



Transporta nelaimes gadījumu un incidentu izmeklēšanas birojs

Transport Accident and Incident Investigation Bureau of the Republic of Latvia

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FINAL REPORT No.4-02/1-19(2-20)

ON THE AIRCRAFT SERIOUS INCIDENT

INSUFFICIENT SEPARATION BETWEEN AIRCRAFT Airbus A-359, call

sign CES220 AND MILITARY AIRCRAFT F16 call sign MA01, in Riga FIR on

FEBRUARY 13, 2019

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Abbreviations and Terminology

ATCC - Air Traffic Control Centre

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

ACFT - Aircraft

ATC - Air Traffic Control

UTC - Universal Time Coordinated

AoR - Area of Responsibility

CWP- Controller Working Position

NM - Nautical mile

Ft - Feet

FIR - Flight Information Region

ATS - Air Traffic Services

STCA - Short-Term Conflict Alert

FL - Flight Level

RVSM- Reduced Vertical Separation Minima

TMA-Terminal Control Area

ANSP- Air Navigation Service Provider

BDRY- Boundary

GAT - General Air Traffic

OAT - Operational Air Traffic

MCU - Mission Control Unit

CRC – Control and Reporting Centre

OSUP – Operational Supervisor

FMP – Flow Management Position

FDA-Flight Data Assistant

SUA -Special Use Airspace

ORA(I)-Quick Reaction Alert (Interceptors)

FA - Flight Allocator

FC- Flight Controller

WEx –West Executive

SERA -Standardised European Rules of the Air

WPI- West Planner

NTA-National Technical Annex

MTCD -Medium-Term Conflict Detection

LNAF AF MC- Latvian National Armed Forces Air Force Military Coordinator

LNAF AF MS- Latvian National Armed Forces Air Force Military Scheduler

Scramble –An order directing take -off of Aircraft as quickly as possible, usually by Mission instructions.

A-SCR -ALPHA Scramble –Tactical mission of military aircraft involved in an actual air policing incident.

AP- Air Policing-A peacetime mission involving the use of the Air Surveillance and Control System, air command and control and appropriate air defence assets, including interceptors, for the purpose of preserving the integrity of the NATO airspace part of Alliance airspace.

Synopsis

Unless stated otherwise the time in this Report is UTC

On Wednesday February 13, 2019 the Airbus A359 of “China Eastern Airlines”, call sign **CES220** was flying on scheduled flight at FL 350 over the neutral waters (High Seas) within Riga FIR from Frankfurt /Germany (EDDF) to Shanghai-China (ZSPD).

Unknown aircraft (later identified as Russian military SU27) was flying over international waters without flight plan, communication and had no Mode 3 transponder code.

At first unknown military aircraft was intercepted by Swedish ORA (I) and after that Operational Air Traffic (OAT) two F16 aircraft were tasked by Combine Air Operation Centre (CAOC) at Uedem, Germany, with ALPHA Scramble (A-SCR) mission to interrogate the targets, transiting over international waters with transponders switched off. Two F16, call signs MA01 and MA02, departed from Šiauliai (EYSA) at about 14:25. Mission was controlled by MCU Control Reporting Centre “KARMELAVA”, Lithuania personnel - Fighter Controller (FC) and Fighter Allocator (FA). Flight were coordinated with appropriate ATS Units Vilnius and Riga.

By the time of intercept by NATO F16's (MA01 and MA02) Russian SU27 was maintaining FL340 and heading southbound. CRC Karmelava FA and Riga ACC Supervisor agreed that MA01 flight will maintain the same flight level although there was a traffic from the west at FL350 (civil aircraft A359, Call sign CES220). Riga ACC Supervisor informed CRC Karmelava FA regarding vertical separation of 1000FT, which was accepted by CRC Karmelava FA. The CRC Karmelava FC gave instruction to MA01 PIC to maintain hard FL340 due to civil traffic and MA01 acknowledged FC order.

When the MA01 flight joined with Russian SU27 the altitude of MA01 was FL343 and civil aircraft A359 (call sign CES220) was FL350.

In despite of instruction given by FC to top FL340 military MA01 violated cleared level and this led to trigger TCAS RA for Airbus 359, call sign CES220. The altitude of MA01 was FL343 and CES220 FL350. Civil ACFT A359 followed instructions of TCAS RA and started to climb. SU27 passed near CES220 when the TCAS was activated.

Minimum horizontal separation recorded was **1.15 NM**, minimum vertical separation recorded was **700 FT**.

The incident occurred at Riga FIR western boundary near to compulsory reporting point “**EVONA**” (**570954N 0195529E**), Class C airspace, in the High Seas.

Reporting and Notification

The next day after the occurrence on Thursday, February 14, 2019 the Transport Accident Investigation Bureau (TAIIB) was advised by the Safety Management Department of Air Navigation Service Provider (ANSP) the State Joint Stock Company „Latvijas gaisa satiksme” (LGS) with ATC Occurrence Preliminary Report according to REGULATION (EU) 2015/1018 of 29 June 2015 laying down a list classifying occurrences in civil aviation to be mandatorily reported according to Regulation (EU) No 376/2014 of the European Parliament and of the Council that an occurrence had taken place (separation minima infringement) in Riga Flight Information Region (FIR), class C airspace on Wednesday, February 13, 2019 at 14:46 UTC between a scheduled flight of Airbus A359, call sign CES-220 and military F16, call sign MA01 departed from Šiauliai (EYSA).

TAIIB sent Notification of occurrence to ICAO, EASA, State of Manufacture and Design (France), State of Operator (China) and CAA Latvia in accordance to para 4.1. Annex 13 to the Convention on International Civil Aviation (Chicago 1944).

Investigation

TAIIB Authorities classified the occurrence as a serious incident and initiated an investigation under the provisions of Annex 13 to the Convention on International Civil Aviation (Chicago 1944) and the REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation, as well as forwarded request to Baltic Air Surveillance Network and Control System Combined Control and Reporting Centre KARMELOVA and Air Traffic Service Provider of Latvia LGS for providing any relevant available information regarding to the incident and personnel data of military and civil controllers involved in the serious incident.

1. Factual information

1.1. History of flight

At 14:12 Riga West Planner controller received estimates from Tallinn Controller on NON-RVSM military flight (call sign 74332) at FL360 from NEKET to GARSO (from NORTH to SOUTH) in High Seas without transponder and communication.

At 14:20:26 GALAXY called RIGA OSUP and informed about ALPHA SCRAMBLE: “We have A SCRAMBLE out of Shaula, estimated time of departure in 5 minutes, requested heading from Shaula 320 in a climb to FL 280, MA01, 02, two F16, will SQUAWK 1325 in sequence. Our target is at north in Estonia and flying to Kaliningrad”

OSUP confirmed: “OK, MA01 Heading 320 FL280 will be assured in 5 minutes, OK you are flying, just again, to the north and then to the Kaliningrad, yes? OK. Thank you”.

GALAXY informed: “MA01,02 flying heading 300”

Then OSUP called to FMP and instructed to create a system flight plan (*in Russian*): “Сделай-ка нам ещё раз MA01 из Шауляя, NEKET, GARSO, такой вот кружочек, эшелон 280, два F16, ... да, спасибо”

At 14:22:03 OSUP called Riga APP and informed RIGA APP about military policing flight (*in russian*): “MA01 полетят из Шауляя, курс 320, эшелон 280, через 5 минут”

At 14:22:18 OSUP called to WPl and informed (*in Russian*): “SCRAMBLE A будет из Шауляя через 5 минут, курс 320, эшелон 280”

WPl acknowledged: “280, курс 320 и, через 5 минут, 27я минута”



NEKET 581816N 0203443E; EVONA 570954N 0195529E; GARSO 560846N 0200456E;

At 14:23:21 WPI called OSUP and informed (*conversation in Russian*): “У нас тут такая “загагулина”. Таллин звонил, сказал, что такой самолёт 74332, он на 360, через 10 минут над НЕКЕТом, он вообще без связи, без ответчика, без RVSM”

OSUP replied (*conversation in Russian*): “да, ох ты через 10 минут? Я понял”

Then WPI called Vilnius Controller and delivered information about interception at Flight level 360, and probably Flight level 340 in following wording (*conversation in Russian*): “Да,

возможно вы наблюдаете там военные и шведские, и наши перехватили товарища на 360. Кто говорит 340, кто говорит 360 и летят, да, спасибо”

Reply of Vilnius Controller was following: “Своих я по SQUAWK-у вижу. Спасибо”

At 14:25:22 WEx instructed Russian military aircraft (callsign 71362): “71362 contact Vilnius Control on 133.305”

At 14:25:26 Russian military flight (callsign 71362) on frequency 135.1 MHz informed Riga WEx controller and passed estimates of another Russian aircraft (1) (callsign 74332): “133.305 362 and just for your information behind me one traffic on FL360 estimated time point **NEKET** on 30 minutes and **GARSO** 45 minutes”

At 14:25:43 WEx: “71362, roger. And do they have radio?”

At 14:25:51 the pilot of 71362 answered: “No”

At 14:25:52 the WEx confirmed: “Roger. Thank you”

At 14:27:06 GALAXY informed RIGA OSUP that NATO aircraft changed heading: “OK, MA 01 turning to heading 310”

OSUP confirmed: “Heading 310, OK, Thank you”

At 14:32:52 Riga WPl called Sweden controller and asked any possible information about military flights over High Seas: “Concerning that from Tallinn. They already now in our airspace. Do you see it?”

Sweden controller answered: “No. they have no transponder”

WPl to Sweden (telephone): “OK. Maybe any other information? Because they told us, they will cross border at 14.30 at 360 and you just told me, that at 340. We just trying, you know ...”

Sweden to WPl (telephone): “No. It just told us military”

WPl to Sweden (telephone): “The Swedish military told you?”

Sweden to WPl (telephone) confirmed: “yes”

WPl to Sweden (telephone): “OK. Thanks”

At 14:33:34 WPl called Vilnius controller and passed estimates of aircraft with call sign 74332 (conversation in Russian): “У нас кое-какая информация от Таллина. Военные без ответчика и без связи, нам Таллин передал на 360-ом в 14:30 он к нам зашёл? к вам он должен зайти в 14:45”

Vilnius controller (telephone): “Предварительно в 14:45 он к нам должен зайти, военные на 360 эшелоне. Он один или ещё с кем-то?”

WPl to Vilnius controller (telephone, conversation in Russian): “без понятия, нам сказали,

что он пока что один, но без ответчика, без связи и без RVSM, но потом позвонили ещё Шведы и сказали, что он вроде как на 340-ом. Что сказали военные шведские. То есть достоверная информация, вот только такая”

Vilnius controller (telephone): “Хорошо. Позывного, ничего не знаем?”

WPL to Vilnius controller: “позывной 74332”

Vilnius controller (telephone): “74332, а точку, через какую он пойдёт?”

WPL to Vilnius controller: “я предполагаю через GARSO по стандартному маршруту, но это только моё предположение”

Vilnius controller (telephone): “Хорошо. Я понял. Спасибо”

At 14:36:00 GALAXY informed RIGA OSUP that they changed heading and stayed at Flight level 280. At the same time OSUP observed that MA01 departed from assigned level without prior coordination and asked to confirm requested level. OSUP informed GALAXY about crossing traffic at Flight level 320 and 310. Galaxy informed about intentions after passing all traffic **to climb Flight level 340/350, because target was at 340.**

GALAXY Telephone: “MA01,02 flying heading 300”

OSUP Telephone: “Heading 300 and FL? I see that they are climbing”

GALAXY Telephone: “No, they will descend back to FL 280”

OSUP Telephone: “OK, FL 280 they will descend. And we have some traffic SQUAWK 0233 at FL 320 and ...”

GALAXY Telephone: “Standby short Can you say again SQUAWK for the traffic?”

OSUP Telephone: “0233 FL 320 and close to him 7651 FL 310”

GALAXY Telephone: “OK, radar contact on both, yes”

OSUP Telephone: “will it be OK to have 3000 feet? oh it’s will be 280, yes 3000 feet?”

GALAXY Telephone: “No, we will be climbing because our target is flying at FL340/350”

OSUP Telephone: “OK. So, for now you will continue 280?”

GALAXY Telephone: “Yes ”

OSUP Telephone: “And we are not changing our FLs?”

GALAXY Telephone: “Not yet”

OSUP Telephone: “OK. Thank you”

At 14:37:44 Riga OSUP informed Riga WEx controller about policing aircraft intentions and that Russian military aircraft was already in RIGA FIR at level 338 according to information from Latvian Air Forces.

OSUP to WEx Telephone (conversation in Russian): “Военная звонила наша, говорит, что этот только вошёл СУ27, эшелон 338. Она так говорит, только вошёл, НЕКЕТ прошёл, МА01 идут 280, а потом будут набирать, потом, какой-то эшелон, поэтому не дёргай этих “чайников” и “французов”, я ему про них рассказал, говорит: “да, всё ОК””

WEx to OSUP: “Да, я понял, хорошо”

At 14:37:44 Malmo Controller called to Riga WPl and informed that Swedish military flight is climbing Flight level 360 and aircraft (callsign 74332) also is at flight level 360.

Sweden to WPl Telephone: “Hallo Riga, Malme... military they now climbing at 360 and unknown traffic is at 360 overhead of RASEL”

At 14:40:45 Malmo (Sweden) Controller called to Riga WPl “Hallo it’s Malme. Concerning CES220”

WPl answered: “CES220 yes”

Malmo (Sweden) Controller to WPl (telephone): “Due to military traffic ... unknown traffic is there... any possibility to give him direct...?”

WPl answered to Malmo (Sweden) Controller: “Well. Standby. He was NETNA. Actually, you can give it to MEGAS”

Malmo (Sweden) Controller to WPl (telephone): “To MEGAS”

WPl answered to Malmo (Sweden) Controller: “Yes. Thanks”

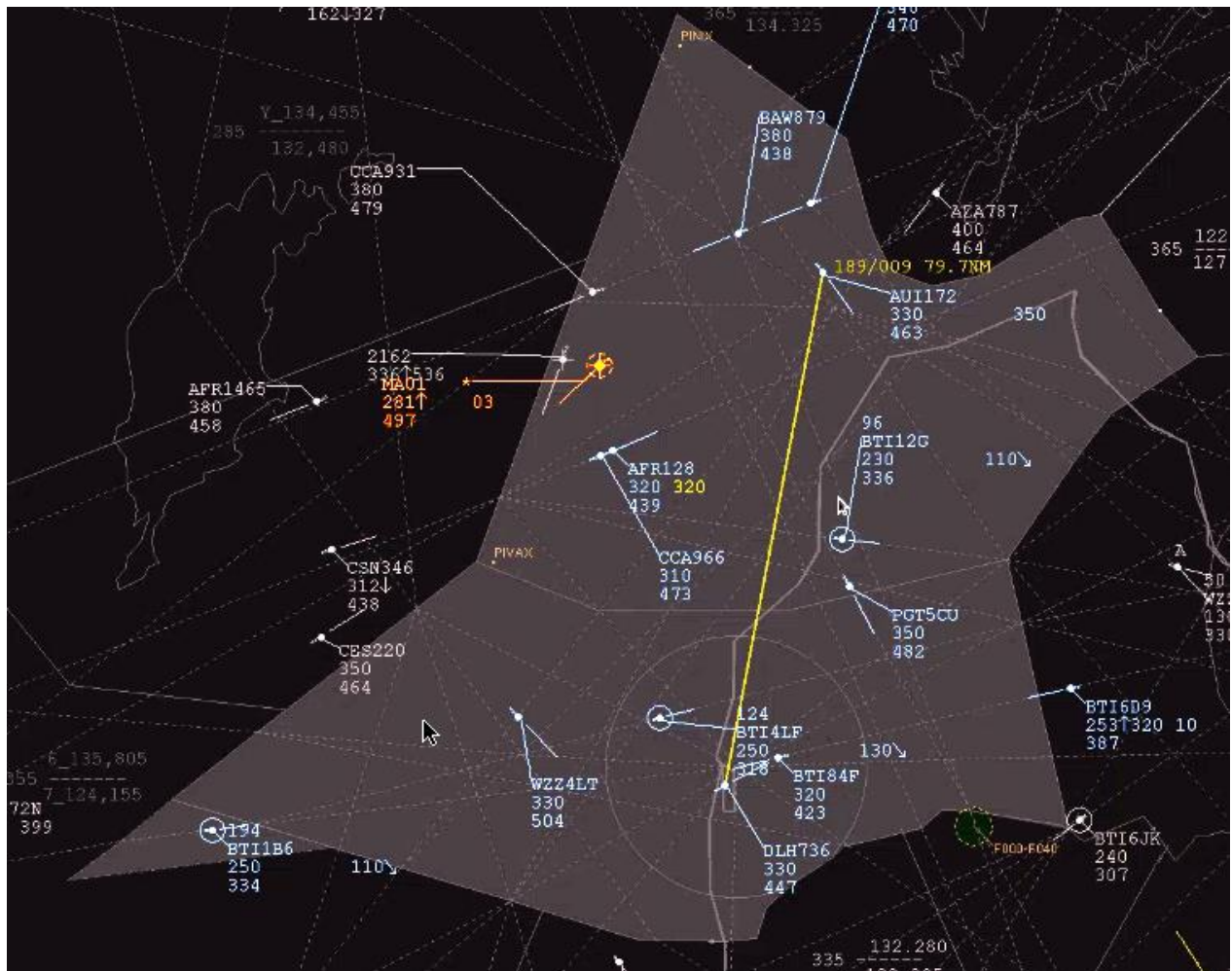
At 14:41:30 GALAXY informed RIGA OSUP that they will fly south and then climb to Flight level 340.

GALAXY Telephone: “MA 01, 02 now turning southbound will maintain FL 280, and when the crossing traffic at 320 and 310 will pass we will slowly to climb to FL 350 ”

OSUP Telephone: “climb to 350 after traffic. What traffic do you mean, SQUAWK?”

GALAXY Telephone: “I mean traffic AFR128 SQUAWK 5233 and behind him AIRCHINA SQUAWK 7651, after that traffic, when they will be approximately 10 miles”

OSUP Telephone: “you see another traffic in Sweden 2503 FL 310, CSN346?”



West Sector traffic situation

At 14:42:01 GALAXY informed RIGA OSUP that NATO policing aircraft start climbing to Flight level 340. OSUP approved this information and pointed that another civil aircraft CES 220 is at FL 350 and asked if 1000ft separation with crossing civil aircraft is acceptable for MA01 for safe separation.

GALAXY Telephone: “OK. So, we will start to climb now to FL340, OK?”

OSUP Telephone: “now it’s approved climb 350, oh 340”

GALAXY Telephone: “340 initially”

OSUP Telephone: “but it’s another traffic just you see CES220 FL350, 7655 SQUAWK”

GALAXY Telephone: “OK. We will go 340 for now and will maintain 340”

OSUP Telephone: “will it be OK 1000 feet with an airchina”

GALAXY Telephone: “It will be OK for us”

OSUP Telephone: “OK 340, copied. Thank you. Good buy”

At 14:42:52 Riga OSUP informed Riga West Planner that NATO policing aircraft was climbing Flight level 340 and that GALAXY will assure 1000ft separation with crossing civil aircraft (CES220) (in Russian):

At 14:42:52 OSUP called Riga WPI and informed (telephone): “МА01 сейчас набирает 340 “чайника” 220 видят, они говорят 1000 с ним будут делать”

WPI to OSUP (telephone): “ОК. Я понял. CES шведы просто отправили на MEGAS, мы согласовали”

OSUP to WPI (telephone): “Я понял. Спасибо”

At 14:43:37 the pilot of CES220 contacted Riga WEx and reported: “Riga control CES220 maintain FL350”

At 14:43:42 Riga WEx answered: “CES220 Riga Control radar contact”

After that Riga WEx had contacted other aircraft and warned about possible turbulence at some levels and existing military activities.

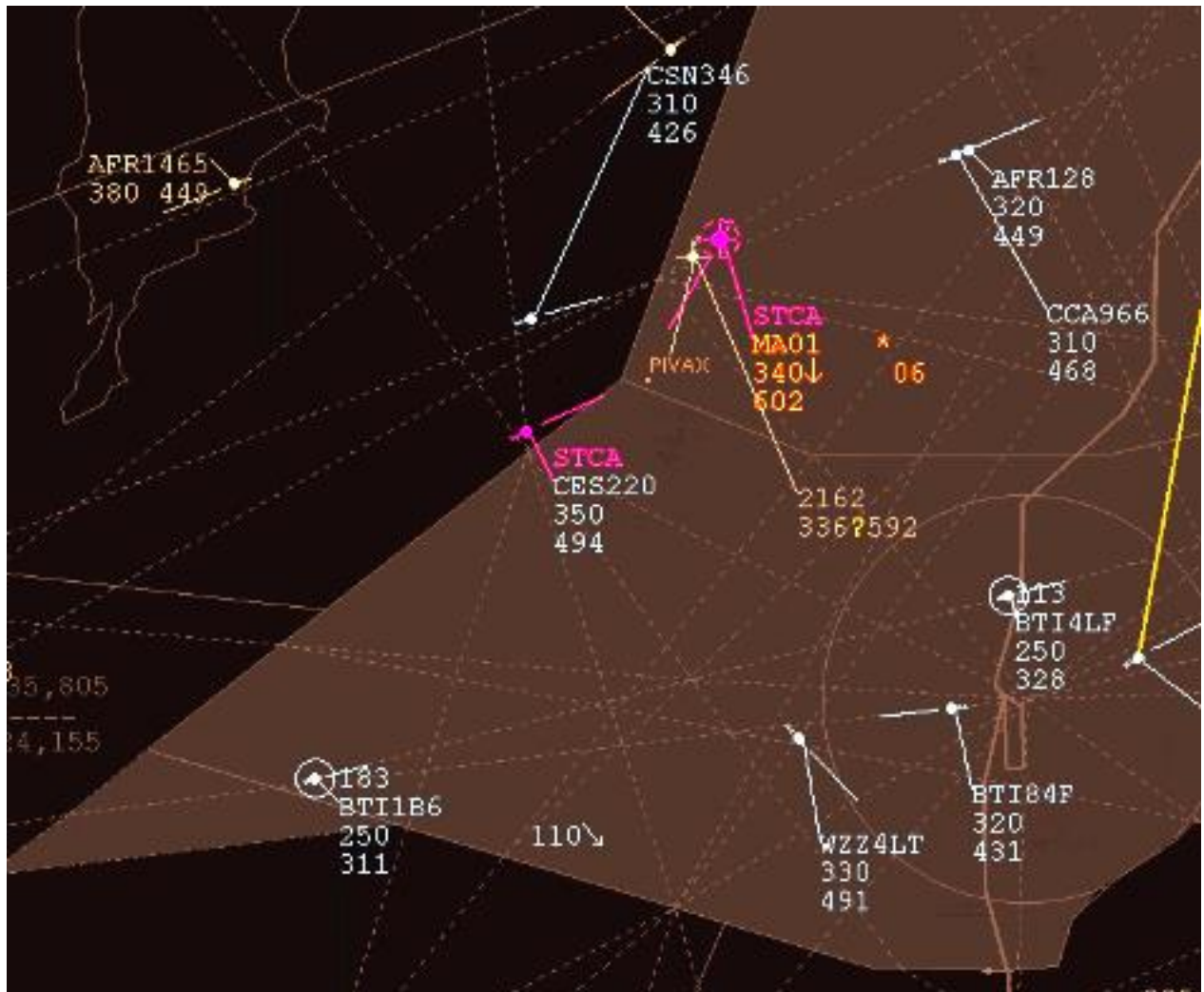


At that time **at 14:43:41** MTCD system indicates following information on potential conflict.

According to radar data and other sources at that moment in the potential conflict area were

operating at least two military Swedish aircraft with transponder Mode A (without altitude indication), two F16 of air policing aircraft with transponder Mode A/C and one Russian military SU27 without transponder.

At **14:43:55** STCA triggered between civil aircraft CES220 and military MA01



Radar picture 2

At 14:45:26 aircraft CES220 (at Flight level 350) reported to RIGA WEST controller about TCAS RA: "CES220 TCAS RA"

Riga WEx answered: "CES220 Roger"

Pilot of CES220: "CES220 I think there is fighter flight"

Riga WEx acknowledged: "Yes. Affirm. There is a military flight, they just passed you below"

Pilot of CES220: "Yes"

14:45:27 WE



At 14:45:27 LATERAL separation was **1.15NM** and vertical **700 FT**.

1.2. Injuries to persons

NIL

1.3. Damage to aircraft

NIL

1.4. Other damage

NIL

1.5. Personnel information

RIGA WEST Sector Controller Executive:

Male, 31 year old

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

Medical Certificate Class 3- valid.

He had reported for duty at 06:01:16hrs UTC and had been at his working position for 45 minutes (forty five) minutes when the incident occurred (14:45:27).

RIGA WEST Sector Controller Planner:

Male, 29 year old

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

Medical Certificate Class 3- valid.

He had reported for duty at 13:59:44 hrs UTC and had been at his working position for 45 minutes (forty five) minutes when the incident occurred (14:45:27).

FC (Fighter Controller), male, 28 years old, Certificate of QRA Controller (FCQ) Qualification No 596, valid.

Medical Certificate valid

FA (Fighter Allocator), male, 33 years old, Certificate of QRA Controller (FCQ) Qualification, No570 valid.

Medical Certificate valid

1.6. Aircraft information

Aircraft type – Airbus A350-941, owner of aircraft - “China Eastern Airlines”.

Aircraft type – Fighter aircraft F16, owner of aircraft – NATO Air Force.

1.7. Meteorological information

No factor to this occurrence investigation

1.8. Aids to Navigation

NIL

1.9. Communications

ATCC controllers provide communication with a computerized voice communication system using pre-set switching and distribution of various aeronautical frequencies and direct communication lines. Co-ordination within Riga FIR shall be performed using available “ATRACC+” system functionality.

The incident reconstruction was based on radar information and voice communications on frequency 135.1MHz transcript between Sector WEST Controller, OSUP, FMP of Riga ATCC, MCU Control Reporting Centre “KARMELAVA” Fighter Allocator (FA) and civil aircraft crew members involved in incident.

The quality of the recordings was good. The controller and crew members used standard phraseology and there had not principal errors in the used phraseology during communication. The OSUP and WPL as well FMP in intercommunication was using plain Russian language with elements of jargon.

1.10. Aerodrome information

NIL

1.11. Flight recorders

NIL

1.12. Wreckage and impact information

Not damage

1.13. Medical and pathological information

Not relevant to this incident

1.14. Fire

NIL

1.15. Survival aspects

NIL

1.16. Tests and research

NIL

1.17. Organizational and management information

Roles , responsibilities and general procedures related to airspace management of the Air Policing (AP) mission are established in the Letter of Agreement (LoA) among NATO and the Ministry of Defence of the Republic of Estonia, the ministry of Economic Affairs of the Republic of Estonia the Government of the Republic of Latvia and the Government of the Republic of Lithuania on airspace management arrangements in support of the NATO Air Policing (AP) mission and other air activities in the Baltic states **(TI-NATO-03/1)**.

According to LoA the ATC Unit within Riga Flight Information Region (FIRs) are responsible to provide Air Traffic Services (ATS), in accordance with the assigned **International Civil Aviation Organization (ICAO) airspace classification, within lateral and vertical limits of areas of responsibility, as published in the respective national Aeronautical Information Publications (AIPs)**. ATC Unit will provide ATS to NATO AP aircraft or other military flights, in accordance with national civil-military procedures and regulations described in the NTAs to this LoA.

National civil-military airspace coordination procedures is determined in separate agreements signed by respective national authorities and enclosed to LoA as NTA.

Such NTA consisting procedures to schedule and utilize designated military SUA for military aircraft within Latvian airspace is performed in accordance with "Letter of Agreement between Latvian National Armed Forces Air Force (LNAF AF) and Air Navigation Service Provider (ANSP) on scheduling and use of military special use airspace (SUA)".

Within the Baltic States CRC Karmelava will act as the primary Mission Control Unit (**MCU**) and will exercise Tactical Control (TACON) over Quick Reaction Alert (QRA).

General Air Traffic (GAT): "A flight conducted in compliance with relevant standard and recommended practices of ICAO and/or national civil aviation rules and procedures". Military aircraft of NATO nations and other NATO aircraft will fly in accordance to GAT rules when:

- Flying from/to a military/ Special Use Airspace (SUA);
- Flying en-route training flights;
- Performing other military/ flights;
- Flying from/to operating bases and alternate aerodromes;
- Performing a TANGO Scramble (T-SCR) before entering a designated area;
- Conducting a ROMEO Scramble (R-SCR) outside military SUAs.

Normally, such typologies of NATO military/ air activities will not be granted with special priority over other traffic.

Operational Air Traffic (OAT): "A flight, involved in the Air Policing or other military manoeuvres and operations, which do not comply with GAT rules". In particular, a military aircraft from NATO nations will fly OAT when:

- Conducting an ALPHA Scramble (A-SCR);
- Flying within a military/ SUA and under the control of a MCU in accordance with respective national regulations as specified in the NTAs.

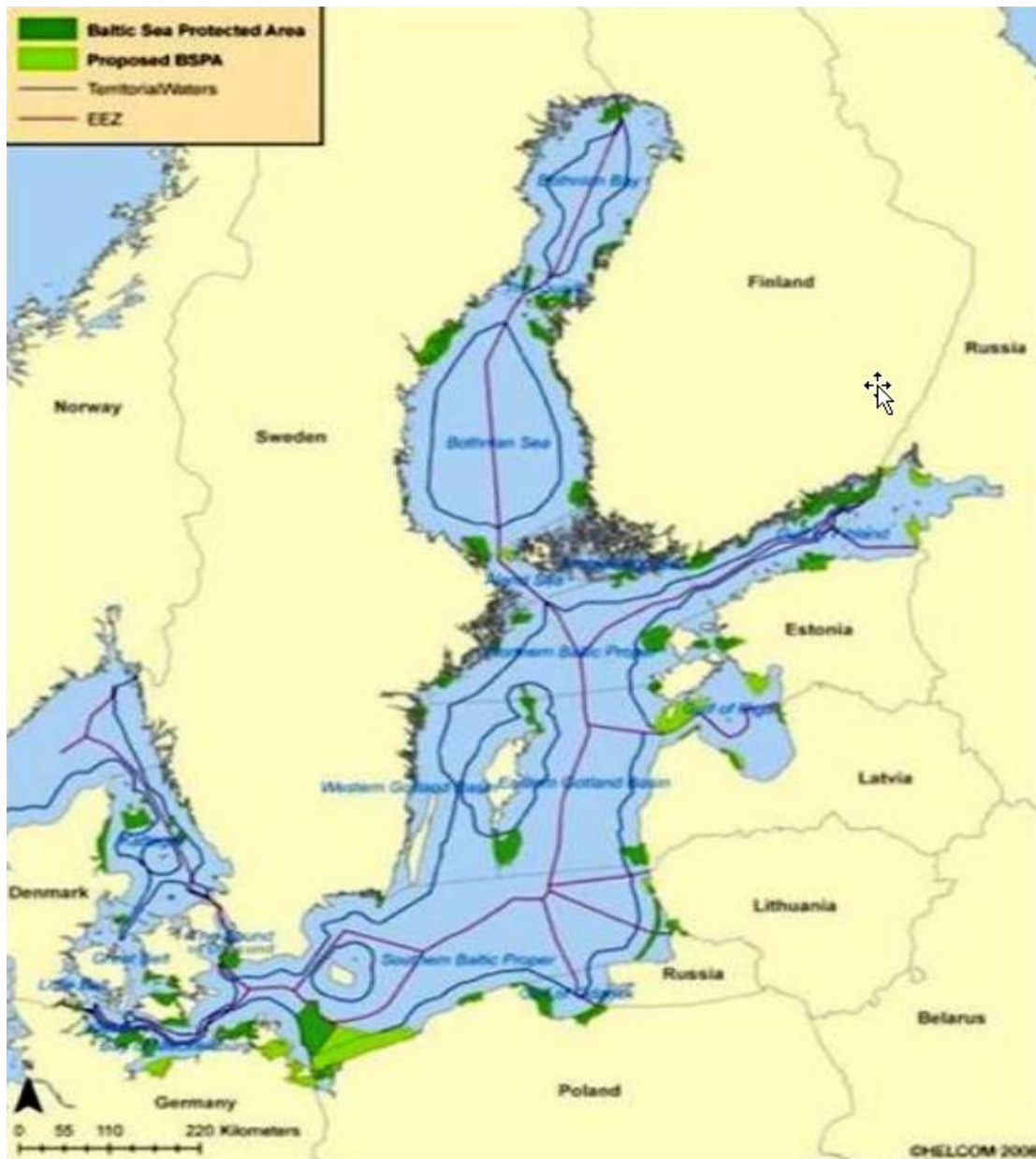
Flights over the **High seas** within **Riga FIR** shall be conducted in accordance with the rules specified in **Annex 2** to Chicago Convention.

(Paragraph 3.1.10 "Prohibited areas and restricted areas "Aircraft shall not be flown in a prohibited area, or in a restricted area, the particulars of which have been duly published, except in accordance with the conditions of the restrictions or by permission of the State over whose territory the areas are established.")

Provisions of **Annex 11** to the Chicago Convention shall be applied.

In Europe, some relevant provisions are included in the (SERA) of October 2012 Commission Regulation (EU) No 923/2014, which entered into force in and which is applicable since December 2014.

For the High seas, SERA mirror the Chicago Convention and refer to ICAO Annex 2 and to the Convention. When Member States have taken the responsibility to provide ATS over the High seas, SERA refers to ICAO Annex 11 as applicable for the provision of ATS (Paragraph 2.6 “Classification of airspaces” and Chapter 3. “Air Traffic Control Service”)



(High seas start outside the territorial sea and the territorial sea extends up to a maximum of 12 NM from the national coastline.)

The separation prescribed by Cabinet Regulation No. 966 “Procedures for the Performance of Flights by Military Aviation Aircraft in the Airspace of the Republic of Latvia” Adopted 21 November 2006 (paragraph 4.³¹.) is 5,000FT.

According to SUA LOA (**paragraph 11.1**) when Civil ATC unit confirms that it is able to assume responsibility for separation by phrase “**Scramble Vector and Level Assured**” the radar separation within class “C” will be provided –vertically not less than **5000FT** from the occupied FL/altitude and **2,000FT** by reduced separation (**Annex A, paragraph 11.2.**).

However, neither requirements of **Cabinet Regulation** and SUA LOA not applicable in the High seas. The applicable **AP LOA does not provide separation requirements.**

ACC Operational manuals (DI-GSV/GSVC-07, DI-GSV/GSVC-04, effective date 11.10.2018) did not contain A-scramble coordination procedures with MCU and roles and responsibilities between Fighter Allocator, OSUP, Planner and Executer. Operational manuals contained reference to the SUA LoA which was obligatory to comply with.

According to information given by staff of ANSP “LGS” the AP LOA was available in OPS room but didn’t not provide enough details to provide separation for A-Scramble flights. According to this document it is not clear, under what conditions civil ATC unit should change routes and altitudes of GAT. In the AP LOA important details are vague (staff responsibility), unclear (coordination between performers) or missing (requirements of vertical and horizontal separation).

1.18. Additional information

NIL

1.19. Useful or effective investigation techniques

NIL

2. Analysis

2.1. Introduction

The analysis is based on the Riga WEST sector Controllers – WPl and WEx, OSUP, FMP of Riga ATCC and MCU Control Reporting Centre “KARMELAVA” Fighter Allocator (FA) and Fighter Controller (FC) actions, radio and telephone communications between them, the military pilot actions, radar recordings, Air traffic service’s procedures.

Rules of Letter of agreement among NATO and the Ministry of Defence of the Republic of Estonia, the ministry of Economic Affairs of the Republic of Estonia the Government of the Republic of Latvia and the Government of the Republic of Lithuania on airspace management arrangements in support of the NATO AP mission and other air activities in the Baltic states analysis of civil and military ATC units responsibilities to ensure ATM.

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

2.2. Air traffic service’s procedures

2.2.1. Responsibility of the Mission Control Unit Control Reporting Centre

According to LoA:

- the ALPHA-SCR has priority in the use of the airspace over all other traffic, except aircraft in emergency;
- in the execution of ALPHA-SCR missions, the designated MCU will assume **the responsibility for the provision of fighter control to the AP aircraft during the mission within the airspace of the Tallinn, Riga and Vilnius FIRs.**
- the MCU will ensure that appropriate safety standards are preserved. During an ALPHA-SCR mission, MCU Master Controllers **are required to maintain the safest separation between the air policing aircraft and all other traffic flying** in their proximity.
- the MCU Master Controller will act in the safest manner against all the other traffic within the involved portion of the airspace. In accordance with the available information received by ATC Units, the MCU **Master Controller will ensure that the safety of other aircraft in the area will be not endangered.**

When an ALPHA-SCR order has been issued, the MCU Master Controller, or his designated representative, will ensure the maximum level of coordination with the appropriate ATC Units **during all phases of the mission.** Immediately before the initiation of an ALPHA-SCR mission, the following information shall be issued to the relevant ATC Unit:

- Airbase of departure of the AP aircraft;
- Position and identity (SSR Mode 3 A/C Code if available) of aerial target against which the scramble was ordered;
- Call sign and SSR Mode 3 A/C Code of the AP aircraft;
- Requested heading and Flight Level to reach the target in the shortest way;
- Information in case a supersonic run is needed;
- Any other additional information as required.

Once the ALPHA-SCR mission is airborne, the MCU shall inform relevant civil ATC Units about **radar identification of the AP aircraft, reporting SSR Codes and position,** as well as **crossing flight levels** and other relevant information, as appropriate.

2.2.2. Responsibility of the appropriate civil ATC Units

According to LoA:

- the ATC Unit shall acknowledge the information on an ALPHA-SCR mission received by the MCU and shall provide the necessary support to ensure the required priority to the ALPHA-SCR mission in the use of the airspace;
- the appropriate civil ATC Unit is responsible of providing a safe separation of other traffic from the radar-identified military aircraft involved in ALPHA-SCR, when essential information of the mission, such as required heading(s) and level(s), are acknowledged;
- the ATC Unit is responsible to avoid any potential conflicts with the ALPHA-SCR aircraft/formation, maintaining **standard separation between GAT traffic under their control** and providing **the best possible separation from radar-identified military aircraft** involved in an ALPHA-SCR mission;
- the ATC Unit shall acknowledge the heading and level required to fulfil the ALPHA-SCR mission and shall make every effort to ensure that these requirements are met. In case of exceptional circumstances when the required level is not available for impellent safety reasons, the ATC Unit **must allocate an alternative level which will have the minimal impact on the departing QRA(I) aircraft.** In this exceptional case, the requested level must be allocated as soon as possible once air traffic flow conditions permit.

- once the ALPHA-SCR mission is airborne, the relevant civil ATC Unit normally **have no responsibility for the separation of the AP aircraft executing an ALPHA-SCR mission** but they **shall provide available air traffic information** to all other aircraft in the vicinity of the AP aircraft.
- The relevant civil ATC Unit shall take any required actions to avoid or coordinate **any possible conflicts between aircraft under their control**, or otherwise known, and **ALPHA-SCR flights**.

The Air Policing LOA (TI-NATO-03/1) does not define clear what a safe separation is. It does not define under what conditions civil ATC unit should change routes and altitudes of GAT. In the AP LOA important details are uncertain, vertical and horizontal standards for safe separation not determined.

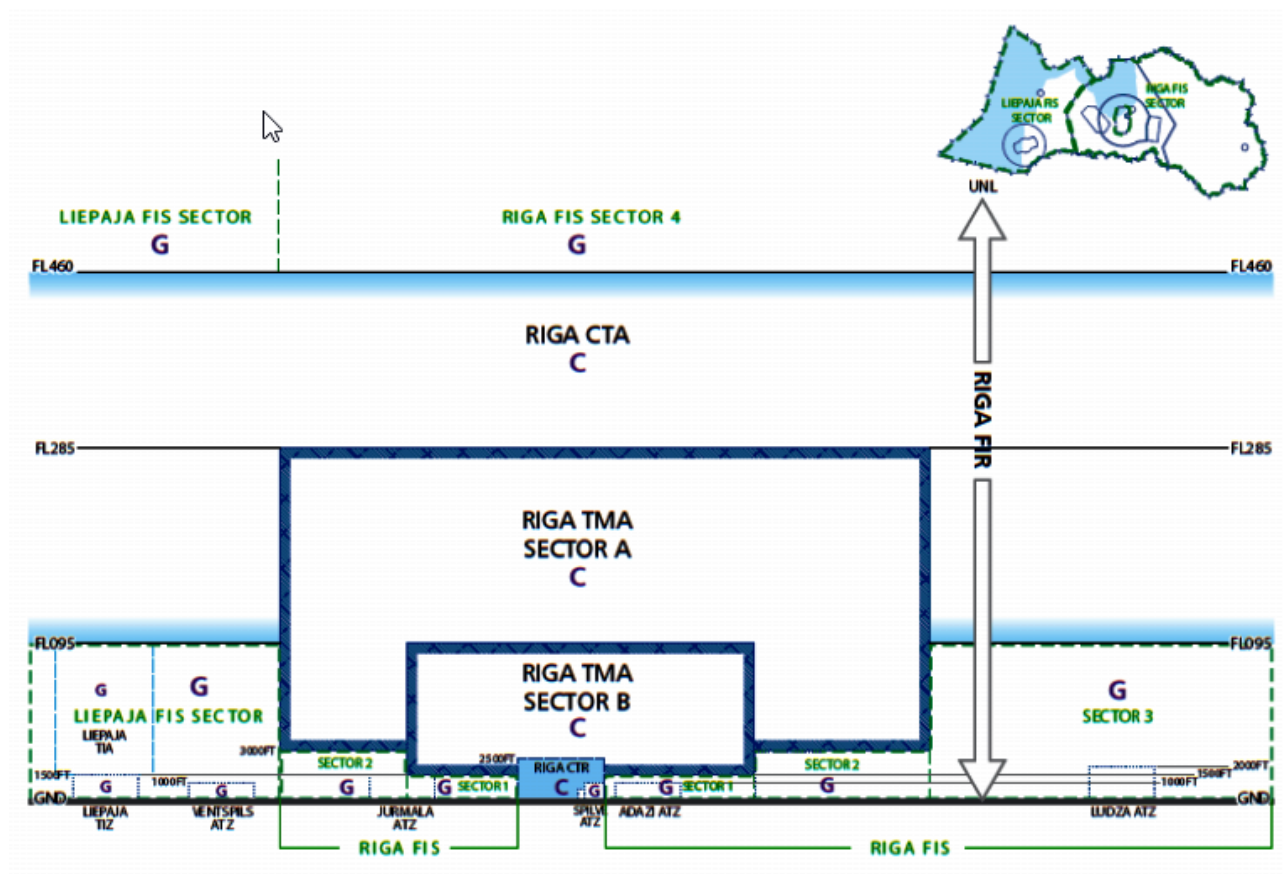
2.2.3. National civil-military airspace coordination procedures specified in the NTA.

National civil-military airspace coordination procedures are determined in separate agreements signed by respective national authorities of the Baltic States: procedures to schedule and utilize designated military SUA for military aircraft within Latvian airspace "**Letter of Agreement between Latvian National Armed Forces Air Force (LNAF AF) and Air Navigation Service Provider (ANSP)**".

These procedures define responsibilities and cooperation between **ANSP** and **LNAF AF MS** and **LNAF AF MC**.

Annex A of LoA (SUA) determines NATO or allied forces aircraft operation within Riga FIR.

The ATS airspace is classified in Riga FIR in accordance with Commission Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010.



Airspace classes “C” and “G” are used in accordance with AIP Latvia. Airspace within SUAs is not classified.

2.2.3.1. Separation during ALPHA Scramble

In the Annex A of **LoA (SUA)** effective from 25 April, 2016 approved by Commander of Lielvarde AFB and Head of ATM Department, SJSC “LGS” established following Separation Minimums.

Reduced Separation during ALPHA Scramble.

The radar separation may be reduced after coordination between **Civil ATC** unit and **MCU**:

Vertically:

- to 1000 Ft within the airspace below FL290;
- to **2000 Ft** within the airspace above FL290;

Longitudinally:

- to 5NM.

Separation from Supersonic Flights.

Within class "C" airspace Civil ATC unit will provide the radar separation from the aircraft flying supersonic:

Vertically:

- not less than 2000 Ft within the airspace below FL290;
- not less than 4000 Ft within the airspace above FL290; OR

Longitudinally:

- not less than 10 NM;

2.2.3.2. Spacing to avoid the active SUAs.

Within class "C" airspace GAT will be radar vectored by Civil ATC unit to avoid the active SUAs providing the defined spacing.

When spacing is not defined, GAT will be radar vectored by Civil ATC unit to provide the separation from the active SUAs boundary:

a) Vertically:

not less than 1000 Ft within the airspace below FL290; not less than 2000 Ft within the airspace above FL290; OR

b) Longitudinally:

- not less than 3 NM within Riga TMA;
- not less than 5 NM outside Riga TMA.

2.3. ATCC Operational Supervisor actions

According to Supervisor Operations manual DI-GSV/GSVC-07 during the process of work Operational Supervisor (OSUP) must:

- Analyse traffic conditions, aero navigational and meteorological situation in the responsibility area;
- Take decisions about commencing, restricting or terminating flights in the responsibility area;
- Take decisions for carrying out flights without transponders in the controlled airspace;
- Take decisions about airspace utilization taking into account real traffic situation

Supervisor Operations manual DI-GSV/GSVC-07 (effective date 17.10.2016) defines that procedures to schedule and utilize designated military SUA for military aircraft within Latvian airspace **is performed in accordance** with *"Letter of Agreement between Latvian National Armed Forces Air Force (LNAF AF) and Air Navigation Service Provider (ANSP) on scheduling and use of military special use airspace (SUA)"*.

Manuals did not contain A-scramble coordination procedures with MCU and roles and responsibilities between Fighter Allocator, OSUP, Controller's Planner and Executer.

The system FPL for "ALPHA SCRAMBLE" flight is prepared by FDA controller in accordance with initial data from **MCU and delivered by OSUP**:

- Heading;
- Level;
- Distance.

MCU Control of Reporting Centre “KARMELAVA” Fighter Allocator (FA) informed OSUP that military MA 01, 02 now turning southbound, because to intercept and interrogate the unknown traffic and requests OSUP A-Scramble turn towards route of CES220.

The FA informed that will maintain FL 280, and when the crossing traffic at FL 320 and FL 310 will pass, military will slowly to climb to FL 350, because **unknown traffic** had altitude about **FL350**.

Transcript verifies that OSUP approved FL340 and questioned confirmation from Fighter Allocator whether 1000 ft separation will be enough:

At 14:41:30 FA: “we will start to climb now to FL340, OK?”

OSUP: “now it’s approved climb 350, oh 340, will it be OK 1000 feet with an airchina?”

- **GALAXY** : “It will be OK for us”
- **OSUP:** “OK 340, copied. Thank you. Good buy”

According to Operational Manual OSUP don’t coordinate approved flight level with WEx Controller;

The separation prescribed by **Annex A of LoA (SUA) is 2000Ft** but not applicable in the High seas. The **AP LOA** does not provide any separation requirements.

2.4. Riga Control Sector WEST traffic situation and Controller Executive actions

ACC West sector configuration was 3.0 (2 ATCO) 14:00 – 15:00 UTC. Capacity 46 aircraft per hour (see attachment 1).

Actual traffic 14:00 – 15:00 UTC 42 aircraft per hour. The occurrence occurred during the peak traffic of the day. At the time of the occurrence besides A-Scramble and unidentified aircraft sector controlled 19 aircraft.

1. CES569 / A332	FL340	TODNA – DEREK
2. BAW879 / A320	FL380	TODNA – DEREK
3. AZA787 / A332	FL400	LOGNA* – KEDUX
4. AFR128 / B772	FL320	EVONA – NETNA
5. CCA966 / B77W	FL310	EVONA – NETNA
6. AUI172 / E190	FL346↑	NEKET – BERIL
7. CSN346 / A333	FL310	EVONA – NETNA
8. SSR 2141	FL000?	HEADING 292
9. SSR 2162	FL336?	HEADING 236
10. MA01 / 2F16	FL343↑	HEADING 195
11. CES220 / A359	FL350	GELDA* – NETNA*
12. BTI1B6 / DH8D	FL250	NINTA – EVRA
13. BTI4FL / DH8D	FL250	NINTA – EVRA
14. DLH736 / A343	FL330	GARSO – VALGA*
15. WZZ4LT / A321	FL330	GELDA – RUCAV*
16. PGT5CU / A20N	FL350	RASEL – MIRMA
17. BTI6D9 / BSC3	FL305↑	EVRA – NINTA
18. BTI84F / BSC3	FL320	EVRA – NINTA
19. BTI12G / DH8D	FL230	EVONA – EVRA

Occurrence took place near EVRR FIR border. The A-Scramble was flying South West from the West border of EVRR FIR. CES220 had established radio contact with West ACC controller **2 minutes and 16 sec** before the occurrence took place. CES220 has entered AoR of Riga ACC 50 sec before the occurrence took place.

Vertical separation is carried out according to ICAO Annex 2 “Rules of the Air” Table of Cruising levels 3a – **“in areas where, on the basis of regional air navigation agreements and in accordance with conditions specified therein, a vertical separation minimum (VSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive:”**

** Except when, on the basis of regional air navigation agreements, a modified table of cruising levels based on a nominal vertical separation minimum of 300 m (1 000 Ft) is prescribed for use, under specified conditions, by aircraft operating above FL 410 within designated portions of the airspace.*

Radar separation between identified controlled aircraft and unknown aircraft:

When an **identified controlled aircraft is observed to be a conflicting path with an unknown aircraft** deemed to constitute a collision hazard, the pilot of the controlled flight shall, whenever practicable:

- be informed of the unknown aircraft, and if so requested by the controlled flight or if, in the opinion of the controller, the situation warrants, **a course of avoiding action should be suggested;** and
- be notified when the conflict no longer exists.

At **14:37:44** Riga OSUP informed Riga WEx about policing aircraft intention to change

heading as well as climb to FL340/350 and incoming information from Latvian Air Forces that unknown military aircraft was already in Riga FIR at level 338.

Information about 1,000ft separation coordinated by OSUP with FA MCU passed on from OSUP to WEx. STCA warning was available to WEx. WEx did not have information regarding the location and altitude of unidentified aircraft, therefore there it was problematic to initiate separation management between civil and AP aircraft taking into account the presence of aircraft which location and altitude were fully or partly not visible to Executer.

Controller West Executer **did not pass traffic information to CES220** about conflicting A-Scramble according to requirement in Operation Manual DI-GSV/GSVC-02 Chapter 2.6.1 “Radar separation” and 2.7 “Essential traffic information” that essential traffic information must be passed to the aircraft as well Executer **did not inform CES220** about A-Scramble.

Such information could have provided opportunity to the flight crew of CES220 to prepare and take avoiding action.

AP aircraft was controlled by MCU and does not have voice communication with ACC. Air Policing aircraft communicate with MCU only on secured and crypted frequency and they do not monitor Riga ACC frequency. Therefore, Executer has no possibility to pass critical information to Air Policing aircraft.

2.5. MCU Control Reporting Centre “KARMELAVA” Controllers actions.

At disposal of investigation was not recordings of MCU Flight Controller (FC) with military ACFT crew.

All Air Policing are controlled by staff of MCU CRC Karmelava and they does not have voice communication with civil ACC. Air Policing aircraft communicate with MCU Controllers only on secured and crypted frequency and they do not monitor ACC frequency.

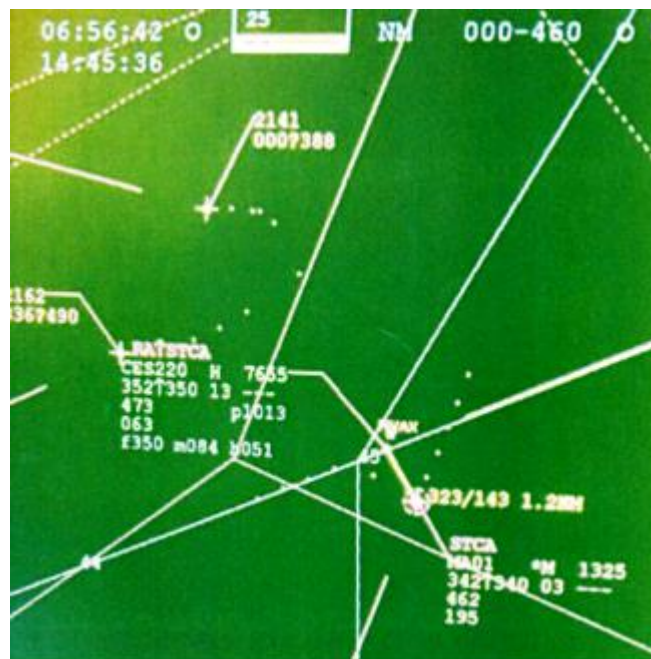
The unknown military traffic was flying South East from the West boarder of EVRR FIR. Prior and during the occurrence, Swedish OAT and unknown traffic was operating in vicinity of EVRR FIR without transponder. Civil aircraft CES220 had entered West ACC 50 sec before the occurrence took place.

The situation that led to the incident began when Fighter Allocator requests OSUP that it is necessary to turn AP aircraft towards South East in direction to route of CES220 because to intercept and interrogate the unknown traffic. Taking into account that the unknown traffic had altitude approximately FL340 - FL350, Fighter Allocator informed that A-Scramble will climb to FL340 and his request had approved by OSUP. OSUP considered that the military flight has priority and MCU can request reduced separation due to tactical necessities.

The telephone communication transcript (at **14:41:30**) confirms that when OSUP approved FL340 he questioned confirmation from Fighter Allocator whether such separation (**1000FT**) will be enough. OSUP approved FL without coordination with sector West Executer.

Fighter Allocator, Fighter Controller, OSUP, Planner and Executer could have decided to increase separation.

According to statement of MCU CRC Karmelava Fighter Controller he gave instruction to A- Scramble MA01 to maintain hard FL340 due to traffic and MA01 acknowledged order. By the time where the MA01 flight joined with SU27 were in the same geographical position with civil CES220 the altitude of MA01 flight was FL343 and CES220 at FL350.



Minimal longitude distance from A- Scramble MA01 and civil CES220 was **1.2NM** which caused the TCAS RA of CES220.

The SU27 passed near CES220 when TCAS RA was activated. PIC of MA01 told that SU27 was flying on his right side and above and passed CES220 flight closer than MA01 flight.

After A-Scramble the pilot of MA01 said that he had full SA, both visual on target and traffic.

3. Conclusions

During process of investigation were made the following conclusions:

3.1. Findings

- In the AP LOA important details are uncertain, vertical and horizontal standards for safe separation not determined, important details are vague (staff responsibility), unclear (coordination between performers) or missing (requirements of vertical and horizontal separation);
- NTA consisting procedures to schedule and utilize designated military SUA for military aircraft within Latvian airspace is performed in accordance with "Letter of Agreement between Latvian National Armed Forces Air Force (LNAF AF) and Air Navigation Service Provider (ANSP) on scheduling and use of military special use airspace (SUA)";
- Cabinet regulation No 966 of November 21, 2006. "Procedures for the Performance of Flights by Military Aviation Aircraft in the Airspace of the Republic of Latvia" determines rules for military flights in Latvian airspace in general and does not cover requirements of AP.
- In order to maintain an overview traffic, the Air Traffic Control radar system ATRACC+ was in use;
- Flight were coordinated with appropriate ATS Units Malme, Tallinn, Vilnius, Riga and MCU CRC Karmelava;
- At the time of the incident the traffic was handled by Sector WEST Executive Controller;
- Riga Sector WEST Controller's WEx and WPI held valid licenses and ratings and was qualified and current at their positions;
- MCU CRC Karmelava Controllers FC and FA held valid licenses and ratings and was qualified and current at their positions;
- A-Scramble aircraft flights was controlled by MCU CRC Karmelava staff and did not have voice communication with ACC;
- FA of MCU CRC requested FL 340 and OSUP approved FL340 with 1000FT vertical separation;
- OSUP approved FL340 and separation 1000FT ;
- Occurrence took place near RIGA FIR western boarder over High Seas;
- The occurrence occurred during the peak traffic of the day. At the time of the occurrence besides A-Scramble and unidentified aircraft sector controlled **19 aircraft**;
- Civil aircraft **CES220** had entered West ACC sector 50 sec before the occurrence took place;

- The STCA warning trigger reason probably was repetitive deviation of MA01 from FL340 till FL343;
- STCA warning appeared 93 seconds before the A-Scramble flight passed below the route of CES220;
- OSUP passed information to WEx Controller of Alpha Scramble separation 1000ft and STCA warning was available to WEx;
- WEx Controller did not pass traffic information to CES220 about conflicting A-Scramble;
- According to WEx controller statement he can't change the altitude of CES220 because both aircraft were very close to each other, and a given altitude change clearance to the flight crew could have escalated the situation;
- MA01 flight in close proximity to CES220 continued to deviate from coordinated FL340, when it was approaching FL343 TCAS RA was triggered on CES220;
- When TCAS ALERT signal triggered on Civil ACFT CES220, crew followed TCAS RA instructions;
- No action taken from MCU FA and FC which controls A-Scramble flight 1,000ft below the route of CES220 to instruct MA01 pilot to deescalate ;
- there were not actions taken by WPl and WEx on STCA warning
- The pilot of MA01 had full SA, both visual on target and traffic;
- There was fixed violation of the Military aircraft coordinated with ANSP flight level 340;
- Insufficient separation between GAT and OAT (A-Scramble) occurred, minimal vertical separation between aircraft was **700FT**, horizontal ~ **1.2 NM**;
- The pilot of MA01 had full SA, both visual on target and traffic;
- Neither requirements of Cabinet Regulation No. 966 "Procedures for the Performance of Flights by Military Aviation Aircraft in the Airspace of the Republic of Latvia" and SUA LOA **not applicable in the high seas**;
- The applicable AP LOA does not provide separation requirements;
- ACC Operational manuals (**DI-GSV/GSVC-07, DI-GSV/GSVC-04, effective date 11.10.2018**) did not contain A-scramble coordination procedures with MCU and roles and responsibilities between Fighter Allocator, OSUP, Planner and Executer;

- The communication between OSUP and WPI as well FMP was used plain Russian language with elements of jargon;
- At the time of incident Visual Meteorological Conditions (VMC) prevailed.

3. 2. Causes

3.2.1. Main Cause

Lack of clear instructions for staff and ambiguous documents in the main legislative acts in force which establish roles, responsibilities and general procedures related to airspace management of the Air Policing (AP) mission, procedures of the ATC Unit within Riga Flight Information Region (FIRs) to provide Air Traffic Services (ATS), in accordance with the assigned International Civil Aviation Organization (ICAO) airspace classification within lateral and vertical limits of areas of responsibility.

3.2.2. Contributing causes

- MA01 transponder Mode C was switched “ON”;
- Non-cooperative (without flight plan, transponder and communication with Riga Air Traffic Control Center) Russian military SU-27 aircraft performed flight over the High Seas and passed in close proximity from civil aircraft CES220;
- unclearly defined MCU CRC responsibilities in the AP LOA in case of AP mission (A-Scramble), not defined separation standards;
- ambiguous definition of ANSP staff instructions and requirements in the Operational Manuals for providing A-scramble missions;
- Failure of the pilot of F16 to maintain cleared top flight level 340 due to very high speed or sharp climbing rate at the time Fighter Controller instruction;
- No action taken from MCU FA and FC which controls A-Scramble flight 1,000ft below the route of CES220 to avoid;
- No timely warning action taken by MCU FC, which controlled A-Scramble flight 1,000ft below the route of CES220, to instruct MA01 pilot.

3.3. Safety actions

Following this serious incident the following safety actions were taken based on the findings of the internal investigation by ANSP “LGS”:

- Detailed information of the incident were given to air traffic controllers, additionally instructions are provided during briefing before the start of the shift;

- All operational personnel were obliged to acquaint themselves with the results of the internal investigation
- Amendments were made in the Operational Manuals of OSUP and ATC Controller's in Chapter "Scheduling and use of military special use airspace (SUA)" on July, 2019;
- ANSP "LGS" organized a meeting with Ministry of Transport, Ministry of Defence, CAA, NAF about safety incidents that took place in previous years during the A-Scramble, legal regulation and necessary further amendments.
- ANSP "LGS" organized a meeting with the MCU CRC in Karmelava to conduct a overall analysis of the particular safety incident, to discuss the regulatory framework and further actions coordination during A-Scramble.

4. Safety Recommendations

During the investigation it was revealed that in the main legislative acts in force which establish roles, responsibilities and general procedures related to airspace management of the Air Policing (AP) mission, procedures of the ATC Unit within Riga Flight Information Region (FIRs) to provide Air Traffic Services (ATS), in accordance with the assigned International Civil Aviation Organization (ICAO) airspace classification, within lateral and vertical limits of areas of responsibility have lack of clear instructions for staff and documents have ambiguous requirements.

Consequently, the Transport Accident Incident Investigation Bureau addressees the following recommendation to the Air Navigation Service Provider Joint Stock Company "LGS":

Recommendation - LV2020-001

The ANSP shall come forward with a proposal to amend Letter of Agreement between Latvian National Armed Forces Air Force and ANSP with requirement to MCU to instruct the ALPHA-SCR aircraft to turn off their SSR transponder.

Recommendation - LV2020-002

The ANSP shall come forward with an initiative and, within its competence, to address the document deficiencies by coordinating with all authorities involved in national civil-military airspace coordination procedures.

February 17, 2020

Investigator in charge

Visvaldis Trūbs

Director of Transport Accident and
Incident Investigation Bureau

Ivars Alfreds Gaveika

