

# FINAL REPORT

of

the investigation on a serious incident, realized on 21.08.2017 on Balchic Airfield, District of Varna, by Cessna 172RG airplane, registration marks LZ-SPD, operated by Air Operator Avio Detachment - Varna Ltd.



## **Purpose of the report and level of responsibility**

In accordance with Annex 13 of the Chicago Convention on International Civil Aviation of 7 December 1944, Regulation 996/20.10.2010 of the European Parliament and the Council on the investigation and prevention of accidents and incidents in civil aviation and Ordinance 13 of 27.01.1999 of the Ministry of Transport, Information Technology and Communications, the objective of the aviation occurrence investigation is to ascertain the causes that have led to its realization in order to eliminate and not repeat them in the future, **without seeking anyone's fault or responsibility.**

## CONTENTS:

01	LIST OF ABBREVIATIONS .....	4
1.	Introduction .....	5
2.	Factual information .....	5
2.1.	Flight history .....	5
2.1.1.	Flight number, type of operation, last point of departure, take-off time and destination point:5	
2.1.2.	Preparation and description of the flight .....	5
2.1.3.	Location of aviation occurrence .....	6
2.2.	Injuries to persons.....	6
2.3.	Damages to the aircraft.....	6
2.4.	Other damages .....	6
2.5.	Personnel information .....	6
2.5.1.	Pilot-in-command:.....	6
2.6.	Aircraft information.....	7
2.6.1.	Airworthiness information.....	7
2.6.2.	Aircraft information.....	8
2.6.3.	Fuel .....	9
2.7.	Meteorological Information.....	9
2.8.	Navigation .....	9
2.9.	Communications.....	9
2.10.	Aerodrome information .....	9
2.11.	Flight data recorders .....	9
2.12.	Wreckage and Impact Information.....	9
2.13.	Medical and Pathological Information .....	9
2.14.	Fire.....	10
2.15.	Survival Aspects.....	10
2.16.	Tests and Research .....	10
2.17.	Additional information .....	10
3.	Analysis .....	11
4.	Conclusion.....	12
4.1.	Findings .....	12
4.2.	Causes.....	13
5.	Safety recommendations .....	14
	SUPPLEMENT 1 .....	15
	ENCLOSURE 1 .....	17

**01 LIST OF ABBREVIATIONS**

AO	- Air Operator;
A/S	- Airspace;
A/C	- Aircraft;
AAIU	- Aircraft Accident Investigation Unit;
DG CAA	- Directorate General “Civil Aviation Administration”;
SG	- State Gazette;
F/C	- Flight Crew;
CAA	- Civil Aviation Act;
AMRTAIU	- Aviation, Maritime and Railway Accident Investigation Unit;
PIC	- Pilot in Command;
MTITC	- Ministry of Transport, Information Technology and Communications;
CAMO	- Continuing Airworthiness Management Organization;
PST	- Pitot Static Tube;
RWY	- Runway;
AOM	- Aircraft Operation Manual;
AAIU	- Aircraft Accident Investigation Unit;
SOP	- Standard Operating Procedure;
TLB	- Technical Logbook;
ROC	- Release to Operation Certificate;
AMM	- Aircraft Maintenance Manual;
EASA	- European Aviation Safety Agency;
ICAO	- International Civil Aviation Organization;
MTOW	- Maximum Take-Off Weight;
CPCP	- Corrosion Prevention and Control Program;
SID	- Supplemental Inspection Document;
SRIS	- Safety Recommendations Information System;
NG	- Non Retractable Gear;
RG	- Retractable Gear;
UTC	- Coordinated Universal Time.

## 1. Introduction

Date and time of air occurrence: 21.08.2017, 14:50 local time (11:50 UTC).

Notified: Aircraft, Maritime and Railway Accident Investigation Unit (AMRAIU Directorate) and Directorate General “Civil Aviation Administration” (DG CAA) at the Ministry of Transport, Information Technology and Communications of the Republic of Bulgaria (MTITC), the European Aviation Safety Agency (EASA) and European Commission, the National Transport Safety Board (NTSB) of the USA.

On the grounds of the provisions of Article 9, para.1 of Ordinance No 13 dated 27.01.1999 on Investigation of Aviation Accidents; the occurrence was classified as a serious incident by the Aircraft Accident Investigation Unit (AAIU) at AMRAIU Directorate at the MTITC. The materials on the aviation occurrence are filed in case No 05/21.08.2017 in the AAIU archives.

In accordance with the provisions of Article 5, Para 1 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, Para 1 of Ordinance No 13 of the Ministry of Transport dated 27.01.1999 on the Investigation of Aviation Occurrences, by Order No RD-08-378/21.09.2017 of the Minister of Transport, Information Technology and Communications, a Commission was appointed for investigation of this serious incident.

The difference between the local and Universal Coordinated Time is +3 hours. All times in this report are local.

During the second flight for the day by Cessna 172RG, registration marks LZ-SPD, on landing approach for RWY34 at Balchik airfield, the commander forgot to extend the landing gear and A/C made a belly landing. After the full stop on the runway, the pilot left the cabin without injuries. There are some damages on the propeller and the lower surface of the airframe.

## 2. Factual information

### 2.1. Flight history

#### 2.1.1. Flight number, type of operation, last point of departure, take-off time and destination point:

**Flight number:** Registration marks of the aircraft LZ-SPD.

**Type of flight:** Observation flight.

**Last point of departure:** Balchik airfield.

**Take-off time:** 2:10 PM.

**Planned landing point:** Balchik airfield.

#### 2.1.2. Preparation and description of the flight

On 21.08.2017, a pilot-instructor was appointed to perform a series of flights for A/O “Avio Detachment Varna” Ltd from Balchik Airfield with two different models of Cessna 172, owned by the operator. The main difference between the two modifications is the landing gear - LZ-SPC (172RG) is with retractable landing gear, and LZ-SPD (172NG) is with non-retractable one. At 09:20 AM, he took-off for the first flight for the day with student-pilot on board. The 2:37 hours flight was performed without any problems on Cessna 172NG aircraft, registration marks LZ-SPD. This aircraft is equipped with non-retractable landing gear; see Fig. 3 of Enclosure 1.

After a short break for lunch, at around 13:30, he prepared for flight another Cessna aircraft, модел 172RG, with retractable landing gear, registration marks LZ-SPD, Fig. 1 of Enclosure 1. His task was to make an observation of the area around the areas of Balchik and Kavarna for forthcoming operation, coming soon. The pilot performed this flight alone. After take-off there was suspicion of inaccuracies in the readings of the aneroid-and-diaphragm-actuated instruments, most likely due to the ingress of an insects into the Pitot tube. He landed back normally at Balchik to check and correct the problem (this landing and the maintenance actions associated with the purge of the system was not recorded in the airplane technical log). When the air ducts of Pitot tube were purged, at about 14:10, the commander took-off again for execution of the same task. About 40 minutes later, the aircraft approached for landing on RWY 34 at the Balchik airfield. During the landing, the weather conditions were favorable – daylight, clear sky, light headwind with speed of 4 m/s. During the

approach, the PIC saw a large flock of birds near the threshold of the RWY and he felt an anxiety of a possible collision with them. It did not happen, but diverted his attention and he failed to extend the landing gear. The aircraft flared at a normal height and speed, but at touchdown point slipped on belly instead on the wheels. The commander understood what has happened when the propeller hit the runway. After the airplane full stop on the runway, the pilot informed the airfield coordinator by the radio, switched off the battery, switched off the fuel and left the cabin, waiting for the airfield staff.

The commander pointed out in his explanations that during the flight and landing, all aircraft systems, including controls and the engine, were functioning accordingly to the technical requirements.

### 2.1.3. Location of aviation occurrence

The event was realized in daylight, 14:50 h local time, on RWY34 of Balchik airfield. The location of the occurrence is with coordinate's [43°25'28.9" N 28°10'49.8"E](#), elevation is 188 m.

## 2.2. Injuries to persons

Injuries to persons	Crew	Passengers	Other persons
Fatal	0	0	0
Serious	0	0	0
Minor	0	0	0
Total	0	0	0

### 2.3. Damages to the aircraft

During the post flight inspection of the aircraft, the following damages were found:

- Bent blades of the propeller, Fig. 1 & 2 of Enclosure 1;
- Abrasion of the nose landing gear doors and damages to drainage pipes on the left side of the bow, after the nose landing gear doors, Fig. 3 of Enclosure 1;
- Abrasion on the lower surface of the fuselage and light deformation, Fig. 4 of Enclosure 1;
- Rubbing of antenna cover on the radio compass, Fig. 5 of Enclosure 1;
- Rasping of part of the material of the rear suspension hook, Fig. 6 of Enclosure 1;
- Cut off the transponder antenna from the fuselage, Fig. 13 of Enclosure 1.

### 2.4. Other damages

No other damages.

## 2.5. Personnel information

### 2.5.1. Pilot-in-command:

Male - 68 years old;

License: Commercial pilot license CPL (A), valid, qualification class SEP (land), FI (A).

The aircraft commander possesses medical certification Class 1, issued on 24.07.2017, valid until 08.02.2018.

Flight experience:

Total flight hours - 6035:56 hrs.

Hours flown:

- during the last 24 hrs – 1:17 AM hrs;
- during the last 30 days – 7:18 AM hrs;
- during the last 90 days – 40:32 hrs.

All flights during the last 90 days period are on Cessna 172.

Rest before the incident - 8 hrs.

The Commission accepts that the aircraft commander possesses the necessary training and experience for his functions.

## 2.6. Aircraft information

### 2.6.1. Airworthiness information

Cessna Aircraft Company, USA, produced the aircraft Cessna 172RG, serial number 172RG0862, registration marks LZ-SPD, on 15.04.1981. The airplane has Certificate of Registration No 2578 issued by the Directory General of Civil Aviation Administration of the Republic of Bulgaria on 27.10.2015. The aircraft is owned by Garnet Company with office address “Lyuben Karavelov” 7, 3rd floor, Varna, Bulgaria. Aircraft operator is “Avio Detachment Varna” Ltd with office address: residential complex “Vladislav Varnenchik” 401, entrance 17, apartment 288, Varna, Bulgaria.

The aircraft has valid certificates up to the moment of realization of the occurrence:

- “Certificate of Airworthiness” No 25-070, issued by DG CAA on 27.10.2015. This certificate was issued on the basis of an Airworthiness Review Certificate issued by the aviation authorities of the Republic of Romania under reference number RO.MG.031 of 23.06.2015 and valid till 31.05.2016.
- “Airworthiness Review Certificate” No BG-ARC – 2578, issued on 27.06.2016 with validity until 26.06.2017, extended until 25.06.2018.
- “Aircraft Noise Certificate” No. 45-0074 of 09.12.2016, issued by DG CAA.

The aircraft has flown 4 872:36 flight hours totally since new to the day of air occurrence according to the readings of service meter.

The continuing airworthiness of the airplane was maintained in accordance with the Maintenance Program for Cessna 172 RG aircraft, operated by AO “Avio Detachment Varna” Ltd. Based on this document, a total technical resource of 40 000 flight hours for the airframe was established without a calendar limitation if certain conditions were met. These conditions foresee implementation of Supplemental Inspection Document (SID) 2A-14-00 tasks together with the implementation of the Corrosion Prevention and Control Program (CPCP) - Section 2A-30-00 of AMM. In accordance with this program on 06.07.2017 a 500-hour basic maintenance of the aircraft and its equipment was performed, after which a “Release to Operation Certificate” No AOV-N-SPD-8 was issued, signed by the certifying staff of “Avio Detachment Varna” Ltd was issued.

The aircraft has a Lycoming O-360-F1A6 aviation piston engine, serial No L-10170-36E. Until the moment of air occurrence, the engine had accumulated 835:56 hrs. The limitation is 2000 hours time-between-overhaul or 12 years. The engine was installed on the aircraft in March 2011 with 0:00 hours flown.

A McCauley B2D34C220-B air propeller is installed on the aircraft with blade serial numbers ADH 26083 and ADH 26086. Up to the moment of the occurrence, the propeller has accumulated 593:48 hrs, with limit of 2000 hours time-between-overhaul or 72 months. The blades are installed on 29.12. 2015

At the time of execution of the flight, the aircraft was provided with the necessary resources.

A technical logbook with a page number 1611905 was completed for the flight. The pre-flight inspection and the amount of fuel and oil on board were noted in the logbook. There were no records for any malfunctions, detected or eliminated. For the flights conducted during the previous day, 20.08.2017, a technical logbook No 1611904 was filled in. There were no records in this logbook related to the abnormal operation of the aircraft during flights and during the post-flight inspection. There is no such information either from the interviews conducted with the pilot and the personnel of flight support personnel of the aircraft operator.

Taking into account information in this paragraph, the Commission accepted that before the last flight, the aircraft was prepared in accordance with the continuing airworthiness requirements and was supplied with enough fuel.

### 2.6.2. Aircraft information

Cessna 172RG is a four-seat airplane, with high-mounted wing, single-engine and retractable tricycle landing gear, designed for the general-purpose aviation.

Weight and balance:

According to the issued by DG CAA "Aircraft Noise Certificate" № 45-0074, Cessna 172RG aircraft, serial number 172RG0861, registration marks LZ-SPD, has limited MTOW and MLW 1198 kg. The mass of the aircraft empty is 767.6 kg, according to the weighting protocol dated 23.06.2016 issued by the Avio Detachment Varna Maintenance Organization. There was about 90.7 kg of fuel on board after landing. The pilot's weight is 80 kg. Totally, the actual landing mass of the airplane was 938.4 kg, which is within the normal range.

The actual take-off and landing mass of the aircraft, as well the respective center of gravity, were within the allowable operation range.

Some typical operational characteristics are given bellow, regarding distances, speeds and some procedural requirements, according to the AOM of Cessna 172RG aircraft.

Distances:

- Landing roll distance - 190.5m;
- Total landing distance over 50ft standard obstacle - 408m.

Speed Limitations:

Speed		KTAS
V <sub>NE</sub>	Never exceed speed	<b>164</b>
V <sub>NO</sub>	Maximum structural cruising speed	<b>145</b>
V <sub>A</sub>	Maneuvering speed	<b>106</b>
V <sub>FE</sub>	Maximum speed with flaps - up to 10°, between 10° - 30°	<b>130</b> <b>100</b>
V <sub>LD</sub>	Maximum landing gear operating speed	<b>140</b>
V <sub>LE</sub>	Maximum landing gear extended speed	<b>164</b>

Procedures:

In Section 4 "Normal Procedures" of the Aircraft Operation Manual on page 4-10, the following is written in the checklist of normal procedures at the BEFORE LANDING stage:

"... 3. Landing gear – DOWN (below 140 kt).

4. Landing gear - CHECK (observe main gear down and green indicator light illuminated).

According to the pilot's statement, he did not read the checklist with normal procedures, as he piloted alone and acted by the memory.

In the same section on page 4-20, the following advanced landing procedures are described:

... In view of relatively low drag of the extended landing gear and the high allowable gear operating speed V<sub>LD</sub> 140 kt, the landing gear should be extended before entering the traffic pattern. This practice will allow more time to be confirmed the landing gear in down and locked position. As a further precaution, leave the landing gear extended in go-around procedures or traffic patterns for touch-and-go landings.

Landing gear extension can be detected by illumination of gear down indicator light (green), absence of gear warning horn with the throttle retarded bellow 12 inches of manifold pressure and/or the wing flaps extended beyond 20°, and visual inspection of the main gear position. ..."

Section 7 of the Aircraft Operation Manual is entitled "Airplane & Systems Description". On pages 7-13 of this section a Landing Gear Warning System is described.

In Section 5 of Landing Gear, Brakes and Hydraulic System of the Aircraft Maintenance Manual, on pages 5-33 ...5-35 there is description for the installation of horn micro-switch coupled to the engine throttle and the installation of a flaps-operated warning system of the landing gear.

The operation of these systems is described above. In accordance with the requirements of the standards for light aircraft, the systems described in the Airplane Operation Manual must be available on board. The pilot and representatives of the operator's CAMO at the beginning declared that the airplane does not operate such a system. Later the representatives of the CAMO stated that after

verification they found that such system was aboard the aircraft, but it was not operational. A written document on the study carried out and the established reasons was not provided.

### **2.6.3. Fuel**

According to the technical logbook page No 1611905, completed before the flight, in which the occurrence was realized, the aircraft was refueled with 120 kg of 100LL aviation gasoline. The fuel type was not written in the technical logbook. During the post flight inspection of the aircraft after the occurrence, the pointers of both fuel indicators were: left-hand indicator 90 lbs, right-hand indicator 110 lbs. A picture of the fuel indicators is shown on Fig. 11 of Annex 1. The total fuel quantity was 200 lbs (90,7 kg).

The fuel quantity and its condition are not relevant to the occurrence.

### **2.7. Meteorological Information**

Weather conditions during the landing - wind direction 340° and speed 4 m/s, visibility over 10 km, scattered clouds, no specific phenomena.

### **2.8. Navigation**

The respective navigation aids of the aircraft and the airfield were operational and they did not influence the occurrence realized.

### **2.9. Communications**

The communication between the pilot and ATC was conducted by the radio and GSM, free of interference.

### **2.10. Aerodrome information**

The occurrence was realized at Balchik airfield, situated at about 1.5 km northeast from the city of Balchik. There is one RWY 34/16, 2498m long and 60 wide. The runway and taxiways are covered with concrete hexagonal blocks, the joints are filled with asphalt, as it is visible on Fig. 12 and Fig. 13 of Enclosure 1. The reference point is RWY center with geographic coordinates N 43° 25' 28" and E 028° 10' 51", elevation is 188 m. The airspace is Class "G".

### **2.11. Flight data recorders**

Not applicable for aircraft.

### **2.12. Wreckage and Impact Information**

The place of the A/C contact with the ground is shown in the picture in Fig. 12, where the traces of the propeller's contact with the RWY surface are visible. It is also visible where the aircraft fuselage rubbed the concrete surface. The touchdown was at 500 m from the threshold of RWY 34. From the point of touchdown to the final stop of the aircraft 17.80m were measured. The touchdown was smooth, without impact, by sliding on the surface of the runway. The aircraft retained its structural integrity, with only one piece detected on the runway, the transponder antenna shown on the picture, Fig. 13 of Annex 1. After the aircraft's full stop on the runway, the airfield crew arrived and measured, captured and documented the occurrence, and then the plane was moved by a crane to the air operator's hangar. The damages to the aircraft are described in paragraph 2.3.

There are no consequences for the pilot resulted from aircraft contact with the ground.

### **2.13. Medical and Pathological Information**

There is no information about the consequences for the pilot resulting from the occurrence and therefore medical and pathological examinations are not performed.

There is no information about any physiological factors or loss of capacity, that influenced the pilots' working capacity.

#### 2.14. Fire

There was no fire during or after the incident.

#### 2.15. Survival Aspects

The pilot turned off the fuel cock and the battery before his leaving the aircraft. There was no need the airfield emergency rescue group to take any actions.

#### 2.16. Tests and Research

For the purposes of the safety investigation the following was done:

1. Examination of the place of aircraft touchdown on the runway;
2. Post flight inspection of Cessna 172RG aircraft, serial number 172RG0862, registration marks LZ-SPD;
3. Interview with the pilot, witnesses of the air occurrence and air operator's officials;
4. Investigation and analysis of operational documentation of the AC;
5. Research and analysis of the company documents, related to the aircraft registration and aircraft airworthiness;
6. Evaluation of the flight and operational performance of the aircraft;
7. Operational test of the landing gear retraction and extension system;
8. Logical and probabilistic analysis of possible causes for the occurrence.

For Item 1, the results of the on-site inspection are reflected in Para 2.12 and Para 2.4.

For Item 2, the results of the aircraft inspection after the air occurrence are given in Para 2.3.

For Item 3, the results of interview are reflected in Para 2.1.2 & 2.6.1.

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

For Item 5 the study and analysis of documents, related to the aircraft registration and airworthiness are reflected in Para 2.6.1 and 2.17.

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

For Item 7 the results of the assessment of the condition of landing gear retraction and extension system are set out in Para 2.6.2 and 2.17.

Logical and probabilistic analysis of the possible causes for the serious incident is given in Chapter 3 of this Report.

#### 2.17. Additional information

Cessna 172RG aircraft is included in the US Federal Aviation Administration No 3A17 type certificate. This certificate must meet the requirements of the US Federal Aviation Administration set out in Part 23. Subpart 23.729 of this Part is headed "Landing gear extension and retraction system". In subparagraph (f) of Part-23.729 are written the requirements for the presence of a functioning audible warning device for indication of not extended landing gear, namely:

... „(f) Landing gear warning. For landplanes, the following aural or equally effective landing gear warning devices must be provided:

(1) A device that functions continuously when one or more throttles are closed beyond the power settings normally used for landing approach if the landing gear is not fully extended and locked. A throttle stop may not be used in place of an aural device. If there is a manual shutoff for the warning device prescribed in this paragraph, the warning system must be designed so that when the

warning has been suspended after one or more throttles are closed, subsequent retardation of any throttle to, or beyond, the position for normal landing approach will activate the warning device.

(2) A device that functions continuously when the wing flaps are extended beyond the maximum approach flap position, using a normal landing procedure, if the landing gear is not fully extended and locked. There may not be a manual shutoff for this warning device. The flap position sensing unit may be installed at any suitable location. The system for this device may use any part of the system (including the aural warning device) for the device required in paragraph (f)(1) of this section.”

In Para 2.6.2 of this report it is stated that landing gear alert system of Cessna 172RG aircraft, serial number 172RG0861, registration marks LZ-SPD, was out of order during the realization of the air occurrence.

As it is mentioned in Para 2.6.1. the airplane currently has a Registration Certificate No. 2578 issued by the DG CAA of the Republic of Bulgaria issued on 27.10.2015, Certificate of Airworthiness No 25-0070 and a Certificate for the Airworthiness Review No BG-ARC-2578, issued on 27.06.2016 with validity till 26.06.2017. On 23.06.2017, the validity of this certificate was extended until 25.06.2018. DG CAA issued the said documents based on the statutory requirements and procedures described in Inspector's Handbook, Part Airworthiness. On pages 286, 287 & 288 the responsible inspector's actions are described in regards to

- Acceptance and assessment of the completeness of the issued documents;
- Review and evaluation of documents compliance;
- Inspection of the aircraft.

The purpose of these actions is to establish if the aircraft and its flight manual are suitable for execution of flights.

The Commission for safety investigation sent an inquiry on the occurrence to the authorized representative of NTSB with the question, if there is onboard of Cessna 172RG, serial number 172RG0861 a landing gear warning system. The reply from the manufacturer Textron Aviation said that the aircraft had been manufactured with a functioning warning system for retracted landing gear, as described in the Manuals. The operation of this system is described in Para 2.6.2.

### 3. Analysis

It is evident from the explanation in paragraph 2.1.2 that the serious incident resulted from the failure of the pilot flying to put the landing gear lever into down position, which led to a landing with retracted landing gear. To avoid such an occurrence, the manufacturer has foresaw constructive and technological measures.

The constructive measures are related to the presence of the onboard warning systems for the position of the landing gear - light and sound. The appearance of the green light on the indicator confirms the lowering and locking of the landing gear.

The sound warning system activates a horn for not extended landing gear when:

1. the carburetor throttle valve is in a position, creating a pressure in the suction manifold below 12 inches mercury;
2. the wing flaps are extended beyond 20°.

The presence of the on-board alert warning system for the landing gear is necessary to meet the requirements of FAR 23.729 (f), quoted in Para 2.17 of this Report. In Para 2.6.2 of the Report it is stated, that the pilot flying and the representative of continuing airworthiness management organization of the air operator argued, that there wasn't such warning system for the landing gear, although such a system was described in the Airplane Operation Manual provided to the Investigation Commission. Para 2.17 states that the responsibility of the national CAA's inspector for issuing an Airworthiness Review Certificate, is to establish compliance between the airplane and its

approved operation manual. The lack of a functional warning system for the landing gear is a serious prerequisite in certain circumstances to prevent the landing gear not to be put in down position, related mostly with the lack of experience or disturbance of concentration even of an experienced pilot. In the case under consideration such preconditions might be a distraction due to the presence of a flock of birds close to the runway threshold and / or by the different procedures in performing the previous flight with the same type of airplane, but with a non-retractable landing gear.

The technological measures are related to the description of normal landing procedures in the airplane's AOM. These procedures are outlined in Para 2.6.2, and all pilot's actions before landing are listed in details. In this case, the pilot didn't read the check list and in the pre-landing stage he didn't comply with Para 3 & 4 of these procedures. As a possible cause of this omission, it might be pointed out that the pilot's attention was drawn to avoid collision with flock of birds that he had noticed at the threshold of the RWY and the routine in analogy action in the previous flight with the same type of aircraft, but with non-retractable landing gear.

In view of the above, **as the prime cause** for the realization of the serious incident could be accepted: Infringement of the technology during the approach and landing, related with aircraft commander's failure to put landing gear lever to DOWN position.

As a **main cause**: Lack of instrumental and visual control on the landing gear position during the approach and landing stages.

The **main contributing factors** for the occurrence should be:

1. Carrying out consecutive flights on the same day by the commander with airplanes of different modifications - with non-retractable and with retractable landing gear.
2. Inoperative sound warning system when landing gear is not down on final approach;
3. Issuing of Certificate of Airworthiness for non-compliant aircraft systems with those described in the Aircraft Operation Manual.

## 4. Conclusion

### 4.1. Findings

As a result of the investigation, the Commission concluded:

1. The aircraft Cessna 172RG, serial number 172RG0862, registration marks LZ-SPD, was produced on 15.04.1981 by Cessna Aircraft Company, USA.
2. The airplane has Certificate of Registration No. 2578 issued by the Directorate General of Civil Aviation Administration of the Republic of Bulgaria on 27.10.2015.
3. The aircraft is owned by Garnet Company with office address: 7 L. Karavelov str., 3rd floor, Varna, Republic of Bulgaria.
4. The aircraft operator is Avio Detachment Varna Ltd with office address V. Varnenchik residential complex, block 401, entrance 17, apartment 288, Varna 9023, Republic of Bulgaria.
5. There is a Certificate of Airworthiness No 25-070 of the aircraft, issued by DG CAA on 27.10.2015.
6. An Airworthiness Review Certificate of the aircraft No BG-ARC - 2578 was issued on 27.06.2016 with validity till 26.06.2017. On 23.06.2017 the validity of this certificate was extended till 25.06.2018.
7. The Cessna 172RG aircraft, serial number 172RG0861, does not meet the requirements of FAR 23.729 (f) for the presence of a retracted landing gear warning system.
8. In the aircraft AOM there is a landing gear warning system described.
9. DG CAA has issued an Airworthiness Certificate and Airworthiness Review Certificate in spite of discrepancy between the actual equipment of the airplane and AOM.
10. An Aircraft Noise Certificate No 45-0074 was issued for the aircraft. The certificate was issued by DG CAA on 27.10.2015.
11. The aircraft has flown 4,872:36 hrs total flying time since new to the day of air occurrence.

12. The continuing airworthiness of the airplane was maintained in accordance with Cessna 172 RG aircraft, operated by Aviodetachment - VarnaLtd AO.

13. A total technical resource of 40,000 flight hours is determined for the aircraft airframe without a calendar limitation, subject to certain conditions specified in paragraph 2.6.1 of this Report.

14. On 06.07.2017 a 500-hours basic maintenance of the aircraft and its equipment was performed. After this maintenance a Release to Operation Certificate No AOV-N-SPD-8, signed by the certifying staff of Avio Detachment Varna Ltd was issued.

15. The aircraft features a Lycoming O-360-F1A6 aviation piston engine, serial No. L-10170-36E. As to the moment of air occurrence the propeller has accumulated 835:56 hrs, with 2000 hours time-between-overhaul or 72 months.

16. A McCauley B2D34C220-B air propeller was installed on the aircraft with blade serial numbers ADH 26083 and ADH 26086. As to the moment of air occurrence the propeller has accumulated 593:48 hrs, with 2000 hours or 72 months time-between-overhaul.

17. At the time of execution of the flight the aircraft was provided with the necessary resources.

18. A technical logbook was completed for the flight with a serial number 1611905. During this pre-flight inspection no malfunctions detected or eliminated were recorded. For the flights conducted during the previous day, 20.08.2017, a technical logbook No № 1611904 was filled in. There were no records in this logbook related to the abnormal operation of the aircraft during flights and during the post-flight inspection.

19. The Commission accepted that before the last flight was made, the aircraft was prepared in accordance with the continuing airworthiness requirements and was loaded with enough fuel to carry it out.

20. The ACC pointed out in his explanations that during flight and landing, all aircraft systems, including controls and engine, had functioned in accordance with the technical requirements.

21. The intermediate landing and the works involved in purging the Pitot tube were not reflected in the aircraft technical logbook..

22. The mass and balance of the aircraft during the flight were within the permissible limits.

23. The aircraft damages were a result of slipping of the aircraft fuselage on the runway surface, as described in paragraph 2.3.

24. No fire occurred during the sliding on the runway.

25. The pilot has the necessary qualifications and medical fitness to perform the flight.

26. There is no information for any physiological factors or loss of capacity has influenced the pilots' capacity for work.

27. Prior to the flight in which the air occurrence was realized, the pilot flew a C172 aircraft with a non-retractable landing gear.

28. During the landing approach the pilot noticed a flock of birds at the runway threshold.

29. During the landing approach the pilot failed to put landing gear lever in Down position.

30. During the landing approach the ACC didn't monitor the green indicator lights for the landing gear and does not perform a visual inspection of landing gear position.

31. The weather conditions have no direct impact on the realization of the air occurrence.

#### 4.2. Causes

Based on the analysis of the circumstances set out in this Report, the Commission pointed out:

**The prime reason for the serious incident is:**

Infringement of the technology during the landing approach, namely aircraft commander's failure to put landing gear lever to position DOWN.

**Main cause:**

Lack of instrumental and visual control on the landing gear position during the approach and landing stages.

**Contributing factors:**

1. Carrying out consecutive flights on the same day by the commander with airplanes of different modifications - with non-retractable and with retractable landing gear.
2. Inoperative sound warning system when landing gear is not down on final approach;
3. Issuing of Certificate of Airworthiness for non-compliant aircraft systems with those described in the Aircraft Operation Manual.

**5. Safety recommendations**

In execution of the preliminary measures for ensuring the flight safety, addressed to the AO “Avio Detachment Varna” Ltd, the Company Safety Manager informed AMRTAIU Directory at MTITC for the following actions taken with a letter, reg. No 10-50-155 /04.09.17:

1. A 4-days rest was given to the pilot who has admitted the air occurrence.
2. On 26.08.2017 the pilot pass at Balchik airfield ground training under instructor’s supervision.
3. The pilot completed 10 landings with an instructor on board at the Balchik airfield on 27.08.2017.”

Taking into account the causes of the serious incident and the deficiencies found during the investigation, the Commission recommends the following **safety measures** for implementation:

**BG.SIA-2017/05/01.** DG CAA to give orders to the Air Operators and/or Owners of all Cessna 172RG aircrafts to perform a functional flight test for landing gear warning system serviceability and to make respective entry of test results in Aircraft Forms and Technical Logbooks.

**BG.SIA-2017/05/02.** Air operators or owners of Cessna 172 with retractable and non-retractable landing gear to include in their Flight Operation Manuals measures to ensure acceptable level of safety, in case of need the flight crews to perform consecutive flights with both modifications of the aircraft.

**BG.SIA-2017/05/03.** The Airworthiness Department of CAA shall monitor the compliance of actual aircraft equipment with that reflected in the Aircraft Operations Manual and shall include and executing such an item point in the inspection check lists during the regular inspections of light and ultralight aircraft,.

*On the grounds of Art. 18, § 5 of Regulation 996/2010, the safety measures instructed shall be recorded in the centralized European System of Safety Measures (SRIS).*

*The Investigation Commission reminds all organizations to which safety measures have been sent, that on the basis of Article 18 of Regulation 996/2010 on Investigation and Prevention of Accidents and Incidents in Civil Aviation and Art.19, Para7 of Ordinance No. 13 for investigation of aviation accidents, they are obliged to notify in writing the AMRAIU Directorate of MTITC on the actions taken according the safety measures made.*

END

**SOFIA, 30.05.2018**

## SUPPLEMENT 1

In compliance with the requirements of Article 19 of Ordinance No 13 of 27.01.1999 on the investigation of aviation accidents, the Chairman of the investigation commission sent a draft final report for the serious incident, realized on 21.08.2017 at the Balchik Airfield, Varna District, with Cessna 172RG aircraft, registration marks LZ-SPD, operated by operator "Avio Detachment –Varna" Ltd to interested parties, including DG CAA. Within 60 days, the Head of Investigation (the Chairman of the Commission for the investigation of the serious incident, appointed by Order No RD-08-378 / 21.09.2017 of the Minister of Transport, Information Technology and Communications) received a letter with a internal reg. number 10-01-18 / 07.03.18 with an opinion on the draft final report signed by the Chief Director of DG CAA. His opinion is focused on the question of whom and on what basis the airworthiness certificate and the airworthiness review certificate have been issued. In this regard, the investigation commission specified in paragraph 2.17 of the report that the Airworthiness Certificate No 25-0070 of the aircraft was issued on 27.10. 2015 by the CAA in accordance with the requirements of Regulation (EC) No 216, Article 5 (2), c), and the Airworthiness Review Certificate № BG-ARC-2578 of the aircraft was issued on 27.06.2016 by CAMO of Avio Detachment -Varna Ltd., with validity until 26.06.2017. On 23.06.2017, the validity of this certificate was extended till 25.06.2018. The document was issued based on the regulatory requirements described in Regulation (EC) 1321/2014, Annex 1 (Part M) M.A. 711 (a) p.4 under the conditions, given in M.A. 901 (e).

The DG CAA opinion does not address the aforementioned contributing cause for realization of the serious incident:

"Issuance of an airworthiness certificate to an aircraft in case of inconsistency of available onboard systems and those described in the Airplane Flight Manual."

As it is stated above, the DG CAA has issued the valid Certificate of Airworthiness for the aircraft.

Paragraph 2.6.1 of the final report notes that at the time of the event the aircraft had a valid airworthiness certificate and a valid airworthiness review certificate. The results of the investigation shown that at the moment of realization of the occurrence and for a long period before (1 year and 10 months since the aircraft was in the register of the Republic of Bulgaria), the airplane was not airworthy. How this has happened is a matter for the DG CAA to decide. This problem as a whole is related to the quality of the control exercised and, in particular, to the quality control of the contents and the implementation of the Airplane Maintenance Program when assessing the environment in which the aircraft operated. Probably the question is related with the qualifications of the personnel reviewing and verifying the documents related to the continuing airworthiness. This is the direction, where DG CAA should address its activity, but not to distance itself from the problems, as in the final paragraph of its opinion. In this connection, the Commission recalls Article 16-b, para.1, item 2 of the Civil Aviation Act of the Republic of Bulgaria.

Art. 16b. (1) The Directorate General Civil Aviation Administration performs regulatory and control functions of the state for ensuring the safety and security of the aeronautics, such as:

...  
2. controls civil aviation, civil airports and airfields, civil aircraft, aeronautical and other facilities related to civil aviation on the territory of the country, regardless of their ownership; "

The precise execution of the control, but not the distance from the problems, will lead to the avoidance of recurrence of events similar to the serious incident under investigation.

In conclusion, the Investigation Commission for the serious incident recalls the content of Article 4 (2) and (3) of Regulation (EU) No 996/2010 on investigation and prevention of civil aviation accidents:

"... 2. The safety investigation authority shall be functionally independent, in particular from aeronautical authorities responsible for airworthiness, certification, flight, maintenance, licensing, air

traffic control or airport operations, as well as any other person or an institution whose interests or purposes could conflict with the tasks assigned to the safety investigation authority or affect its objectivity.

3. When conducting a safety investigation, the safety investigation authority does not seek and accept instructions from anyone and has unlimited powers to conduct safety investigations.

...“

The content of these points does not correspond to the mentoring tone that emerges from the last paragraph of the letter expressing the view of DG CAA in relation to the draft final report.

The draft final report was also sent to the Avio Detachment - Varna Ltd. airline operator, which its letter № 10-50-49/16.03.18 expressed related. The Investigation Commission accepted the editorial notes and reflected them in the report. The rest of the notes were leaved with no consequences and the Commission suggests to the latter to familiarize himself with the contents of Art. 143, para.(1), points 1, 9, 18 and 19 of the Civil Aviation Act of the Republic of Bulgaria.

End of SUPPLEMENT 1

**ENCLOSURE 1**



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12

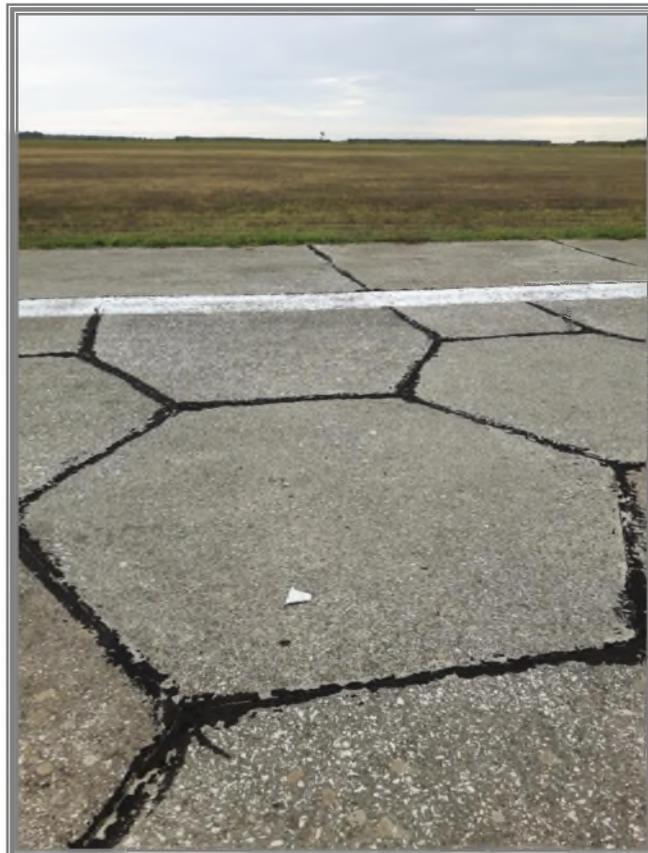


Fig. 13