FINAL REPORT
of civil aviation safety investigation

CLASSIFICATION  Accident
Owner  Valaboko LLC
Operator  SC Port Prest Services SRL
Manufacturer  Cessna Aircraft Company
Aircraft  Cessna 340A
Registration country  Romania
Registration  YR - RAG
Location  Fratăuți Air Field, Suceava County
Date and time  27.08.2015/18:55 LT (15:55 UTC)

No.  A 18 – 06
Date:  11.05.2018
MAIN LH LANDING GEAR FAILURE AFTER LANDING

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Cessna 340A / YR-RAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date and time</td>
<td>27.08.2015/18:55 LT (15:55 UTC)</td>
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<tr>
<td>Operator</td>
<td>Port Prest Services</td>
</tr>
<tr>
<td>Flight type</td>
<td>Private flight</td>
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<tr>
<td>Persons onboard</td>
<td>The pilot and one passenger</td>
</tr>
<tr>
<td>Injuries</td>
<td>None</td>
</tr>
<tr>
<td>Pilot</td>
<td>Male, 46 years old, PPL(A) / MEP (land) / 31.08.2015</td>
</tr>
<tr>
<td>Damages</td>
<td>Main LH landing gear - broken, left engine propeller blades - broken</td>
</tr>
<tr>
<td>Location</td>
<td>Fratăuți Air Field, Suceava County</td>
</tr>
</tbody>
</table>
  Coordinates: Latitude: 47°53’14,53” N
  Longitude: 25°53’54,40” E

1. HISTORY OF OCCURRENCE

On 27.08.2015, the pilot of Cessna 340A aircraft, registered YR-RAG, after submitting the flight plan, according to the visual flight rules (VFR), took-off from Tuzla airfield, Constanța County, to Fratăuți airfield, Suceava County. The flight was performed in its own interest, with one passenger onboard and during the flight there were no problems with the aircraft’s systems operation.

On landing, after a roll of almost 100 m, the aircraft started to lean to the left. The pilot made maneuvers to maintain the aircraft on landing steering, trying to balance the aircraft. The main LH landing gear failed (folded), and the aircraft rolled for another 400 m, touching the ground with the left-wing tip and with the left engine propeller.

After this accident, the aircraft’s pilot and passenger suffered no injuries.

Fig.1 YR-RAG aircraft after the accident
2. ADDITIONAL INFORMATION

2.1 Pilot information

The pilot hold a PPL license and medical certificate, both valid.

2.2 Aircraft information

![Cessna 340A aircraft](image)

Cessna 340A is a pressurized airplane in MEP (Multi Engine Piston) class, with six seats (two pilots and four passengers), manufactured by Cessna Aircraft Company (SUA).

The landing gear is a fully retractable trike, made of two main landing gears, both situated behind the nacelle in which there are installed the engine and an nose landing gear which is steerable.

The aircraft is equipped with two Continental TSIO engines of 300Hp (225 Kw) each, with piston, injection, each having 6 horizontal-opposite air-cooled cylinders.

According to the documents of YR-RAG aircraft, serial number 340A-0227 it hold a valid airworthiness certificate, and its maintenance was performed according to the approved maintenance schedule.

2.3 Meteorological information

On the date of the accident occurrence, the weather condition on Frătăuți air field was the following: visibility over 10 km, temperature 27° C, wind from 220° direction with the speed of 2,5 m/s (5 kts).

The weather conditions had no influence on this accident.
2.4 Airfield information

The airfield in the vicinity of Frătăuți locality, on which the landing was performed, correspond, according to the provisions of the Romanian Government Decision no. 912 since 25.08.2010, to other fields than certified aerodromes from which take-offs and landings of civil aircraft can be performed.

The take-off-landing runway is grassy and has the length of 800 m and width of 30 m and is oriented on 340° and 160° directions.

2.5 Analysis

The investigation commission, which arrived at the accident’s site, found that the attaching shafts of the fuselage LH landing gear’s AFT and FWD truss assembly were as follows:

- Attaching shaft of main landing gear’s AFT truss assembly – broken during landing

Fig. 3 Attaching shaft of main landing gear’s AFT truss assembly – broken during landing

- Attaching shaft of main landing gear’s FWD truss assembly – undamaged, was recovered from the attaching hole to fuselage.

Fig. 4 Attaching shaft of main landing gear’s FWD truss assembly – undamaged

Given the failure of the main LH landing gear (folding) during landing, as well as the evidences collected on the accident’s site, the investigation commission took into custody the LH landing gear’s assembly, in order to expertise it.
The landing gear’s examination has as main purpose to determine the breaking conditions and also the breaking mode of the attaching shaft of the AFT truss assembly, as well as the analysis of installation of the attaching shaft belonging to the main landing gear’s FWD truss assembly.

It was performed the metallurgical analysis of the broken attaching shaft during landing, in order to determine the causes of the occurred breaking.

There were also examined the aircraft’s technical (maintenance) records to determine the maintenance works performed on the main landing gear.

2.5.1 Maintenance records

After taking into custody the main LH landing gear, it was analyzed the attaching shaft’s installation of the AFT and FWD truss assembly. It was found that one of the two attaching shafts was incorrectly installed.

Therefore, in the front part of the truss assembly (see fig.6), the safety pin was installed without securing the attaching shaft, which thus had the possibility to move into the fuselage during the lading gear’s operation.
It was also found that the correct installation is at the AFT truss assembly (see fig.7): the safety pin along with the attaching shaft also secures the truss assembly, being then secured with safety wire. In this way, the possible movement of the attaching shaft during the landing gear’s operation is eliminated.

The investigation commission checked the maintenance records of YR-RAG aircraft, which showed that the last removal from the fuselage of both main landing gears was performed in 2009.

During the annual inspection checks, there were detected liquid leakages from the shock dampers of the two main landing gears, and in order to stop these leakages, it was necessary removal from the fuselage. The works were performed by AIRplus Maintenance GmbH – maintenance organization Part 145 certified (authorization no. DE.145.0307) and approved for this aircraft type. These works are certified in the aircraft’s technical documents and they were performed according to the requirements of Cessna 340/340A Service Manual.

Since 2009 until the time of the accident, maintenance checks were performed to the aircraft, but these checks did not require removal of the main landing gears from the aircraft.

From the last removal from the fuselage of both main landing gears, recorded in 2009, and until the time of the accident, according to the recordings from the technical logbook, the aircraft performed a number of 159 landings.
2.5.2 Metallurgical analysis

The metallurgical analysis of the attaching shaft broken during the operation, in comparison with the undamaged one, showed that the breakage appeared as a consequence of a repeated and prolonged action of a couple of forces, to values in the area of elastic deformations, the morphology of breaking area being a typical fatigue breaking.

![Attaching shafts of the two truss assemblies from the LH landing gear](image)

![Details of the broken attaching shaft](image)

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Fig. 8 Attaching shafts of the two truss assemblies from the LH landing gear

Fig. 9 Details of the broken attaching shaft
The attaching shaft of the AFT truss assembly began to deform in the moment when the progressive withdrawal of the other attaching shaft began (FWD truss assembly), and breakage occurred during the complete withdrawal.

As a conclusion, it can be said that the attaching shaft of the LH landing gear broke to fatigue, as a consequence of a repeated and prolonged action of a couple of forces, to values in the area of elastic deformations. The estimated moment of the final breakage is the one in which it occurred the complete withdrawal of the FWD attaching shaft, when the operating requirements suddenly increased to higher values than those provided.

3. CONCLUSIONS

3.1 Findings

1. The pilot hold a PPL license and medical certificate, both valid;

2. The aircraft YR-RAG hold a valid airworthiness certificate, and maintenance was performed according to the approved maintenance schedule;

3. The weather conditions had no influence on the occurrence of this accident;

4. According to the maintenance records of YR-RAG aircraft, the last removal from the fuselage of both main landing gears was performed in 2009;

5. Since 2009 until the time of the accident, the aircraft performed 159 landings;

6. Analyzing the installation of the main LH landing gear on the airplane, it was found that the attaching shaft was correctly mounted only on the AFT truss assembly; as for the FWD truss assembly, the attaching shaft was not correctly mounted;

7. The attaching shaft of the AFT truss assembly began to deform in the moment when the progressive withdrawal of the other attaching shaft began (FWD truss assembly), and breakage occurred during the complete withdrawal.

3.2 Cause of accident

The cause of this accident was the incorrect installation on the aircraft of the main LH landing gear.
3.3. Recommendations

The investigation commission issues the following safety recommendation:

It is recommended for the Civil Aeronautical Authority in Germany to perform an additional audit to the maintenance organization that is Part 145 (DE.145.0307) certified in order to check the content of maintenance procedures used when performing the removal/installation of the landing gear. These procedures should also contain actions which can prevent/detect/eliminate any incorrect installation.

Note: The documents and analysis objects used for the issuance of the flight safety investigation Report are confidential and are archived at the Civil Aviation Safety Investigation and Analysis Center, according to legal provisions.