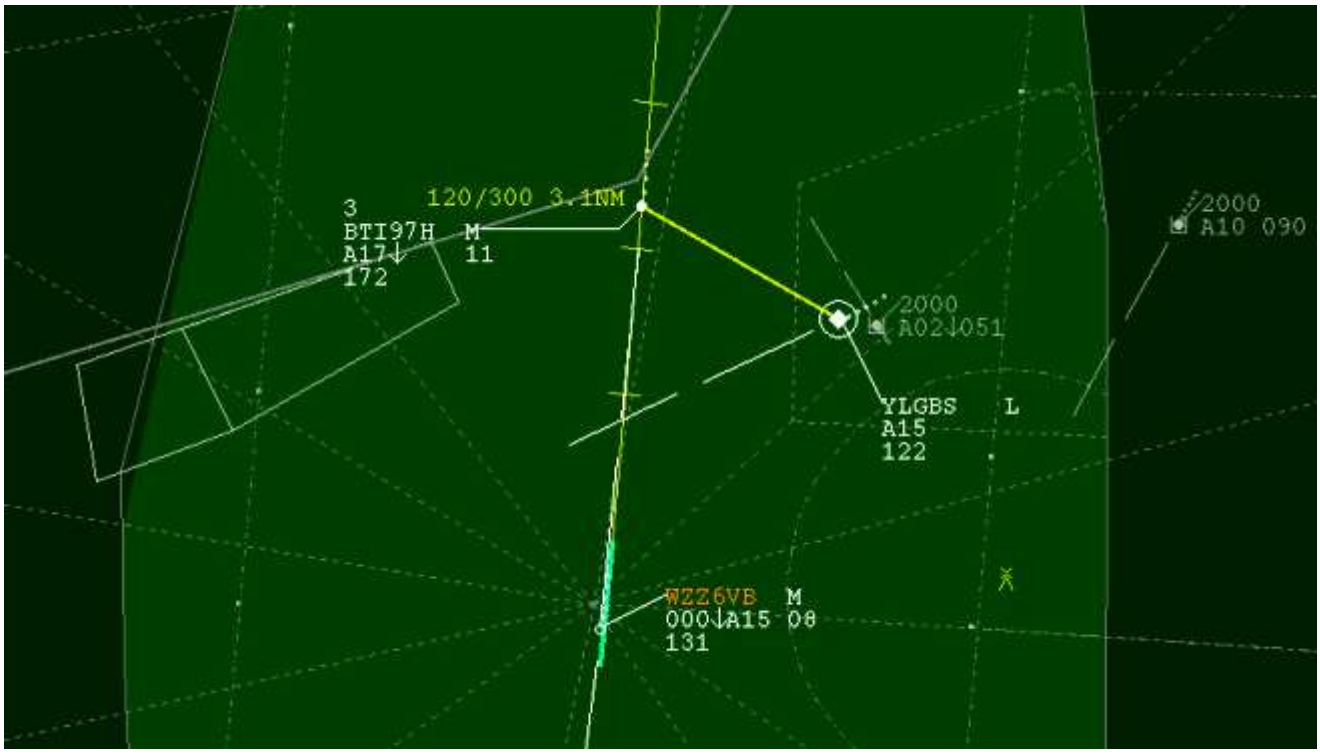
YLGBS was at altitude 1500 feet with ground speed 119knots on true track 240 degrees.

Separation between traffic was 3.9NM.

At **13:16:47** YL-GBS started to turn right. Distance between aircraft continued to reduce.

BTI-97H descended on final to RWY 18 was crossing 1700 feet with ground speed 172 knots on true track 186 degrees.
YLGBS was at altitude 1500 feet with ground speed 122knots on true track 245 degrees.

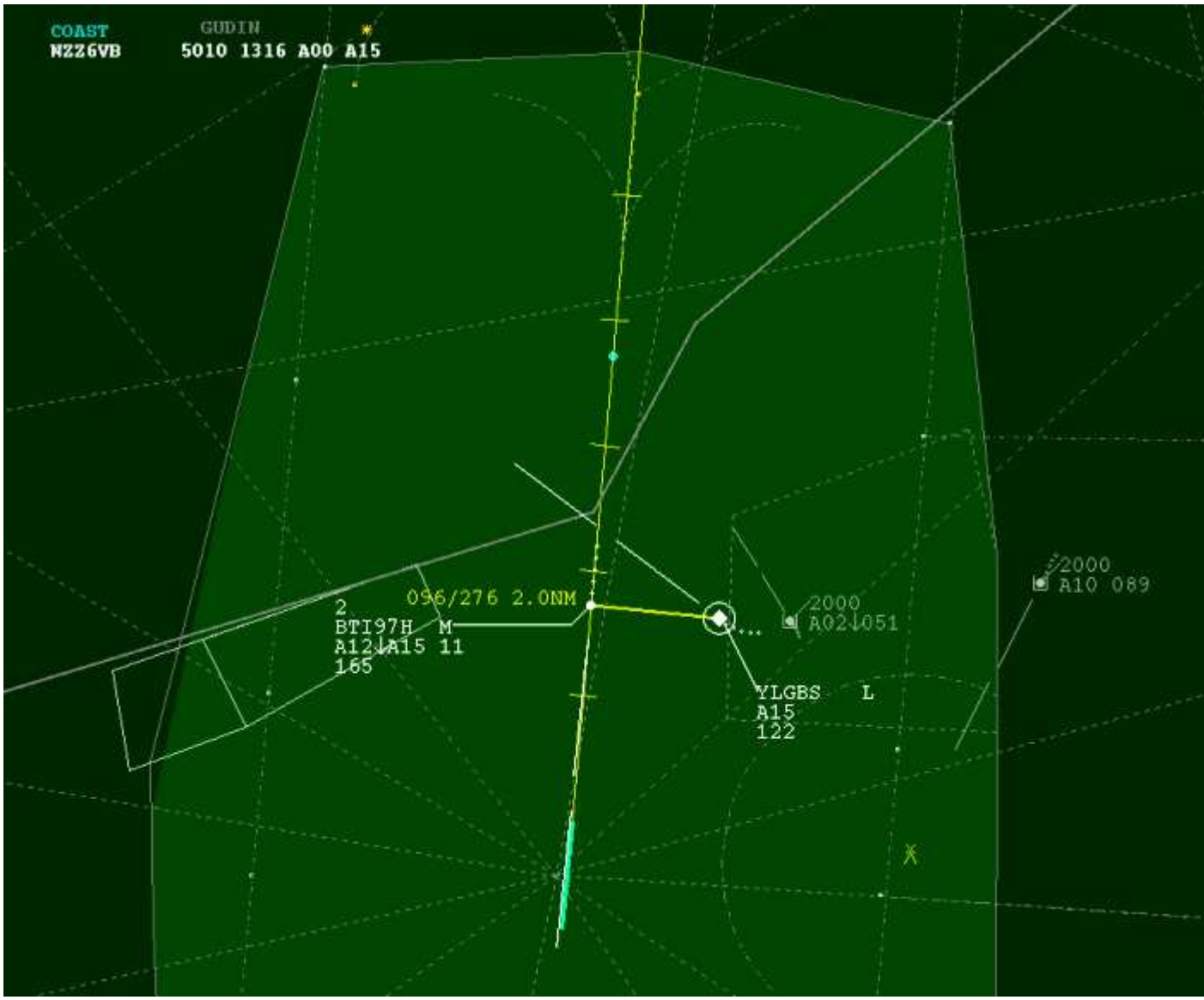
Separation between traffic was 3.1NM and aircraft tracks was crossing at the same altitude.



At **13:17:11** **BTI-97H** descended on final to RWY 18 was crossing **1200** feet with ground speed 165 knots on true track 186 degrees.

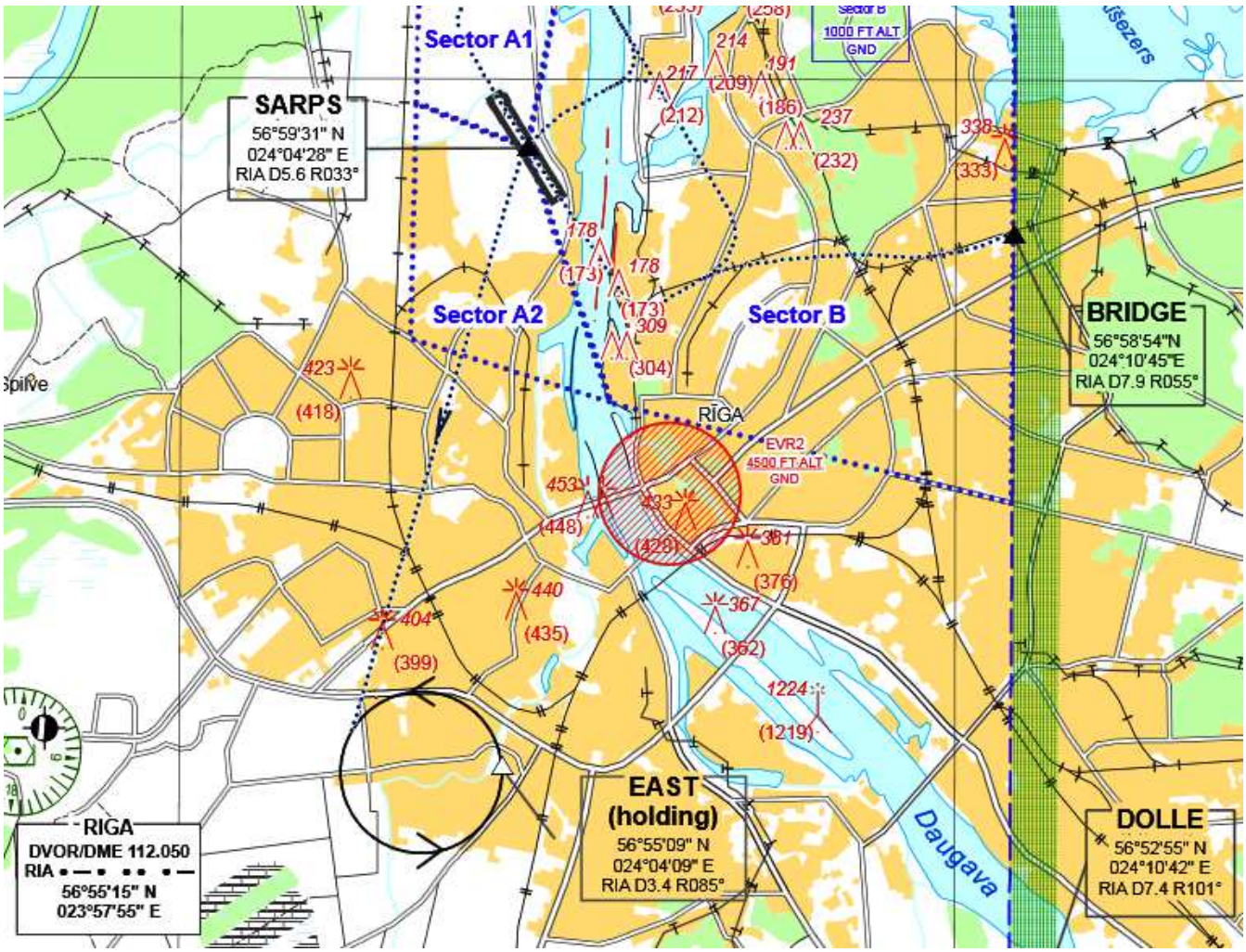
YLGBS was at altitude **1500** feet with ground speed 122 knots on true track 245 degrees.

Separation between traffic was 2 NM, vertical separation was 300Ft



According to radar data when aircraft YL-GBS executed his turn to the north, aircraft was proceeding opposite direction of arriving final aircraft BTI97H and lateral distance between final RWY 18 and aircraft YLGBS was **1.4 NM** at altitude 1500ft.

There was not provided established separation standards by ATC between VFR aircraft in CTR class C and was not provided arriving IFR aircraft with appropriate lateral and vertical separation from light crossing aircraft that entered from uncontrolled airfield Spilve (EVRS) via SARPS.



SPILVE (EVRS) ARRIVAL AND DEPARTURE ROUTE CHART

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, 27 years old
Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid);
Medical Certificate Class 3- valid.

1. 6. AIRCRAFT INFORMATION

Aircraft type – Boeing 735, owner of aircraft -„Air |Baltic";

Aircraft type – Piper P34L, private owner;

1.7. Meteorological information

Date & Time	Data
2014-10-11 11:20:20	EVRA ARR ATIS G 1120Z EXP ILS APCH RWY IN USE 18 RWY SFC DAMP BA GOOD TRL 50 WIND 200/7KT 170/ V 260/ VIS 9999 CLD SCT 1800FT. T 15 DP 12 QNH 1018 TREND NOSIG
2014-10-11 11:50:17	EVRA ARR ATIS H 1150Z EXP ILS APCH RWY IN USE 18 RWY SFC DAMP BA GOOD TRL 50 WIND 210/3KT 170/ V 260/ VIS 9999 CLD SCT 1800FT. T 15 DP 12 QNH 1018 TREND NOSIG
2014-10-11 12:20:17	EVRA ARR ATIS I 1220Z EXP ILS APCH RWY IN USE 18 RWY SFC DAMP BA GOOD TRL 50 WIND 190/4KT 170/ V 250/ VIS 9999 CLD SCT 1800FT. T 15 DP 12 QNH 1018 TREND NOSIG
2014-10-11 12:50:19	EVRA ARR ATIS J

	TREND NOSIG
2014-10-11 13:20:19	EVRA ARR ATIS K 1320Z EXP ILS APCH RWY IN USE 18 RWY SFC DAMP BA GOOD TRL 50 WIND 230/4KT 180/ V 280/ VIS 9999 CLD SCT 1800FT. T 16 DP 12 QNH 1018 TREND NOSIG
2014-10-11 13:50:18	EVRA ARR ATIS L 1350Z EXP ILS APCH RWY IN USE 18 RWY SFC DAMP BA GOOD TRL 50 WIND 300/3KT 270/ V 330/ VIS 9999 CLD SCT 1800FT. T 16 DP 12 QNH 1018 TREND NOSIG
2014-10-11 14:20:20	EVRA ARR ATIS M 1420Z EXP ILS APCH RWY IN USE 18 RWY SFC DAMP BA GOOD TRL 50 WIND 300/3KT VIS 9999 CLD SCT 1800FT. T 15 DP 12 QNH 1018 TREND NOSIG

	EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50 WIND 300/3KT VIS 9999 CLD SCT 1800FT. T 15 DP 12 QNH 1018 TREND NOSIG
2014-10-11 14:50:19	EVRA ARR ATIS O 1450Z EXP ILS APCH RWY IN USE 18 RWY SFC DRY BA GOOD TRL 50 WIND CALM CAVOK T 14 DP 12 QNH 1018 TREND NOSIG

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:

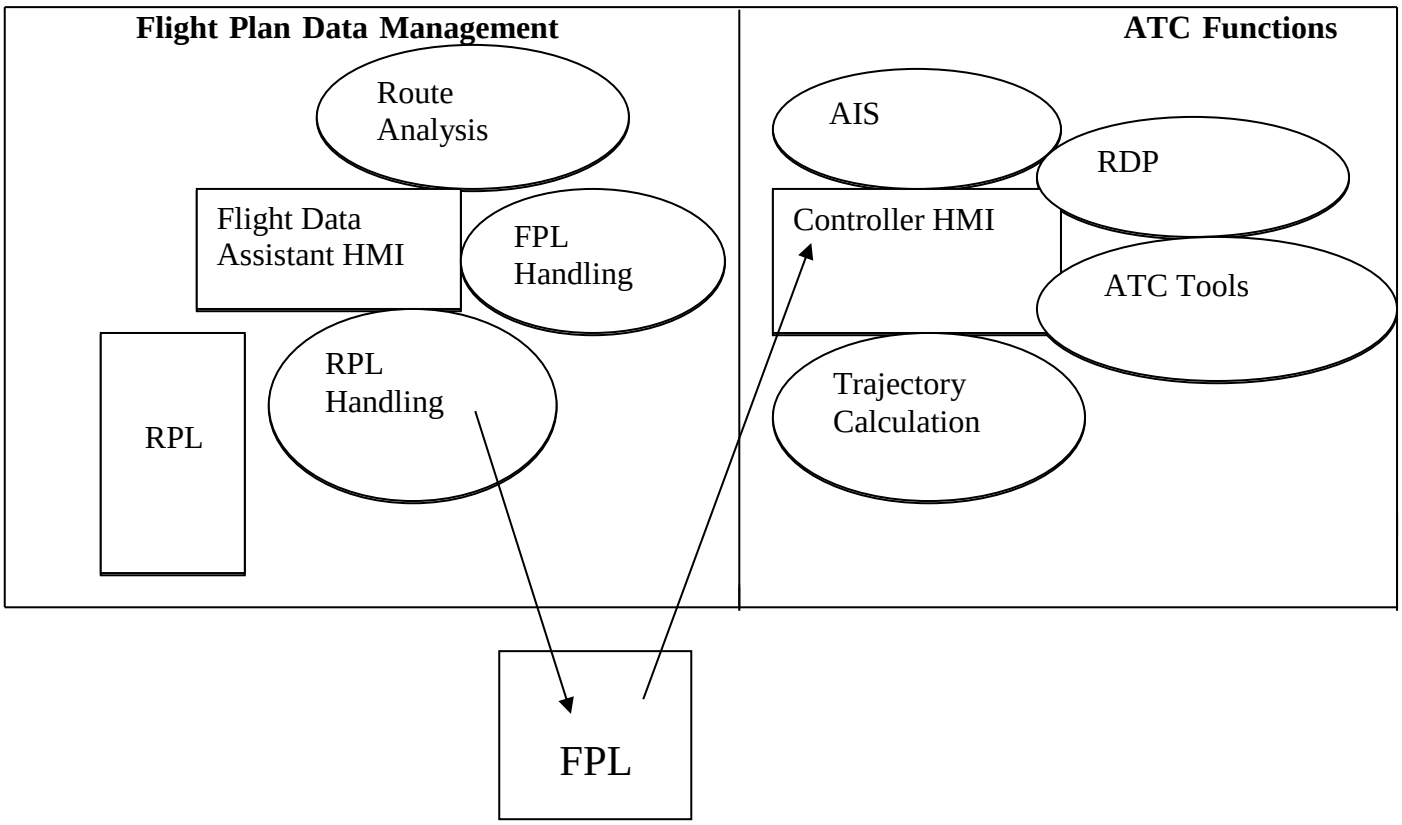
- a Primary System;
- a Radar Bypass System.

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



Picture 6

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

`Radio communications were recorded and made available as transcripts for evaluation purposes. The B735 crew was in radio communication with the APP Controller on frequency 129.925 MHz; the YL-GBS crew with the TWR controller on frequency 118.1 MHz

APP and TWR Controller's and crew members of Boeing B735 and Piper P34 used standard phraseology, it was mainly in compliance with the instructions given in ICAO ANNEX 10 and there were not principal errors in the used phraseology. Communication Transcript there was not essential inaccuracies in radio communications from all sides.

1.10. Aerodrome information

The airport had not any significance for the incident.

1.11. Flight recorders

The incident reconstruction was based on radar display information.

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

NIL

1.17. Organizational and management information

NIL

1.18. Additional information

Not applicable

1.19. Useful or effective investigation techniques

The incident has been investigated in accordance with Annex 13.

2. Investigation and Analysis

2.1. Introduction

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 B735 and Piper P34 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.

This chapter is subdivided into 4 main parts as indicated below:

Air traffic control procedures;
Air Traffic TWR Controller action aspects;
Human and organizational factors

2.2. Air traffic control procedures

2.2.1. VFR Flights from "SPILVE" ATZ

According to airport Riga Tower Controller operational manual DI-GSV/TWR-01/2 (***Item 3.13.3***) point SARPS is established to enter Riga CTR at ALT 1000Ft from SPILVE ATZ.

Normally when traffic operating in SPILVE ATZ should use Mode C transponder with squawk 2000.

VFR traffic should be instructed to within ATZ SPILVE when:

- there is landing traffic for RWY 18 and VFR traffic flying within ATZ SPILVE has not reported landing traffic in sight;

*Note: TWR Controller should take into account that **any point on ATZ boundary does not provide separation from IFR landing/departing traffic** and point SARPS cannot be used as holding pattern.*

2.2.2. AIP requirements for departure from Spilve AD to Riga CTR

There are 4 standard entry/exit points for Spilve ATZ from/to the surrounding airspace:

Entry/exit point	Visual reference	Coordinates	Surrounding airspace	Flight altitude
CLUB	Jaunciems Yacht Club Harbour	570231N 0241020E	G	1000 FT ALT
BRIDGE	0.5 NM East of the road bridge across the railway	565854N 0241045E	G	1000 FT ALT
SARPS	Located the RWY 14/32 centre (ARP)	565931N 0240428E	C (Riga CTR)	1000 FT ALT
RIVER (exit point only)	Confluence of the Daugava and Sarkandaugava rivers	570127N 0240519E	C (Riga CTR)	500 FT ALT

Departure procedures from Spilve AD to Riga CTR

- File FPL as per standard procedures.
- **Normally, point SARPS can be filed as a standard entry point from Spilve ATZ to Riga CTR;**
- Before lining up on the RWY the crew shall establish communication with Riga Tower (118.100 MHz) **in order to receive ATC clearance**.
- Before lining up on the RWY announce the departure and intentions on CTAF (123.950 MHz);
- Take-off, climb to 1000 FT ALT within the circuit;
- Once airborne, re-establish radio communication with Riga Tower (118.100 MHz).
- Leave circuit from downwind leg across the RWY 14/32 centre.

Depending on airspace load, the actual instructions from Riga Tower may differ from the procedures described above.

2.2.3. Separation between IFR and VFR a/c (with radar control)

Normally Tower controller shall provide separation between IFR and VFR a/c using VFR published holding patterns. Nevertheless Tower controller also can assign holding pattern for VFR a/c over any position on route between CTR entry points and VFR published holding patterns.

During VFR approach Tower controller shall:

- **inform VFR a/c about affecting IFR landing a/c**

- **instruct the pilot to report affecting IFR traffic on final in sight;**

- inform VFR a/c about number in sequence and if the pilot reported IFR traffic in sight Tower controller may instruct pilot to maintain own separation and sequence in traffic.

2.2.4. Training flights

Tower controller should not approve any training flights (low pass, touch and go) if the flight does not have appropriate FPL and permission from FMP controller.

Tower controller may issue approval, based on pilot request, for additional training flight execution for flight, which has appropriate FPL and there are no other planned flights for training purposes at Riga aerodrome.

VFR training flights (**1000ft- 1500ft**)

The separation minima may be reduced in the case of one aircraft following another, the flight crew of the succeeding aircraft reports that the preceding aircraft is in sight and own separation can be maintained.

Training flight can be directed to VFR holding pattern "West" or "East" for ATS purposes.

2.3. Air Traffic TWR Controller action aspects

The pilot of aircraft YLGBS, before departing from uncontrolled airfield SPILVE, established

communication with Riga Tower Controller and notified about departing at one o'clock according to submitted FPL.

Getting clearance may take time, the controller is responsible for other aircraft, and has to check the position and level of other aircraft in the airspace. That is why before entering CAS it is advisable that pilots must make request at least 10 minutes before entry time.

Aircraft must not enter controlled airspace until receiving clearance. It is not sufficient that pilot have informed the controller of his request, he must wait until a formal clearance is issued, so always have an alternative plan of action ready in case of refusal. If pilot cannot plan an alternative route avoiding CAS, pilot may need to turn back or land at a nearby aerodrome.

The TWR Controller issued squawk for YL-GBS, gave entry clearance into the controlled airspace right away without prior identification. Thereby after few minutes from entry clearance, YLGBS turned his transponder on correct squawk and was presented by radar.

The TWR controller issued clearance for entry via SARPS to climb an altitude of 1500ft without issuing landing traffic information (BTI97H) for RWY 18 and receiving confirmation from VFR traffic that IFR traffic in sight and ready to maintain own separation *(requirements paragraph "**VFR Flights from "SPILVE" ATZ**" of Riga Tower Controller operational manual DI-GSV/TWR-01/2).* TWR Controller did not issued instruction – *"Stand-by, I will call you"*.

The TWR Controller served arriving aircraft, communicated with APP for entry clearance for YL-GBS, despite that there was FPL with information about planned training and routing from ATZ SPILVE via SARPS to RIA for flight rule change and then training, and did not reacted when YLGBS (**VFR flight**) reached 1500 Ft in controlled airspace and his true track was 245°, which was crossing the track of arriving IFR flight on final BTI-97H. STCA was switched ON, informing about potential conflict.

When TWR Controller identified the VFR traffic YL-GBS according to identification procedure and recommended the right turn on heading 030° the information for VFR aircraft about IFR aircraft BTI97H on final was not given. Aircraft routings were crossing and lateral separation was still reducing.

When pilot of BTI-97H reported of establishing ILS and was transferred by APP Controller to Tower frequency the TWR Controller did not inform on final BTI97H about YL-GBS, which was conflicting. BTI-97H was cleared to continue approach for runway18. Aircraft tracks were crossing and separation continued to reduce to 3.9 NM.

After a minute YLGBS started to turn. Separation still reduced to 3.1NM and tracks still crossing at same altitude.

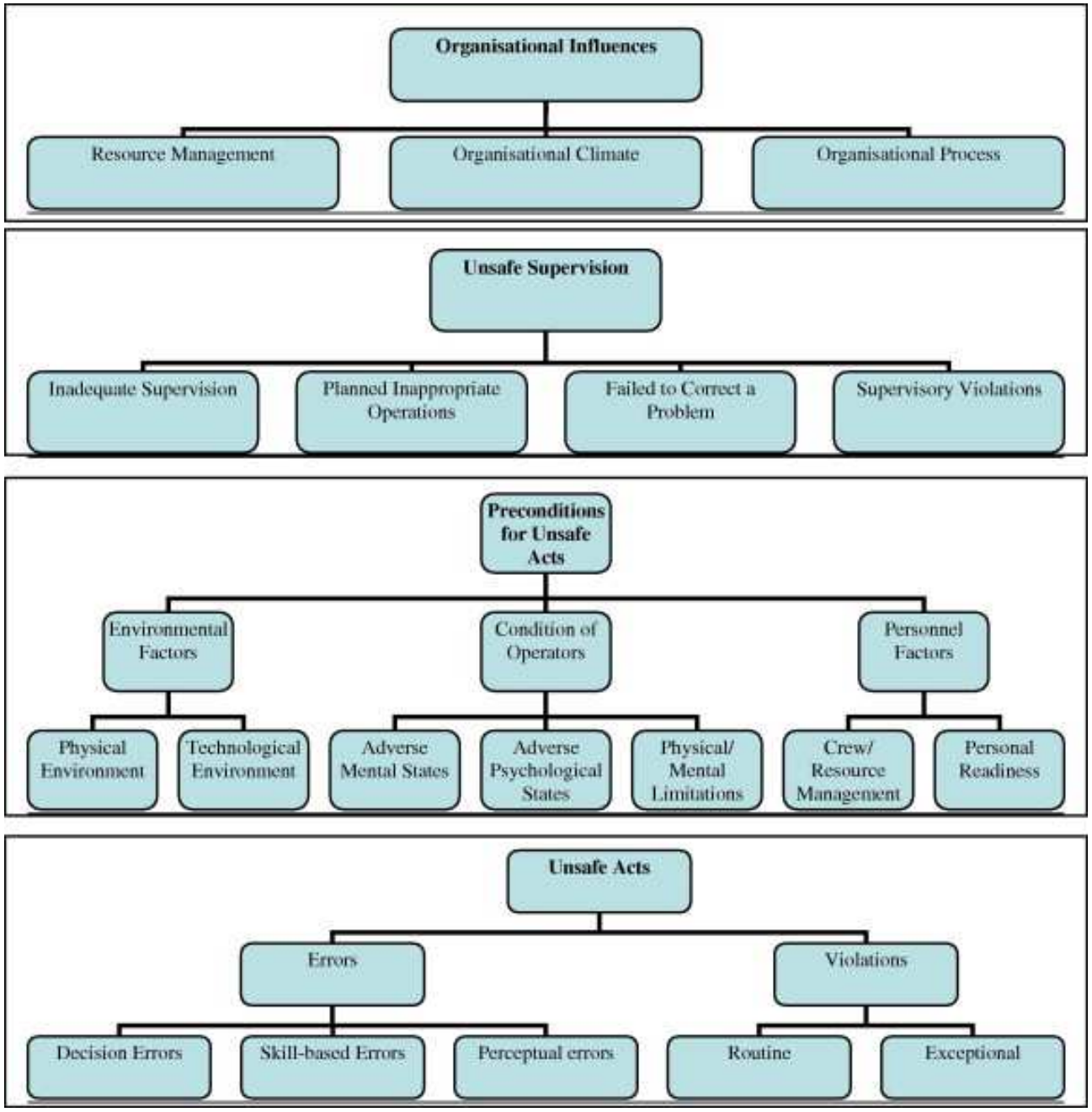
When arriving aircraft BTI-97H was on final and descended to altitude 1200 ft, YLGBS was at altitude 1500ft and still proceeding inbound final. Lateral separation reduced to minimum distance of **2NM** between IFR and VFR aircraft in class C. Necessary vertical separation 1000ft was not provided and was **300Ft.**

When YL-GBS executed turn to the north (according to radar transcript **true track was 353°**), aircraft practically was proceeding **opposite direction of arriving final BTI-97H** and lateral distance between final runway 18 and aircraft YLGBS was 1.4NM at altitude 1500ft.

Hence investigation may conclude that the TWR Controller was not controlling VFR aircraft in CTR (class C airspace) and was not providing arriving IFR aircraft with appropriate lateral and vertical separation from crossing aircraft that entered CTR via SARPS from SPILVE ATZ.

2.4. Human and organizational factors

Human and organizational factors provides of the human and organizational factors investigation with the overall investigation to clarify the circumstances that existed at the time of the occurrence which influenced the action of the individuals involved by asking what part the organization played in creating these conditions or allowing them exist, thereby increasing the likelihood of a incident.



The HFACS framework

2.4.1. Underlying Human Factors problems associated with incident

Today's ATC system is human centred: based on processing of a continuous stream of information, the controller issues clearances and instructions to prevent or resolve conflicts. However, the drive for consistency in cognitive information processing tasks leads to selective perception/exposure, selective attention and selective interpretation. As a result, conflicts and deviations from clearances or instructions leading to aircraft proximity can remain unnoticed.

For revealing causation of this incident investigation has tried to 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.** 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. For analysis investigation has considered that the classification system has following four levels, each of which influences the next level:

- 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.

2.4.2. 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

The TWR controller has ADI (Aerodrome Control Instrument) ratings with 3 year experience, thereby it is possible to consider that controller has competent knowledge and practical skills to provide safe ATC services.

2. Decision errors

In order to be able to process all available information, the controller must acquire situational awareness and build a mental model of the airspace and traffic pattern. To control the situation and make decisions, the controller has to establish a sector plan, which includes strategies and tactics to handle the traffic flows and conflicts.

Issued flight clearance to aircraft YL-GBS without prior identification was incorrect decision.

However, there was FPL that showed information about planned training and routing from ATZ SPILVE, SARPS to RIA for rule change and then training, the Tower controller decided to ask for entry clearance from APP controller. It was mentioned that deviation from FLP that was filed for the training aircraft was evaluated as more effective routing.

TWR Controller did not detect developing potential conflict, thereby did not carry out avoiding actions to provide safe separation between aircraft.

II. Violations

Investigation didn't reveal intent violations of instructions.

The TWR controller issued clearance for entry via SARPS to climb an altitude of 1500ft without issuing landing traffic information (BTI97H) to RWY 18 and receiving confirmation from VFR traffic that IFR traffic in sight and ready to maintain own separation *(it is to the contrary requirements of paragraph "**VFR Flights from "SPILVE" ATZ**" of Riga Tower Controller operational manual DI-GSV/TWR-01/2).*

The controller had not provided separation of 1000ft between IFR traffic on final and VFR traffic which was flying outside of published VFR holding patterns or published VFR crossing routes at CTR.

2.4.3. 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.

It was stated by ATC service provider internal investigation that due to traffic APP controller requested to provide lateral separation between VFR training flight with arrivals (final runway 18) before transfer of communication and control made disturbance to Tower controller, which all caused stress and further deviation from operational manual.

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 was not revealed poor coordination.

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.

2.4.4. 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 reveled any inappropriate supervision of operations.

2.4.5. 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;
- Organizational climate;
- Operational process.

Within the context of this incident investigation there were not found lack of human resources, budget resources, deficient planning, as well as were not found 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.

Investigation tried to scrutinize *Operational Process* of ATC service provider. This category refers to corporate decisions and rules that govern the everyday activities within an organization, including the establishment and use of **standardized operating procedures** and formal methods for maintaining checks and balances between the workforce and management. Such factors as operational tempo, time pressures, incentive systems, and work schedules are all factors that can adversely affect safety.

The investigation sought to clarify the circumstances why the controller's behavior was such as it was. Traffic situation was usual with several arrivals and departures, not overload. Light aircraft submitted FPL with intention to enter CTR, change flight rules and perform training. Analysing disposable information during investigation process and internal investigation results of ATC service provider it was stated:

- that there was deviation from FLP that was filed for the training aircraft and it was evaluated by TWR controller **as more effective routing** and such a way probably become as practice among Tower controllers;
- There was made change in CTR airspace configuration. The entry point to controlled airspace from ATZ SPILVE changed to SARPS. Distance for the official entry point is closer than it was via point PARKS. Without prior or additional simulator training for Tower controllers it was not clear about all problems and impact on traffic flow while non-standard situations;
- In the Riga Tower Controller operational manual DI-GSV/TWR-01/2) there are not clear instructions what to do in non-standard situations as well how to remedy the occurred situation;
- There shall be specified lateral radar separation between IFR<->IFR and IFR< >VFR flights for non-standard situations e.g. crossing **airspace outside published VFR routes/VFR holdings** and interaction with arrivals and departures in “Airport Riga TOWER Controller Operational Manual”;
- The airspace class of SPILVE ATZ shall be reviewed due to impact to RIGA CTR;
- It is necessary to improve ATCO training to get the experience and understanding of issuing vectoring instructions to VFR pilots when traffic situation dictate so e.g. deviation from a given clearance, non-standard situation with VFR;
- The TWR Controller had lack of experience with newly implemented airspace configuration and insufficient training in case if nonstandard situations occurred.

2.5. Severity Classification for Safety Occurrences in ATM

According to **ICAO Annex 13** occurrence is classified as **Serious Incident**: **"An incident involving circumstances indicating that an accident nearly occurred."**

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**- "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	Frequen**t**	Occasional	Rare	Extremely rare
FREQUENCY				

Table 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	Freq uent	Occasi onal	Rare	Extre mely rare
			Frequency				

Table3. Severity Classification Scheme of ATM specific occurrences according to the Severity of their Effect on the ability to provide Safe ATM Services

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

Table 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

- At the time of the incident the traffic was handled by Tower Controller;

- The crew of YL-GBS has submitted FPL that showed information about planned training and routing from ATZ SPILVE, via SARPS to RIA for rule change and then training;

- According to Note in the Riga Tower Controller operational manual DI-GSV/TWR-01/2). TWR Controller **should take into account that any point on ATZ boundary does not provide separation from IFR landing/departing traffic** and point SARPS cannot be used as holding pattern.

- There was deviation from FLP that was filed for the training aircraft and it was evaluated by TWR controller **as more effective routing;**

- There was made change in CTR airspace configuration. The entry point to controlled airspace from ATZ SPILVE was changed from PARKS to SARPS. Distance for the official entry point is closer than it was via point PARKS;

- Flight clearance to aircraft YL-GBS was issued without prior identification;

- Clearance for entry via SARPS to climb an altitude of 1500ft was given **without issuing landing traffic information (BTI97H) to RWY 18 and receiving confirmation from VFR traffic that IFR traffic in sight a**nd ready to maintain own separation *(it was to the contrary requirements of paragraph "**VFR Flights from "SPILVE" ATZ**" of Riga Tower Controller operational manual DI-GSV/TWR-01/2);*

- When YL-GBS executed turn to the north (according to radar transcript **true track was 353°**), aircraft practically was proceeding **opposite direction of arriving on final BTI-97H**
- Separation of 1000ft between IFR traffic on final and VFR traffic which was flying outside of published VFR holding patterns or published VFR crossing routes at CTR had not provided;

- There are not included in the Riga Tower Controller operational manual DI-GSV/TWR-01/2 clear instructions what to do in non-standard situations, as well how to remedy the situation developed;

- The TWR Controller had lack of experience with newly implemented airspace configuration and insufficient training in case if nonstandard situations developed;

- Situation **that any point on ATZ boundary does not provide separation from IFR landing/departing traffic** is associated with high risk for safety;

- In order to maintain an overview arriving traffic, the Air Traffic Control radar system ATRACC+ was in use;

- The runway in service was RWY 18;

- Radio communications on the TWR frequency 118.1 MHz between the pilots of BTI97H, Piper 34L and the TWR controller took place in English, communication between APP Controller and TWR Controller in Russian ;

- At the time of incident the workload of the controller was not high;

- The TWR controller held valid license and ratings and was qualified and current at the position;

- The minimum of horizontal separation between aircraft was 1.4 NM;

- According to EUROCONTROL ESARR 2 this incident is classified as Significant Incident;

- According to EUROCONTROL ESARR 2 Severity Classification table this incident is classified as **C3;**

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

- At the time of incident Visual Meteorological Conditions (VMC) prevailed

3.2. Causes

3.2.1. Proximate Cause

The Controller did not reacted when YLGBS (VFR flight) reached 1500ft in controlled airspace and his true track was 245°, which was crossing the track of arriving IFR flight on final aircraft BTI-97H.

3.2.2. Root Cause

The source or origin of an event that played the major role that caused this incident - infringement the separation minima between an aircraft B735 in the final approach phase and Piper 34L after entering from Spilve ATZ in CTR, was nonperformance of actions by responsible traffic control personnel that lead to infringement of separation standards due to an inadequate evaluation of traffic situation.

3.2.3. Contributing causes

Lack of clear instructions in the Controller's operational manual DI-GSV/TWR-01/2) what to do in non-standard situations with VFR aircraft as well how to remedy the developed nonstandard situation;

Recent made changes in CTR airspace configuration.

Existing airspace configuration, that any point on ATZ boundary does not provide separation from IFR landing/departing traffic.

Lack of practical personnel training after newly implemented airspace configuration and in case if nonstandard situations developed with VFR aircraft;

3.2.3. Primary cause

The event after which incident became inevitable.

Conviction of the Controller that situation developed normal, due to a failure to correctly perceive the situation which includes strategies and tactics to handle the traffic flows and conflicts, having an accurate understanding what is likely to happen in the near future.

3. Safety Recommendations

Recommendation – LV 2015-006

It is recommended to the authority responsible for air navigation services in the Latvian airspace VAS Latvijas Gaisa Satiksme (LGS) to perform Controller's practical training for understanding of issuing vectoring instructions to VFR pilots and the ability to handle VFR flights to/from ATZ SPILVE in different scenarios like deviation from a given clearance and non-standard situations with VFR flights.

Recommendation – LV 2015-007

It is recommended to the authority responsible for air navigation services in the Latvian airspace VAS Latvijas Gaisa Satiksme (LGS) to check Controller's skills to handle VFR flights to/from ATZ SPILVE.

Recommendation – LV 2015-008

It is recommended to the Civil Aviation Authority, State Agency "Civil Aviation Agency" responsible for supervision of the use of the airspace of the Republic of Latvia and civil aviation

operations to perform inspection Riga Tower Controller operational manual DI-GSV/TWR-01/2 of ATS provider “Latvijas Gaisa Satiksme”.

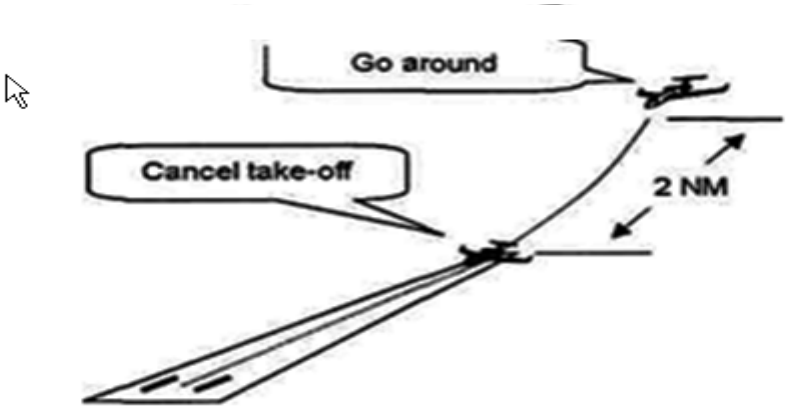
Recommendation – LV 2015-009

It is recommended to the Civil Aviation **Authority, State Agency “Civil Aviation Agency” responsible for** supervision of the use of the airspace of the Republic of Latvia and civil aviation operations to consider usefulness to change airspace configuration which will not affect landing or departing traffic at Riga International airport. To ensure flight safety this point should be more oriented to handle traffic from/to ATZ SPILVE due to huge impact on RIGA CTR.

Riga July 9, 2015

Investigator in charge Visvaldis Trūbs

Director of Transport Accident and
Incident Investigation Bureau Ivars Alfreds Gaveika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