Transporta nelaimes gadījumu un incidentu izmeklēšanas birojs

Transport Accident and Incident Investigation Bureau of the Republic of Latvia

Brīvības iela 58, Rīga, LV-1011, Latvia, phone +371 67288140, mob. phone +371 26520082, fax +371 67283339,
e-mail taiib@taiib.gov.lv, www.taiib.gov.lv

FINAL REPORT No.4-02/7-14(6-2015)

ON THE AIRCRAFT SERIOUS INCIDENT

LOSS OF SEPARATION BETWEEN THE AIRCRAFT Bombardier DH8D, flight BTI34H and ATR-72-500, flight FCM-72TX, ON November 15, 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.

Address:
58 Brivibas Str., Riga
LV-1011, Latvia
Phone. 67288140, Fax. 67283339,

E-mail: taiib@taiib.gov.lv

Director of Transport Accident and
Incident Investigation Bureau — Ivars Alfreds Gaveika

FINAL REPORT No.4-02/7-14(6-2015)

OF THE AIRCRAFT SERIOUS INCIDENT

LOSS OF SEPARATION BETWEEN THE AIRCRAFT Bombardier DH8D, flight BTI34H and ATR-72-500, flight FCM-72TX, ON November 15, 2014

TABLE OF CONTENTS

Synopsis.....

General information.....

Investigation.....

1. FACTUAL INFORMATION.....

1.1. History of the flight……...
1.2. Injuries to persons……....
1.3. Damage to aircraft……....
1.4. Other damage…….....
1.5. Personnel Information……..
1.6. Aircraft information……
1.7. Meteorological information…….
1.8. Aids to Navigation……...
1.9. Communications…….....
1.10. Aerodrome information…….
1.11. Flight recorders…….....
1.12. Wreckage and impact information…….
1.13. Medical and pathological information……
1.14. Fire…….....
1.15. Survival aspects…….....
1.16. Tests and research……...
1.17. Organizational and management information…….
1.18. Additional information……
1.19. Useful or effective investigation techniques……...

2. Analysis……

3. Conclusions……

4. Safety Recommendations……...

Appendices:

1. Radiotelephony records, 15.11.2014, Riga APP 129,925 MHz -2pages
2. Radiotelephony records, 15.11.2014, Riga TWR 118.1 MHz -2pages
3. Air Traffic Controller (OJTI) Report
4. Copy of Air Traffic Controller Rating Certificate to Air Traffic Controller Licence
5. Copy of Air Traffic Controller Licence
6. Medical Certificate class 3
7. Air Traffic Controller's time-table for November, 2014
8. Flight plans
9. ATS Provider "Latvijas Gaisa Satiksme" internal Safety Occurrence Investigation Final Report No149-14.
10. ATS occurrence Reporting Form.
11. Controller student On-the-Job training Log Book.

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
OJTI- On Job Training Instructor
ANSP-Air Navigation Service Provider

Synopsis

Unless stated otherwise the time in this Report is UTC
On Saturday, November 15, 2014 according to submitted FPLs Finnair aircraft ATR72-500M, flight FCM-72TXwas on scheduled flight from Riga International airport (**EVRA**) to Helsinki-Vantaa Airport (**EFHK**).

FF EVRAZPZX EVRRZDZX EVRRZQZX
150127 EUCHZMFP
(FPL-FCM72TX-IS
-AT75/M-SDE2E3FGRY/S
-EVRA1150
-N0270F190 SOKVA M857 INTOR
-EFHK0103EFTP
-PBN/B2B3B4D2D3S1 DOF/141115 REG/OHATP EET/EETT0020 EFIN0047 RVR/300 OPR/FCM ORGN/SJYOWFC PER/C)

FF EVRAYDYD EVRAZPZX EVRRZDZX

EVRRZQZX 151206 EUCHZMFP

(DEP-FCM72TX-**EVRA1206-EFHK**-DOF/141115)

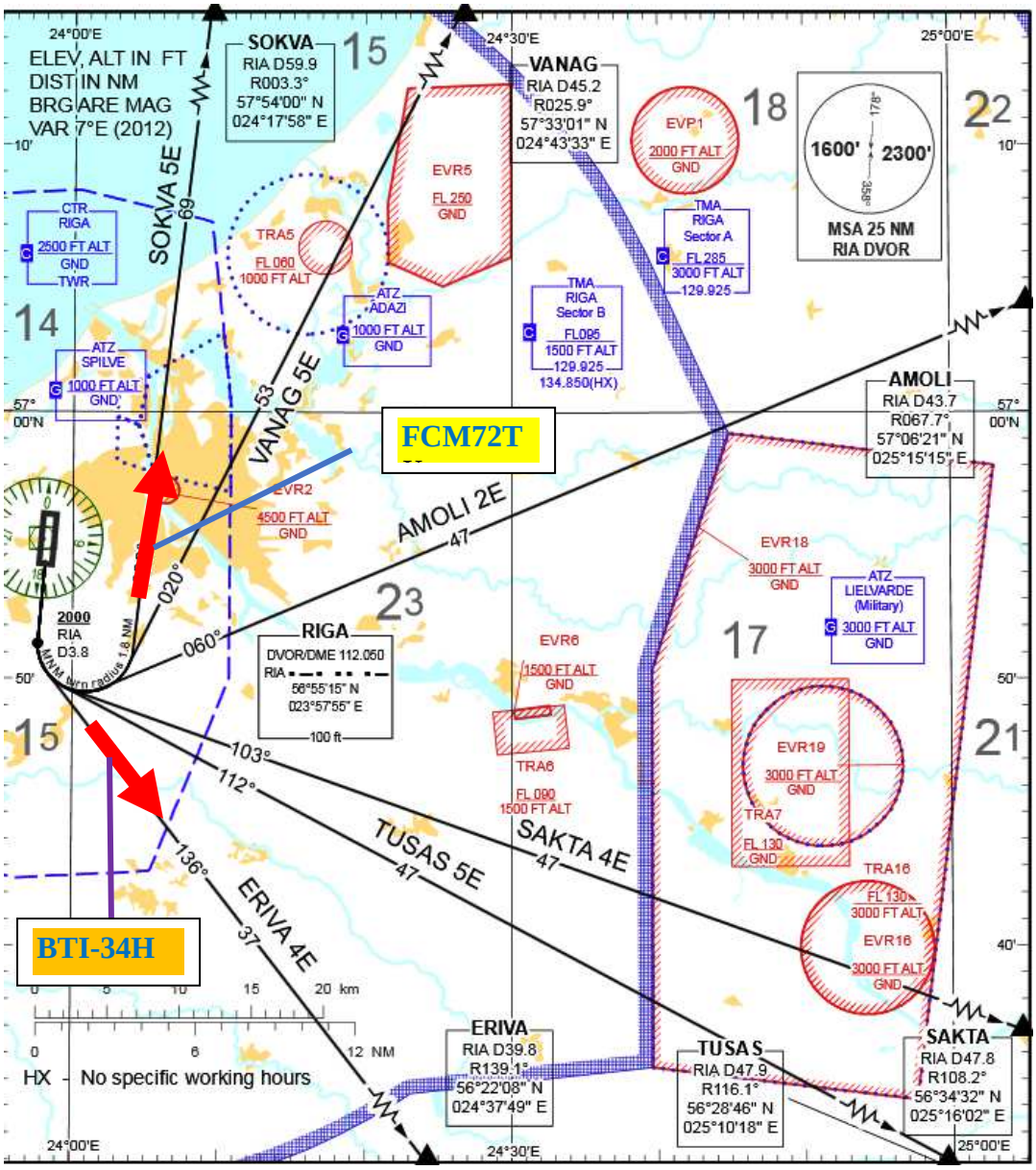
Air Baltic aircraft DH8D, flight BTI-34H was on scheduled flight from Riga International airport (**EVRA**) to– Vilnius International Airport (**EYVI**).

FF EVRAZPZX EVRRZDZX EVRRZQZX
150201 EUCHZMFP
(FPL-BTI34H-IS
-DH8D/M-SADGLORY/S
-EVRA1200
-N0317F170 ERIVA N994 MURUN
-EYVI0027 EYKA
-PBN/B2B3B4D2D3 NAV/ABAS DOF/141115 REG/YLBAY EET/EYVL0014 CODE/502C7E RVR/300 OPR/BTI ORGN/EVRABTIO RMK/PHONE CTC: 0037167788426)

FF EVRAYDYD EVRAZPZX EVRRZDZX EVRRZQZX
151208 EUCHZMFP (**DEP-BTI34H-EVRA1208-EYVI** DOF/141115)

The FCM72TX departed from RWY18 Riga International airport (EVRA) on SID “SOKVA 5E”

The BTI34H departed from RWY18 on SID “ERIVA4E”.



At 11:30:21 UTC Approach-Executive "AE" controller was on duty along with Controller-student. Direct air traffic control performed Controller-student.

FCM72TX departed from RWY18 on SID SOKVA 5E. Altitude 300FT by climbing 4000FT with rate of climb 800FT/MIN on true track 184 degrees and received a clearance to climb to FL190.

BTI-34H departed from the same RWY18 on SID “ERIVA 4E”. Altitude 100FT by climbing 4000FT on true track 187 degrees and was cleared to climb to FL170.

Initially after departure FCM72TX has high rate of climb but later climb rate decreased as a result distance between aircraft decreased and STCA signal triggered warning about potential conflict situation. APP Controller (AE) (as Instructor) tried to correct potential conflict and stopped climb BTI34H to altitude 4000 feet, but due to late intervention and high rate of climb BTI34H stopped only at altitude 4400 feet. Notwithstanding that the SID`s for traffic were on different directions, during the turn to the north of preceding AT-75 the longitudinal separation

decreased to less than 3NM and infringement of separation standards occurred. Horizontal distance between aircraft during conflict was **2.7 NM**, vertical **800FT**.

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 Monday, November 17, 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

At **12:05:42** Riga TWR Controller on frequency 118.1 MHz gave clearance to FCM72TX: **"**Fin Com-72TX "Tower" wind 110 degrees 12 knots runway 18 cleared for take-off. When airborne contact "Approach" 129,925.Good bye."

At **12:05:54** the crew of FCM72TX approved clearance: "Cleared for take-off runway18, then airborne radar 129,925. Fin Com-72TX bye, bye."

At **12:06:27** the crew of BTI-34H contacted Riga TWR Controller on frequency 118.1 MHz: "Riga "Tower" good afternoon Air Baltic-34H approaching "Echo" 18 we are fully ready."

At **12:06:32** the Riga TWR Controller answered: "Good day Baltic-34H "Tower" line runway 18 and wait." The crew approved clearance.

At **12:07:15** the crew of FCM72TX contacted Riga APP Controller on frequency 129.925 MHz and declared: "Riga "Approach" Fin Com-72TX 1300 "SOKVA-5 Echo"

At **12:07:22** the Riga APP Controller ***(Controller-student)*** gave clearance for FCM72TX: "Fin Com-72TX Good day Riga "Approach" radar contact **climb flight level 190**."

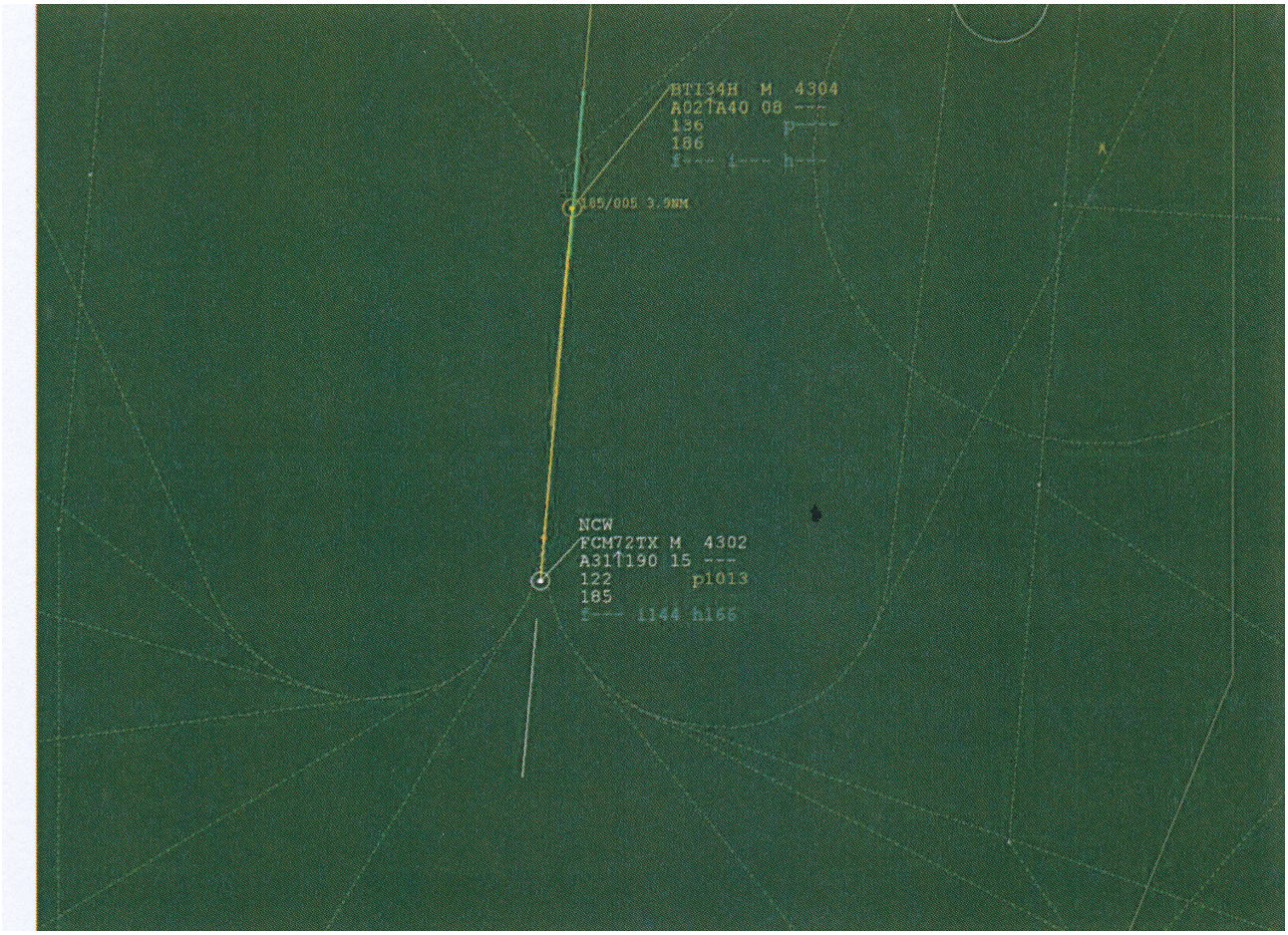
At **12:07:29** the crew of FCM72TX approved clearance:"Climb flight level 190. Fin Com-72TX."

At **12:07:47** the Riga TWR Controller cleared BTI-34H: "Baltic-34H "Tower" wind 100 degrees 12 knots runway 18 cleared for take-off. When airborne contact "Approach" 129,925.Good bye."

At **12:07:53** according to radar data FCM72TX was at altitude 2000FT by climbing FL-190, with rate of climb **1500FT/MIN**. ground speed 125KT on true track 186 degrees.

At **12:08:29** FCM72TX was at altitude 2900FT by climbing FL-190,with rate of climb 1500FT/MIN. ground speed 123KT on true track 187 degrees.

BTI-34H departed from RWY18 on "ERIVA 4E" departure. Altitude 100FT by climbing 4000FT, ground speed 126KT on true track 187 degrees. Distance between traffic 4NM.



Traffic situation at 12:08:36 UTC

At **12:08:48** FCM72TX started left turn to "SOKVA".

At **12:09:07** the crew of BTI-34H contacted Riga APP Controller and declared: **"**Riga "Approach" good afternoon Air Baltic-34H.**"** First radio contact at **1900 ft**.

FCM72TX was at altitude 3900FT by climbing FL-190 turning left, with rate of climb 1500FT/MIN. Ground speed 117KT on true track 135 degrees.

BTI-34H was at altitude 1700FT by climbing FL-170, ground speed 140KT on true track 185 degrees. Distance between traffic 3.6NM.

At **12:09:13** the Riga APP Controller ***(Controller-student)*** cleared BTI-34H: "Air Baltic-34H good day Riga "Approach" radar contact climb flight level 170."

At **12:09:19** FCM72TX was at altitude 4100FT by climbing FL-190 turning left, with rate of climb 1500FT/MIN. ground speed 116KT on true track 124 degrees.

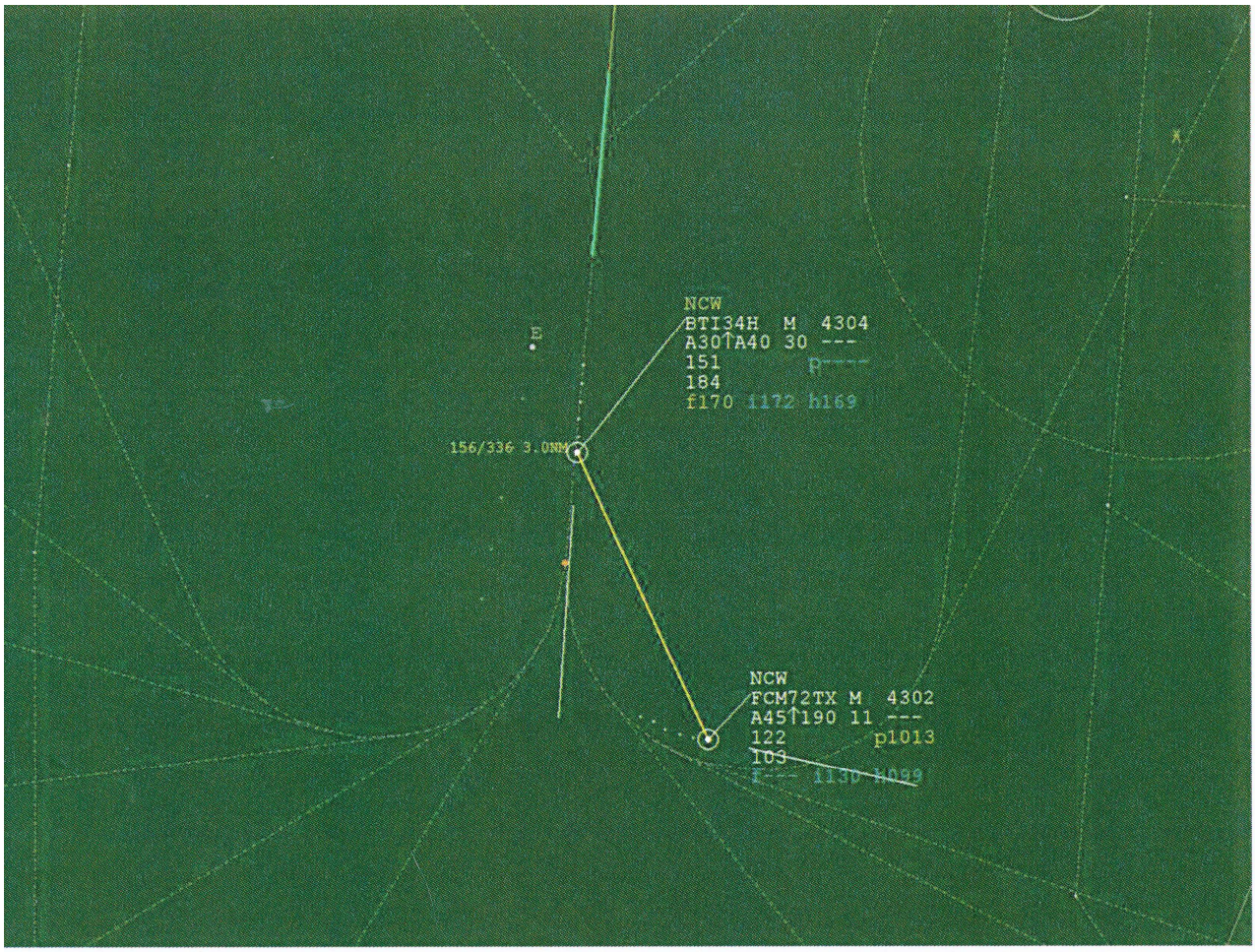
BTI-34H was at altitude 1900FT by climbing FL-170, ground speed 156KT on true track 184 degrees. Distance between traffic 3.4NM.

At **12:09:21** the crew of BTI-34H contacted Riga APP Controller: "Climbing level 170. Air Baltic-34H.And any chance direct to "KEKBI"?"

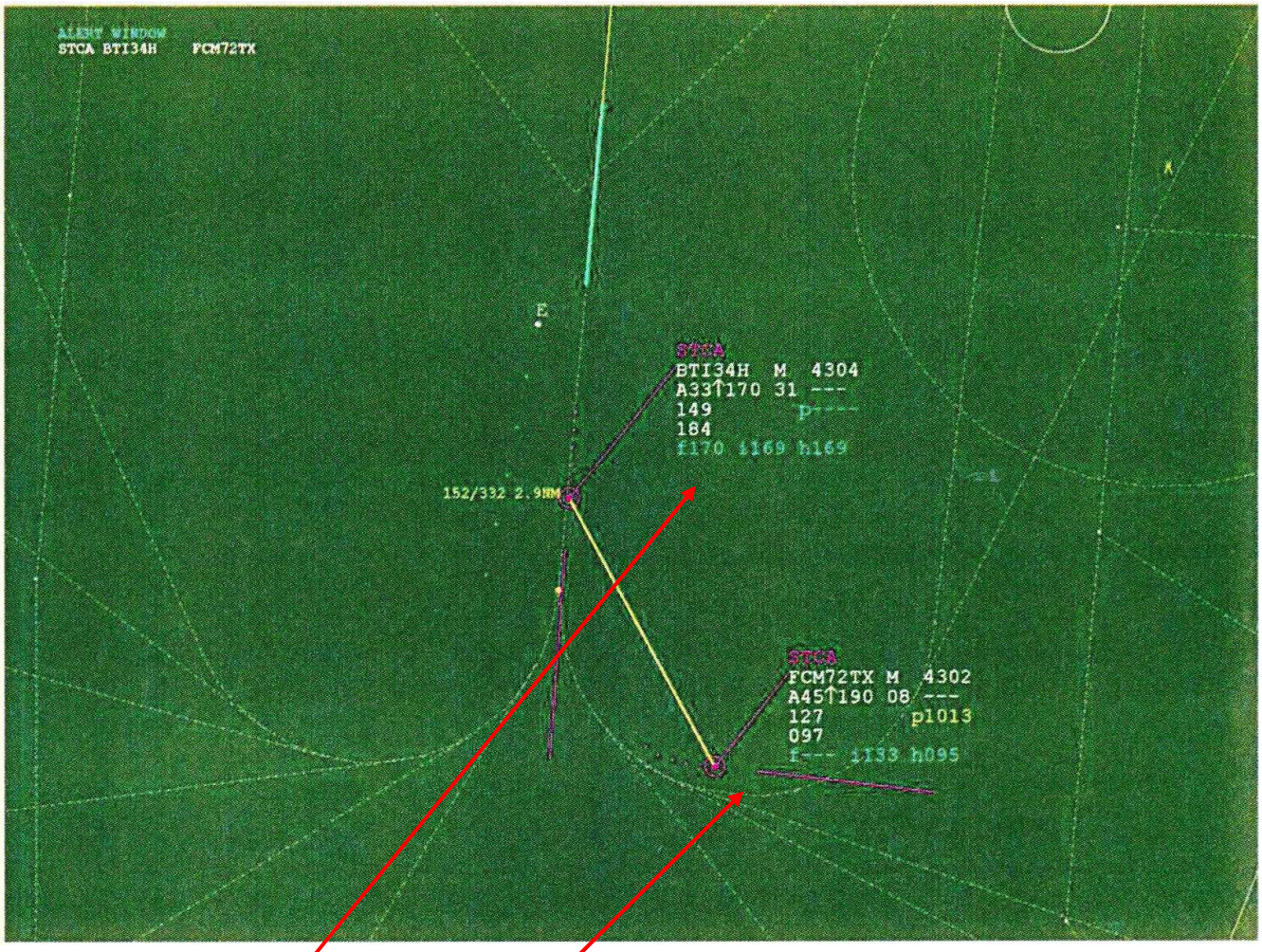
The Riga APP Controller ***(Controller-student) i***nstructed BTI-34H: "Air Baltic-34H stand by."

After that APP Controller ***(Controller-student)*** contacted Vilnius ATCC Controller: "A 34H просит "KEKBI"?"

Vilnius ATCC Controller answered: "Давайте."



Traffic situation at 12:09:36 UTC



Traffic situation at 12:09:42 UTC

According to radar data at **12:09:42** UTC STCA signal triggered warning about potentially dangerous situation. **FCM72TX** was at altitude **4500FT** climbing to flight level **190** with climb rate **800 FT/min.**

BTI-34H was at altitude **3300FT** climbing to flight level **170** with climb rate **3100 FT/min.** Horizontal distance between aircraft was **2.9NM,** vertical interval **1200FT.**

At 12:09:50 the APP Controller instructed BTI34H to stop climbing to 4000FT.

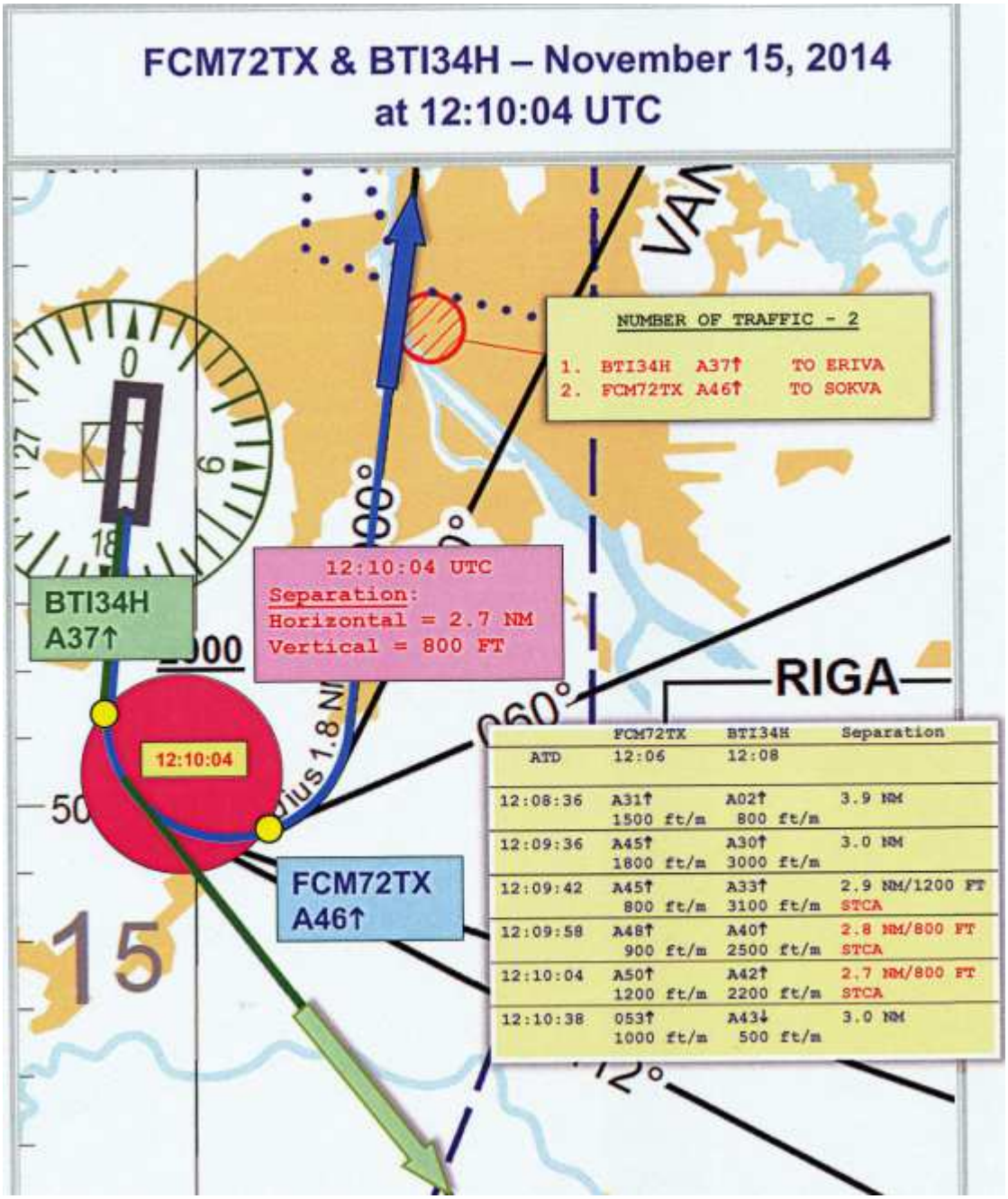
FCM72TX was at altitude 4600FT by climbing FL-190 turning left, with rate of climb 700FT/MIN. Ground speed 134KT on true track 092 degrees. Distance between traffic **2.8NM**. BTI-34H due to high rate of climb crossed FL4000FT and aborted climbing at FL 4300FT.

Traffic situation at 12:09:58 UTC

At **12:10:09** FCM72TX was at altitude **5100FT** by climbing FL-190 turning left, with rate of climb 1400FT/MIN. Ground speed 144KT on true track 056 degrees.

BTI-34H was at altitude **4400FT**, ground speed 156KT on true track 184 degrees.
Distance between traffic **2.7NM.** Vertical interval between aircraft was **700FT.**

On time of incident there were 2 aircraft in the AoR of Riga ACC APP Controller.



After short time conflict APP Controller at **12:11:21** issued clearance to BTI-34H: “Air Baltic-34H climb flight level 170 direct “KEKBI”. The crew of BTI34H confirmed clearance.”

1.2. Injuries to persons

NIL

1.3. Damage to aircraft

NIL

1.4. Other damage

NIL

1.5. Personnel information

Air traffic controller:

Male, 32 years old.
Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid); OJTI initial Acquisition since November 14, 2008
Medical Certificate Class 3- valid.

Air traffic controller student:

Male, 26 years old
Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid. Ratings ACS/RAD (Area Control Surveillance/Radar) valid untill12.05.2015.
Medical Certificate Class 3- valid.

1. 6. AIRCRAFT INFORMATION

Aircraft type – Bombardier Dash-8-400, owner of aircraft -„Air |Baltic";

Aircraft type – ATR-72-500M;

1.7. METEOROLIGICAL INFORMATION |

Riga International Airport (EVRA)

WIND	Visibility	Clouds	Temperature	QNH (QFE)
10:20UTC				
120/10KT	10km	OVC 2900FT	T 6°C	1026hPA
10:50UTC				
100/13KT	10km	OVC 3300FT	T 6°C	1025hPA
11:20UTC				
100/10KT	10km	OVC 3300FT	T 6°C	1025hPA
11:50UTC				
100/11KT	10km	OVC 2800FT	T 6°C	1025hPA

TAF EVRA 150800Z 1509/1609 10007KT 9000 BKN030 TEMPO 1521/1606 BKNOIO OVC025=
SIGMETEVRRNIL

1.8. Aids to Navigation

DVOR/DME (RIA), ATRACC+ (RADAR), SSCHMID Telecom Communication module (Voice Communication System)

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:

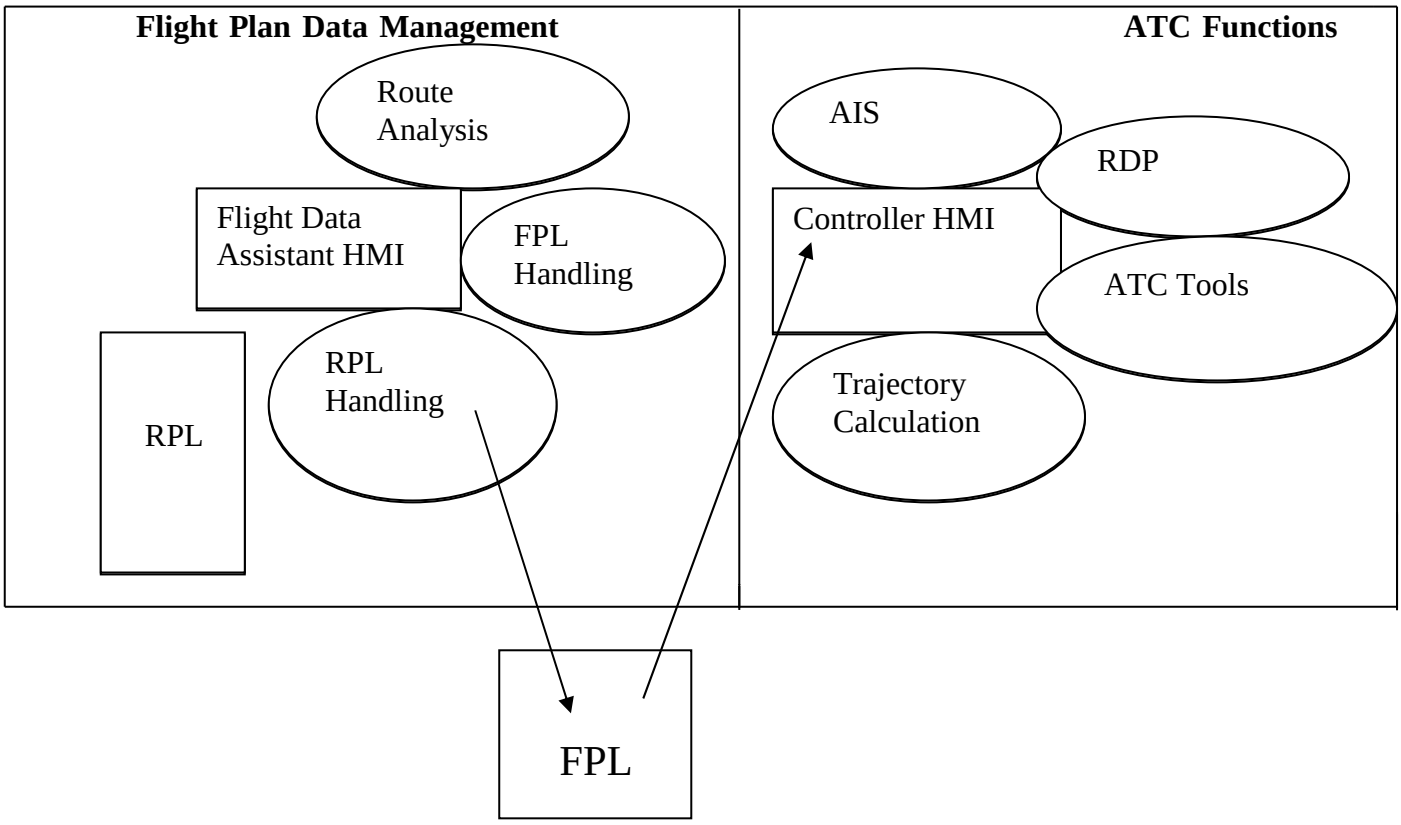
- a Primary System;
- a Radar Bypass System.

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.

SHORT-TERM CONFLICT ALERT (STCA) PROCEDURES

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

Main conditions concerning use of the STCA function:

- All types of flight transponder-equipped aircraft with Mode C are eligible for generation of STCA;
- The STCA function can not be inhibited for individual radar tracks;
- A procedure applicable in respect of flights for which STCA has been inhibited is not determined.

In the event an STCA is generated in respect of controlled flights, the controller shall without delay take action to ensure that the applicable separation minimum will not be infringed.

Following the generation of an STCA, only in the event that a separation minimum was infringed, controllers must fill out “ATS Occurrence Reporting Form”

1.9. Communications

Radio communications were recorded and made available as transcripts for evaluation purposes. The pilots of ATR75 and DH-8D were in radio communication with the TWR controller on frequency 118.1 MHz, with APP Controller on frequency 129.925 MHz;

Crew members with the APP and TWR Controller’s 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. In audio files and in 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

Safety occurrences during on-the-job training

According to EUROCONTROL report "Analysis of ATC related Incidents" **10%** of the analysed safety occurrences are associated with the contextual condition **"controller under training".** This fact alone does not give sufficient indication of the scale of the problem, unless statistics are made available to establish the relationship between the total number of sector hours and number of sector/hours during on-the-job training at global/centre level for a specified time period. Independent of the above argument there is concern from some ANSPs of an increasing trend in such events. "Lack of attention of the coach" was reported as significant during the second hour in working position and was reported as "infrequent to none" during the first 10 minutes;

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 APP Controller action aspects;

Potential solutions to avoid incidents during on-the job- training;

Assessment of crew actions;

Human and organizational factors.

2.2. AIR TRAFFIC CONTROL PROCEDURES

2.2.1. TRANSFER OF CONTROL WITH RIGA TOWER

- **For IFR departing aircraft**

Responsibility for providing air traffic control for departing traffic is handed over by the TWR controller to the APP controller immediately after take-off.

The departing traffic should be handed over to APP controller on frequency 129.925 MHz or 134.850 MHz in accordance with actual Riga APPROACH sector configuration.

2.2.2. PROVISION OF SEPARATION BETWEEN AIRCRAFT

TWR controller is responsible for separation of all departing traffic following standard SID or non-standard clearances from all other traffic within Riga CTR.

For traffic operating at altitude 2500 FT within CTR:

- APP controller shall inform Tower controller about traffic;
- APP controller provides separation for all other traffic **within Riga TMA;**
- Tower controller provides separation for all other traffic within Riga CTR.

Separation for traffic operating above altitude 1500FT and below altitude 2500 FT within CTR:

- Tower controller shall coordinate with APP controller about this traffic;
- APP controller provides separation for this traffic from all other traffic **within Riga TMA**;
- Tower controller provides separation for this traffic from all other traffic within Riga CTR.

2.2.3. Separation Minima requirements within RIGA TMA of Air Traffic Control Centre Approach Sector Operations Manual DI-GSV/GSVC-01 (*Enactment on 27.01.2014, effective at 15.11.2014).*

THE SEPARATION MINIMA BETWEEN AIRCRAFT SHALL NOT BE INFRINGED.

- **Vertical separation**

Vertical separation is carried out according to ICAO Annex 2 Table of Cruising levels 3a). In case of radar failure or in an emergency situation, controller may apply 500 FT vertical separation as temporary contingency measure.

- **Climb or descent through occupied level.**

Giving the clearance to climb or to descend through level occupied by another aircraft in the opposite or cross direction:

Giving the clearance to climb or to descend ATCO shall:

1. **Order the defined rate of climb or descent;**
2. **Constantly monitor the position of aircraft and vertical rate of climb/descent.**

In cases when the crew has reported impossibility to maintain the ordered rate of climb/descent or **monitored rate is less than ordered, new clearance shall be given or the manoeuvre shall be terminated.**

- **Horizontal separation**

Radar separation between identified, controlled aircraft at the same flight level (altitude):

- When single PSR and double SSR coverage is provided the radar separation **not less than 3 NM may be applied** within Riga TMA AoR.

Investigation consider that Air Traffic Control Centre Approach Sector Operations Manual DI GSV/GSVC-01 fully comply with requirements of ICAO documents and are satisfactory to perform air traffic control if its requirements **have been executed strictly according to operational manual** to ensure established separation standards.

2.3. AIR TRAFFIC APP CONTROLLER ACTION ASPECTS.

According to ATCC schedule for November 2014 at 11:30:21 UTC Approach-Executive "AE" controller was on duty. Direct air traffic control performed Controller-student.

According to LGS ATS Personnel Unit Training Plan Controller-student was On-the-Job Training Phase. Planned Dates for OJT was from October 22, 2014 till January 5, 2015, planned hours 350hrs.

OJT Program consists:

1. Theoretical Part -15 hrs

2. Practical Part. Sector Planner Position-30 hrs

3. Practical Part. Sector ExecutivePosition-235 hrs

4. Simulator-30 hrs

On the Date of occurred Serious Incident (15.11.2014) the trainee has completed the Theoretical Part (27.10.2014) and the Practical Part, Sector Planner Position (10.11.2014.) and undertook the Practical Part, Sector Executive Position.

According to Trainee Log Book Assessment Sheets, Instructor conclusions at the end of 2 completed sessions contain Trainee weaknesses in different theoretical and practical lessons.

Direct air traffic control during Incident performed APP Controller-student. Instructor-Approach-Executive "AE" controller was on duty along with Controller-student.

Aircraft with call sign FCM72TX departed from RWY18 on SID “SOKVA 5E” at **12:06:49** and APP Controller-student cleared it to climb to FL190.

After short time (about 2 minutes) at **12:08:29** BTI34H departed from the same RWY18 on SID “ERIVA4E”. Distance between traffic was 4NM.

At **12:08:48** FCM72TX started left turn to “SOKVA”.
At **12:09:07** BTI34H was cleared to climb FL170.

Initially the preceding aircraft with call sign FCM72TX, climbing 4000FT gained up high rate of climbing 1800 -1500 FT/MIN but later rate of climb sharply decreased. At **12:09:50** FCM72TX at altitude 4600FT climbed to FL-190 and turned left with rate of climb **700FT/MIN**.

Before that at **12:09:21** BTI-34H climbing to level 170 contacted APP Controller-student and asked for chance to fly direct to “KEKBI”. At **12:09:40** APP Controller-student coordinated requested route with Vilnius ACC and entered allowed flight level 170 “LABEL” and after that at **12:09:42** STCA warning signal triggered, horizontal distance between aircraft was **2.9NM**, vertical **1200FT.** FCM72TX climbed with rate of climb **800FT/min** and succeeding aircraft BTI-34H climbed with rate of climb **3100FT/min.**

The APP Controller-student did not analyze the situation and rate of climb of succeeding aircraft and cleared BTI34H to climb to FL170.
At **12:09:50** APP Controller-student gave instruction to BTI-34H:**”Air Baltic-34H stop climb altitude 4000 feet.”** The crew confirmed instruction, but **due to late intervention and high rate of climb** BTI34H stopped at altitude 4400 which resulted in short loss of separation **2.7NM** horizontal and **800FT** vertical. During incident at AoR of APP sector controller were only 2 aircraft.

This serious incident –infringement of separation standards took place due to:

- underestimating real air space situation allowing non gradually aircraft climbing;
- not ordering vertical speed of climbing;
- controller – student dilatory activities to limit climbing of succeeding aircraft.

2.4. POTENTIAL SOLUTIONS TO AVOID INCIDENTS DURING ON-THE-JOB TRAINING.

Analyzing incident’s investigation of air traffic control during on-the-job training in different ANSP institutions it was discovered the following causes:

- Insufficient awareness by the instructors of the level of competence of the student or trainee they are supervising;
- The instructor allowing the situation to develop for the purpose of training;
- Distraction of the instructor;
- An unmanaged mismatch between the simulator exercise timing (often between 45 minutes and 1 hour) and the time on the position (often 2 hours);
- General inconsistency between the ab-initio and on-the-job training programmes in terms of:
    - Level of knowledge and skills required to start on-the-job training;
- General inconsistency between the simulator and on-the-job training process in terms of:

    - Change of instructors;
    - Change in system support provided by the SIM facility and OPS system;
    - Specific operational environment not known to the needed level of detail;
    - Unrealistic simulation environment, including aircraft performance and coordination procedures;
- Generally humans are not good at monitoring tasks and the OJTI (on-the-job training instructor) role demands a high degree of monitoring;

It is the OJT Instructor who is responsible for the safety of the ATC service being provided under supervision.

Therefore consider:

- Clearly define and document the roles and responsibilities of the OJTI and implement them in OJTI training programme;
- Limiting the time on the OJT position;
- The arrangements of how to share the **situational awareness** and the plan of work between OJTI and the trainee;
- When and how to take over the control from the trainee, including the take over of communication by using appropriate switch/pedal to activate the transmitter;
- **How to perform hand-over take over/take over of the position, including introducing appropriate checklists;**
- Ensuring the OJTI is briefed on the level of proficiency of the student/trainee;
- Ensuring that the ANSP has a procedure to provide an assurance that students and trainees are appropriately trained and licensed;
- Review the training programmes to ensure that they reflect the knowledge and skills required for:

    1. **collision avoidance;**
    2. **emergency situations;**

On the date of incident Controller- student was at the initial phase of the On-the-job training program. He has completed only Theoretical Part and Practical Part-Sector Planner position.

Reviewing Controller-student's Trainee Assessment Sheets of completed Parts investigation established that he had much different weaknesses recorded by OJTI before starting next Practical Part, **Sector Executive Position.** Taking into account readiness of Trainee to work without assistance it was necessary by OJTI to pay special attention to his activities and **to monitor air space situation in order to intervene in a timely manner and avoid conflict.**

In investigation opinion there was not established the arrangements of how to share the **situational awareness** and the plan of work between OJTI and the trainee during on-the-job training and monitoring of Trainee actions and air space situation, before incident occurred, by OJTI was insufficient. In the same way OJTI was **responsible for the safety of the ATC service being provided under supervision.** In case if OJTI has intervened in a timely manner conflict situation would not be created.

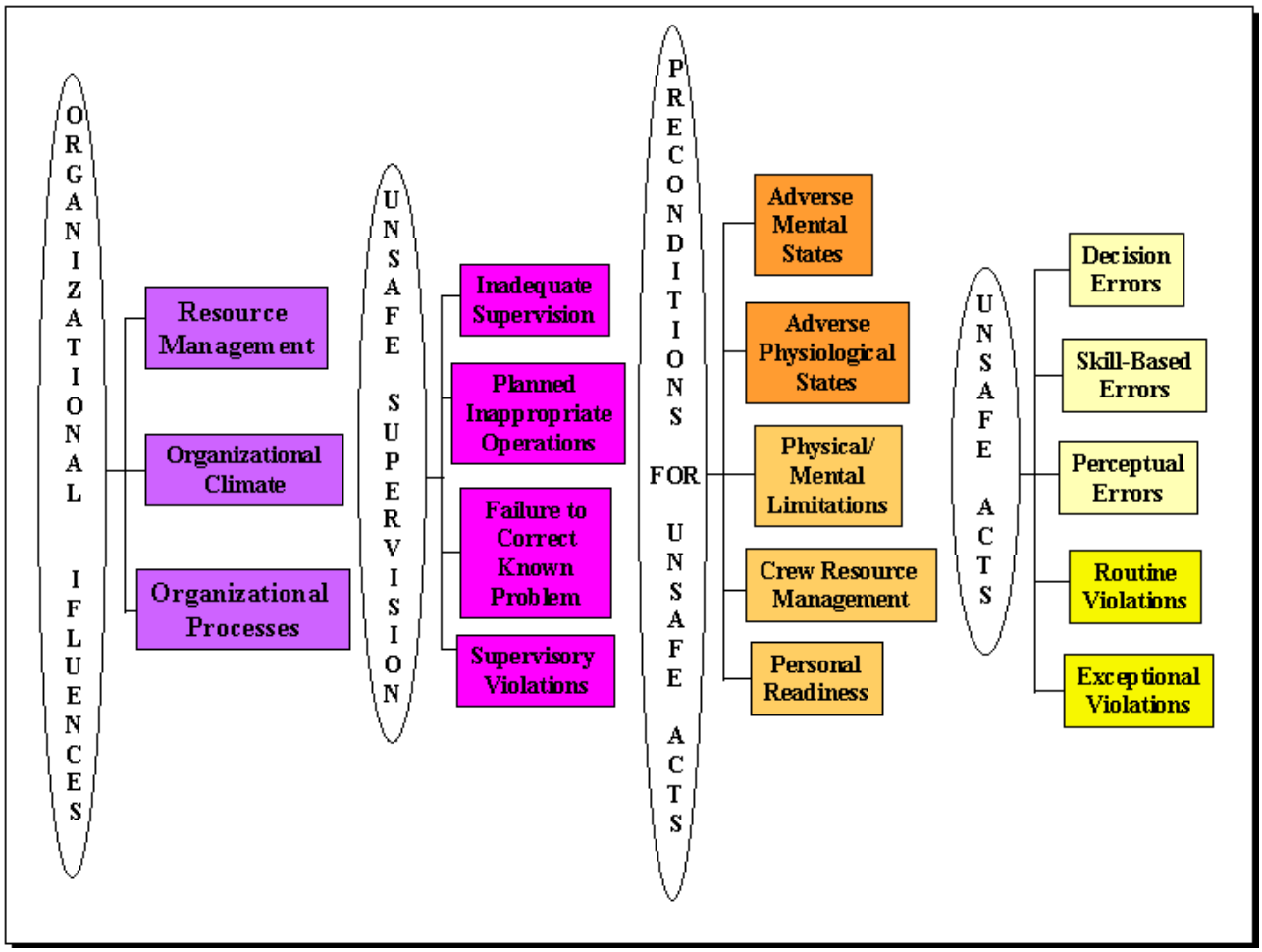
2.5. ASSESMENT of CREW ACTIONS BEFORE INCIDENT

According to radar data at **12:09:07** BTI34H departed RWY18 on ERIVA4E and was cleared to climb FL170.

For outbound traffic Standard departure routes (SIDs) are established for Riga aerodrome (EVRA) as published on charts in the AIP Latvia. According to the AIP Latvia Initial climb clearance is 4000 FT unless otherwise instructed by TWR;

According to requirements of EVRA AD 2.22 FLIGHT PROCEDURES, paragraph 1.6. Outbound traffic, 1.6.1 Radio communication **of the AIP Latvia, first radio contact with APP controller crew shall establish** on frequency 129.925 MHz not later than passing 1500 ft after take-off unless otherwise instructed. There was in place infringement of rules established by AIP Latvia.

2.6. Human and organizational factors



The HFACS Taxonomy

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 incident.

2.5.1. 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 (HFACS) that describes the human factors that contribute to an incident.

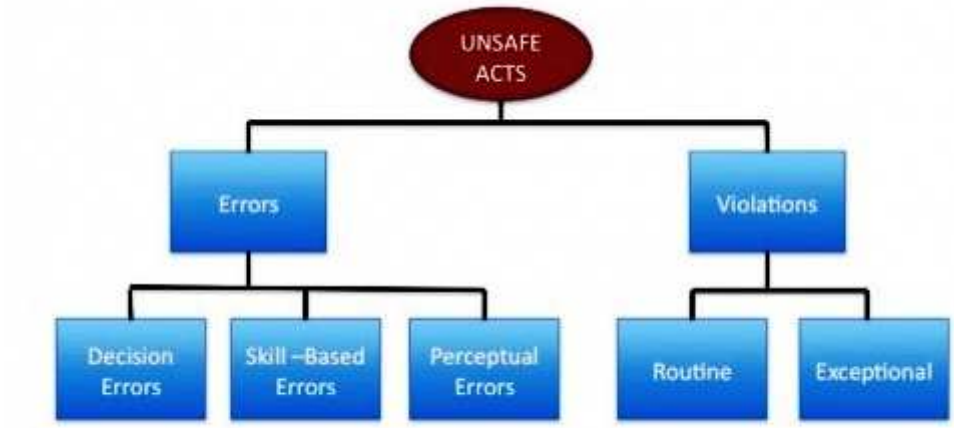
It is based on a sequential or chain-of-events theory of accident causation. The human contribution don't build on the person approach, that focuses on the errors and violations of individuals but **is based on the system approach, that traces the causal factors back into the system as a whole.** Such 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.

2.5.2. 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 APP controller- student underestimated real air space situation, failed to prioritize attention as a result allowing non gradually aircraft climbing;

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 succeeding aircraft BTI-34H to_climb to FL170 without climb rate limit was incorrect decision.

OJTI detected developing potential conflict, but intervened dilatory and promptly did not cancel Controller-student's wrong issued clearance to BTI-34H to carry out avoiding actions to provide safe separation between aircraft.

II. Violations

According to Regulation of ANSP "Latvijas Gaisa Satiksme" Approach Sector Operations Manual DI-GSV/GSVC-01 giving the clearance to climb or to descend ATCO shall:

- **Order the defined rate of climb or descent;**
- **Constantly monitor the position of aircraft and vertical rate of climb/descent.**

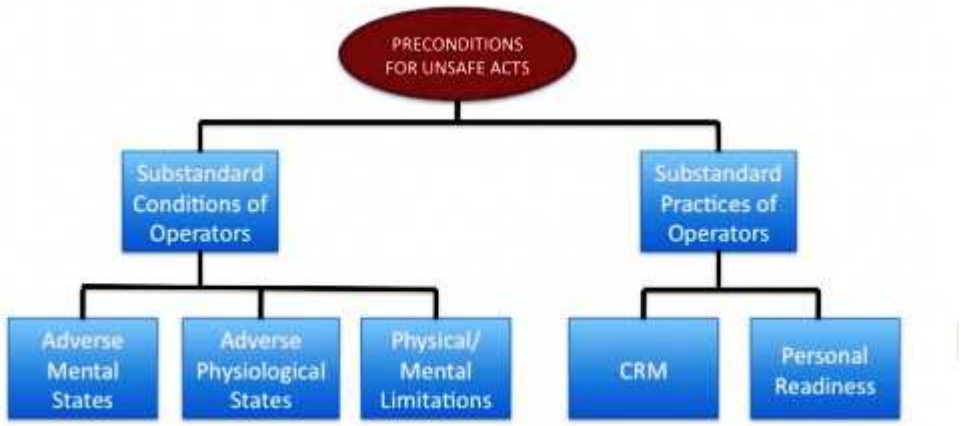
The APP Controller-student permitted breach of these rules prescribed in the Approach Sector Operations Manual. The controller had not ensured separation of 3NM and 1000ft between IFR traffic in TMA.

Such violation is considered as exceptional violation and appear as isolated departures from authority, not necessarily indicative of individual's typical behavior pattern nor condoned by management.

2.5.3. Preconditions for unsafe acts

Two major unsafe subdivisions of unsafe conditions are developed:

- Substandard conditions of operators;
- Substandard practices of operator.



I. Substandard conditions of operators

1. Adverse Mental States

As such, the category of Adverse Mental States was created to account for those mental conditions that affect human performance. Principal among these are the loss of situational awareness, task fixation, distraction, and mental fatigue due to sleep loss or other stressors. Also

included in this category are personality traits and pernicious attitudes such as overconfidence, complacency, and misplaced motivation.

Investigation did not reveal any adverse mental states, adverse physiological states or physical/mental limitations of Controller- student and OJTI.

II. Substandard practices of operators

Numerous substandard conditions of operators can, lead to the commission of unsafe acts. Nevertheless, there are a number of things that operators do to ourselves that set up these substandard conditions. Generally speaking, the substandard practices of operators can be summed up in two categories:

- crew resource mismanagement (**in reviewed case of incident- TRM (Team Resource Management);**
- Personal readiness.

Within the context of this incident this includes coordination both within and between Controller-student with OJTI.
In opinion of investigation there were not developed:

- The arrangements of how to share the **situational awareness** and the plan of work between OJTI and the trainee;
- When and how to take over the control from the trainee, including the take over of communication by using appropriate switch/pedal to activate the transmitter;
- **How to perform hand-over take over/take over of the position, including introducing appropriate checklists or similar;**

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;
- Failed to correct a known problem;
- Supervisory violations.

Inadequate Supervision

The role of any supervisor is to provide the opportunity to succeed. To do this, the supervisor, no matter at what level of operation, must provide guidance, training opportunities, leadership, and motivation, as well as the proper role model to be emulated.

While empowering Controller-student to make decisions and function independently was certainly essential, this does not divorce the OJTI as supervisor from accountability, what is more **it is the OJT Instructor who is responsible for the safety of the ATC service being provided under supervision.**

Failure to correct problem

The OJTI assumed that student will stop succeeding traffic at 4000 FT for providing vertical separation but upon understanding students' mistake the instructor should have cancelled issued wrong clearance by himself. The OJTI failed to communicate /coordinate **in a timely manner**, his actions was too slow and dilatory.

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 *Resource/ Acquisition Management* of ATC service provider.

The investigation sought to clarify the circumstances why the controller's behavior was such as it was. Traffic situation was **usual with 2 ACFT in the APP sector AoR, not overload**. The SID`s for traffic were on different directions. Aircraft control was provided by Controller-student but under supervision and direct responsibility of experienced ACC controller with instructor ratings.

Analysing disposable information during investigation process and internal investigation results of ATC service provider it was stated:

- There is no clearly defined and documented the roles and responsibilities of the OJTI and implemented them in OJTI training programme;

- The arrangements of how to share the situational awareness and the plan of work between OJTI and Trainee.

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 **C2** - An occurrence involving circumstances indicating that a total, serious or partial inability to provide safe and non degraded ATM Services **could have occurred, if the risk had not been managed/controlled by ATS personnel** within Safety Regulatory Requirements, even if this implied limitations in the provision of ATM Services.

3. Conclusions

During process of investigation were made the following conclusions:

3.1. Findings

- At the time of the incident the traffic was handled directly by APP Controller-Student under supervision of his OJTI;

- The OJTI was responsible for the safety of the ATC service being provided under supervision;

- On the Date of occurred Serious Incident the Trainee has completed the Theoretical Part (27.10.2014) and the Practical Part, Sector Planner Position (10.11.2014.) and undertook the Practical Part, Sector Executive Position;

- The APP Controller-Student constantly did not monitor the position of aircraft and vertical rate of climb/descent;

- The APP Controller-Student gave flight clearance to succeeding aircraft BTI-34H to climb to FL170 without climb rate limit;

- The APP Controller-Student did not order the defined rate of climb for succeeding aircraft;

- The APP Controller-student did not follow the rules prescribed in the Approach Sector Operations Manual and had not ensured separation of 3NM and 1000ft between IFR traffic in TMA;
- Upon understanding Controller-students' mistake the instructor did not cancel issued wrong command by himself;

- There was not plan when and how to take over the control from the Trainee, including the take over of communication by using appropriate equipment;

- There was not procedures how to perform hand-over take over/take over of the position, including introducing appropriate checklists or similar;

- The APP Controller-student gave instruction to BTI34H to stop climbing to 4000FT, but due to high rate of cling aircraft stopped at 4300FT;

- The OJTI failed to communicate /coordinate Trainee actions **in a timely manner**, his actions was too slow and dilatory;

- There was not clearly defined and documented the roles and responsibilities of the OJTI and implemented them in OJTI training programme;

- 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;

- The SID`s for both departing traffic were on different directions;

- The crew of BTI34H **first radio contact with APP controller established** on frequency 129.925 MHz when passing 1900 ft after take-off that did not comply to requirements of AIP Latvia;

- Radio communications on the TWR frequency 118.1 MHz between the pilots of BTI-34H, FCM72TX and the TWR controller took place in English, communication between APP Controller-student and pilots on the APP frequency 129.925 MHz;

- At the time of incident the workload of the controller was very low;

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

- The minimum of horizontal separation between aircraft was 2.7 NM;

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

- According to EUROCONTROL ESARR 2 Severity Classification table this incident is classified as **B2;**

- According to the Severity of their Effect on the ability to provide Safe ATM Services this serious incident is classified as **C2**;

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

3.2. Causes

3.2.1. Proximate Cause

The APP Controller-Student decision to clear succeeding aircraft BTI-34H to_climb to FL170 without climb rate limit;

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 departing aircraft DH-8D and ATR-72-500 in the TMA was not strict complying the rules prescribed in the Approach Sector Operations Manual by the APP Controller-student, that lead to infringement of separation standards.

3.2.3. Contributing causes

- Lack of Controller-student experience due to perform On-the-job training and starting initial phase of Practical Part, Sector Executive Position;

- Lack of procedures how to perform hand-over take over/take over of the position;

- Failure of the OJTI to communicate /coordinate Trainee actions in a timely manner;

- Late establishing first contact with APP controller after take-off to the contrary of requirements of the AIP Latvia.;

3.2.3. Primary cause

The event after which incident became inevitable.

Decision of OJTI not to cancel wrong command by himself immediately upon recognizing students' mistake- wrong command.

Safety Recommendations

Recommendation – LV 2015-010

It is recommended to the authority responsible for air navigation services in the Latvian airspace VAS Latvijas Gaisa Satiksme (LGS) to consider necessity to make possible amendments in ATCC Personnel Trainee programs.

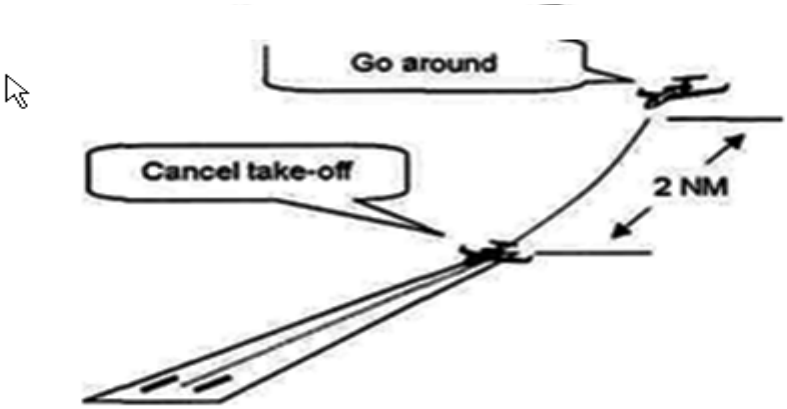
Recommendation – LV 2015-011

It is recommended to the Civil Aviation Authority, State Agency "Civil Aviation Agency" responsible for certifying institutions of vocational in-service training of civil aviation personnel, approving vocational in-service training programmes, instructors and examiners, as well as performing the supervision of their activities to perform inspection of ANSP "Latvijas Gaisa Satiksme" ATCC Personnel Training Programs;

Riga October 8, 2015

Investigator in charge Visvaldis Trūbs

Director of Transport Accident and
Incident Investigation Bureau Ivars Alfreds Gaveika


Go around
Cancel take-off
2 NM