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INVESTIGATION NATIONAL BOARD
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Safety Investigation Report

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ACCIDENT, OCCURRED ON AUGUST 8, 2022 BY PARTENAVIA P.66C "CHARLIE" AIRCRAFT, REGISTRATION MARKS LZ-PTS, OPERATED BY THE PILOT OWNER AFTER TAKE-OFF FROM PRIMORSKO AIRFIELD, DISTRICT OF BOURGAS

Purpose of Report and Responsibility Level

Under Annex 13 of the Chicago Civil Aviation Convention of 07.12.1944, Regulation 996/20.10.2010 of the European Parliament and the Council on the investigation and prevention of accidents and events in Civil Aviation and Ordinance No. 13/27.01.1999 of MT (last amendment and addition - 22.01.2016), the investigation of an aviation event aims at identifying the reasons that led to the event to eliminate and exclude these in future **without identifying someone's guilt or liability**.

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List of abbreviations

AAIU	- Air Accident Investigation Unit;
AC	- Aircraft;
ACC	- Aircraft Crew;
ACC	- Aircraft commander;
AOM	- Aircraft Operation Manual;
AS	- Air space;
ATCC	- Airspace Traffic Control coordinator;
ATCO - SM	- Air Traffic Controller - Shift Manager
ATS	- Air Traffic Services
CAAct	- Civil Aviation Act;
CAMO	- Continuing Airworthiness Management Organization;
CAS	- Controlled Air Space;
DG CAA	- Directorate General of Civil Aviation Authority;
DG ERA	- Directorate General of Emergency Rescue Activity;
EA	- Executive Agency;
EASA	- European Air Safety Agency;
ELA1	- European Light Aircraft (an aeroplane with a Maximum Take-off Mass (MTOM) of 1 200 kg or);
FAA	- Federal Aviation Authority;
FIC	- Flight Information Center;
ICAO	- International Civil Aviation Organization;
JCCMASAR	- Joint Coordination Center for Maritime and Aviation Search and Rescue;
MP	- Maintenance program;
MT	- Ministry of Transport;
MTC	- Ministry of Transport and Communications;
NBAMRAI	- National Board for Aircraft, Maritime and Railway Accidents Investigations;
NPSARAA	- National Plan for Search and Rescue at air accident;
NTSB	- National Transport Safety Board;
ORMAEA	- Organizational Rules of Maritime Administration Executive Agency;
ORR	- Overhaul and restoration repair;
p.	- page;
RC	- Regional Center;
ROC	- Release to Operation Certificate;
RWY	- Runway;
SARCCAA	- Search and Rescue Coordination Center for Air Accident;
SARSAA	- Search and Rescue System for Air Accidents;
SG	- State Gazette;
SOP	- Standard Operating Procedures;
SSP	- Special Service Publication;
TLB	- Technical Logbook;
TU	- Technical University;
UTC	- Coordinated Universal Time;
VFR	- Visual Flight Rules;
WP	- Working Place;

1 Introduction

Date and time of the aviation event: 08.08.2022 г., 08:39 h local time (05:39 h UTC).

Notified: NBAMRAI of Republic of Bulgaria and Directorate General of Civil Aviation Administration" at the MTS of the Republic of Bulgaria, the European Aviation Safety Agency, the European Commission, the US National Transportation Safety Board (NTSB), and the Agenzia Nazionale per la Sicurezza del Volo of the Republic of Italy.

Pursuant to Art. 9 para. 1 of Ordinance No 13 of 27.01.1999 on the investigation of aviation accidents, the event is classified by the air transport unit of NBAMRAI as an air accident. The materials on the aviation occurrence are classified under state file number No 03/08.08.2022 in the archives of air transport unit of NBAMRAI.

Pursuant to Article 5, Para 4 of Regulation (EU) No 996/2010 on investigation and prevention of accidents and incidents in civil aviation, Article 142, Para2 of the Civil Aviation Act of the Republic of Bulgaria dated 01.12.1972 and Article 10, Para1 of Ordinance No 13 of the MT dated 27.01.1999 on the Investigation of aviation occurrences, and on the grounds of item 8, Para1, of Article 6 of the Rules for the Activity, Structure and Organization of NBAMRAI, by an Order No RD-08-21/19.08.2022 of the Chairman of Managing Board of NBAMRAI, a Commission was appointed for investigation of the accident.

The difference between the local time and UTC is +3 hours. All times in this report are in local time. On 08.08.2022 at 8:24 a.m. a Partenavia P.66C "Charlie" aircraft, registration marks LZ-PTS, operated by a pilot-owner, took off from Primorsko Airfield on a route ending at Bohot Airfield. After about 9 min of flight in climb, the pilot noticed a drop in oil pressure and informed the FIC that he was taking a reverse course to Primorsko Airfield. The oil pressure continues to drop and the pilot decides to make a forced landing at a site chosen from the air in the territory of the village of Krushevets. In the last stage of the landing, just before touching-down, he touched a wire fence, which wasn't noticed during the approach. After the touch-down onto the ground the aircraft nosed over (Fig. 1 of Enclosure 1). The pilot suffered a laceration on head, accompanied by bleeding. The aircraft received significant damage to the airframe and destruction of the propeller (Fig. 3 of Enclosure 1).

The commission for the investigation of the air accident points to the following as the immediate reasons for its realization:

1. Falling off of the oil filler cap of the aircraft engine due to failure to close and lock it during the preflight inspection by the pilot-owner.
2. When landing at selected from the air site, the pilot-owner didn't identify the site fence.

The following concomitant reasons also contributed to the realization of the air accident:

1. Execution by the owner pilot of elements of the line maintenance for which he has no rights.
2. The use by the pilot-owner on board the aircraft of checklist for normal and emergency procedures in Italian, a language he did not speak.
3. Poor quality and not approved by DG CAA translation of AFM
4. The approved documentation (AMM and AFM), at that time, was only in Italian language
5. Inadequate control by DG CAA in carrying out the annual airworthiness inspections.
6. Ineffective functioning of the search and rescue system in aviation accidents.

2 Factual information

2.1 Flight History

2.1.1 Flight number and type, the last point of departure and time, and planned destination point

Flight Number: Aircraft registration marks LZ-PTS.

Type of flight: Entertaining (enroute flight)

Last point of take-off: Primorsko Airfield.

Time of take-off: 08:24 on 08.08.2022

Planned landing point: Bohot Airfield., Bulgaria.

2.1.2 Flight preparation and description of the flight

Factual information is based on data collected and analyzed by:

The inspection of the place of the event, carried out by the investigative team of the NBAMRAI;

The pilot's personal explanations;

Conducted interviews with other participants and witnesses of the event;

The audio recordings from the Sofia FIC (130.6 MHz), the telephone recordings and the radar picture from the SATCAS ATS, provided in a report by the Directorate of BULATSA.

On 29.07.2022, the pilot owner of the P.66C "Charlie" aircraft with reg. marks LZ-PTS flew alone from Bokhot airfield (LZBO) and landed at 19:20 LT at Primorsko airfield (LZPR) after a two-hour flight without any particularities. The return flight was planned after 10 days, during which time the aircraft was parked in a hangar at the airfield and did not perform any flights.

On August 8, 2022, around 07:30 am, the pilot owner performed a preflight inspection of the aircraft, studied the weather conditions along the route and on the airfields using an Internet program. Actual weather and forecast were favorable. At 08:06, the pilot of the P.66C "Charlie" aircraft with registration marks LZ-PTS coordinated with the ATCC of FIC by phone the information about the upcoming route Primorsko Airfield - OSVOR - Kotel - Popovo - Polski Trambesh - Bokhot Airfield. The flight was planned without flight plan and outside the CAS. According to the pilot, during the preflight inspection he had performed an external inspection of the aircraft, the engine covers were opened, and the amount of oil was checked. No deviations from the norms were found, nor were there any traces of fuel and lubricant leaks on the floor of the hangar. According to a report at the RC of ATS Sofia, at 08:24, the pilot took-off for a VFR flight without a flight plan in Class G Airspace. He established radio communication with the Sofia FIC and reported his route. In order to avoid the Bourgas Airport, the pilot flew in a southwesterly direction at an altitude of 3000ft at QNH 1013 hPa.

At 08:33, he reported on the radio that he had detected a drop in oil pressure and the presence of oil splashes on the windshield of the cockpit, therefore he terminated the flight and took a reverse course to Primorsko Airfield. A state of emergency (MAYDAY) has not been declared by the ACC. The oil pressure continued to drop below the permissible limits, its temperature rose above 120°C, the upper limit of the permissible interval. The pilot chose an emergency landing site, set the flaps partly down in descent, shut down the engine due to the possibility of seizing and reduced speed to 40kts. The landing site was a plowed field between the villages of Krushevets and Varshilo, in a hilly area near a forest (Fig.1 of Enclosure 1). The pilot approached with the engine off to the beginning of the field, but at the last moment noticed that it was surrounded by a light wire mesh and thin wooden stakes, which the aircraft is unable to jump over. The undercarriage hit the fence, the aircraft flipped over (nosed over), slid onto its back, and settled at 22 meters after the point of contact with the ground (Fig.3 and 4 of Enclosure 1).

Place of final stop was 21.5 km west of Primorsko Airfield. Coordinates:

Latitude: N 42° 15' 45,32926"; Longitude: E 27° 26' 16,04414".

The plane was seriously damaged; a two-bladed propeller was broken. A fire did not occur; before leaving the cockpit the ACC turned off the power supply and took most of the available on-board documents and personal belongings. At 08:39 he called the landline phone of the FIC, reporting that he had a bleeding wound on the left-hand side of the head and sent the coordinates of his location to Sofia ATCO-SM Sofia via the mobile application. Since the ambulance was unable to reach the scene, after about an hour and a half the injured pilot, after profuse blood loss, was put on his son's personal car and transported to a nearby village, from where he was transported by ambulance to a hospital in Bourgas for wound treatment and thorough examination.

A mobile phone, a tablet with specialized navigation software and laminated maps for actions in normal and emergency situations in Italian (not approved by DG CAA) were found in the cockpit (Fig.9 of Enclosure 1).injury.

2.1.3 Location of aviation occurrence

Location: The forced landing was made on a chosen from the air site between the villages Krushevets and Varshilo, Sozopol municipality. It was a field at 292 m elevation and the place of last stop of the aircraft was LAT/LONG 42°15'45, 32926"N/027°26'16, 04414"E.;

Date and time: 8 August 2022, 08:24 Local;

Lighting conditions: Daylight

2.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Total in the aircraft</i>	<i>Others</i>
<i>Fatal</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Serious</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Minor</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>None</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>Not applicable</i>
<i>Total</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>

The crew did not have any injuries.

2.3 Damage to aircraft

During the inspection of the aircraft after the accident, the following damages were found:

There were traces of oil leakage on the aircraft, on the entire right-hand airframe and on lower surface (Fig. 3 of Enclosure 1);

Destroyed blades of the air propeller and bruised propeller spinner (Fig.6 and Fig.10 of Enclosure 1);

Destroyed nose wheel assembly (Fig.3 and 11 of Enclosure 1);

Deformed fire wall (Fig.13 and 14 of Enclosure 1);

Deformed engine mounting frame (Fig.13 and 14 of Enclosure 1);

Traces of overheating on the cooling fins of the engine cylinders (Fig.15 of Enclosure 1);

Destroyed engine intake air duct (Fig.12 of Enclosure 1);

Traces of oil leakage in the rear of the engine compartment;

Dropped engine oil filler neck cap (Fig. 22 of Enclosure 1). The cap was found dropped at the place of final stop of the aircraft, when it was disassembled for transportation.

Engine oil filler cap not locked (Fig. 21 of Enclosure 1);

Abrasions and deformations on the lower surface of the aircraft body (Fig.11 of Enclosure 1);

Deformations on the end fairing of the left-hand half-wing;

Deformations on the fairing of the rudder;

Bent wing bracing strut of the right-hand half-wing (Fig.3 of Enclosure 1);

Deformations of the attachment assembly of the of the right-hand semi-wing;

Deformed upper surface of the cockpit;

Missing landing light guard (Fig.18 of Enclosure 1).

The readings of the instruments in the cockpit are at technological zero, when the power was turned off.

2.4 Other damages

Five stakes and the wire on the fence of the field were knocked down and broken (Fig.1 of Enclosure 1).

2.5 Personnel information:

2.5.1 Pilot in command

Man Pilot owner 54 years old, male.

License: PPL(A);

Date of first issue: 26.08.2015;

Validity of license: Expire date 31.08.2023;

Qualification records: SEP (Land);

Authentication of pilot license: 2017, 2019, 2021;

Last LPC inspection on P.66C "Charlie" aircraft 23.08.2021, valid until 31.08.2023;

Initial theory course to acquire PPL: 2014;

Flight training: Year 2015 with a total flying time of 49 hrs 45 m on Cessna C150 aircraft;

Medical fitness: Class 1/2 LAPL/23.08.2019 expiry date 08.09.2022;

Medical limitations: None;

Education: No aviation or technical education.

Flight experience: Total flying time: 256:06 FH;

According to data in the personal flight book, filled in by the pilot himself, from 21.07. 2017 (when he acquired a P.66C Charlie aircraft with reg. marks LZ-PTS and received a Bulgarian Certificate of Airworthiness), he has flown a total of 125 FH. According to the running hour indicator of Lycoming SN RL-2560-76T, the hours flown are 149. During the last year 2022, the pilot owner has completed 3 flights with a total flight time of 4 hours and 10 minutes, including the last one. In a statement to the commission, he stated that the flight log was not filled out in the proper order and it did not reflect all the flights actually conducted, so the flight time was approximate. The commission found some inconsistencies in the specified data, the readings of the running hour indicator and the reporting documents presented to GD CAA, which had no significant impact on the training and experience of the pilot owner.

In view of the foregoing, the Commission accepts that the pilot owner has satisfactory training and experience as a private pilot.

2.6 Aircraft Information

2.6.1 Airworthiness Information

The Partenavia P.66C Charlie aircraft s/n 33 was built in 1978 by Partenavia Costruzioni Aeronautiche S.p.A. The P.66C "Charlie" variant was certified on 26 February 1976 and included into Type Certificate No. SO/A134 issued by RAI (Italian NAA at that time) and only on 2013 Vulcanair S.p.A. became the new Type Certificate Holder of the old P.66 series aircraft (Type Certificate No. EASA.A.613)

The aircraft has Certificate of Registration No. 2708, issued by the Directorate General Civil Aviation Administration of the Republic of Bulgaria on 27.07.2017, and in this certificate the type of the aircraft was recorded as Partenavia P.66C "Charlie". The aircraft has two owners, private individuals. During the realized occurrence, a flying pilot was one of these owners.

The aircraft has a Certificate of Airworthiness No 25-0126 issued by DG CAA on 27.07.2017. An Airworthiness Review Certificate was issued for the aircraft with reference number BG-ARC-2708 by DG CAA on 15.10.2021. The expire date of this certificate is 14.10.2022, and by the time of its issuance, the aircraft has flown 8,719 flight hours. As to the date of occurrence the certificate was valid.

A Certificate of Compliance with Aviation Noise Standards was issued for the aircraft with No 45-0140. The maximum mass of the aircraft at take-off and landing is 990 kg, as it was recorded in the certificate, issued on 27.07.2017.

Since the beginning of operation to the day of the occurrence realized, the aircraft has flown 8,721:48 h, according to an entry in the technical logbook.

The aircraft is equipped with a Lycoming O-320-H2AD aviation piston engine, serial number RL-2560-76T. As to the time of the occurrence realization, the engine running time according to the

running hour indicator was 1,378:06 h (Fig.19 of Enclosure 1), with time between overhauls of 2000 flight hours or 12 years. The last engine overhaul was on 27.03.2006 and activities related with prolongation the time to overhaul according the calendar period were carried out. In the engine technical logbook when documenting the annual inspection carried out on 27.08.2021, a running hour indicator reading of 1394:42 h was recorded, which is 16:36 h more than the running hour's indicator reading at the occurrence. The difference between the running hour's indicator readings and the entry in the technical logbook was not noted in the inspection report after presentation of the aircraft for airworthiness review on 15.10.2021.

The aircraft was fitted with a Hoffmann HO23CHM – 186140 air propeller.

By the time the occurrence, the propeller running time was 801:48 h, after an overhaul performed on 08.03.2010.

No documentation related to the technical operation prior to its entry in the register of the Republic of Bulgaria was provided to the commission.

The maintenance of the aircraft airworthiness is based on a Maintenance Program proposed by the manufacturer in 2009. The program is in Italian, and the pilot owner declared in written, in accordance with the requirement of Annex Vb (part ML) of Regulation 13-21/2014 of the Commission of November 26, 2014, that he is responsible for its implementation, but he himself does not know the Italian language. In the copy of the program presented by the DG CAA, containing 56 pages, seven are in Bulgarian and the rest in Italian, without specifying the works that are performed during the line service and who should perform these works, for example on the day of the event the pilot owner has performed the service at the beginning of the flight day without having permission to perform such an activity. After the check of the oil quantity, he left the oil filler cap not tightly closed and didn't lock it. This caused the leak of oil from the engine and subsequent forced landing on selected from the air site.

The program itself should be annually reviewed during the annual airworthiness inspection, but during these inspections no notes related to the need for its correction or improvement were written. The basic maintenance of the aircraft was carried out by OLIMPIA AIR AMO, possessing a certificate as maintenance organization No BG.MF.3006, at the request of the pilot owner.

2.6.2 Aircraft characteristics

The Partenavia P.66C Charlie aircraft is an all-metal, four-seat, high-wing, and single-engine aircraft with non-retractable tricycle (nose wheel) landing gear designed for use in general aviation. The aircraft category is semi-acrobatic.

The maximum take-off mass of the aircraft is specified in paragraph 2.6.1. The mass of an empty aircraft is 657 kg in accordance with measurement protocol No. 52 dated 23.07.2018 issued by SIMEK AIR LTD. At the time of the forced landing, only the pilot was on board.

The Aircraft Operation Manual is in Italian, and the commission was provided by the pilot owner with an unedited translation in Bulgarian, without a stamp for approval by DG CAA. DG CAA did not submit a copy of the AOM to the commission.

Below are some typical speeds and limitations according to the Partenavia P.66C Charlie Aircraft Operation Manual.

Speed limitations

Speed		KIAS
V _{NE}	Maximum speed	177
V _{NO}	Maximum cruising speed	121
V _A	Maneuvering speed	118
V _{FE}	Maximum extended flaps speed	83
V _S	Stalling speed:	
	Flaps up	54
	Flaps at 15°	50
	Flaps at 35°	46

Speedometer white arch for flight with flaps	46 - 83 KIAS;
Speedometer green arch for normal operation	54 – 121 KIAS;
Yellow arch - attention	122 -177 KIAS;
Red radial line	177 KIAS;
Maximum vertical acceleration	+ 4,4 ; - 1,76;
Maximum speed of cross wind	20 kt;
Fuel tanks capacity	180 (2X90) l;
Oil system capacity	5,67 l.

The item “N” of the pre-flight inspection, included in chapter No.3 (normal operating procedures) of the approved AFM, specifies to perform, during the engine bay inspection, the check for presence of FOD, any leakages and appropriate locking of all items.

Chapter Four of the AOM, Emergency Procedures, is only half a page and does not include a procedure for oil pressure drop.

2.6.3 Information on the used fuel.

No entry was made in the technical logbook for refuel the aircraft, but according to the pilot owner, the plane was fully loaded with aviation gasoline.

The amount of fuel and its condition have no relation to the realization of the occurrence.

2.7 Meteorological information

The weather conditions at the time of the forced landing received by the coordinator of Primorsko airfield were as follows: wind direction from NE and speed 16 kt, CAVOK, QNH 1013.

There were no meteorological phenomena that have influenced the realization of the occurrence.

Detailed information on the weather conditions at the time of the occurrence is attached to the investigation file.

2.8 Navigation systems

Standard navigation equipment of the aircraft.

2.9 Communication systems

Standard communication equipment of the aircraft.

The two-way radio communication between the ACC and FIC was carried out on a frequency of 130.600 MHz.

ATC SE provided a record of the radio communication between the ACC and FIC. When listening to the radio communication on the working frequency of the FIC, the commission found that there was no loss of radio communication. There were no interruptions or disturbances during the radio exchange. The records are enclosed to the investigation materials.

2.10 Aerodrome information

During the flight in which the occurrence took place, the aircraft took off from Primorsko airfield and the landing was planned at Bohot airfield. The coordinates of referent point of Primorsko airfield are as follows: N 42°15'34.8''; E 027° 42'12.5'' and 4.3m elevation. The airfield has a RWY with directions 100°/280°, the length of RWY is 910m, and the width 30m, with asphalt concrete pavement of the RWY.

The landing was carried out on a site selected from the air with coordinates of the place of the final stop of the aircraft specified in paragraph 2.1.3.

2.11 Flight recorders

Not used for the type of aircraft

2.12 Information about the impact and the debris

After detecting a drop in oil pressure, the pilot informed the FIC and took a reverse course to Primorsko Airfield. The oil pressure continued to drop and its temperature rose above the permissible values. The pilot decided to make a forced landing at a site selected from the air. As a suitable one, he selects a harrowed field on the grounds of the village of Krushevets, which he approached at a height of about 1500 ft above the ground, almost perpendicular to the furrows, turning off the engine by the main switch. In the final stage of the approach, when the speed was in his judgment close to stalling, he noticed a wire fence, fails to fly over it and it caused the aircraft to overturn (nose over) and slide on its back to the final stop (Fig. 1 - 7 of Enclosure 1). It can be seen from the photos, that the structural integrity of the aircraft was preserved during the impact. The resulting damages are described in a protocol attached to the investigation file and reflected in paragraph 2.3 of this report. Upon impact with the ground surface, the pilot received a cut wound on the left-hand side of the head caused by the aluminium cockpit ventilation diffuser (Fig. 8 of Enclosure 1).

During the inspection of the scene, it was also found that the main switch was in the off position (Fig. 16 of Enclosure 1). The engine control levers were in the following positions: the throttle lever at 2/3 from the stop for maximum, the mixture control lever at 1/2 of the stop for a rich mixture, the lever of the heating of the carburettor was at the front stop (Fig. 18 of Enclosure 1). From this figure it can be seen that the flap position pointer is at 10o position. The position of the arrows of the instruments in the cockpit is at technological zero, including the indicators of oil pressure and temperature. The altimeter arrows indicate an altitude of 750 ft. The running hour's indicator reading is 1378.1 hours. The fuel cock is in the position both tanks on (Fig. 20 of Enclosure 1).

During the inspection of the engine compartment it was revealed, that the cap on the oil filler neck was unscrewed, and there were no traces of locking wire on it.

There were traces of oil leakage on the aircraft, on the entire right-hand airframe and on lower surface (Fig. 3 of Enclosure 1); there were also traces of oil leakage on the fire wall (Fig. 14 of Enclosure 1). No signs of oil leakage from the oil filter connection assembly to the engine housing were found.

There were no signs of fire in the air or on the ground.

2.13 Medical and pathological information

The pilot received a cut wound on the left-hand side of the head when the aircraft hit the ground, causing profuse bleeding.

Since the sent ambulance was unable to reach the place of accident, the injured pilot was transported in his son's personal car to the nearby village of Krushevets, from where he was transported by ambulance to a hospital in the city of Bourgas for treatment of the wound and examination. After the examination, he was released without the need for further treatment.

There is no information that physiological factors or incapacitation affected the pilot's workability.

2.14 Fire

No fire appeared.

2.15 Factors for Survival

After the plane came to a final stop, the pilot-in-command unbuckled his seat belts, exited the plane, and called the FIC, reporting a bleeding head wound and sending the location to the mobile number they provided. RC Sofia had immediately notified on the the need to transport the pilot to a medical facility. At 08:41:46 ATCC at FIC called the emergency center 112 and informed that there is a forced landing of an aircraft and the pilot needs medical attention, and all available information was transmitted.

As a result of the activation of the SAR system, teams from the Ministry of Internal Affairs, fire department and emergency ambulance arrived at the scene of the occurrence. The injured pilot was transported to the nearby village of Krushevets by the car of his son, who was informed by phone about what had happened..

2.16 Tests and research

1. Examination of Partenavia P.66C "Charlie" aircraft, registration marks LZ-PTS, serial number 33, at the site of the forced landing;
2. Additional examination of the aircraft at the place of storage;
3. Interviews with the pilot, witnesses of the realized event and persons related to the occurrence;
4. Research and analysis of operational documentation of the AC;
5. Research and analysis of documents related to the registration and airworthiness of the aircraft;
6. Evaluation of the flight and operational performance of the AC;
7. Study of the functioning of the existing SAR system in relation to the realized occurrence;
8. Logical-probabilistic analysis of possible causes of the air occurrence.

For the Item 1, the results of the inspection of the aircraft after the realized occurrence are reflected in paragraphs 2.1.2, 2.1.3, 2.3 & 2.12.

For the Item 2, the results of the inspection of the aircraft at the place of storage are reflected in paragraphs 2.3 & 2.12.

For Item 3, the results of interviews with the piloting pilot, witnesses of the realized occurrence and persons related to it, are reflected in paragraphs 2.1.2, 2.5, 2.6.1, 2.7, 2.15 & 2.17.

For Item 4, the results of the study and analysis of the operational and technological documentation of the aircraft are reflected in paragraphs 2.6.1, 2.6.2 & 2.6.3.

For Item 5, research and analysis of documents related to the registration and airworthiness of the aircraft are reflected in paragraph 2.6.1.

For Item 6, the results of evaluation of flight and operational characteristics of the aircraft, related to the realized occurrence, are given in paragraph 2.6.2.

For Item 7, researching the functioning of the existing SAR system in relation to the realized occurrence, the results are reflected in paragraphs 2.15 & 2.17.

Logical and probabilistic analysis of the possible causes for realization of the accident has been made in Chapter 3 of this report..

2.17 Additional Information

2.17.1 Chronology of the event

At 08:24 the ACC of the LZ-PTS established radio communication with Sofia FIC after taking off from the Primorsko airfield.

ACC of LZ-PTS and ATCC at FIC specified the conditions for conducting flights.

At 08:33 the ACC of LZ-PTS informed ATCC at FIC that he should return to the Primorsko airfield due to a low oil pressure indication.

At 08:34:14 ATCC at FIC informed the flight controller at Bourgas Approach that LZ-PTS was returning to Primorsko due to a technical problem.

At 08:37, the ATCC at FIC registered on the ATS monitor that the aircraft was performing a descending orbit at about 11 miles west of the town of Primorsko. ATCC at FIC searched ACC of LZ-PTS on the operating frequency, but didn't receive an answer to the call.

At 08:38:28 at an altitude of about 800ft and a distance of about 11.5 NM to the west of Primorsko airfield, the overview symbol of LZ-PTS disappears from the FIC monitor and went into the "Coast list" - a red mark with the last known coordinates of the aircraft - 42 16 06 N; 027 26 42 E.

At 08:39:14, the ACC of LZ-PTS called the office phone of the RM FIC and informed the ATCC at FIC that he had made a forced landing and needed medical assistance.

At 08:40:45 ATCC at FIC informed ATCO - SM Sofia by phone that the ACC of LZ-PTS made a forced landing.

At 08:41:45 ATCC at FIC called the emergency center 112 and informed that there was a forced landing of an aircraft and the pilot needed medical attention, and all available information was transmitted.

Within the current conversation, which ends at 08:49:45, ATCO - SM Sofia, ATCC at FIC and the operator of phone 112 (via the office phone of RM FIC) coordinated the process of locating the pilot and the way of sending the location of the aircraft of the rescue team, namely:

At 08:44 ATCO - SM Sofia via the personal mobile phone (heard in the background of the main communication with the phone 112) spoke to the pilot of LZ-PTS, clarifying his state of health, and he understood that the ACC had brought the bleeding from the head under control. ACC, for its part, sent its location to ATCO - SM Sofia as a "location" from a phone application. The location of the crashed aircraft was found to be between the villages of Krushevets and Varshilo.

At 08:47:32 KUV D CPI transmitted to the operator from phone 112 the digital geographic coordinates of the location of the aircraft and the phone of ATCO - SM Sofia for subsequent coordination.

Between 08:46 and 08:56 ATCO - SM informed the person on duty at Emergency Center 112, in order to speed up the provision of medical assistance to the injured pilot of the crashed aircraft, personally transmitting the coordinates of the location to the rescue team (doctor or driver).

At 08:57 ATCO - SM Sofia received a call (on the personal mobile phone) from the SARCCAA.

At 09:10 ATCO - SM broadcasts a notification through the SARIX automated system. In the meantime, SARCCAA called again ATCO - SM Sofia on the office phone with a request for all available information.

It is necessary to point out that ATC SE do not immediately inform SARCCAA and NBAMRAI about the realized occurrence.

From the information provided by the DG CAA, there was no evidence that the SARCCAA coordinated search operations with the Ministry of Internal Affairs.

The person on duty at the SARCCAA was notified by the Emergency Center 112 about the occurrence and conducted a conversation with ATCO - SM (by mobile phone), in which he was informed about the complete information about the emergency landing and the condition of the pilot. Immediately after this conversation, he received the digital location (via a mobile application) of the site of the accident from the mobile phone of ATCO - SM - Sofia.

The ambulance did not go to the scene of the accident, the injured pilot was transported by his son to the village of Krushevets.

2.17.2 Search and rescue system for air accidents

The functioning of a full-fledged and effective search and rescue system in the event of aviation accidents (SARSAA) is in fulfillment of the obligations of the Republic of Bulgaria arising from the Convention on International Civil Aviation.

In the NPSARAA (National Plan for Search and Rescue in Aviation Accidents) the tasks of SARSAA are included, the participants in it are defined, including their technical capabilities, the main units for the implementation of search and rescue operations, the levels of coordination and control, as well as the financial support of the activities under the plan.

According to NPSARAA and Ordinance No 12 of September 11, 2020 for the search and rescue system in the event of an aviation accident of MTITC, the Ministry of the Interior, the Ministry of Defense and the National Security State Agency,

the leading role in the SARSAA is assigned to DG CAA, which manages the system and coordinates the activities and management of search and rescue operations through the Search and Rescue Coordination Center in Air Accident (SARCCAA), which is also in accordance with the provision of Art. 141, para. 4 of the Civil Aviation Act.

The main unit in the SARSAA is the SARCCAA, which is responsible for the immediate management and coordination of preparatory actions and the conduct of search and rescue operations in the event of aviation accidents.

In the functioning of the SARSAA as a full-fledged and effective system, the activities provided for in Ordinance No 12, NPSARAA activities and the requirements of Ordinance No 1 on licenses of the aviation personnel must be fulfilled in their entirety, which include:

- ensuring the adequate technical provision of the SARCCAA and trained and competent personnel;

- signing operational agreements between the participants in the system, which should clearly define duties and responsibilities in order to achieve effective coordination;
- signing agreements with neighboring search and rescue centers in connection with the implementation of cross-border operations of such a nature;
- conducting the necessary training for the personnel involved in search and rescue activities in aviation accidents.

It is extremely important that each SARSAA participant in it has the necessary expertise, abilities and technical support. In this regard, it is essential for search and rescue coordinators to have appropriate qualifications and in-depth aviation knowledge. It is also important to note the following:

In the organizational regulations of the Maritime Administration Executive Agency and DG CAA similar texts are provided regarding the fact that in case of 24-hour mode of operation, they should maintain forces and assets in joint aviation and maritime coordination center for coordinating and conducting search and rescue operations. According to Art. 23, para. 1 of the Organizational Rules of the Maritime Administration EA (ORMAEA), it should carry out search and rescue activities in the Bulgarian maritime area of responsibility for search and rescue and in the inland waterways of the Republic of Bulgaria through the Emergency and Rescue Activity General Directorate (DG ERA), located in Varna and with territorial units in Bourgas and Ruse.

The specific activities that are attributed to the GD ERA are defined in Art. 23, para. 2 of ORMAEA. In case of 24-hour mode of activity, it should maintain forces and means in the combined aviation and maritime rescue coordination center for coordinating and conducting of search and rescue operation for salvation of human life and for providing assistance to ships and aircraft in distress in the Bulgarian maritime area of responsibility for search and rescue and in the inland waterways of the Republic of Bulgaria and maintain together with employees of the DG Civil Aviation Administration" on duty rescue of Maritime Administration EA for reaction in case of signal of distress of people, ships and aircraft in Bulgarian maritime area of responsibility for search and rescue.

The specific activities that are attributed to the ERAGD are defined in Art. 23, para. 2 of ORMAEA. In case of 24-hour mode of activity, it should maintain forces and means in the combined aviation and maritime rescue coordination center for coordinating and conducting of search and rescue operation for salvation of human life and for providing assistance to ships and aircraft in distress in the Bulgarian maritime area of responsibility for search and rescue and in the inland waterways of the Republic of Bulgaria and maintain together with employees of the DG Civil Aviation Administration" rescue duties means of Maritime Administration EA for reaction in case of signal of distress of people, ships and aircraft in Bulgarian maritime area of responsibility for search and rescue.

However, neither the NPTSAP nor Ordinance No. 12 foresees a unified or joint coordination center for search and rescue.

By an agreement between DG CAA and MAEA, the manner and conditions of interaction are regulated by mutual unification of the activities of the Coordination Center for Search and Rescue in the event of aviation accidents and the Maritime Rescue Coordination Center in the Joint Coordination Center for Maritime and Aviation Search and Rescue (JCCMASAR), through which, with joint efforts, coordination of search and rescue will be carried out on the land territory of the country, its airspace, the Bulgarian maritime area of responsibility for search and rescue and the inland waterways of the Republic of Bulgaria.

SARCCAA, on the other hand, is the core of SARCAA, and it must be provided with modern technical equipment and competent personnel. As already stated, the concept of coordination being carried out by a joint center is not included in the NPSARAA and Ordinance No 12. Assigning the functions of air accident search and rescue coordinators to persons from the MSCC in MAEA based on short training threatens the operational capability of the SARSAA.

As can be seen from the above, as well as after consulting other normative documents, the statutory territorial competence of the DG ERA, resp. of its employees, is strictly defined in the Bulgarian maritime region of responsibility, which essentially covers only maritime spaces and does not extend over the land territory of the Republic of Bulgaria, including and the airspace above it.

The need for interaction between individual search and rescue services, including and with marine ones, arises from the fact that a given accident, e.g. with an aircraft, can develop in the airspace over the land territory of the country and continue over the sea spaces (emergency ditching).

According §. 2.4.1 of the International Convention on Search and Rescue at Sea, 1979 (SAR Convention), to which RB is also a party, the parties must ensure, as far as practicable, close coordination between maritime and aviation services in order to conduct the most effective and efficient search and rescue in its search and rescue areas and the airspace above them. In turn, according to § 2.4.2. of the SAR Convention, each country should, whenever practicable, consolidate rescue coordination centers and rescue for sea and air sub-centers.

The Convention makes a clear line of competence between maritime and aviation search and rescue services, allowing their unification in a common service, without equating different tasks and unifying competences, emphasizing coordination rather than interchangeability.

Also the establishment of a joint/unified center (JRCC) is addressed in Volume 2 of ICAO DOC 9731 (LAMSAR Manual), where the establishment of a JRCC requires full interchangeability of coordinators across all posts. This means that these coordinators must have the necessary in-depth training to conduct search and rescue operations in both aspects.

In this case, it is not clear how employees appointed to full-time positions in the GD ERA in the maritime rescue coordination center and possessing profiled maritime education and training can effectively cover and perform the specific search and rescue activities in the Bulgarian maritime area of responsibility and simultaneously in the air space and the territory of the country.

It is not clear whether this does not violate the basic principles of search and rescue in the country's maritime spaces, giving the MSCC obligations that do not fall within its legally established territorial competence.

In connection with what was stated in paragraph 2.13 of this report, the commission requested documents from DG CAA to clarify the functioning of the SARSAA. After reviewing the documents, listening to records and conducting interviews, it was found:

- Persons carrying out search and rescue activities in aviation accidents do not hold a search and rescue coordinator (SAR) license according to Ordinance 12 and Ordinance No. 1;
- General Directorate Civil Aviation Administration does not have concluded cooperation agreements for the purposes of search and rescue in the event of aviation accidents with the Ministry of Defense, the Ministry of the Interior, the Ministry of Foreign Affairs and the Ministry of Health, as participants in the NPSARAA in the search and rescue system in aviation accidents.
- The staff carrying out search and rescue of aircraft, crews and passengers suffering a disaster on the land territory of the country is insufficient to ensure a continuous 24-hour duty at the SSARCCAA.
- There is no clear legal framework for the specific duties and responsibilities of the Joint Coordination Center for Maritime and Aviation Search and Rescue, including and the manner of implementation of coordination between the MSCC and the Coordination Center for Search and Rescue in the case of aviation accidents. Such a framework should be defined by statutory or by-law, rather than by agreement, because of the importance of such a framework in the search and rescue system. The establishment of a Joint Coordination Center for Maritime and Aviation Search and Rescue should also be defined in some type of regulatory act (statutory or by-law).

3 Analysis

The statement in paragraph 2.1.2 shows that the cause of the attempted forced landing at an air-selected site, which turned into an emergency landing, was a drop in oil pressure in the engine oil system. The pressure drop was due to oil leakage, from the engine oil filler neck, as it was found during ground inspections. This neck should be closed by a cap, which must be tightly screwed and locked with a locking wire. According to the piloting pilot, before taking off he has performed a preflight inspection, checking the amount of oil. This check includes: Unlocking the cap (if it was locked at all), unscrewing the cap and checking the oil level by the oil level gauge and, if the level is satisfactory, then screwing and locking the cap. The subsequent oil leakage situation showed that the pilot after the check left the oil filler cap not properly closed, i.e. not screwed or not screwed all the

way and not locked (on the cap itself there were no signs of the use of a locking wire, and by design it is not self-locking). It is clear from what was stated in paragraph 2.5 that the pilot owner didn't have aviation or other technical education, nor did have a certificate issued by DG CAA for carrying out work on the line maintenance of the aircraft in accordance with the maintenance program. The lack of experience and the absence of habits related to the maintenance of the aircraft suggests that such a mistake on his part is quite possible.

In paragraph 2.6.1, a number of shortcomings related to the compilation of the Aircraft Maintenance Program were indicated, which were not corrected during the annual inspections of the review of the airworthiness of the aircraft. These deficiencies suggest gaps in the implementation of the aircraft's line maintenance.

The main document by which the pilot owner carries out the flight operation of the aircraft is the AOM. In this case, it is in Italian, which the pilot owner does not speak, and the translation of the AOM presented to the commission, made probably by Google translator, was not edited, was not approved by DG CAA and could not be used, especially by a person with no aviation education. The translation of Chapter Three of this manual entitled "Employment Procedures" (the title was written literally as in the translation provided, it should be "Normal Operating Procedures") contains actions taken by the pilot during the preflight inspection and is practically unusable. The normal and emergency procedures checklists in Italian language in the aircraft cockpit could not be used by the pilot owner who does not speak Italian and this should have been established during the airworthiness inspection of the aircraft when the presence of the required documentation in the aircraft cockpit must also be checked.

In the circumstances created in flight, the oil pressure falling below the permissible values and its temperature increasing above the permissible values, the decision of the pilot shut down the engine and land on a selected from the air site was correct.

During the approach to carry out the forced landing the pilot did not notice that the field selected for landing was fenced with wire attached to stakes. This omission led to the fact that the forced landing turns into an emergency one. The touch to the fence wire caused the aircraft to turn over on its back and caused the damages described in paragraph 2.3. The turning on the back of the aircraft was also accompanied by an injury to the pilot. The pilot's injury was accompanied by significant bleeding, and the timely intervention of his son, who took him to the ambulance waiting in the village of Krushevets, contributed for limiting more significant consequences.

The activation of the search and rescue system did not lead to the arrival at the scene of the teams of emergency assistance, fire protection and the authorities of the Ministry of Internal Affairs.

Taking into account the above, it can be stated that the occurrence of the aviation accident is due to:

- Not properly closed and unlocked oil filler cap by the pilot when performing the preflight inspection of the aircraft;
- Failure of the pilot to notice the wire fence of the field selected from the air for the forced landing.

The following also contributed to the realization of the accident:

- Execution by the pilot of elements of the line maintenance for which he has no rights;
- Use of AOM and checklists with normal and emergency procedures of the aircraft in Italian, which the pilot in command does not speak.
- Poor quality translation of the aircraft AOM, not approved by DG CAA.
- In the 56-page copy of the Aircraft Maintenance Program presented by DG CAA, seven pages are in Bulgarian, and the rest are in Italian, without specifying the works that should be performed during line maintenance and who should perform these works.

- Inadequate control by DG CAA in carrying out the annual airworthiness inspections.
- Ineffective functioning of the search and rescue system in aviation accidents

4 Conclusion

4.1 Findings

As result of the investigation, the Commission made the following conclusions:

1. The Partenavia P.66C “Charlie” aircraft s/n 33 was built in 1978 by Partenavia Costruzioni Aeronautiche S.p.A.
2. The aircraft has Certificate of Registration No 2708, issued by the Directorate General of Civil Aviation Administration of the Republic of Bulgaria on 27.07.2017.
3. In the Certificate of Registration, the aircraft type was recorded as Partenavia P66C “Charlie”, which does not correspond to the type certificate.
4. The aircraft was owned by two private individuals. During the realized occurrence, a piloting pilot was one of these owners.
5. The aircraft has Airworthiness Certificate No 25-0126 issued on 27.07.2017 by DG CAA.
6. An Airworthiness Review Certificate was issued for the aircraft with reference number BG-ARC-2708 by DG CAA on 15.10.2021. The expire date of this certificate is 14.10.2022. , and by the time of its issuance, the aircraft has flown 8,719 flight hours.
7. A Certificate of Compliance with Aviation Noise Standards was issued for the aircraft with No 45-0140. The certificate was issued by DG "GVA" on 27.07.2017.
8. Since the beginning of operation to the day of the occurrence realized, the aircraft has flown 8721:48 h, according to an entry in the technical logbook.
9. The maintenance of the airworthiness of the aircraft is carried out in accordance with Aircraft Maintenance Program, as in the copy of this Program presented by DG CAA of 56 pages, seven are in Bulgarian and the rest are in Italian, and the works that should be performed at the line service and who should perform these works are not specified.
10. In the declaration of execution of the Maintenance Program specified by the pilot owner, no work was indicated that was carried out by him.
11. The owner pilot does not have permission to carry out work under the Maintenance Program.
12. The basic maintenance of the aircraft was carried out by OLIMPIA AIR AMO, possessing a certificate as maintenance organization No BG.MF.3006, at the request of the pilot owner.
13. The Maintenance Program should be annually reviewed during the annual airworthiness inspection, but during these inspections no notes related to the need for its correction or improvement were written.
14. The aircraft is equipped with a Lycoming O-320-H2AD aviation piston engine, serial number RL-2560-76T. As to the time of the occurrence realization (08.08.2022), the engine running time according to the running hours indicator was 1378:06 h, with time between overhauls of 2000 flight hours or 12 years.
15. The last engine overhaul was on 27.03.2006 and activities related with prolongation the time to overhaul according the calendar period were carried out.
16. In the engine technical logbook when documenting the annual inspection carried out on 27.08.2021, a running hours indicator reading of 1394:42 h was recorded, which is 16:36 h more than the running hours indicator reading at the occurrence. The difference between the running hours indicator readings and the entry in the technical logbook was not noted in the inspection report after presentation of the aircraft for airworthiness review on 15.10.2021.
17. The aircraft was fitted with a Hoffmann HO23CHM – 186140 air propeller. By the time the occurrence, the propeller running time was 801:48 h, after an overhaul performed on 08.03.2010. As a result of the realized occurrence, the propeller was destroyed.
18. No documentation related to the technical operation of the aircraft prior to its entry in the register of the Republic of Bulgaria was provided to the commission.

19. The Aircraft Operation Manual is in Italian, and the commission was provided by the pilot owner with an unedited translation in Bulgarian, without a stamp for approval by DG CAA. DG CAA did not submit a copy of the AOM to the commission.
20. The pilot owner, who has realized the aviation accident, has satisfactory training and experience for a private pilot, and in the pilot's brevet in section XIII "Remarks" it is written, Language proficiency level - Bulgarian, level 6.
21. The pilot-in-command performed preflight inspection of the aircraft without using work cards for normal procedures, which were in Italian, a language he didn't not speak.
22. No entries were made in the aircraft logbook for line service performed before the flight.
23. When performing the preflight inspection, the pilot-in-command left the oil filler cap not properly closed and not locked.
24. During the flight in climb conditions, a significant amount of engine oil leaked, which was indicated by oil pressure and oil temperature gauges and by the appearance of oil droplets on the cockpit glazing.
25. The pilot changed course and, judging that he will not be able to fly to the airfield of take off, decided to make a forced landing at a site selected from the air.
26. In order to prevent the engine from overheating and seizing, the pilot shut it down and made a forced landing with the engine off.
27. The pilot did not notice the wire fence around the field selected from by the air for a forced landing.
28. The plane's undercarriage caught the wire of the fence and the aircraft turned onto its back and slid along the ground to its final stop.
29. During the flip of the plane on its back, the pilot received a cut wound on the head, which caused significant bleeding, but he did not lose consciousness.
30. The aircraft sustained severe damage as described in paragraph 2.3 of this report.
31. During the contact with the ground and until the final stop of the aircraft, no fire occurred.
32. After releasing the seat belts, the pilot contacted FIC and sent the coordinates of his location.
33. ATCC at FIC called the emergency center 112 and informed that there was a forced landing of an aircraft and the pilot needed medical attention, and all available information was transmitted.
34. ATC SE did not immediately inform SARCCAA and NBAMRAI about the realized occurrence.
35. As a result of the activation of the SAR system, teams from the Ministry of Internal Affairs, fire department and emergency ambulance arrived at the scene of the occurrence.
36. The injured pilot was transported by the car of his son, who was informed by phone about what had happened, to the nearby village of Krushevets, where the ambulance was waiting.
37. After treatment of the wound and examination at the hospital, the pilot was released without the need for further treatment.
38. Weather conditions do not have a direct impact on the realization of the event.

4.2 Causes

On the basis of the circumstances presented in this report and the analysis made of the same, the commission points to the immediate causes of the aviation accident:

1. Falling off of the oil filler cap of the aircraft engine due to failure to close and lock it during the preflight inspection by the pilot-owner.
2. When landing at selected from the air site, the pilot-owner didn't identify the site fence.

The following concomitant reasons also contributed to the realization of the air accident:

1. Execution by the owner pilot of elements of the line maintenance for which he has no rights.
2. The use by the pilot-owner on board the aircraft of checklist for normal and emergency procedures in Italian, a language he did not speak.
3. Poor quality and not approved by DG CAA translation of AFM.
4. The approved documentation (AMM and AFM), at that time, was only in Italian language
5. Inadequate control by DG CAA in carrying out the annual airworthiness inspections.
6. Ineffective functioning of the search and rescue system in aviation accidents.

5 Safety Recommendations

Taking into account the causes of the realized aviation accident and the shortcomings revealed during the investigation, the commission recommends that the following measures be implemented to ensure the safety of flights:

BG.SIA-2022/03/01. For the subsequent flight operation of the aircraft, with which the air accident took place, it is necessary to carry out a capital repair, and a control disassembly of the engine with subsequent tests.

BG.SIA-2022/03/02. DG CAA should develop operating instructions for the pilot owners of ELA1 aircraft from the registry of the Republic of Bulgaria, in which to inform them in what volume, when and under what circumstances they can perform line service.

BG.SIA-2022/03/03. When performing annual inspections of airworthiness of ELA1 aircraft, the Airworthiness of Civil Aircraft Department of DG CAA should check the compliance of the Maintenance Program with the requirements of the manufacturer, and it should be noted in the inspector's control card.

BG.SIA-2022/03/04. The Ministry of Transport and Communications of the Republic of Bulgaria to make changes in the regulatory documents related to search and rescue in aviation accidents, reflecting the creation and functioning of a joint coordination center for maritime and aviation search and rescue.

On the grounds of Article 18, §5 of Regulation (EU) 996/2010, the safety recommendation issued will be recorded in the centralized European system SRIS (Safety Recommendations Information System).

NOTE:

Pursuant to Article 6.3 of Annex 13 to the Convention on International Civil Aviation and Article 19 of Ordinance No. 13 of 27.01.1999 on Air Accident Investigation issued by the Minister of Transport of the Republic of Bulgaria, a draft of this final report has been sent to the States concerned. Within the 60-day period laid down in Annex 13, the Investigation Commission received comments on the draft report from the aircraft manufacturer, Vulcanair S.p.A. ITALY, and from the General Aviation Administration of the Republic of Bulgaria. The comments are annexed to the investigation documentation. In the final report, the Commission for Safety Investigation reflected the comments made by the manufacturer. The final report also made corrections to recommendations made by DG CAA to improve flight safety. In the letter responding to the CAA DG's opinion, the Commission highlighted the inadequate control functions of the CAA DG with regard to flight safety requirements. The reply letter is annexed to the investigation documentation.

The Investigation Commission reminds all organizations, to which flight safety recommendations are sent that, on the grounds of Article 18 of Regulation (EU) 996/2010 on Investigation and Prevention of Accidents and Incidents in Civil Aviation and Article 19, paragraph 7 of Ordinance No. 13 on the Investigation of Aviation Accidents are obliged to notify the Air, Maritime and Railway Accidents Investigation National Board in writing of the action taken on the recommendations made.

COMMISSION ON INVESTIGATION OF ACCIDENT

Sofia February 8 2023

ENCLOSURE



Fig. 1.



Fig.2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig.6.



Fig.7.



Fig.8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.

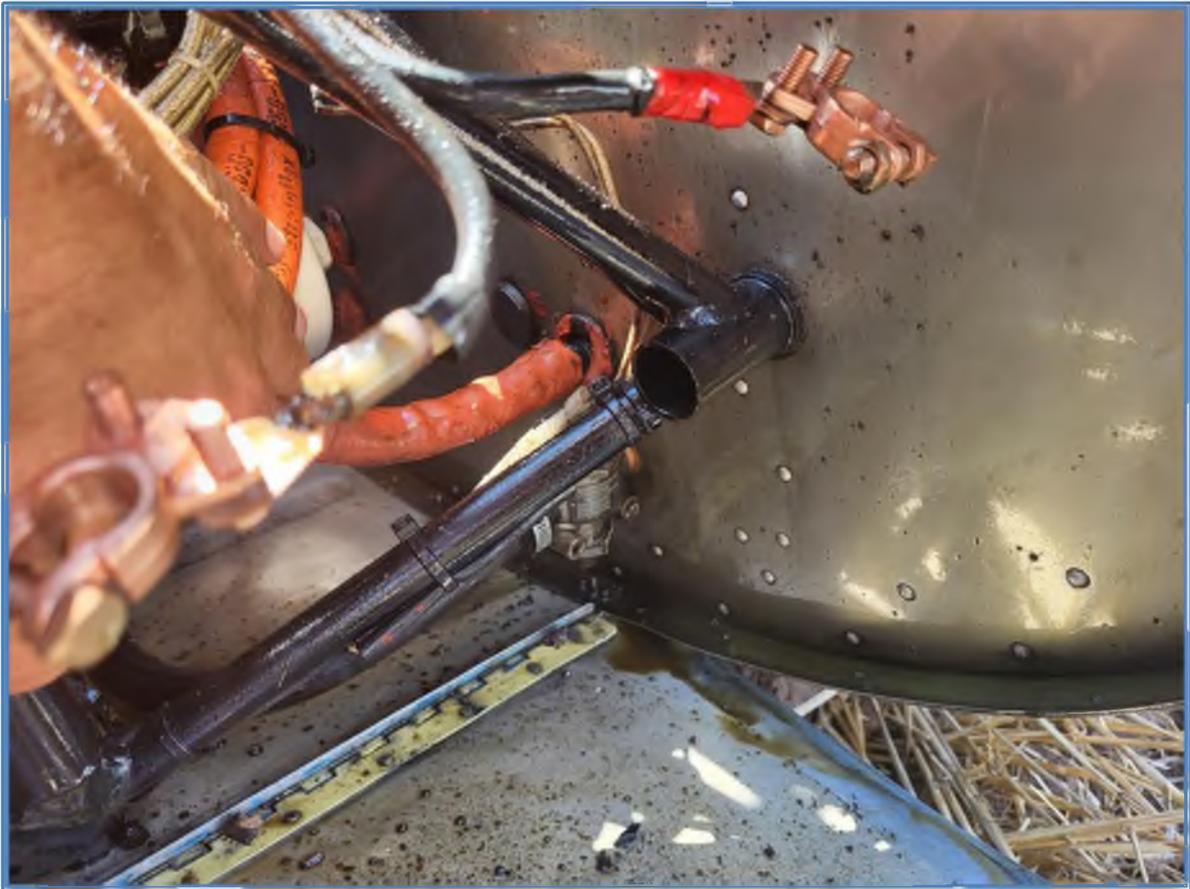


Fig.14.

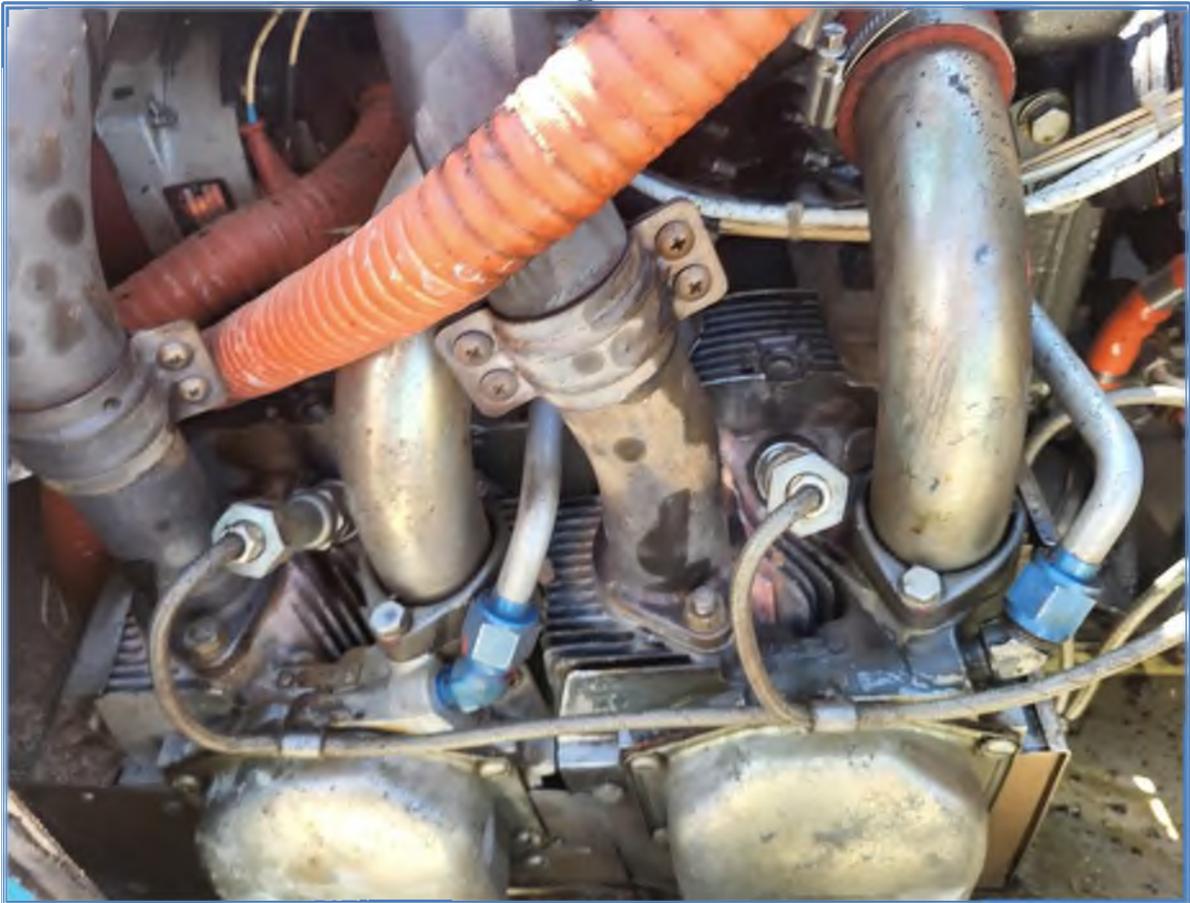


Fig. 15.



Fig.16.



Fig. 17.



Fig. 18.



Fig. 19.



Fig. 20.



Fig. 21.



Fig. 22.