I HEREBY CONFIRM

Chairperson

of the Interstate Aviation Committee

_____ O.G. Storchevoy

«*15*» _____*01*___ 2024

INTERSTATE AVIATION COMMITTEE

FINAL REPORT

ON RESULTS OF AIRCRAFT ACCIDENT INVESTIGATION

Type of an aircraft accident	Aircraft crash
Type of aircraft	Aeroplane Beech 95-B55
State and registration markings	OM-KVV
Owner	Private person
Aviation administration	CA Committee of the Republic of Armenia
Accident site	Republic of Armenia, Kotayk marz, at a distance of 1 km south-east from Djraber settlement, coordinates: 40°20'21.70" of north latitude; 44°39'06.60" of east longitude
Date and time	1 December 2022, 13:13 p.m. local time (09:13 UTC)

In accordance with Standards and Recommended Practices of International Civil Aviation Organisation this reporting has been made solely to prevent aircraft accidents.

An investigation pursued within the frames of this Report does not imply an ascertainment of anyone's share of guilt or liability.

The criminal aspects of this accident are presented within the frames of a separate criminal case.

The list of abbreviations used in this Report

ADS-B	-	automatic dependent surveillance broadcast
GA	-	geographical azimuth
AIP	-	aeronautical information publication
AMC	-	aviation-meteorological centre
ANCO	-	autonomous non-commercial organization
SC	-	stock company
GPA	-	general purpose aviation
AA	-	aircraft accident
ATIS	-	automatic terminal information service
ATC	-	aviation training centre
FS	-	flight safety
e.l.	-	east longitude
P	-	propeller
MFEC	-	medical flight-expert commission
FS	-	flight strip
SR	-	secondary radar
AC	-	aircraft
CA	-	civil aviation
CAC	-	civil aircraft
FVE	-	further vocational education
CJSC	-	closed jointed stock company
ICAO	-	International Civil Aviation Organisation
CAPMI MCS and DST	-	Commission for analysis and processing means of information and modelling conflict situations and development of software technologies
PIC	-	pilot-in-command
CMAEE FFS	-	Commission on monitoring, analysis and expert examination in the field of flight safety
ASC	-	automation solutions complex
IAC	-	Interstate Aviation Committee
MLAT	-	multiliteration
MOS	-	meteorological observing station
OHF	-	occupational health facility
ITD	-	Interregional Territorial Department
MES	-	Ministry of Emergency Situations of the Republic of Armenia
S	-	settlement
NGANCO	-	non-governmental autonomous non-commercial organisation
LLC	-	limited liability company
ATM	-	air traffic management
VFR	-	visual flight rules

IFR	-	instrument flight rules
PR	-	primary radar
SRW	-	search and rescue works
TW	-	taxiway
FOM	-	flight operations manual
FIR	-	flight information region
n. l.	-	north latitude
CA	-	certificate of airworthiness
SPS	-	since placed in service
PJSIC	-	Public Joint-Stock Insurance Company
USA	-	United States of America
M	-	maintenance
ATC	-	air traffic control
FOM	-	flight operation management
FAR-147	-	Federal Aviation Regulations "Requirements for aircraft crew members, aircraft maintenance specialists and flight operations officers (air traffic controllers) of civil aviation " approved by the Order of the Ministry of Transport of Russia No 147 of 12 September 2008
FSIS RICAS	-	federal state information system "Register of issued certificates of aviation personnel"
FSUE	-	federal state unitary enterprise
AA II		Air Accidents Investigation Institute (Czech))
AMIA		Aviation and Maritime Investigation Authority (in Slovak)
BFU	-	German Federal Bureau of Aircraft Accident Investigation (in German- Bundesstelle für Flugunfalluntersuchung)
GAMET	-	area forecast for low level flights
METAR	-	Meteorological Aerodrome Report (by aeronautical meteorological code)
MSAW	-	Minimum Safe Altitude Warning
NTSB	-	US National Transportation Safety Board
QNE	-	standard atmospheric pressure (1013 hPa or 760 mm Hg)
QNH	-	atmospheric pressure adjusted to mean sea level according to standard atmosphere
SID	-	Standard Instrument Departure
TAF	-	terminal aerodrome forecast (in a meteorological code)
UTC	-	coordinated universal time

General information

On 1 December 2022, at 13:13 p.m. local time (09:13 UTC)[1], during flight operation for GPA purposes an AA occurred with aeroplane Beech 95-B55 OM-KVV belonging to a private person.

There were two pilots on the aeroplane board (both citizens of the Russian Federation). As a result of AA an AC was decomposed and partially destroyed by ground fire, the pilots were killed.

Information on AA was received by IAC at 15:41 on 2 December 2022.

In compliance with the letter of the Deputy Minister of Territorial Administration and Infrastructure of the Republic of Armenia № UU/29.2/32797-2022 of 2 December 2022 an AA investigation was conducted by the Commission appointed upon the Order of the Chairperson of IAC Committee of Aircraft Accident Investigation № 40/1047-r of 2 December 2022 composed of:

The Chairperson of the Commission	**Zebrin S.V.**, Deputy Chairperson of CMAEE FFS IAC - head of expert examination department in the field of FS.
Members of the Commission:	**Gabzalilov R.** R., advisor to the technical condition examination department AC CAPMI MCS and DST IAC;
	Kuzmenko M. Yu., advisor to the Commission for monitoring, analysis and expert examination in the field of flight safety;
	Timonin A. L., Head of IT support department of CAPMI MCS and DST IAC.

[1] Hereinafter, if it is not specifically mentioned, Coordinated Universal Time (UTC) is indicated, the local time complies with UTC + 4h.

In accordance with Annex 13 "Aircraft Accident and Incident Investigation" to the Convention on International Civil Aviation, the notifications on aircraft accidents have been communicated to NTSB (USA) - authorised body of AA investigation of State of design and State of manufacture of AC; AMIA (the Slovak Republic) — authorized body of AA investigation of AC registration State; BFU (Germany) and AAII (the Czech Republic) authorized bodies of the States providing upon request the necessary information.

For participating in investigation authorized representatives were appointed from NTSB and AMIA.

Investigation was initiated on 2 December 2022.

Investigation was completed on 15 January 2024.

Assistance in the investigation was provided by the members of the Commission appointed upon the Decree of the Prime-Minister of the Republic of Armenia № 1449-A of 5 December 2022, as well as representatives of the Civil Aviation Committee of the Republic of Armenia and other organisations.

The preliminary investigation was conducted by Kotayk Regional Investigative Department of the Investigative Committee of the Republic of Armenia.

1. Actual information

1.1. Flight history

According to the available information the aeroplane Beech 95-B55 OM-KVV was sold by the previous owner (private person) to the new owner (also a private person). Under the terms of sale and purchase contract the aeroplane should have been delivered to the Republic of Armenia to be transferred to the new owner. A ferry flight was conducted by PIC — a citizen of the Czech Republic — en route: Aerodrome Příbram (LKPM[2], the Czech Republic) — Aerodrome Ivanka Bratislava (LZIB, the Slovak Republic) - Aerodrome Burgas (Sarafovo) (LBBG, the Republic of Bulgaria) — Aerodrome Ankara Esenboğa (LTAC, the Republic of Turkey) — Aerodrome Zvartnots (UDUZ, the Republic of Armenia). There was a second pilot on board (citizen of the Czech Republic)[3].

On 27 November 2022 through the VIP Aviation Operations[4] agent upon request of a company ENLEVER FOUNDATION (the Slovak Republic)[5] the Air Operations Regulation Department of the Civil Aviation Committee of the Republic of Armenia received a request for operating a single non-scheduled non-revenue flight en route: Aerodrome Ankara (the Republic of Turkey) — Aerodrome Zvartnots (the Republic of Armenia) and back, by attaching the copies of documents on the aeroplane Beech 95-B55 OM-KVV and PIC. The flight to Aerodrome Zvartnots was planned for 28 November 2022, and back — for 30 November 2022.

In fact, the departure from Ankara Aerodrome was carried out at 06:51 on 29 November 2022, landing at Zvartnots Airport was carried out at 09:07. According to the available information upon arrival the aircraft has been transferred to the new owner.

[2] A ~~four-letter location indicator of~~ an aerodrome location drawn in compliance with the ICAO rules.
[3] According to FOM the minimum composition of crew is 1 pilot.
[4] Service provision agent, e-mail: ops@vipaviation.ge, Tbilisi Airport (ground service for Georgia, Azerbaijan, Kazakhstan, Egypt, the Ukraine, Turkey and Armenia).
[5] AC operator in Slovak Republic.

On 29 November 2022 the International Air Transport Regulation Division of Air Transport Regulation and International Cooperation Department of Rosaviation received a request for authorisation of a single flight operation for ferrying the aircraft Beech 95-B55 OM-KVV en route: Zvartnots Aerodrome (the Republic of Armenia) — Astrakhan Aerodrome (Russia) — Tambov Aerodrome (Russia), by attaching the copies of documents on the aeroplane Beech 95-B55 OM-KVV and two pilots (citizens of the Russian Federation). The authorisation for flight operation was issued in due time and was effective within 48 hours starting from 00:00 on 30 November 2022.

On 30 November 2022 the Air Operations Regulation Department of the Civil Aviation Committee of the Republic of Armenia received a request for change of a route for AC Beech 95-B55 OM-KVV: from Zvartnots Aerodrome (the Republic of Armenia) — Ankara Aerodrome (the Republic of Turkey) to Zvartnots Aerodrome (Republic of Armenia) — Astrakhan Aerodrome (Russia). According to the submitted plan the flight was declared under IFR. An authorisation for changing the route was issued in due time.

According to Zvartnots Aerodrome security camera records the refuelling[6] of AC was performed from cans on 30 November 2022 by the pilots — citizens of the Russian Federation. The pilots — citizens of the Czech Republic provided assistance and according to their report refuelling of an anti-icing system with nearly 6 litres of TKS fluid was also performed.

The departure en route: Zvartnots Aerodrome (the Republic of Armenia) — Astrakhan Aerodrome (Russia) was planned for 08:00 on 1 December 2022.

The pilots (two citizens of the Russian Federation and one citizen of the Czech Republic) arrived at the aerodrome on 1 December 2022 about 5 hours before the planned departure time, performed compulsory procedures on passing the aviation safety zone, customs, border control and arrived at the flight briefing room for performing pre-flight procedures.

[6] The fuel was bought at Yeghvard Aerodrome (the Republic of Armenia) located at 13 km north of Yerevan. According to the reporting of Yeghvard Aerodrome worker the amount of the bought fuel (petroleum 100LL) was nearly 300 litres.

Two pilots — citizens of the Russian Federation[7] arrived from the flight briefing room to the aircraft at 07:55 and carried out examination of AC. Medical examination of pilots has not been carried out.

At 08:14 the crew got in contact with the flight control officer of Zvartnots Aerodrome.

An authorisation from the flight control officer to start the engines was received at 08:31. *"OMKKU, Start up approved*[8]*, …»*.

The engines were started at 08:32. After the engine warm-up taxiing to line-up was performed at 08:50.

At 09:00 the take-off was performed.

The trajectory of an accident flight built based on air traffic control radar data is presented in Picture 1.

Picture 1. The accident flight trajectory built based on air traffic control radar data

[7] Pilots - citizens of the Czech Republic later that day departed as passengers by flight W6 2892 a/c «Wizz Air» to Vienna (Austria).

[8] Hereinafter, unless otherwise specified in italicised citations, author's edition has been retained.

During the flight the PIC negotiated by radio communication with Yerevan aerodrome controller. It was at 09:11:05 that the PIC last time got in contact with the air traffic controller, moreover the altitude was approximately 10300 ft (3139 m)[9], ground speed — 113 kt (209 km/h). Thereafter the crew did not any more get in contact with the controller.

At 09:13:15.6 ASC ATC "Galaktika" registered the last log report from the AC, moreover the altitude was 7025 ft (2140 m).

The crew did not answer the air traffic controller's requests after which the air traffic controller made an alarm notification according to the chart.

The AA site coordinates were transferred to MES of the Republic of Armenia by the sand pit worker having identified the accident by the sound from the collision of the aircraft with the ground and later having detected burning components of aeroplane structure.

As a result of AA the pilots were killed. The aircraft was decomposed and partially destroyed by ground fire.

1.2. Bodily injuries

Bodily injuries	Crew	Passengers	Other persons
With fatal outcome	2	0	0
Serious	0	0	0
Negligible/absent	0 / 0	0 / 0	0 / 0

1.3. Aircraft damages

The aircraft external appearance at AA site is illustrated in Picture 2. The aircraft was completely destroyed and partially burnt.

[9] Here and further, unless otherwise specified the altitude values are given by QNH pressure.

Picture 2. The overall view of an AA site

1.4. Other damages

There are no other damages.

1.5. Personnel information

PIC

Surname, name, patronymic	**Protsenko Aleksey Valeryevitch**
Age	43 years old
Education	Higher (not flying)
Certificate of aviation personnel of CA	Private Pilot License № 0147642, issued on 5 September 2022 by Rosaviation, ratings: *"single-engine, land-based aircraft; multi-engine, land-based aircraft"*
Medical examination by MFEC	On 6 April 2021 MFEC LLC "Medical Sanitary Unit (MSU) "Flight"", medical opinion II of class VT № 154430, effective till 6 April 2023
Minimum number of PIC	VFR
Total flight experience	About 100 hours
Interruptions in flights during the last year	No information available

Flight experience for the last 30 days	No information available
Flight experience for the last three days	Had no flight experience
Flight experience as of the day of accident	00 hours 13 minutes
Last inspection of flight technique and pilotage	15 August 2022, pilot-instructor, aircraft P2006, conclusion: *"May operate flights as a PIC on a multi-engine, land-based aircraft Tespat P2006»*
Aircraft accidents in the past	None
Rest before flight	More than 8 hours in hotel conditions
Medical control before departure	Self-control
Level of English proficiency by ICAO scale	Not tested

Information on PIC is presented according to FSIS RICAS data, copies of documents submitted to the central office of Rosaviation for obtaining the Private Pilot License (submitted by head of Rosaviation FOM) and information provided by the director of NGANCO FVE "ATC "NEBOSVOD-AVIA" (where PIC passed initial pilot training) and by the director of ATC LLC "AERO REGION TRAINING" (where PIC passed training for multi-engine, land-based aircraft).

In the period from 2 July 2016 to 13 November 2016 PIC passed training in NGANCO FVE "ATC "NEBOSVOD-AVIA" (certificate FVE № 214, issued on 30 October 2014 by Rosaviation, effective till 29 October 2017, certificate FVE № 322, issued on 22 July 2019 by Rosaviation limitless) by the programme on initial training on A-22 aircraft, moreover the volume of class room training was 208 hours, the volume of ground training was 19 hours, the volume of synthetic training was 06 hours, flight training was 42 hours 44 minutes (out of which night flying was 03 hours 33 minutes, instrument flights was 04 hours 10 minutes, route flying was 05 hours 10 minutes, individual flying was 11 hours 05 minutes). Upon completion of training a license № 32 of 13 November 2016 was issued.

Central ITD of Rosaviation issued a Private Pilot Licence № 0049366 on 2 December 2016 with the rating: *"single-engine, land-based aircraft"*.

In the period from 12 March 2022 to 15 August 2022 PIC passed further training in ATC LLC "AERO REGION TRANING" (ATC certificate № 335 issued on 28 April 2021 by Rosaviation, limitless) according to additional further training programme "Pilot training programme for an multi-engine, land-based aircraft Tespat P2006 (training for a new type of AC" (approved by Rosaviation FOM on 12 March 2021). The volume of class room training was 104 hours, the volume of ground training was 18 hours 30 minutes, the volume of synthetic training was 12 hours, flight training was 17 hours 10 minutes (out of which individual flying was 04 hours 10 minutes, night flying was 1 hours 00 minutes, instrument flight was 00 hours 20).

Upon completion a refresher training certificate № 00126 was issued on 16 August 2022.

Upon the application from PIC (21 August 2022) on entering rating into the certificate Rosaviation issued on 5 September 2022 a Private Pilot Licence № 0147642 with the following ratings: *"single-engine, land-based aircraft; multi-engine, land-based aircraft"*

The PIC did not have any rating on instrument flight permission [10].

Pilot

Surname, name, patronymic	**Rogatkin Vitaliy Vasilyevitch**
Age	39 years old
Education	Not flying
Certificate of aviation personnel of CA	Private Pilot License № 0111709, issued on 20 October 2020 by Rosaviation, ratings: *"single-engined, land-based aircraft"*

[10] The requirements for obtaining it are prescribed by Chapter VII of FAR-147.

Medical examination by MFEC	On 17 February 2020 MFEC LLC "MSU "Flight"", medical opinion II of class VT № 108905, effective till 17 February 2025
Total flight experience	About 100 hours
Interruptions in flights during the last year	No information available
Flight experience for the last 30 days	No information available
Flight experience for the last three days	Had no flight experience
Flight experience as of the day of accident	00 hours 13 minutes
Last inspection of flight technique and pilotage	1 October 2020, pilot-instructor, aircraft Cessna-172 B, conclusion: *"The level of aircraft control skills comply with the requirements for a candidate applying for a private Pilot Licence with "single-engine, land-based aircraft" rating.*
Aircraft accidents in the past	None
Rest before flight	More than 8 hours in hotel conditions
Medical control before departure	PIC control
Level of English proficiency by ICAO scale	Not tested

The information on the pilot is presented according to FSIS RICAS data and the copies of documents submitted to the central office of Rosaviation for obtaining the Private Pilot License (submitted by head of Rosaviation FOM).

In the period from 20 February 2020 to 1 October 2020 the PIC passed training in ANCO FVE "C7 training" (ATC certificate № 53 issued on 16 August 2019 by Rosaviation limitless) according to additional further professional training programme "Training of candidates for obtaining a private pilot licence with the following rating: "single-engined, land-based aircraft" (approved by Rosaviation on 11 November 2019).

The volume of class room training was 140 academic hours, the overall volume of flying training for Cessna-172S type of an aircraft was 55 hours 26 minutes. Upon completion of the training a diploma № 241-20-003-01 was issued on 5 October 2020.

On 12 October 2020 the director of ANCO FVE "C7 Training" processed a mediation on providing a Private Pilot Licence with the following rating: *"single-engine, land-based aircraft"*. Private Pilot License № 0111709 was issued on 20 October 2020 by Rosaviation, with the following rating: *"single-engine, land-based aircraft"*.

1.6. AIRCRAFT INFORMATION

Picture 3. An aircraft Beech 95-B55 OM-KVV before the AA

Type	**Aircraft Beech 95-B55**
Manufacturing plant, build date	Beech Aircraft Corporation Wichita (USA), in 1969
Serial number	TC-1279
National and registration aircraft markings	OM-KVV
Civil aircraft registration certificate	№ 1369/02 issued on 27 June 2021 by the Transport Department of Slovak Republic (DOPRAVNY URAD)
Owner	Private person
Civil aircraft airworthiness certificate[11]	№ 1369/01 issued on 29 June 2020 by the Transport Department of Slovak Republic (DOPRAVNY URAD), effective till 28 January 2023.
Life limit and service life	Not determined by the designer, AC was operated based on technical condition

[11] CAC CA is effective during the year. A possibility for CA revalidation option is envisaged. The last inspection (assessment of conformity of the aircraft Beech 95-B55 OM-KVV with requirements for airworthiness) was carried out on 5 January 2022.

Time of operation SPS	5108 hours 44 minutes
Basic overhaul time/ service life	Not determined by the designer, AC was operated based on technical condition

Information on AC and engines is provided to the Commission through AMIA authorised representative.

The aeroplane was powered by two piston engine of "Continental" type, model — I0.470.L19 (serial number: left — № CS237811.R, right — № 245180.R CS), manufactured by Teledyne Continental Motors (USA) company.

The engines were equipped with three-blade propellers of Hartzell Propeller Inc. PHC-C3YF-20F manufactured by Hartzell Walnut Propeller Company (USA).

On 15 November 2022 the Transport Department of Slovak Republic (DOPRAVNY URAD) issued an export certificate of airworthiness [12] of the civil aircraft №1369/01. A certificate was issued based on an expert assessment of conformity of the aircraft Beech 95-B55 OM-KVV with the established airworthiness requirements which was conducted on 10 November 2022 (maintenance release № 1110/2022 of 10 November 2022) in the organisation CAMURO Consulting.

The remaining calendar time of AC accessories and components was sufficient to complete the flight.

The aeroplane had an insurance from PJSIC "Ingosstrakh". Certificate of insurance № 493-129213/22 of 29 November 2022.

According to Beech 95-B55 OM-KVV aircraft FOM (provided by AMIA authorised representative), maximum take-off weight is 5100 lbs (2313 kg), empty weight of aeroplane — 3453.4 lbs (1566.4 kg), centre of gravity range — 78,3 86 in (1988.82:2184.40 mm). Based on the pilots' weight 440.9 lbs (about 200 kg), their

[12] An export certificate of airworthiness is a document certifying the AC airworthiness for flights at the time of export delivery.

personal belongings — 66.1 lbs (30 kg - approximate assessment based on security camera recordings), weight of fuel — 827.2 lbs (375 kg)[13] and oil in an engine unit- 45.2 lbs (20.5 kg), the aeroplane take-off weight was about 4830 lbs (2190 kg), centre-of-gravity position — 80.8 in (2052.32 mm) and did not exceed the specified limits.

The last operational m, was conducted by PIC on 1 December 2022.

The aircraft was equipped with audio alert warning on approaching the stalled condition.

1.7. Meteorological information

A forecast in GAMET format is drawn and issued by Yerevan AMC at 04:30 on 1 December 2022 effective from 06:00 till 12:00 on 1 December 2022 at Zvartnots Aerodrome FIR with lower than FL150 flight level.

Section 1

Ground visibility: north of 40°08' north latitude; 4900 ft (1500 m), mist; north of 40°32' north latitude; 1640 ft (0500 m), fog.

Mountain coverage; further north of 40°08' north latitude; mountains are covered.

Broken clouds: in the period from 06:00 till 08:00 north along the line 40°08' north latitude; — 40°32' north latitude; -40°46' north latitude significant (BKS in the 500-1300 ft (152-396 m) layer from the ground level.

Section 2

Pressure patterns: at 06:00 the front north along the line 40°08' north latitude - 40°32' north latitude ; - 40°32' north latitude with dislocation to north-east speed 20 kt (37 km/h), the intensity is subsiding.

[13] In case of AC full fuelling and the volume of AC fuel tanks - 135.8 gallons (about 514 l), aviation petrol specific density Avgas 100LL - 0.730 kg/l, outside air temperature - + 15°C design fuel weight was about 827.2 lbs (375 kg).

Wind and temperature:

2000 ft (610 m) north of 40°23' north latitude; 310°-04 kt (02 m/s), plus 02 °C;

2000 ft (610 m) north of 40°32' north latitude; 300°-04 kt (02 m/s), minus 0 °C;

2000 ft (610 m) north of 40°46' north latitude; 310°-03 kt (02 m/s), minus 02 °C;

2000 ft (610 m) north of 40°50' north latitude; 310°-03 kt (1.5 m/s), minus 02 °C;

5000 ft (1524 m) north of 40°08' north latitude; 300°-04 kt (02 m/s), minus 0 °C;

5000 ft (1524 m) north of 40°23' north latitude; 310°-04 kt (02 m/s), minus 01 °C;

5000 ft (1524 m) north of 40°32' north latitude; 300°-05 kt (2.5 m/s), minus 02 °C;

5000 ft (1524 m) north of 40°46' north latitude; 300°-04 kt (02 m/s), minus 03 °C;

5000 ft (1524 m) north of 40°50' north latitude; 310°-04 kt (02 m/s), minus 03 °C;

10000 ft (3048 m) 300°-07 kt (3.6 m/s), minus 04 °C;

15000 ft (4572 m) 310°-08 kt (04 m/s), minus 05 °C.

Clouded sky: north of 40°08' north latitude scattered SCT) stratus in 080-150 ft (25-45 m) layer, significant (BKS stratocumulus in 1000-2000 ft (305-610 m) layer from the ground level; north of 40°23' north latitude scattered SCT) stratus in 080-130 ft (25-40 m) layer, significant (BKS 700/1500 ft from the ground; north of 40°32' north latitude a kind of (FEW) stratocumulus in the 700/2000 ft (213/610 m) layer from the ground; N40°46' north latitude significant (BKN) altostratus in the 7000/10000 ft (2133/3048 m) layer from the ground; north of 40°50' north latitude. significant (BKS altostratus in the layer 5000/7000 ft (1524/2133 m) from the ground.

Freezing level north of 40°32 2000 ft (610 m) from the ground. Air pressure QNH: 1021 hPa.

Volcanic ash: none

Weather information in TAF code for Zvartnots Aerodrome (Yerevan) was drawn and issued on 30 November 2022 at 23:00 effective from 00:00 till 24:00 on 1 December 2022; wind at ground of unstable direction, speed 04 kt (02 m/s), visibility 800 m, fog, scattered clouds (3-4 okt.) with floor altitude from the ground 800 ft (240 m), from time to time within the period from 00:00 till 06:00 on 1 December 2022the visibility 200 m, fog, vertical visibility 100 ft (30 m), within the period from 06:00 till 07:00 on 1 December 2022 the visibility is gradually becoming more than 10 km, no specific significant weather.

Information ATIS of Zvartnots Airport

- SIERRA at 08:00: Arrival FS 09, Departure FS 27, FS is wet, braking action good, Instrumental Landing System (ILS DME). Transition level 130. Weather: surface wind 220° – 2 knot (1 m/s) visibility 1900 m, FS visual range 09: touchdown zone 1900 m, middle 1700 m, endpoint 1300 m. Mist, clouded sky of the lower level 2 octants 490 foot (150 m). Temperature + 7° C, dew point + 6° C. QNH 1026 hPa. Mountains and television mast are closed. Without substantial modifications. Bird migrations are observed. The operations are carried out based on procedures in low-visibility conditions.
- –TANGO at 08:30: Arrival FS 09, Departure FS 27, FS is wet, braking action good, Instrumental Landing System (ILS DME). Transition level 130. Weather: surface wind 230° – 2 knot (1 m/s) visibility 1600 m FS visual range 09: touchdown zone 1600 m, middle 1800 m, endpoint 1700 m. Mist, clouded sky of the lower level 2 octants 490 foot (150 m). Temperature + 7° C, dew point + 6° C. QNH 1026 hPa. Mountains and television mast are closed. Without substantial modifications. Bird migrations are observed. The operations are carried out based on procedures in low-visibility conditions.

The actual weather data in METAR code at Zvartnots Airport (Yerevan) on 1 December 2022 (located at a distance about 30 km from AA location in GA = 225°, exceedance – 865 m):

- around 09:00: the wind at ground is unstable - 01 kt, visibility 2000 м, mist, scattered clouds (1-2okt.) with the floor altitude from ground level 500 ft (150 m), scattered clouds (5-7 okt.) with floor altitude from the ground level 3600 ft (1080 m), air temperature + 08 °C, dew point temperature + 06 °C, pressure QNH 1025 hPa;
- around 09:30: the wind at ground - calm air, visibility 2000 m, mist, scattered clouds (1-2okt.) with the floor altitude from ground level 600 ft (180 m), scattered clouds (5-7 okt.) with floor altitude from the ground level 3600 ft (1080 m), air temperature 08 °C, dew point temperature + 06 °C, pressure QNH 1025 hPa.

The actual weather data of Ashtarak meteorological watch office on 1 December 2022 around 09:00 (located at a distance about 25 km from the AA location in GA = 225°, exceedance of meteorological watch office – 1100 m): wind at ground 200° - 01 m/s, visibility 200 m, fog, overcast stratus clouds at 600 m, air temperature + 06.5 °C, dew point temperature + 06.5 °C, air pressure at the station level 900.86 hPa.

1.8. Navigational, landing and ATC aids

The data on navigational, landing and ATC aids are not presented, since their operation had no impact on emergence and development of a special situation.

1.9. Means of communication

During the flight means of communication were in regular state of operation. Communication during the flight was stable. The operation of the means of

communication had no impact on emergence of a special situation and the flight outcome.

Negotiations of the crew with the air traffic controllers at Yerevan Aerodrome are registered with data recorders, decoded and used in the activities of investigation commission.

1.10. The data on aerodrome

The data on aerodrome are not presented since the AA took place outside the aerodrome.

1.11. Flight data recorders

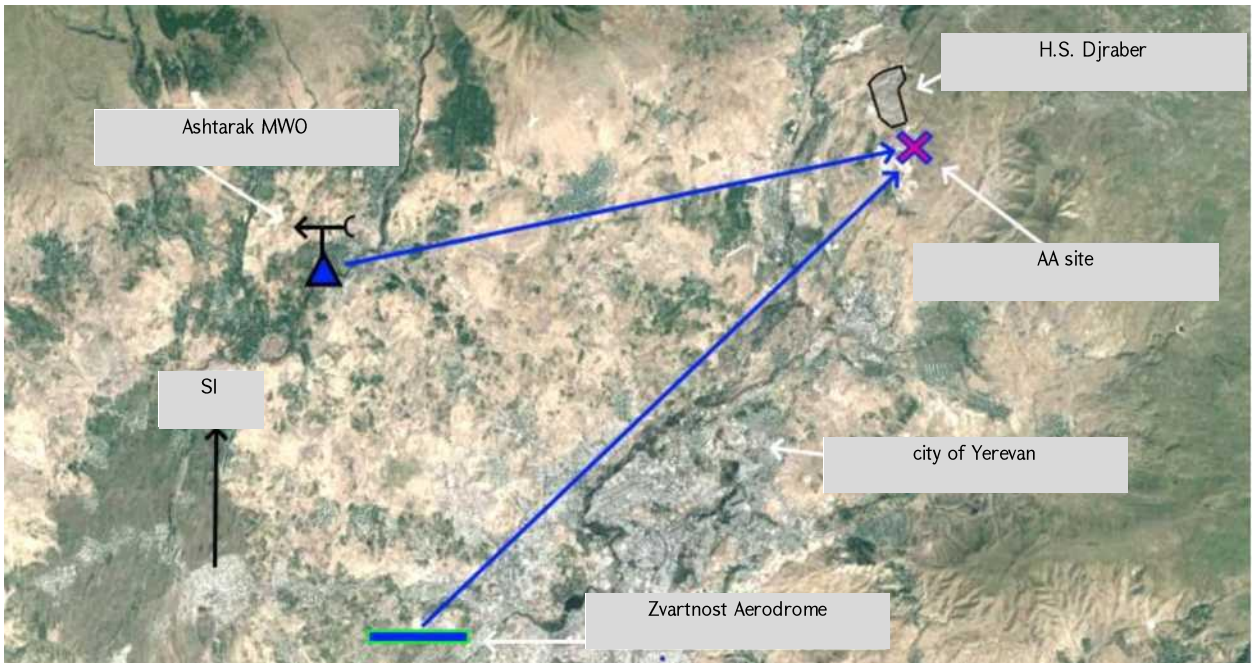
An aircraft is not equipped with parameter registration built-in tools.

1.12. Information on the state of the aircraft elements and on their location at the accident site

The AA took place in the mountainous area in the territory of a sandpit of Kotayk marz of the Republic of Armenia. The exceedance of AA site is about 1700 m. AA site coordinates (AC cabin location on the ground surface): 40°20'21.70" north latitude;44°39'06.60" east longitude

Relative to nearest settlements the AA site is located: at a distance about 1 km south-eastward of settlement Djraber of Kotayk marz of the Republic of Armenia, at a distance about 30 km in GA=45° from aerodrome reference point (ARP) of Zvartnost Aerodrome (Yerevan) at a distance about 25 km in GA =75° from Ashtarak meteorological watch office (exceedance of meteorological watch office about 1100 m).

The geographical location of AA site in relation to the nearest settlements is illustrated in Picture 4.

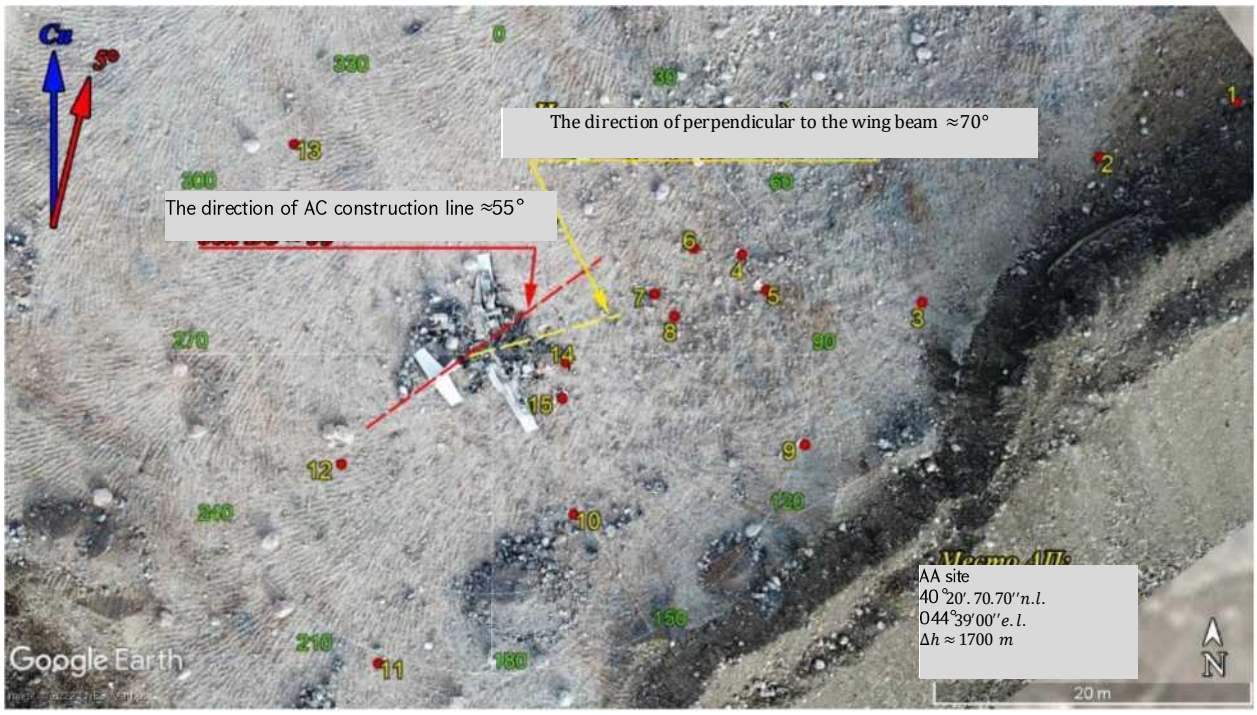


Picture 4. The geographical location of AI site in relation to the adjacent human settlements

At the moment of examination AC was lying on the lower fuselage, reference line of which was oriented in a true course about 55°, perpendicular to the wing beam was oriented in a true course about 70° (Pic.5).

There was no scattering of aircraft components, except for propellers, small fragments of a structure and cockpit transparence, as it is shown in the AA site sketch (Pic.5).

There are traces of ground fire on AC all structural elements, except for the rear end.



Picture 5. Sketch of AA site with Beech 95-B55 OM-KVV aircraft

Table with AA site sketch [14]

S/N	GA, °	D, m	Photos	Description
1	71	50		Cockpit transparence fragment

[14] The azimuth and distance reference of AC fragments location was made from AA site.

S/N	GA, °	D, m	Photos	Description
2	72	40		Fuel cap fragment with fuel level unit
3	84	27		Fragment of vision window transparence
4	69	17		Fragment of nose cone shells

S/N	GA, °	D, m	Photos	Description
5	77	18		Fragment of fuselage shell
6	63	14		Magnetic compass
7	71	11		Left P, fragments of cabin transparence

S/N	GA, °	D, m	Photos	Description
8	79	12		Portable satellite meteorological receiver ADL170/180
9	106	20		Fragment of fuselage shell
10	154	12		Baggage compartment door

S/N	GA, °	D, m	Photos	Description
11	200	21		Cockpit transparence fragment
12	233	12		Cockpit transparence fragment
13	316	18		Cockpit transparence fragment
14	98	4.5		Right P

№ in numerical order	GA, °	D, m	Photos	Description
15	124	5		Right door

Both engines are torn from the attaching points, their output shafts are destroyed in P hub region. Oar blades are malformed, have handling marks in leading edges. One of blades of left-handed screw is destroyed in the root, is separated from P and was located behind the left hand wing.

The nature of blade deformation and destruction of P and location of P at AA site indicate that at the moment of collision of the aeroplane with the ground surface power input was supplied from engines to propellers.

The nature of deformation and destruction of AC tail unit stringers, shell and rivet bonds (Pic. 6. b)), as well as absence of traces from collision of aircraft wing elements with stone [15] Pic. 6.a)) witnesses that AC was approaching the ground with significant vertical speed and left rotation in relation to aeroplane vertical axis.[16].

[15] At AA site was located near left hand wing rear edge.
[16] Vertical axis is an axis lying in a plane of aeroplane symmetry and perpendicular to its construction lines.

Picture 6. Image: of a stone - a), destruction and deformation of framework elements of rear end of AC – b)

Pressure altitude indicator (Pic. 7) is torn from the attaching point, has concussions and traces of high temperature impact. Pressure value is 1025 hPa.

Picture 7. Image of one of pressure altitude indicators

1.13. Medical information and brief results of pathological-anatomical studies

Medical examinations of bodies of PIC and the pilot after AA in state non-commercial organisation of the Ministry of Health of the Republic of Armenia (expert opinion № 403 and № 404 of 25 January 2023) had not revealed any sign of alcohol and drug ingestion by PIC and the pilot.

1.14. Data on survavibility of passengers, members of crew and other persons in an aircraft accident

At the time of AA the pilots were in their working stations, which were both equipped with manipulators. The AC cabin was almost completely destroyed by the ground fire that is why it seems to be impossible to determine: whether the pilots were fastened with safety belts.

At aeroplane's collision with the ground surface the pilots were killed.

No AC design features affecting the AA consequence severity is detected.

1.15. Actions of emergency rescue and fire fighting teams

The message on AA was received by the rescue service crisis management national centre of MES of the Republic of Armenia from the air traffic controller of Central Dispatch Services of the Civil Aviation Committee of the Republic of Armenia at 09:23 on 1 December 2022.

From 09:38 with the support of subdivisions of MES of Gegharkunik and Kotayk SRW were organised at the taxiway in the territory of s. Fantan of Kotayk marz up to s. Gagarin of Gegharkunik marz.

The coordinates of AA site were transferred by phone by the worker of a sandpit, who have detected burning elements of aeroplane structure, to the operator of the Operational control centre of the Police of the Republic of Armenia, which at 10:00 handed over that information to the crisis management centre of the rescue service of MES of the Republic of Armenia.

At 10:20 the MES Kotayk subdivisions arrived at the AA site, after which the ground fire was suppressed.

To eliminate consequences of AA 10 operational groups and 6 truck crews (58 people) were engaged from MES of the Republic of Armenia.

1.16. Tests and examinations

1.16.1. Examination of FOL samples

The workers of Kotayk Regional Investigative Department of the Investigative Committee of the Republic of Armenia took fuel samples from refill capacity at fuelling place.

The examination of fuel samples was conducted in the testing laboratory № 2 of "National Body for Standards and Metrology" CJSC of Ministry of Economy of the Republic of Armenia. The examination results (expert opinion № 1010 of 13 December 2022) showed that the fluid sample submitted for expert examination is an aviation fuel Avgas 100 LL.

1.16.2. Results of examination of source files of documentation with "Galaktika" ASC ATC

The specialists of "Armaeronavigation" CJSC (carrying out air traffic control in the air area of the Republic of Armenia) submitted to the Commission the documentation source files[17], registered by "Galaktika" ASC ATC installed at Zvartnots Aerodrome (Yerevan) of the Republic of Armenia. The submitted documentation files contained data on system tracks created by a complex based on data on air picture in maintained air area obtained from observation facilities connected to the complex. As observation information sources the PR (PSR), SR (SSR), ADS-B (ADS-B) and MLAT are used.

[17] The documentation source file is an information from controller's working station registered by "Galaktika" ASC ATC.

The documentation source files were communicated for interpretation to the system developer (SC «Azimut»).

After interpretation the developer presented in *.xlsx format the files with trajectory data for 1 December 2022 within the period from 08:00 till 10:00, which contained information on the flight of Beech 95-B55 OM-KVV aeroplane, which ended in AA.

In interpreted source data information by system tracks is presented: ground speed estimated value; track angle estimated value; AC reference value; altitude values[18]; the time of creation of a system track by a complex.

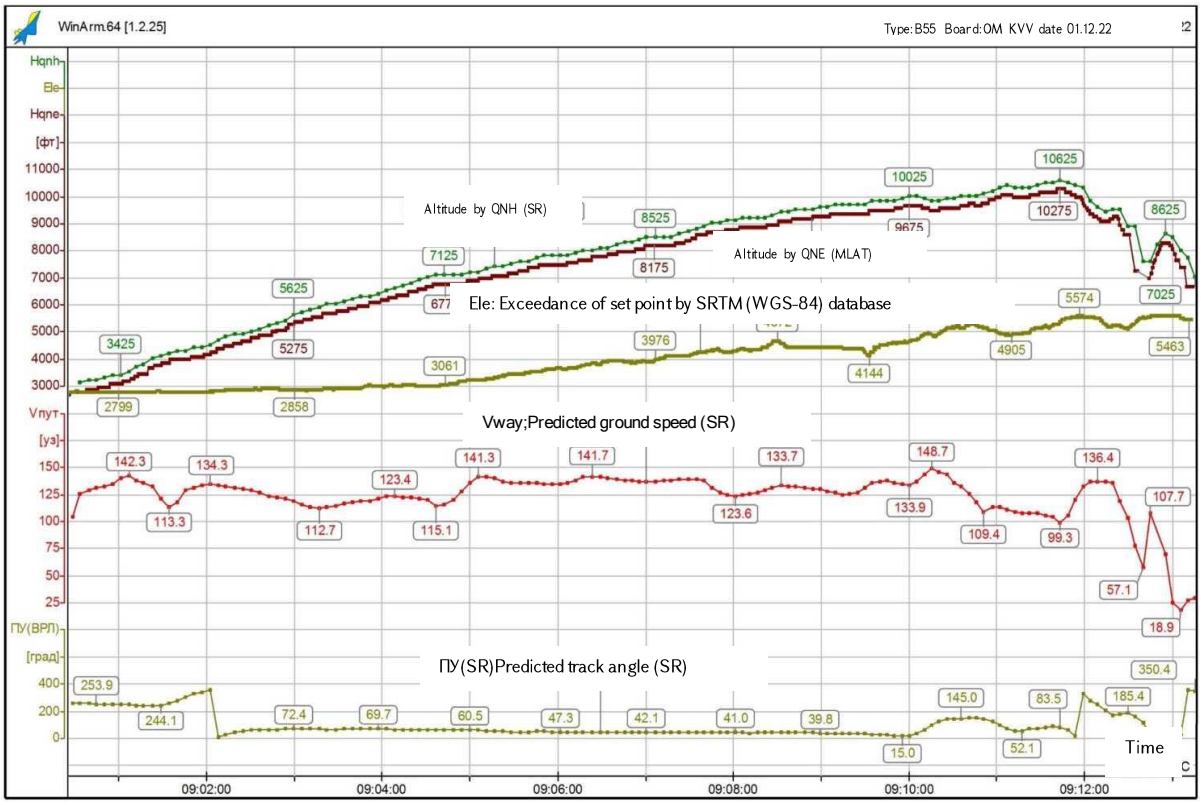
Within the periods from 09:12:30.3 till 09:12:34.3 and from 09:12:36.3 till 09:12:43.3 the flight information from MLAT is absent[19]. According to data of video recording from air traffic controller's working station from 09:12:39 till 09:12:45 AC location extrapolation[20] took place which is indicated by «  » specific symbol.

The specialists of IAC laboratory based on source data design parameter graphics were drawn (Pic.8) and the flight line (Pic.9) of the aircraft Beech 95-B55 OM-KVV of 1 December 2022 ended by AI.

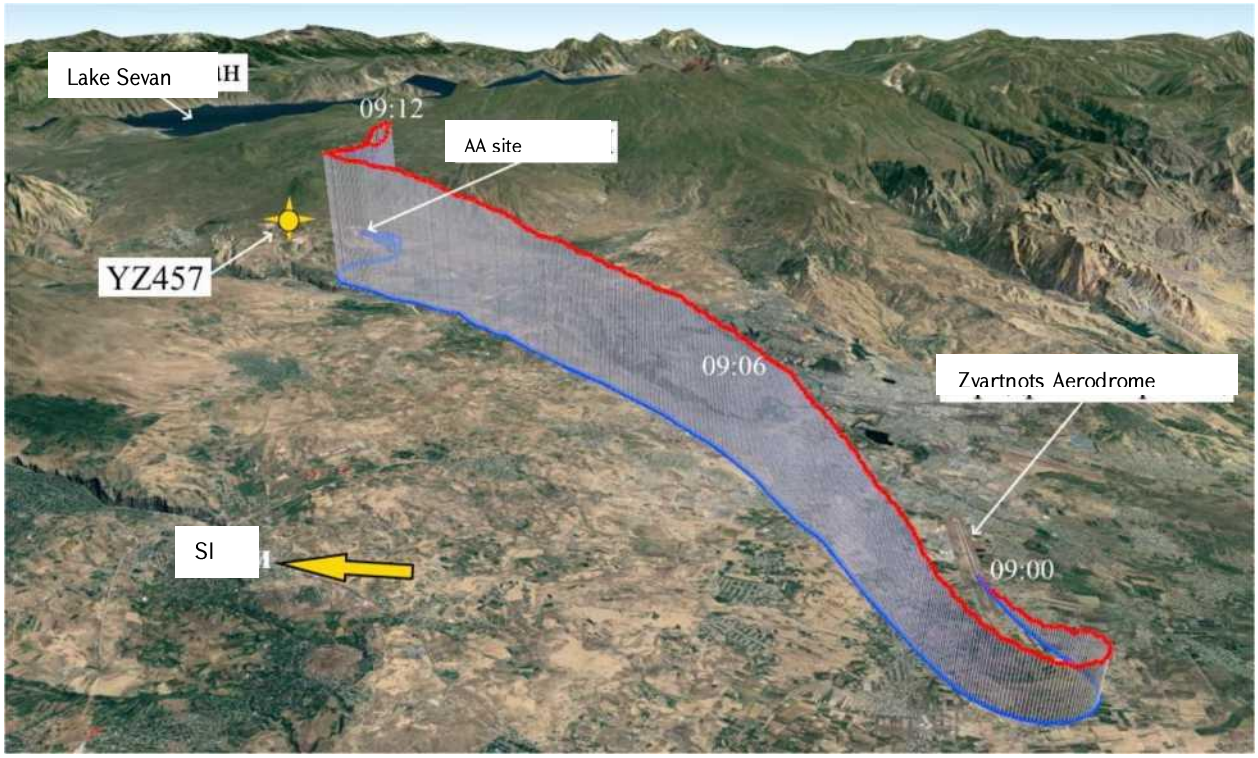
[18] The data received from PR and SR till 120 flight level were recalculated (by "Galaktika"ASC ATC) by QNH pressure; the data received from aeroplane transponder through MLAT are given by QNE pressure.

[19] According to developer's explanations: «... *For determining AC coordinates in MLAT the squawks should be received by at least its four receiving stations. The flight was operated in the mountainous area at the altitude comparable with the height of mountains in Armenia.* AC was probably during these intervals below the screening angle of some MLAT receiving stations which made determination of AC location impossible".

[20] AC location mark extrapolation on the air situation display of controller's working place is carried out in case of loss of information from observation sources and is carried out during three surveillances.



Picture 8. Flight parameters of the aeroplane Beech 95-B55 OM-KVV on 1 December 2022 ended in AA



Picture 9. Aeroplane accident flight trajectory

1.17. Information on organisations and administrative activities relating to accident

An owner of the aeroplane Beech 95-B55 OM-KVV is a private person. The private person does not have GPA operator certificate.

Control (surveillance) over fulfilment of requirements by surveillance entities in the CA field at AA site is exercised by the Civil Aviation Committee of the Republic of Armenia.

1.18. Additional information

1.18.1. On issuing a one-time flight permit

An issuance of permits by Rosaviation for operation of international air services is carried out in compliance with the requirements of Decree of the Russian Federation № 527 of 28 April 2018 "On approval of rules of issuance to foreign aviation

companies, international operating agencies and foreign individual entrepreneurs single permits of an authorised body in the field of civil aviation for accepting in the territory of Russian Federation on aircraft board passengers, luggage, freight and mail for air services to the territory of a foreign country or for their traffic to the territory of Russian Federation from the territory of a foreign country, as well as permits of an authorised body in the field of civil aviation for accepting in the territory of Russian Federation on aircraft board passengers, luggage, freight and mail for air servives within the territory of Russian Federation (hereinafter referred to as "the Rules").

According to the Rules for operating an aircraft non-scheduled overshooting of an aircraft of foreign registration a formalised request by form "N" is communicated to the addresses of International Air Transport Regulation of Air Transport Regulation and International Cooperation Department of Rosaviation and FSUE "Goscorporation by ATM" mentioned in the AIP of Russia, by the operator or a mediator representing the interests of a foreign operator, with the application of 'Internet" information and telecommunication network, postal, telephone and other telecommunications facilities to the addresses published in AIP of Russia.

Together with request by form "N" to specialised addresses of e-mail of International Air Transport Regulation of Air Transport Regulation and International Cooperation Department of Rosaviation and FSUE "Goscorporation by ATM" (are given in AIP of Russia) in compliance with the requirements mentioned in AIP of Russia, an applicant sends the copies of aircraft documents requested for flight operation (aircraft registration certificate, airworthiness certificate, third party insurance certificate, noise certificate). Provision of sale and purchase contract and AC export certificate of airworthiness is not prescribed by the Rules.

A set of documents presented included an insurance certificate № 493-129213/22 of 29 November 2022 issued by PJSIC "INGOSTRAKH" for liability risk coverage of an aircraft owner before third parties for the damage caused to life or health or property of third parties during operation of an aircraft 95-B55 OM-KVV. Compulsory

indemnity liability insurance of AC owner is envisaged by article 131 of the Air Code of the Russian Federation. According to the policy an insurant was one of the pilots on the board of AC.

Meanwhile the Commission does not dispose of documents confirming that he was the owner of AC or legitimately have it in possession. Moreover, the commission has documents indicating that AC was sold to another private person which was not on AC board. A letter of authority from an owner for AC management or any other action with him was not submitted to the commission.

Moreover the Rules does not envisage a procedure on verification of authenticity of documents submitted for getting permits. It is assumed that a responsibility for the authenticity of such documents rests with the aircraft operator.

Note: AIP RUSSIA GEN 1.2-10 (02 DEC 21)

> *«3. Non-scheduled (single) flights.*
>
> *3.1. Non-scheduled (single) flights are the ones not envisaged by schedule and operated by Russian aircrafts and aircrafts of foreign states in the air area of the Russian Federation.*
>
> *3.2. Non-schedules (single) international flights are the ones operated in case of availability of a permit (approval, confirmation) issued by Rosaviation in compliance with the provisions of Decree of the Russian Federation № 527 of 28 April 2018 upon the prior request of an aircraft enterprise».*
>
> …
>
> **Decree of the Government of the Russian Federation № 527 of 28 April 2018:**
>
> **…**

«p. 3. A permit is issued based on an application for operation of non-scheduled (single flight) in the air area of the Russian Federation (hereinafter referred to as application) the form of which is published in Aeronautical Information Publication of the Russian Federation. The copies of the following documents authenticated by foreign operator are attached to an application:

- *aircraft certificate of registration;*
- *aircraft flight airworthiness certificate;*
- *insurance policy confirming the ensurance of liability for causing damage to third parties;*
- *aircraft flight crew licenses for aircrafts with capacity of more than 20 passengers;*
- *conformation of operators of Russian airports for provision of airport slots necessary for transport….*

An application and the mentioned documents are submitted to the Air transport federal agency by a foreign operator or its representative acting based on a written authorization issued by a foreign operator".

1.18.2. On pilot licence validation

In accordance with Standards and Recommended Practices of International Civil Aviation Organisation (p. 1.2.1. Annexes to Convention on international civil aviation) a person not having a valid licence meeting the requirements of this Annex and complying with the obligations to be performed by that person, is not allowed to carry out functions of AC crew member. A licence is issued by the AC registration country or any other contracting state, moreover in the latter case a licence becomes effective by the country of registration of the AC.

The Commission requested through AMIA authorised representative from the Transport Department of Slovak Republic as to whether the pilots - the citizens of the Russian Federation - applied for validation of private Pilot Licences № 0111709 and № 0147642 to the Department.

A reply to a request is received on 6 April 2023 "the mentioned pilot's licences were not validated by our Transport Administration".

1.19. New methods used during the investigation

New methods were not used during AA investigation.

2. Analysis

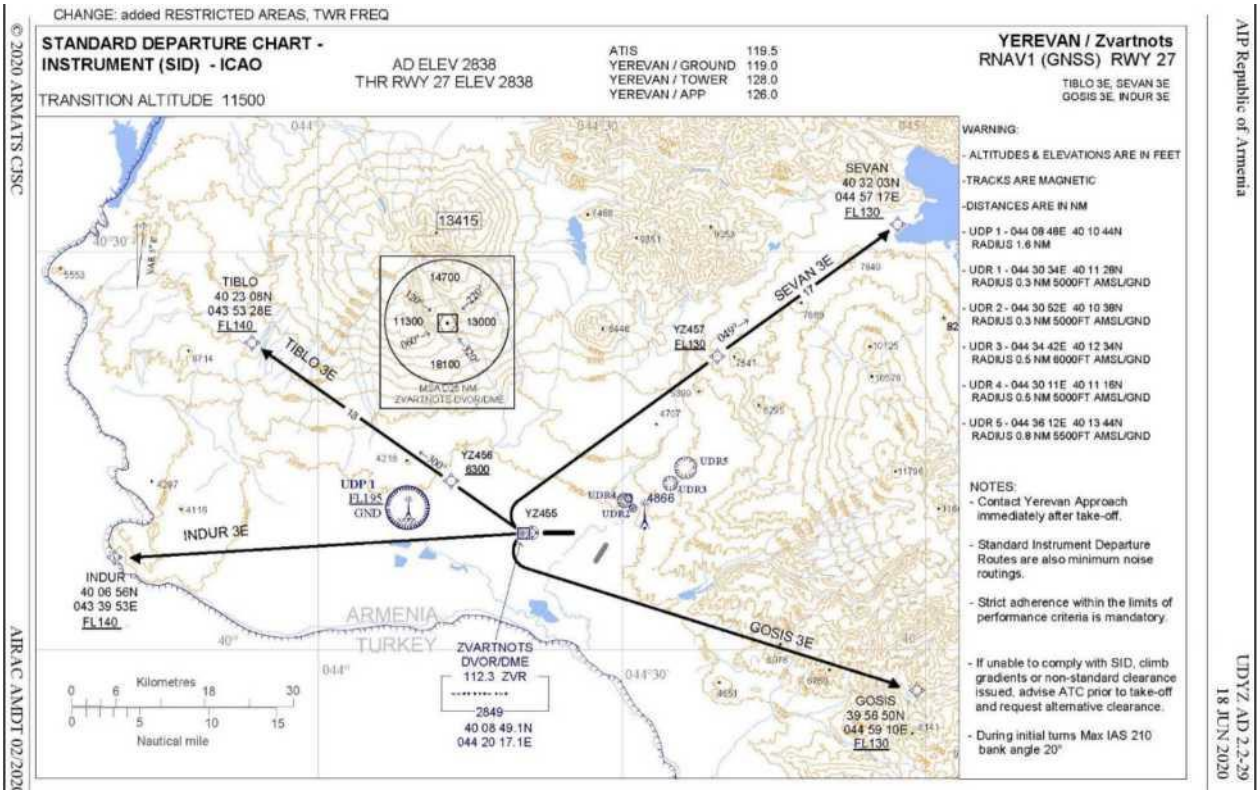
The air ferrying procedure of the aeroplane Beech 95-B55 OM-KVV en route: Příbram Aerodrome (LKPM, Czech Republic) - Zvartnots Aerodrome (Republic of Armenia) and description of performance of preflight procedures at Zvartnots Aerodrome are given in Section 1.1 of this Report.

According to the submitted flight plan the route from Zvartnots Aerodrome to Astrakhan Aerodrome passes through compulsory reporting points mentioned in Pic. 10. For cruising phase of flight FL 150 flight level was mentioned (15000 ft or 4550 m). A flight was planned to be operated by IFR. Meanwhile the PIC did not have any rating on access to flights by IFR.

Picture 10. Flight route pattern drawn based on permitted flight pattern

After having taken the seat in an aeroplane, having heard the ATIS message, a crew reported to the Zvartnots Aerodrome taxiing controller getting in touch at 08:14: *«Yerevan-Taxiing, OMKVV, station 20, hello»; «OMKVV, ready to record controller clearance, have «SIERRA» information, OMKVV».*

At 08:25 the taxiing controller handed over to the crew the code of a squawk and informed of the departure procedure: *«OMKVV, cleared to destination via flight plan route SEVAN 3E[21] departure, initially FL190, SQUAWK 3143».*



Picture 11. Standard departure route from Zvartnots Aerodrome region SID SEVAN 3E

PIC confirmed the receipt of information: *«OMKVV, permitted on SEVAN 3E, initial flight level 190, SQUAWK 3143».*

C: "You got it correctly and when will you be ready for start up ?

C.T: "We are getting ready for start up in five minutes".

C: "Well, accepted".

[21] See Picture 11

At 08:31:43 the controller authorised a crew for starting engines: *«OMKVV, Start up approved, QNH1026, information «TANGO»*. The crew confirmed the receipt of information: *«Information «TANGO», QNH1026, OMKVV»*.

The engine has been started up at 08:32.

At 08:49:59 the crew team reported on readiness to take a holding position. *«OMKVV, ready to take «holding»»*.

At 08:50 the taxiing controller instructed the crew team on taxing out route. *«OMKVV, taxi to the right to the end of a ramp, then along the mainline, TW «DELTA», taxiway 27»*.

The crew team confirmed the receipt of information: *«TW «DELTA», taxiway 27, OMKVV»*.

At 08:57 the crew team shifted under the control of Yerevan-Tower and reported on readiness to take a line up position: *«Yerevan-Tower, OMKVV, good afternoon, ready to take a line up»*.

The air traffic controller permitted to take a line up position FS 27, operate a take-off and shifted the crew team under the control of Yerevan-Approach: *"Good-morning, OMKVV, Yerevan-Tower, take a «line up», taxiway 27, after the take-off with an Approach 126.0, cleared for take-off, calm at the ground»*.

The crew confirmed the receipt of information: *"Cleared for take-off, after the take-off 120.0, Yerevan-Approach, OMKVV»*. Though the radio communication frequency point was wrongly perceived whereto the air traffic controller specified its point: *«After take-off 126.0»*.

C: «Approach 126.0, OMKVV».

At 09:00 the take-off was performed.

In Picture 12 the cadres from security camera video records of Zvartnots Aerodrome are presented. The zones where the silhouette of the aeroplane Beech 95-B55 OM-

KVV can be seen in the video recording at the moment of take-off, are marked with a red oval. The security camera location diagram is illustrated in Picture 13. The distance of cameras from FS centre line in at the shortest distance; camera 1 – about 460 m, camera 2 – about 180 m. In the cadres the mist in the region of aerodrome is visible.

Picture 12. Cadres from the security camera video recordings of Zvartnots Aerodrome

Picture 13. The security camera location diagram of Zvartnots Aerodrome

After the take-off, moving upwards, AC started deviating left from the Standard Instrument Departure SID SEVAN 3E (Picture 14), whereto the air traffic controller of Yerevan-Approach at 09:01:06 noticing the crew team: *«OMKVV, Yerevan-Approach»*.

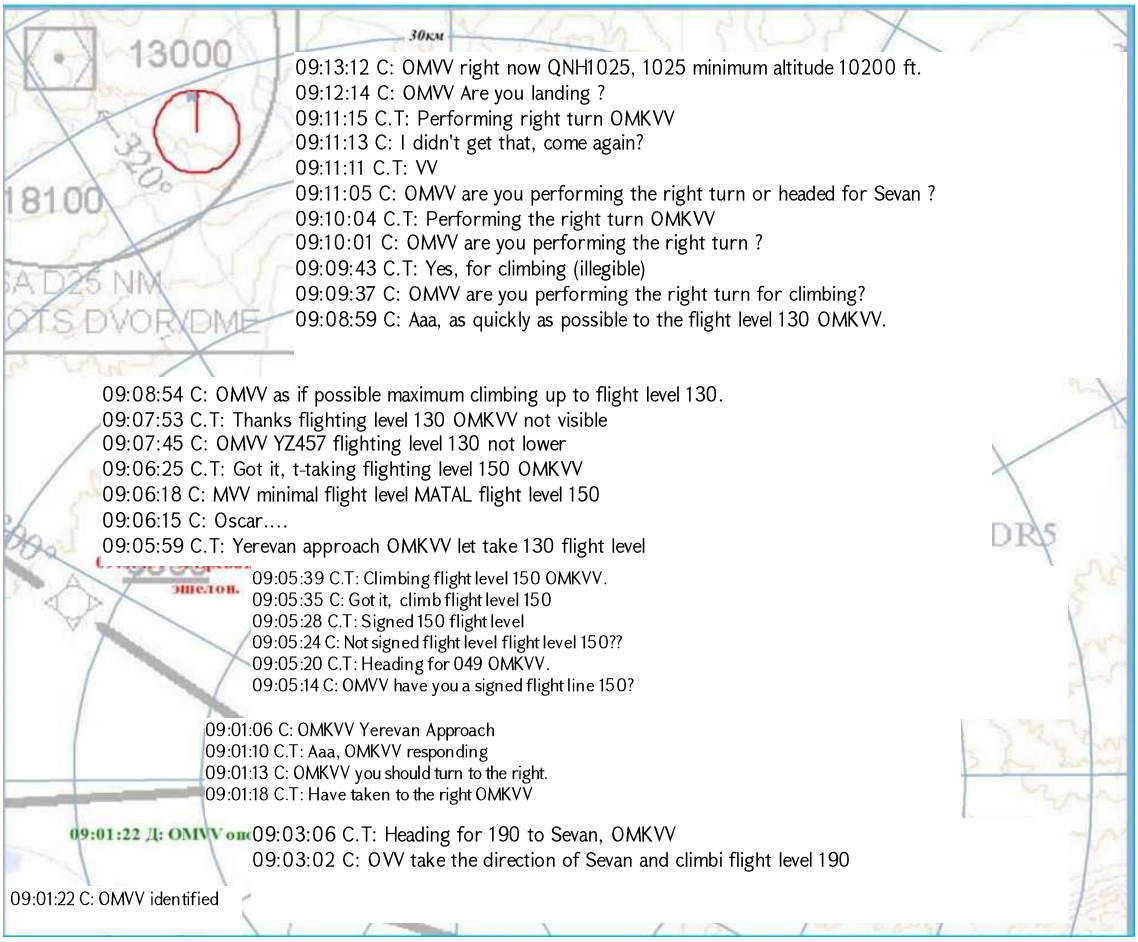
09:01:10 *C.T:* *«Aaa, OMKVV, responding».*

09:01:13 *C:* *«OMKVV, you should turn to the right».*

09:01:18 *C.T:* *«Have taken to the right, OMKVV».*

09:01:22 C: *«OMVV, identified».*

At 09:01:30 the crew team started turning to starboard, continuing moving upwards [22] with ground speed about 130 kt (240 km/h)[23].



Picture 14. Aeroplane flight trajectory combined with standard arrival route of departure from the region of Zvartnots Aerodrome SID SEVAN 3E and radio transmissions "air traffic controller-crew team"

[22] On one of pressure altitude indicators there was a value of 1025 hPa (Picture 7). Moreover, the QNH value was 1026 hPa.

[23] Flight parameters (estimated track angle, predicted ground speed) are illustrated in Picture 8.

AC left from turning with path angle about 70°, moreover the altitude value was about 5030 ft or 1530 m, whereas cross track angle from desired track of SID SEVAN 3E patter was about 5,5km to the right.

Observing the deviation of AC from the pattern an air traffic controller at 09:03:02 gave an instruction to the crew team to head for SEVAN[24] control point and climb the flight level 190[25] (19000 ft or 5790 m): "OVV, take the direction of SEVAN and climb flight level 190".

The crew team confirmed the receipt of information: "Climbing at 190 to SEVAN, OMKVV".

For desired track interception the crew team from 09:05 started to correct the mistake by completing a turn to the left. The deviation was eliminated upon 5 minutes of flight.

At 09:05:14 the air traffic controller clarified with the crew team the flight level approved by the flight plan. *"OMVV, have you a signed flight line 150[26]?"*

09:05:20	*C.T:*	*"Heading for 049 OMKVV"*
09:05:24	*C:*	*Not signed flight level flight level 150?»*
09:05:28	*C.T:*	*"Signed 150 flight level OMKVV".*
09:05:35	*C:*	*"Got it, climb flight level 150".*
09:05:39	*C.T:*	*"Climbing flight level 150 ,OMKVV".*

Upon confirmation by the crew team 150 flight level, the air traffic controller changed in his logbook the flight level from 190 to 150.

[24] See Picture 11
[25] The transition altitude is 11500 ft (3505 m).
[26] 15000 ft (4550 m).

At 09:05:59 the crew team requested air traffic controller to take 130[27] flight level; *"Yerevan-Approach, OMKVV, let take 130 flight level"*. Whereto the air traffic controller at 09:06:18 notified the crew team: *«MVV, minimal flight level at MATAL[28] – flight level 150»*.

At 09:06:25 the crew team confirmed the height gain up to 150 flight level: *"Got it, taking 150 flight level ,OMKVV"*. Moreover the altitude current value was 7825 ft (2385 m).

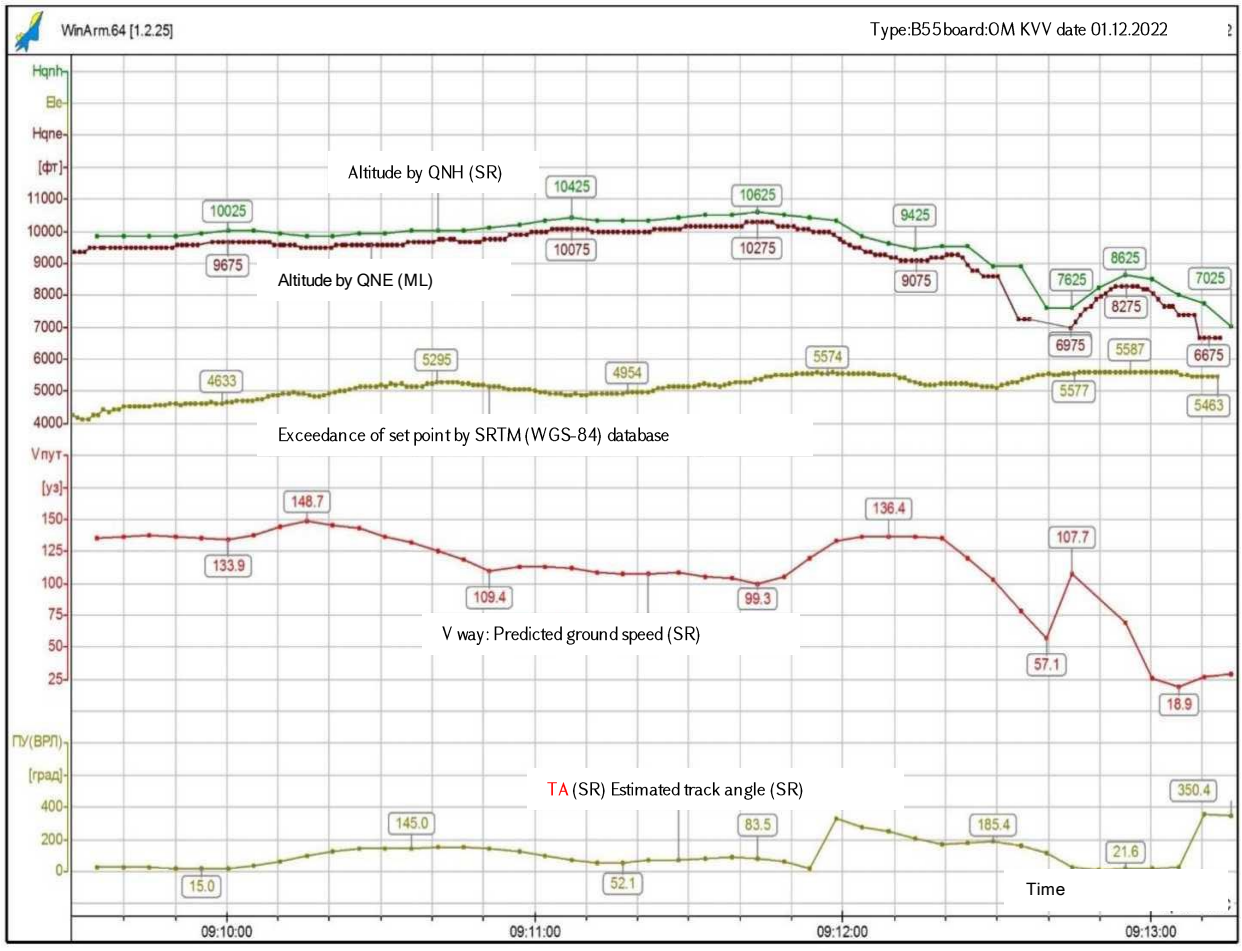
At 09:07:45 the air traffic controller clarified for the crew that in YZ457[29] control point the flight level is not lower than 130: *«OMVV, YZ457 the flight level not lower than 130»,* the crew team confirmed the given information: *"Thanks, flight level 130, not lower, OMKVV"* Moreover the altitude value was about 9025 ft (2750 m).

At 09:08:54 at a distance about 11.5 km till YZ457 control point the altitude value was about 9540 ft (2910 m), the air traffic controller gave an instruction to the crew team for the quickest gain of 130 flight level: *«OMVV, the possible maximum gain till 130 flight level»,* the crew team confirmed the given information: *"Aaa, as quickly as possible to the flight level 130 OMKVV"*.

At 09:09:37 the altitude value was about 9825 ft (2995 m) in case of a distance up to YZ457 control point about 10 km, the air traffic controller gave an instruction for operation of climbing right spiral for the gain of 130 flight level, since according to calculations keeping this climb gradient AC did not manage to gain 130 flight level up to this point: *«OMVV, for climbing perform the right turn». The crew team responded: "Yes, For the climbing (illegible) OMKVV"*. Since the part of phrase on controller's tape recorder is not precisely heard it is impossible to confirm the extent to which the crew team got the instruction correctly.

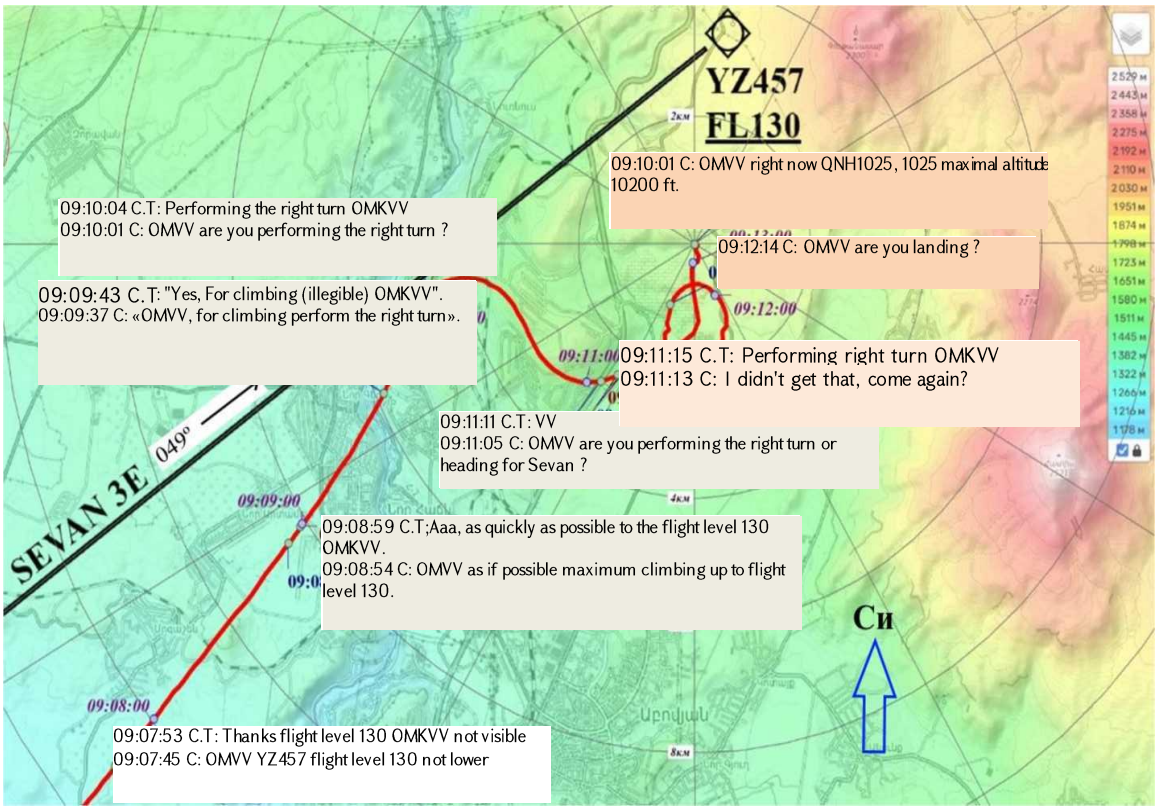
[27] 13000 ft (3950 m).
[28] Compulsory reporting point (see Picture 10).
[29] The control point mentioned on SID SEVAN 3E (see Picture 11).

The crew team started the fulfilment of air traffic controller's instruction in 20 seconds at 09:10:01[30], after reminding the air traffic controller *«OMVV, are you performing the right turn?»*, whereto the crew gave an affirmative answer: *"Performing the right turn, OMKVV"*.



Picture 15. The parameters of aeroplane flight in the interval 09:09:30 – 09:13:16 (before the collision of AC with the ground surface)

[30] See Picture 15 and Picture 16.



Pic. 16 The aeroplane flight trajectory in the final region combined with the standard route of departure from aerodrome's region, with topographic map and radio transmissions

By turning to the right at an angle about 130°, at 09:10:50 the crew turned AC to the left turn.

At 09:11:05 the air traffic controller requested the crew team: *"OMVV are you performing the right turn or heading for Sevan?"*

09:11:11 *C.T:* *"P"*

09:11:13 *C:* *"I didn't get that, come again?"*

09:11:15 *C:* *"Performing right turn OMKVV"* Nevertheless AC was in the left turn.

After 09:11:15 the crew team did not contact with the air traffic controller and did not respond the requests of the air traffic controller.

At 09:12:40 the altitude level was 7630 ft (2325 m), and on the screen of controller position locator in the board logbook OM-КУУ, MSAW information was illustrated in red, which means that AC is descending lower the minimal safe altitude about 8000 ft (2440 m), moreover the controller repeatedly tried to contact the crew.

09:12:14 *C:* *"OMVV Are you moving downwards?"*.

09:12:24 *C:* *«OMVV, the minimal safe altitude 10200 ft there»*.

09:12:37 *C:* *«OMVV, Are you hearing me Approaching?»*

At 09:12:50 the MSAW information (on controller's locator screen) changed from red to orange, most probably, the aircraft switched to gaining the height. At 09:12:55 its value reached 8625 ft (2630 m).

From 09:12:58 AC again switched to *moving downwards*.

At 09:13:03 the controller informed: *«OMVV, Yerevan-Approach, You are landing, gain 10200 ft, do not move downwards there»*.

At 09:13:06 the MSAW information reflected again in red on controller's locator screen.

The last mark of the aeroplane on the screen of air traffic controller's locator was registered at 09:13:15.6.

The Commission remarks that the altitude gain by flight route was carried out by the crew with 3-5 m/s vertical speed, which in case of flight at 130 к (240 km/h) ground speed resulted in a situation where an aircraft did not manage to gain minimally permissible flight level (FL 130) to YZ457 control point.

In these conditions the air traffic controller's instruction for performing the right climbing spiral was totally justified.

The analysis of weather reports and ATIS messages showed that the actual weather conditions in the region of Zvartnots Aerodrome and the AA location did not correspond to VFR: the visibility not more than 2000 m, broken clouds (5-7 okt.), with lower edge from 3600 ft (1080 n) ground level, mountains covered. Thus, at about 9825 ft (2995 m) altitude, when the air traffic controller issued an examined instruction, the flight was most probably passing in instrument meteorological conditions: in the absence of visibility of natural horizon and ground surface.

According to Section II «Restrictions» FOM of the aeroplane Beech 95-B55 OM-KVV, AC had authorisation for flights by VFR and IFR in the day and night time.

Meanwhile, as was mentioned above, the crew members did not have access to flights by IFR. The flights in these conditions may be operated by pilots trained and meeting corresponding requirements of Chapter VII FAR-147.

The PIC was trained for instrumental flights under screen in the volume 04 hours 10 minutes in initial pilot training on single-engine, land-based aeroplane, as well as in the volume of 00 hours 20 minutes - in the preparation for multi-engine, land-based aeroplane. The given preparation volume does not meet the qualification requirements for permission to IFR flights.

Note: *FAR-147*

> *IV. The requirements to the owner of private pilot licence or commercial pilot for obtaining a rating on access to instrumental*

flights

«p. 7.1. …

e) have flying rate not less than:

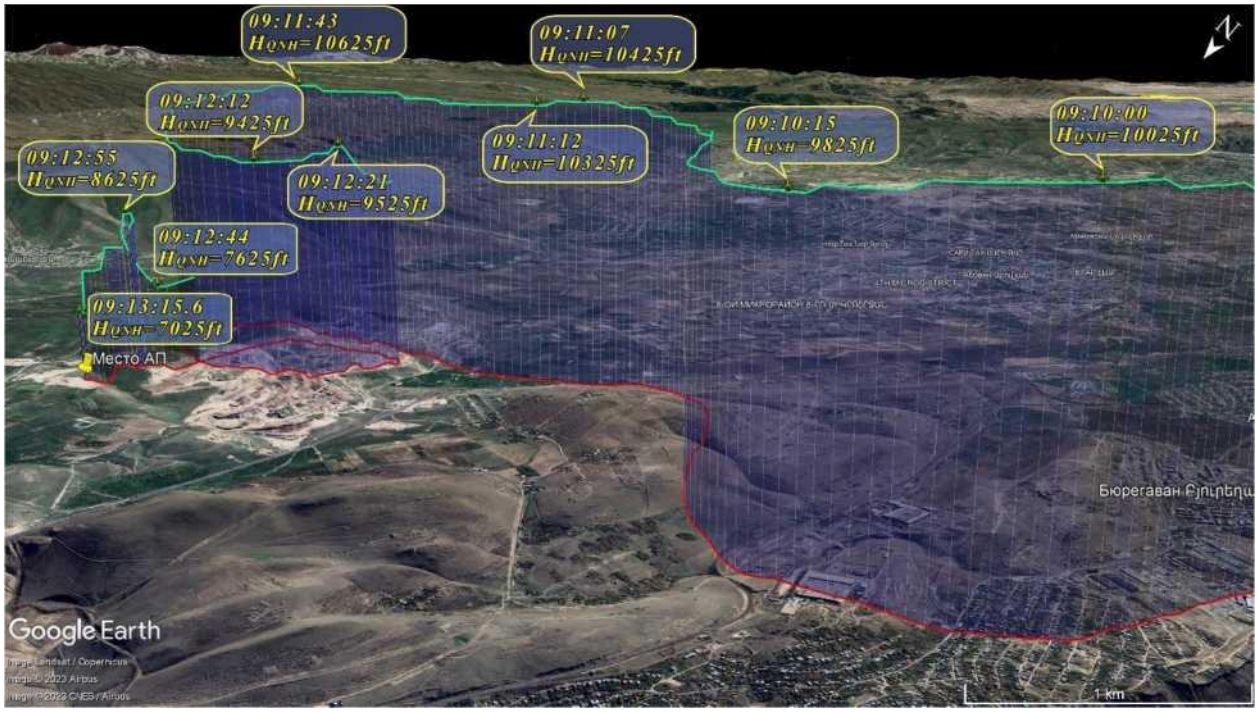
50 hours operating route flights as a pilot-in-command of an aircraft, out of which 10 hours on aircrafts of requested type;

40 hours operating instrumental flights on aircrafts, out of which:

10 hours on dual control aircrafts under the control of a pilot-instructor, 30 hours on a full-flight simulator or not more than 20 hours of ground instrumental training.…»

The Commission remarks that keeping flight parameters in the conditions of visibility of surface background at climbing stage and later on route straight-line segments did not cause difficulties for the crew team.

Moreover in the course of about two final minutes of flight significant altitude variations were registered (within 1000 ft or 305 m) and speed (50 kt or 92 km/h). AC switched from climbing to descending and back (Picture 17), as well as AC banking angle was also changed, though the crew team confirmed to the air traffic controller the right turn performance. From the AA investigation experience it is known that such flight parameters changes are specific to spatial disorientation by crew team.



Picture 17. Aircraft flight trajectory on the terminal subphase

Upon examination of AA site and the aeroplane components the commission drew to the conclusion that AC was approaching the ground at significant vertical speed and left turn to the aeroplane vertical axis, which is typical for left-hand spin regime.

Most probably in case of actual absence of PIC's skills for instrumental flight and spatial disorientation, later speed loss took place, aeroplane recovery for post-stall and stall situation.

Due to the lack of data recorder on AC board, it is not possible to assess the control actions of the crew team.

There were no reports from the crew team to the air traffic controller indicative of contingency rating, or on faults of aircraft.

The resulting destructions and malformation of aeroplane components were a consequence of off-design load actions resulted from the aircraft collision with the ground surface and ground fire.

3. Opinion[31]

The AA with Beech 95-B55 OM-KVV aeroplane took place in the daytime during flight operation in instrument meteorological conditions, for which the crew was not prepared and permitted, which most probably in an attempt to perform a climbing spiral resulted in spatial disorientation and aircraft post-stall recover and stall situation with further collision with the ground surface.

The contributing factors most probably were[32]:

- lack of appropriate risk analysis and departure decision taking in the availability of weather conditions information for which the crew team was not prepared;
- lack of instrumental flight skills of the crew team in the absence of corresponding rating and permission to IFR flights.

[31] According to Annex 13 Aircraft Accident and Incident Investigation to Chicago Convention, the determination of causes and AA contributing factors "does not imply laying of blame or establishment of administrative, civil or criminal liability".

[32] In accordance with the ICAO Guide on Aircraft Accident and Incident Investigation (Doc 9756 AN/965), the contributing factors are given in chronological order without a priority assessment.

4. Other deficiencies identified during the investigation

Not identified

5. Recommendations on enhancing flight safety

To Aviation Powers of Russia[33]

5.1. Inform the aviation personnel on the results of investigation of AA with Beech 95-B55 OM-KVV aeroplane.

5.2. Consider the expediency of introduction of procedure on verification of validity of documents submitted for obtaining permission for operating single flights.

To operators and private pilots

5.3. To conduct with pilots extraordinary lessons on the order of taking flight decision depending on weather conditions, consideration of flight area climate characteristics, as well as on actions in case of having the weather conditions not corresponding to the level of crew team preparedness and methods of prevention of spatial disorientation.

Chairperson of the Commission	*[signature]*	**S.V.Zebrin**
Members of the Commission:	*[signature]*	**R. R. Gabzalilov**
	[signature]	**M. Y. Kuzmenko**
	[signature]	**A.L.Timonin**

[33] To aviation administrations of other member states to the Agreement consider the applicability of these recommendations with consideration of actual situation in countries.