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pour la sécurité de l'aviation civile
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INVESTIGATION REPORT

Accident to the MOONEY - M20F registered F-HOSJ

on 29 January 2020
at Biscarrosse-Parentis (Landes)

Time	Around 08:55[1]
Operator	Aero Mecanic's
Type of flight	Cross country
Persons on board	Pilot and passenger
Consequences and damage	Aeroplane substantially damaged

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in March 2022. As accurate as the translation may be, the original text in French is the work of reference.

[1] Except where otherwise indicated, the times in this report are in local time.

Loss of electrical power, partial extension of landing gear, collapse of landing gear on landing

1 - HISTORY OF THE FLIGHT

Note: The following information is principally based on statements.

The pilot, manager of a maintenance workshop, accompanied by a passenger[2], took off from Biarritz-Pays Basque airport (Pyrénées-Atlantiques) bound for Biscarrosse-Parentis aerodrome.

[2] Apprentice mechanic in the maintenance workshop.

On approach south of the aerodrome, he contacted the tower controller who informed the pilot that he was receiving him intermittently. The aeroplane then experienced a complete loss of electrical power.

Ten minutes later, still south of the aerodrome, the pilot contacted the tower controller with his mobile phone. The latter told him that there was no known traffic in the vicinity of the aerodrome, that the wind was calm and that the runway was free to be used at his discretion. The pilot told the controller that he was going to use unpaved runway 09[3] and then hung up.

[3] Runway measuring 1,300 m x 60 m. The landing distance available is 1,300 m.

Before joining the downwind leg, the pilot set the landing gear selector to "*down*" and realised that this would be to no effect because of the loss of electrical power.

He actioned the emergency landing gear extension handcrank without managing to completely extend the landing gear, while turning the long way round south of the aerodrome.

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Before landing, at around 50 m from the threshold, the pilot shut down the engine, cut off the magnetos and shortly before touchdown, retracted the flaps in order not to damage them.

The main landing gear touched the runway first. When the nose gear came into contact with the ground, the landing gear retracted. The propeller, windmilling, struck the ground and the aeroplane came to a halt on the runway.

2 - ADDITIONAL INFORMATION

2.1 Aircraft information

2.1.1 Maintenance of aeroplane

The aeroplane had been stored in the maintenance workshop at Biarritz-Pays Basque airport since June 2018. Most of the time it was parked outside under a tarpaulin.

The workshop had first carried out an annual inspection in August 2018 followed by a second one in July 2019.

At the end of 2019, the oil and oil filter had been replaced and the spark plugs cleaned and adjusted.

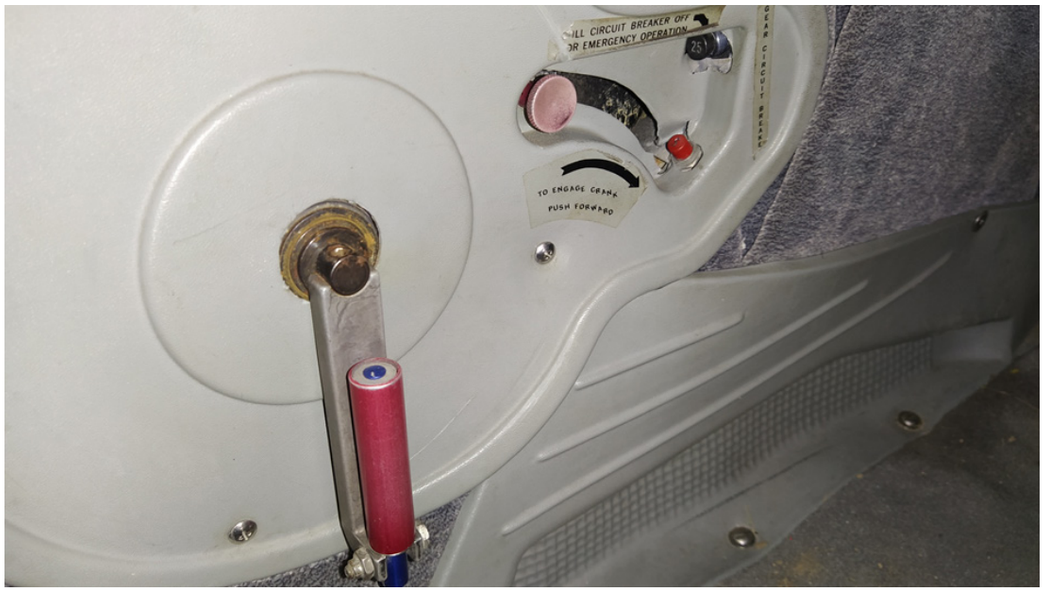
At the end of this maintenance operation, the workshop manager had carried out a check flight on 10 January 2020. This was the aeroplane's first flight since June 2018.

In order to check the operation of all the systems and with the aeroplane owner's agreement, the workshop manager had flown the plane another three times before the accident flight.

2.1.2 Emergency gear extension

A selector on the instrument panel allows the pilot to electrically extend and retract the landing gear.

A handcrank situated forward of and to the left of the pilot's seat can be used to extend the landing gear if it cannot be done so with the selector.



Source: BEA

Figure 1: emergency landing gear extension handcrank (view from bottom of pilot's seat)

2.1.3 Procedure for emergency gear extension

The procedure described in the flight manual is the following:

Caution: a discharged battery may compromise the landing gear being fully extended electrically.
1) Pull the landing gear motor circuit breaker (OFF).
2) Set the landing gear selector to DOWN.
3) Push the handcrank forward to engage the drive mechanism.
4) Turn the handcrank clockwise about 50 times to completely extend the landing gear. The landing gear is extended and locked when the green light[4] is lit. In case of an electrical power loss, check that the markings of the visual indicator (between the front seats) are aligned.

[4] Situated above the airspeed indicator.

A label giving the procedure in full (in English) was situated above the emergency landing gear extension handcrank.

Source: BEA

Figure 2: view of label from pilot's seat

2.1.4 Examination of landing gear

The nose gear extension control rods were deformed by compression, the probable consequence of the collapse of the main landing gear on landing.

It was possible to extend and lock the landing gear after around 60 turns of the handcrank. It is possible that the compression deformation of the rods may have affected the number of turns of the handcrank. It was possible to retract the landing gear by turning this handle in the counterclockwise direction.

2.1.5 Aeroplane's electrical system

The alternator is switched on by the pilot (after starting up the engine) using a switch located on the lower left side of the instrument panel.

An ammeter on the lower right side of the instrument panel indicates the status of the battery charge system. Positive values indicate that the alternator is powering the system and charging the battery. Negative values indicate that the battery is discharging and powering the system and thus that the alternator has not been switched on or is inoperative.

2.2 Pilot information

The 45-year-old pilot was the manager of the maintenance workshop for F-HOSJ. Holder of an LAPL(A), on the day of the accident he had logged 575 flight hours, eight hours of which on F-HOSJ. In the three months preceding the accident, he had logged nine flight hours, including five hours on F- HOSJ.

He had "retractable landing gear" training and had logged 30 flight hours on retractable-gear aeroplanes.

He could not remember if he had switched on the alternator on starting up.

He explained that the values indicated on the ammeter were negative after take-off.

He specified that after the first contact with the tower controller at Biscarrosse-Parentis aerodrome who told him that he was receiving him intermittently, he tried the headset jacks on the pilot's side and passenger's side and then tried to contact the controller using the PTT[5] on the passenger's side, without result. He added that the radio equipment then switched off.

[5] Push To Talk. This is a button which has to be pushed to send a radio message.

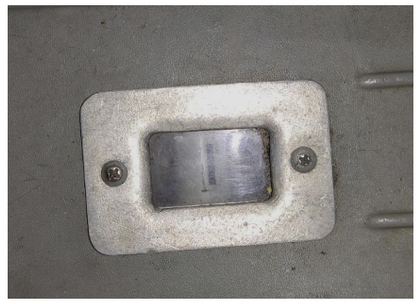
He had neither the checklist nor the normal and emergency procedures on board the plane. The pilot specified that he did not think to consult the onboard flight manual.

In order to troubleshoot the loss of electrical power, the pilot indicated that he carried out 360° turns south of the lake bordering the aerodrome. All of the circuit breakers were still pushed in and the ammeter needle was in the centre on zero. He deduced from this that the busbar was no longer being powered.

He added that he next switched off the power supply to the equipment consuming electrical power and then switched the battery and alternator off and then on without this having an effect on the failure.

After trying to extend the landing gear in the usual way, he started flying 360° turns again, this time overhead the lake, south abeam the control tower. He pushed his seat back to access the emergency landing gear extension handcrank. He added that he turned it in the counterclockwise direction for three to four minutes, i.e. just over twenty turns. The handcrank turned easily. On checking the visual gear extension indicator between the two front seats, he had confirmation that the landing gear was extending. Nevertheless, the mobile black line stopped well before the centre[6] of the visual gear extension indicator.

[6] When the mobile black line is centred, this indicates that the landing gear is extended and locked.



Source: BEA

Figure 3: visual landing gear extension indicator

In this example, the mobile black line is centred which indicates that the landing gear is extended and locked.

As his action had not completely extended and locked the gear, he then wanted to turn the handcrank in the opposite direction, i.e. clockwise. As the force to be applied was too high, he was unable to turn the handcrank and stopped his action as he did not want to break it.

He next started turning the handcrank in the counterclockwise direction again. After around one minute, i.e. about ten turns, the mobile black line of the visual gear extension indicator was still stuck in the same spot. The pilot indicated that he then thought that he had broken the emergency extension control. In retrospect, he had a doubt as to whether he had correctly engaged the drive mechanism for the emergency landing gear extension (refer to point 3 of the procedure described in paragraph 2.1.3).

A few days after the accident, the pilot checked the operation of the alternator. No anomaly was found.

The pilot explained that he found the cause of the electrical failure in November 2021 while he was repairing the aeroplane. He indicated that the problem was on the electrical line which charges the battery. This electrical line connects the alternator, its circuit breaker, the busbar and the battery. According to the pilot, the cable connecting the alternator to its circuit breaker was not correctly fixed (it could move) at the circuit breaker due to one of the contact screws being loose.

3 CONCLUSIONS

***The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation. They are not intended to apportion blame or liability*.**

Scenario

Due to a problem on the battery charge line, the battery powered the electrical equipment until it was completely discharged, leading to a complete loss of electrical power.

The pilot tried to extend the landing gear manually without managing to lock it in the down position. The landing gear collapsed during the landing.

Contributing factors

The following factor may have contributed to the electrical failure:

- A fault on the attachment of a cable on the electrical line connecting the alternator, its circuit breaker, the busbar and the battery.

The following factor may have contributed to the partial extension of the landing gear:

- Not using the checklist or procedure during the flight.