



Accident to the ROBIN DR400-180 “Regent”
registered **F-GYKM**
on Friday 9 August 2024
at Aire-sur-l’Adour

Time	Around 17:40 ¹
Operator	Aéroclub de Bordeaux
Type of flight	Instruction
Persons on board	Student-pilot and instructor
Consequences and damage	Aeroplane substantially damaged
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.	

**Total reduction in engine power during touch-and-go,
forced landing in a field, in instruction**

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements and radar data.

The student-pilot, accompanied by an instructor, took off at approximately 14:45 from Bordeaux - Léognan - Saucats aerodrome (Gironde) for a triangular cross-country flight, with one landing at Bagnères-de-Luchon aerodrome (Haute-Garonne) and one touch-and-go at Aire-sur-l’Adour aerodrome. The flight between Bordeaux - Léognan - Saucats and Bagnères-de-Luchon, lasting one hour and ten minutes, took place without any problems. The student-pilot took off again from Bagnères-de-Luchon aerodrome at approximately 16:50 and headed towards Aire-sur-l’Adour aerodrome.

On arrival, it flew overhead the aerodrome and then joined the circuit at the start of the downwind leg for runway 30. The instructor made an input on the fuel tank selector to select the main tank. The student-pilot made a standard circuit, landed and then went around.

During the initial climb, while the aeroplane was at a height of between 100 ft and 150 ft, the student-pilot observed the illumination of the fuel pressure and low fuel level warning lights on the warning strip and informed the instructor of this. Less than 2 s later, the engine was no longer delivering power. The student-pilot allowed the stick to move forward and the instructor immediately took over the controls. He managed the path to land in the field located on the extended axis of the runway, avoiding the haystacks on it. The aeroplane hit the ground and bounced. The instructor maintained the aeroplane in the air to fly over a road with traffic. The aeroplane touched down again in a second field. The instructor, seeing haystacks on the path, made

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

a ground loop and managed to stop the aeroplane. The landing gear was ruptured. The student-pilot and the instructor transmitted a message over the frequency to report the accident, secured the aeroplane and evacuated it.

2 ADDITIONAL INFORMATION

2.1 Site information

The accident site was located in a field, on the extended axis of runway 30, around 500 m from the end of the runway and 100 m from the runway centreline. The RH landing gear was ruptured.

The positions of the controls in the cockpit were consistent with an off-airfield landing and a secured aeroplane:

- the electric pump, fuel selector valve, magnetos, alternator and battery switch were in the OFF position;
- the throttle lever was in the idle position and the mixture lever was in the cut-off position.



Figure 1: position of the fuel selector valve (Source: BEA)

A sample of 2.25 l of fuel was taken via the main tank bleed screw at the accident site. The aeroplane was moved a few days after the accident, without any removal, to a hangar located at Aire-sur-l'Adour aerodrome. After this operation, the main tank was completely emptied. The amount of fuel removed was around 30 l. The LH wing tank was full and the RH wing tank was filled to a third of its capacity. The carburettor bowl contained very little fuel.

The aeroplane was then transported to the flying club, after removing the wings. This operation required the removal of the three aluminium sheet tanks and the disconnection of the associated piping and electrical cables. The electric pump was also removed.

2.2 Aeroplane information

2.2.1 General

The flying club bought the aeroplane two years before the event. According to the chief-pilot, the aeroplane had just undergone a “1,000-hour” inspection, during which the low fuel level warning light had been set.

The aeroplane was powered by a 180 hp Lycoming O-360-A1P engine. The engine had undergone an overhaul on 23 April 2019 and had logged 1,138.59 operating hours since that date.

The carburettor was repaired on 23 June 2022 and was installed on the aeroplane on 22 December 2023. It had logged 206.12 operating hours since reinstallation on the aeroplane.

2.2.2 System description

The schematic diagram of the aeroplane’s fuel system is shown below:

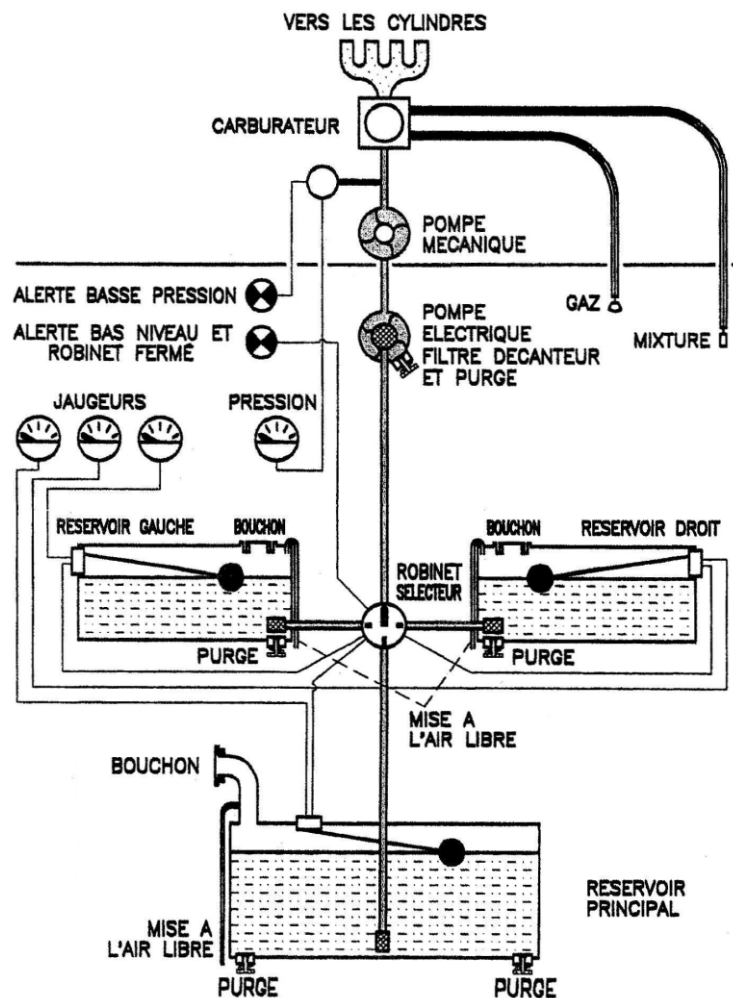


Figure 2: fuel system diagram (Source: Robin)

The aeroplane is equipped with three tanks:

- the main tank with a capacity of 110 l, located at the rear of the aeroplane;
- one tank with a capacity of 40 l, located at the LH wing root, on the leading edge;
- one tank with a capacity of 40 l, located at the RH wing root, on the leading edge.

According to the aeroplane's flight manual, the amount of unusable fuel is 1 l for each tank.

A selector valve is located on the instrument panel tunnel (see **Figure 1**). This valve can be used to select one of the three tanks or to close the fuel system.

The fuel pressure warning light illuminates on the warning strip when the pressure measured by the sensor (located between the mechanical pump and the carburettor) is below the defined limit. This can happen in particular when the fuel selector valve is in the OFF position or an intermediate position.



Figure 3: warning strip (Source: BEA)

The low fuel level warning light illuminates on the warning strip when the amount of fuel measured by the fuel gauge in the selected tank is below the defined limit² or when the fuel selector valve is in the OFF position or an intermediate position.

2.3 Examination information

2.3.1 Examination of the tanks and piping

The examination of tanks and piping did not reveal anything abnormal.

2.3.2 Examination of the electric pump

The inside of the pump, its filter and the remaining fuel were clean. There was no foreign body.

The pump was reinstalled to test the operation of the system with a flexible hose dipped into the can containing the 30 l of fuel drained from the main tank. With the fuel selector valve in the “main” position, the electric pump reactivated the system and caused the fuel pressure warning light to go off. The fuel flow rate observed was normal.

2.3.3 Examination of the operation of the low fuel level warning light

The illumination of the warning light was tested by simulating a low fuel level in each of the three tanks and by setting the fuel selector to all possible positions, including unusual positions. This examination did not reveal any malfunction.

2.3.4 Assessment of the internal capacity of the carburettor bowl

The amount measured in normal operation is approximately 160 cm³ (i.e. 0.16 l). By comparison, the amount removed at the site was around 20 cm³ (0.02 l).

² 16 l to 18 l for the main tank and 7 l to 8 l for the LH and RH tanks.

2.3.5 Engine tests

On 3 September 2024, the flying club's mechanic carried out engine tests. The engine operated normally, for 20 to 30 min, at a speed ranging from idle to 2,000 rpm³. The pressures were nominal.

The engine, carburettor and pumps were removed and sent to a specialist workshop for further examination. These examinations showed that the whole system was operating nominally.

2.3.6 Examination of the fuel selector

The flying club's mechanic removed the fuel selector and carried out the tests recommended by the manufacturer, i.e. cam length measurements. The values measured were within the tolerances. Furthermore, the mechanic did not observe anything abnormal.

2.3.7 Additional information

According to the mechanic, during the valve leakage test, the engine keeps operating for approximately 1 min and 30 s at a speed of 1,500 rpm after the fuel selector valve has been set to the OFF position.

2.4 Pilots' experience and statements

2.4.1 Experience

The 74-year-old instructor held a Private Pilot Licence - Aeroplanes (PPL(A)), as well as a Flight Instructor - Aeroplane (FI(A)) rating. He had logged more than 20,000 flight hours, 1,137 hours of which on DR400s.

The 18-year-old student-pilot had logged 34 flight hours, nearly 7 of which in solo flight.

2.4.2 Instructor's statement

The instructor reported that a complete refuelling of the three tanks was made before the flight. He specified that the first leg of the cross-country flight and the climb of the second leg were flown using the main tank. The en-route phase of the second leg was flown using the RH tank. On arriving at Aire-sur-l'Adour aerodrome, after flying overhead the aerodrome at an altitude of 500 ft above that of the aerodrome circuit and at the start of the downwind leg, he decided to select the main tank for the aerodrome circuit and the touch-and-go, as this tank contained more fuel and turbulence was forecast. He specified that he made this input himself.

The standard aerodrome circuit and the touch-and-go (performed with the flaps in take-off configuration and without the use of carburettor heating given the temperature) took place normally. During the initial climb, at a height of approximately 150 ft, the instructor observed the simultaneous illumination of two indicator lights, which he identified as the low pressure and low fuel level warning lights, followed by a partial and then total reduction in engine power. He added that the climb attitude was normal, that the turbulence was moderate and that there were no warning signs of the failure. He saw the student-pilot allow the stick to move forward and then immediately took over the controls to land in the field located on the extended axis of the runway.

³ Maximum speed tested, for safety reasons.

Given the obstacles in the path, he altered the heading to the right to steer the aeroplane towards the gap. He specified that the members of the Aire-sur-l'Adour flying club had cleared the haystacks that were located on the extended axis of the glider runway in the event of a failure at take-off.

The instructor specified that after taking over the controls, he focused exclusively on the path to avoid obstacles. He remembered that the student-pilot made some inputs, including an attempt to restart the engine. He did not know whether the student-pilot switched fuel tanks during this phase. He specified that he heard the noise of the electric pump.

The instructor reported that he made sure that the fuel selector valve was in the “main” position during the last tank switching at the start of the downwind leg. According to him, no other input was made on the selector valve until the failure occurred.

The instructor added that during a flight in February 2024 with the same student-pilot, he was already faced with the illumination of these two warnings, without any reduction in engine power. He then turned around and landed. After reporting the incident to the chief-pilot, he did not record it in the logbook.

2.4.3 Student-pilot's statement

The student-pilot indicated that they performed the first leg and about 20 min of the second leg on the main tank before switching to the RH tank. On arrival at Aire-sur-l'Adour aerodrome, before the downwind leg, the instructor switched on the electric pump and selected the main tank, which was half full. The pump remained in operation after switching tanks.

The aerodrome circuit and landing, performed with the flaps in take-off configuration, took place normally. There was no turbulence. During the go-around, the engine parameters were normal. The student-pilot indicated that he carried out the rotation and then a level-off phase to accelerate up to approximately 135 km/h. He then continued the climb, with an attitude that he estimated to be a little steeper than usual.

While the aeroplane was at a height of approximately 100 ft, the warning lights illuminated. He remembered being already faced with the illumination of these lights during a take-off in February 2024, without any reduction in engine power. He therefore did not worry immediately, however he informed the instructor of this. This time, engine power decreased very quickly and the engine choked, less than 2 s after the illumination of the warning lights. The student-pilot specified that the propeller was still rotating with the relative wind and that there was no abnormal noise. He added that he could hear the sound of the electric pump.

He allowed the stick to move forward to maintain speed. The instructor took over the controls immediately after the power reduction and decided to land in the field located on the extended axis of the runway. The student-pilot indicated that he tried to restart the engine once or twice by operating the starter, using the button located at the OFF position of the fuel selector valve, without changing the position of the valve. He then applied the off-field landing procedure while the instructor managed the path. He specified that he switched off the mixture and the alternator, but did not set the fuel selector valve to the OFF position at that time⁴.

⁴ The off-field landing procedure requires the fuel valve to be closed and the electrical system to be switched off.

The student-pilot reported that once the aeroplane was stopped, he set the fuel selector valve to the OFF position, he switched off the electric pump, the magneto switches and the battery switch and he removed the keys.

2.5 Chief-pilot and mechanic statements

The chief-pilot confirmed that the instructor informed him of the illumination of the fuel pressure warning light during a take-off in February 2024. He asked the instructor if the pressure had remained within the indicator's green range on the instrument panel and indicated that the flickering of this light could occur on switching off the electric pump, depending on the conditions of the day and on the aeroplane's attitude.

The mechanic stated that he was not informed of the incident of February 2024. He specified that during a strong nose-up input, given the length and diameter of the supply system, the fuel pressure warning light may flash depending on the power requested. This problem can be overcome by using an electric pump. The mechanic specified that the low fuel level warning light is not affected by this problem.

2.6 Meteorological information

The meteorological conditions estimated by Météo-France at the accident site were as follows: 130° wind of 7 kt, CAVOK, temperature 8.5°C, dew point temperature 3.5°C, QNH 1,020 hPa.

3 CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation.

Scenario

During the initial climb after a touch-and-go, while the aeroplane was at a height of between 100 ft and 150 ft, the student-pilot and the instructor observed the illumination of the fuel pressure and low fuel level warning lights on the warning strip. Less than 2 s later, the engine was no longer delivering power. The student-pilot allowed the stick to move forward and the instructor immediately took over the controls and landed in the field in front of them, avoiding the haystacks on it.

The examinations carried out suggested an engine fuel supply fault. However, the investigation was unable to determine the reason for this. No failures were identified during the examinations. The fuel tanks contained enough fuel. According to the statements, the fuel selector valve had been in the “main” position since the start of the downwind leg and the electric pump was operating.

Actions taken by the flying club

Following this accident, the chief-pilot conducted a survey of pilots and found that few of them were aware of the secondary function of the low fuel level warning light, which is to inform pilots that the fuel selector valve is in the OFF or an intermediate position on DR400/180 or DR400/160 aeroplanes.

As a result, the flying club amended the tank switching procedure to include:

- a visual check of the position of the selector valve when switching tanks;
- a check of the low fuel level warning light after switching tanks.

The BEA investigations are conducted with the sole objective of improving aviation safety and are not intended to apportion blame or liabilities.