BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

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SAFETY INVESTIGATION REPORT

Accident to the PILATUS PC-6/B2-H4 registered HB-FDU on Tuesday 21 January 2025 at Maripasoula aerodrome (French Guiana)

Time	Around 14:00[1]
Operator	Private (sole trader)
Type of flight	Own-account transport under a dry lease[2]
Persons on board	Pilot
Consequences and damage	Aeroplane substantially damaged, pilot seriously injured
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.	

Loss of control on short final, collision with ground

1 HISTORY OF THE FLIGHT

Note: The following information is principally based on statements, radar data, radio-communication recordings and airborne avionic equipment[3].

The pilot took off from Cayenne-Félix Éboué airport (French Guiana) at 12:58 bound for Maripasoula aerodrome. The aeroplane was loaded with cargo, principally foodstuff.

After a flight time of around 50 min, at a mean cruise altitude of 3,100 ft[4], the pilot started the descent to Maripasoula. The pilot levelled off at an altitude of around 850 ft and joined the RH downwind leg for runway 07[5] at Maripasoula (see **Figure 1**, point 1). The pilot indicated that he positioned the power lever in order to have 20 PSI, activated the booster pump and started extending the flaps (four turns of the handle). The pilot made a LH turn to increase his distance with respect to the runway before starting his final descent. He started his final descent at an altitude of around 800 ft (point 2) and carried out a large continuous 180° turn to line up with the axis of runway 07. At the beginning of the final approach, at an altitude of around 520 ft, the indicated airspeed (IAS) was around 61 kt.

[1] Except where otherwise indicated, the times in this report are given in local time. Three hours should be added to obtain UTC time on the day of the event.
[2] For the context and the regulatory framework of the flight, see paragraph 2.7.
[3] HB-FDU was equipped with a Garmin GTN750XI EFIS, a Garmin GI275 artificial horizon, a Garmin AERA660 portable GNSS computer and a LEVIL BOM multi-function sensor.
[4] The glossary of abbreviations and acronyms frequently used by the BEA can be found on its web site.
[5] Paved runway measuring 1,198 m X 15 m.

The pilot indicated that once on the axis, on short final, he extended the flaps to nearly full deployment and checked that they were correctly positioned. The speed progressively decreased and a few seconds later, the pitch attitude increased (point 4) to reach around 12°. The IAS was 53 kt at this point. The IAS continued to decrease until reaching a minimum of 46 kt. The pitch attitude oscillated, reaching a maximum of 14° before suddenly decreasing (point 5). The pilot lost control of the aeroplane. The aeroplane collided with the ground and came to a stop on the LH side of runway 07.

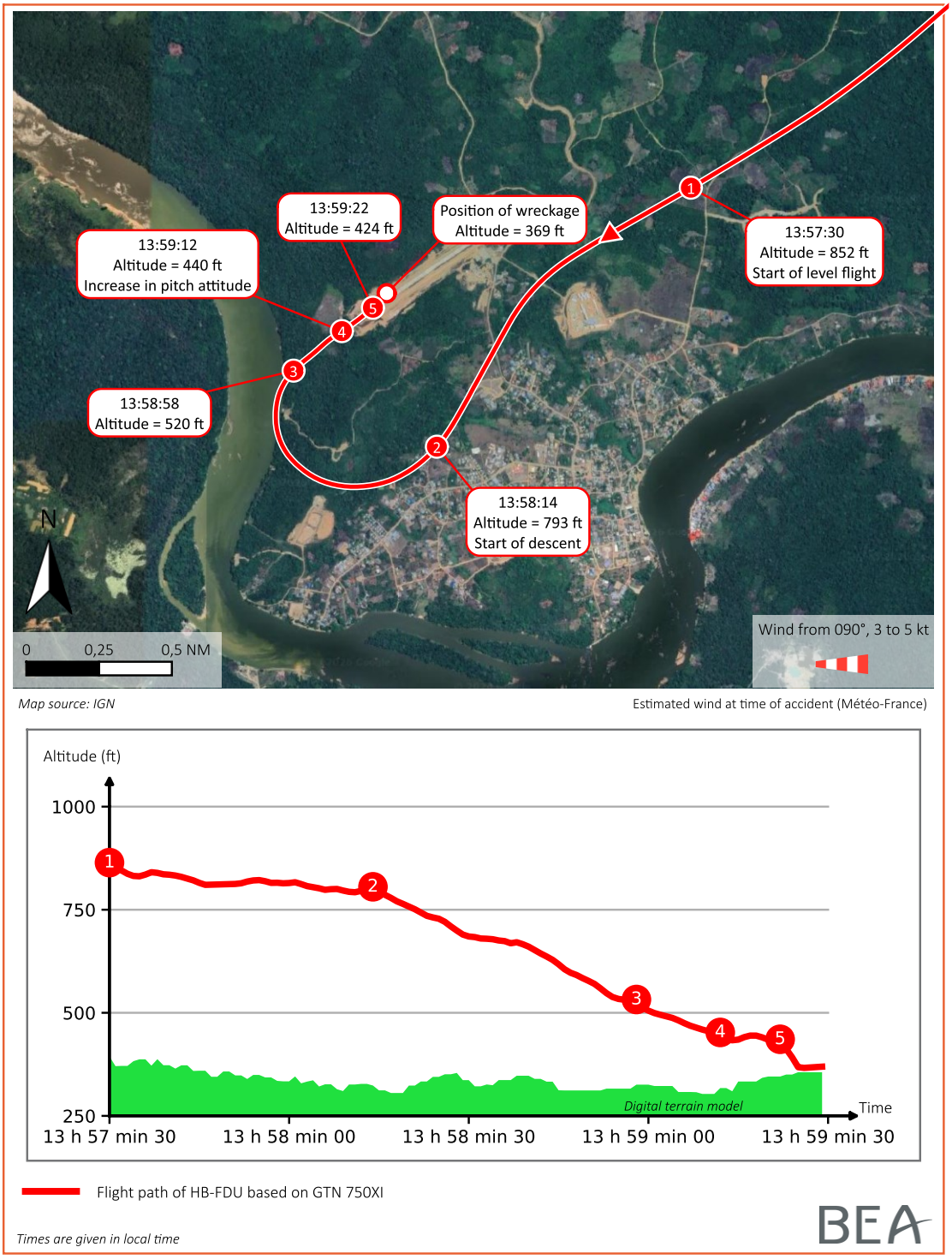

Figure 1: end of flight path of HB-FDU

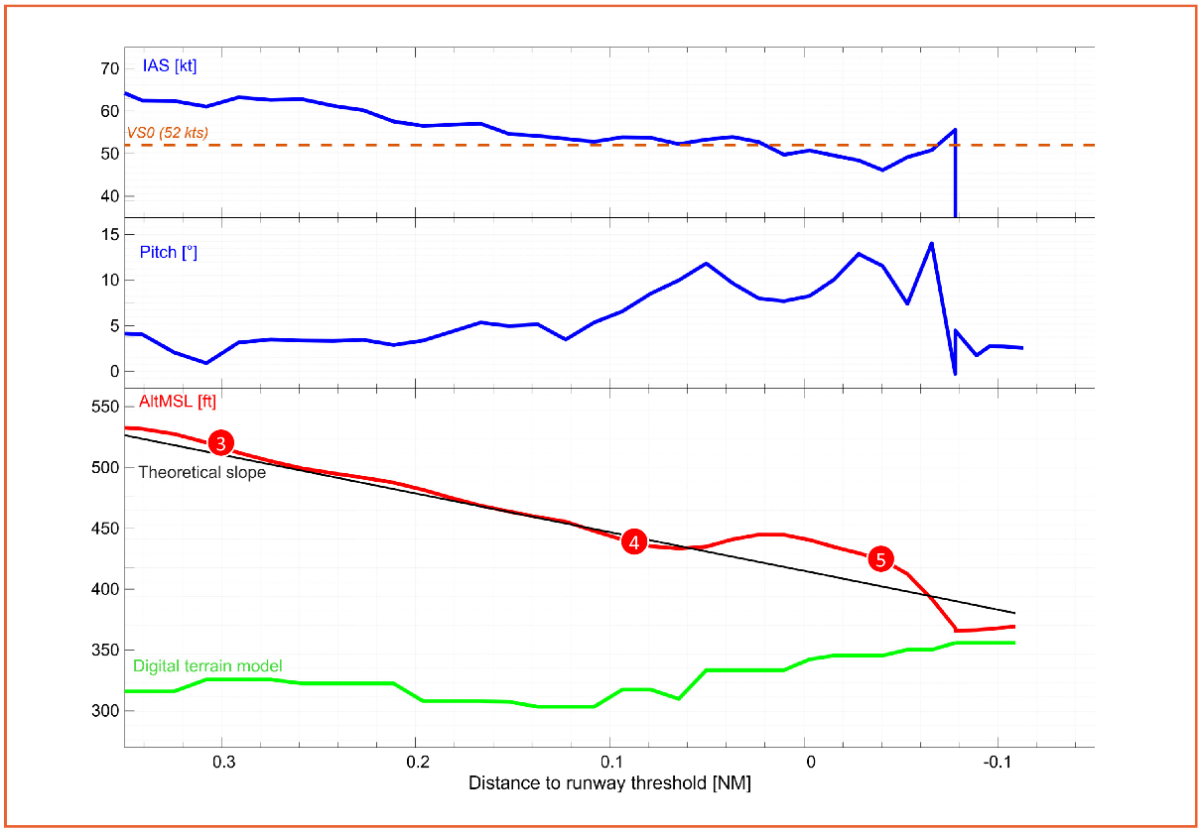

Figure 2: final descent of HB-FDU

2 ADDITIONAL INFORMATION

2.1 Site and wreckage information

Figure 3: photo taken by drone of accident site (source: GTA)

The wreckage was situated 20 m to the LH side of the runway 07 centreline and approximately 160 m from the threshold. BEA field investigators and the air transport police went to the site. The latter weighed all of the aeroplane's cargo and obtained a measured weight of 1,069 kg. As the cargo had moved after the impact, it was not possible to accurately determine the distribution of the loads. The LH fuel tank gauge indicated less than 90 l, the RH fuel tank was found empty due to a leak after the RH wing was partially torn off.

Figure 4: damage on airframe (source: GTA)

The trim indicator in the cockpit was found in position 2 (slightly nose-up). The position of the flaps corresponded to around ten turns of the handle for a maximum of eleven and a half. The flight controls were continuous and functional on the three flight control linkages. The examination of the propeller showed that there was engine torque (moderate to high power, no feathering) when the propeller struck the ground.

2.2 Weight and balance information

According to the company which weighed the cargo before loading it on the aeroplane, the load weighed 1,060 kg. This weight is consistent with the value obtained by the GTA when it weighed the load after the accident.

On site, the weight and balance sheet was not found. The pilot provided a weight and balance sheet along with a chart after the accident. These documents indicate, for landing, an aft centre of gravity within the centre of gravity envelope and a weight slightly below the maximum landing weight.

Besides the documents provided by the pilot, the centre of gravity could not be determined based on the actual position of the cargo on board because the collision with the ground had caused the load to shift (see paragraph 2.1).

It was not possible to determine the exact weight of the aeroplane during the landing as the fuel tanks were damaged by the accident and the fuel had leaked. However, based on the statements made by the pilot and the refuelling operator, the aeroplane had a near full fuel load on departure.

According to the manufacturer, Pilatus, based on various, realistic cargo and fuel load hypotheses, the aeroplane was close to the weight and balance limits (aft centre of gravity, maximum landing weight) when it landed.

2.3 Meteorological information

According to Météo-France's analysis, between 13:00 and 14:00, the weather conditions at Maripasoula aerodrome were as follows: an easterly wind of 3 to 5 kt with gusts up to 10 kt, few clouds and no precipitation. At 14:00, the temperature was approximately 30°C and the atmospheric pressure at sea level was approximately 1013 hPa.

Maripasoula aerodrome does not have METAR or TAF weather reports. The nearest METAR station is located at Cayenne airport, 227 km from Maripasoula.

2.4 Aircraft information

2.4.1 Characteristics

HB-FDU is a PC6/B2-H4, a single-engine aeroplane which can carry nine passengers or cargo. Based on the flight manual, the maximum permissible weight in the cabin behind the front seats is 1,000 kg. The aeroplane's maximum take-off weight is 2,800 kg and its maximum landing weight is 2,660 kg. The stall speed in the landing configuration with the maximum take-off weight and zero bank is 52 kt (VS0). The stall speed is 53 kt with the flaps in the take-off position.

HB-FDU was equipped with a mechanical flaps system: the flaps are controlled by means of a handle situated on the cockpit overhead panel. The position of the flaps is shown to the pilot by a rod indicator on the leading edge of the wing. The take-off position corresponds to a deflection of 28° and eight turns of the handle, complete deployment corresponds to a deflection of 39° and eleven and a half turns of the handle.

The aeroplane was equipped with a Pratt & Whitney PT6A-27 turbine engine and a Hartzell metal four-blade propeller. The engine and propeller controls are:

- a power lever to adjust the torque;
- a propeller lever to act on the propeller speed (RPM);
- an idle control to adjust the idle fuel flow according to the flight phase.

The idle control is not progressive like the other two controls but has three possible positions: HIGH IDLE (FLIGHT IDLE), LOW IDLE (GROUND-IDLE) and CUT-OFF. The flight manual contains a warning specifying that the idle control must be set to HIGH IDLE when a need for rapid engine acceleration is anticipated.

The idle control was found in the LOW IDLE position after the accident (see **Figure 5**). The investigation was not able to determine the position of this control during the final approach nor whether this control was moved after the accident (see paragraph 2.6.2).

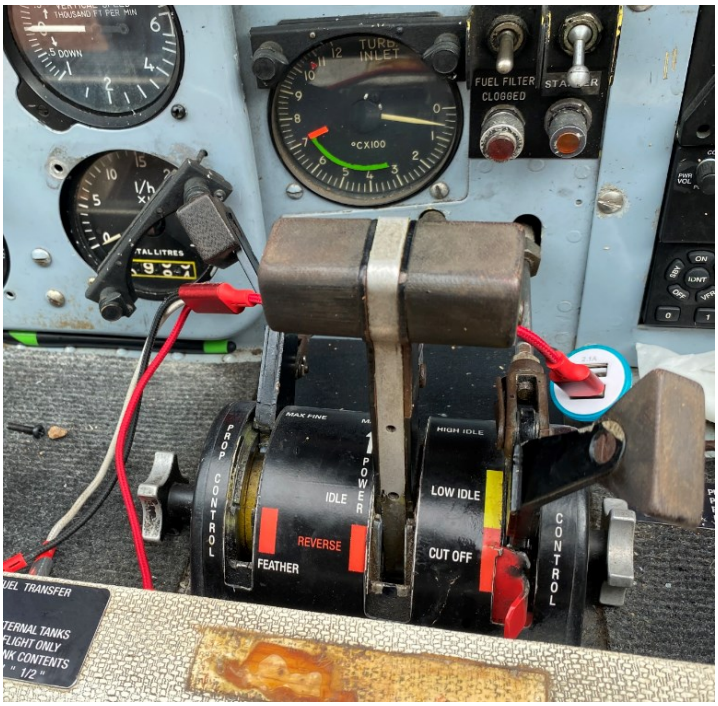

Figure 5: photo of engine and propeller controls of HB-FDU taken after the accident (source: GTA)

2.4.2 Maintenance

HB-FDU had logged approximately 11,690 flight hours and 10,937 cycles at the time of the accident. The propeller on HB-FDU had been installed during the last maintenance inspection. The flight preceding the accident was a maintenance check flight of 30 min to verify its correct operation; this flight did not reveal any anomalies.

The analysis of the maintenance documents by the BEA and by Pilatus along with the analysis of photos of the propeller by the manufacturer, Hartzell, did not reveal any anomaly.

2.4.3 Operating procedures

The normal before landing procedure described in the flight manual asks the pilot to position the idle control to HIGH IDLE[6], to extend the flaps as required and to trim the aeroplane so as to maintain a speed of 68 kt[7]. The preselection of the torque must allow the aeroplane to fly on a slope of 3°.

The flaps of HB-FDU were extended, close to their maximum position. Some PC6 operators indicated during the investigation that they prefer to use the flaps in the take-off position during the landing and to increase the approach speed to around 75 kt on runways longer than 500 m. Based on what they had observed, configuring the flaps to the maximum setting makes the aeroplane more difficult to manoeuvre. They considered that this configuration creates an increased risk of loss of control in the event of a premature reduction in speed.

[6] In order to reduce noise during the approach, the idle control can also be used in the LOW IDLE position. In this case, a supplement to the operations section of the flight manual warns that "*longer acceleration times should be anticipated when overshooting, especially with high outside air temperatures*."

[7] This speed corresponds to roughly 1.3 X VS0.

Pilatus informed the BEA that this analysis was reasonable, nevertheless the aircraft can always be landed in a full flaps configuration.

2.4.4 Flight performance

Pilatus stated that it did not have test data to accurately address the consequences in terms of flight performance in this configuration of weight and balance of HB-FDU. In the event that the weight and balance limits were slightly exceeded, Pilatus indicated that the handling of the aircraft should not be immediately impaired. However, Pilatus indicated that the PC-6 should be flown with more caution when it has an aft centre of gravity and is close to its maximum weight, particularly regarding the monitoring of the airspeed and the power control.

The manufacturer indicated that the deployment of the flaps is accompanied by an increase in the aeroplane's drag and nose-up torque. This nose-up torque associated with an aft centre of gravity may contribute to an increased pitch attitude.

Pilatus stated that the increased drag due to flap deployment on final, combined with the high mass of HB-FDU during the accident flight, may have contributed to the deceleration of the aeroplane. Under these conditions, the pilot's recovery through power adjustment may have been slowed.

2.5 Aerodrome information

Maripasoula aerodrome is situated close to the border with Suriname. As the border is situated less than 800 m from the threshold of runway 07, the approach to this runway requires the pilot to carry out a short final so as not to fly over Suriname territory (see Figure 6).

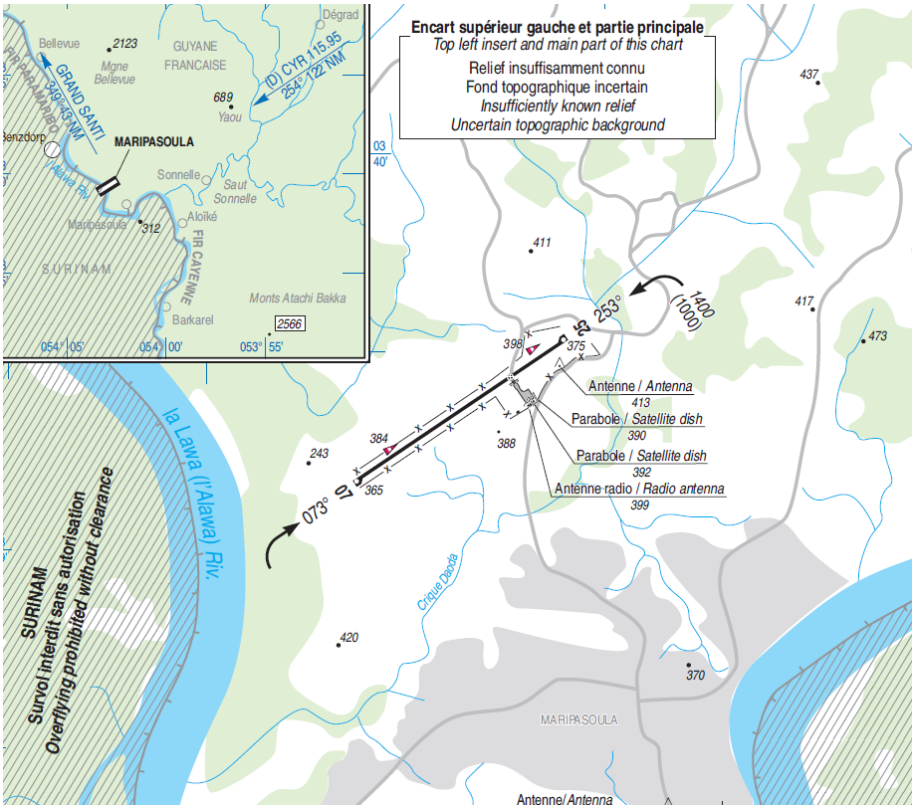

Figure 6: excerpt from Maripasoula VAC (source: SIA)

2.6 Pilot information

2.6.1 Experience

The 48-year-old pilot at the time of the occurrence held an aeroplane commercial pilot licence (CPL (A)) obtained in 2010 along with a Pilatus PC6 SET rating obtained in 2023. He had logged approximately 4,000 flight hours including 400 hours on the PC6. He had carried out 45 flight hours on the PC6 in the three months preceding the accident flight. His last flight on the PC6 was more than one month before the accident flight, on 17 December 2024. The pilot held a valid class 1 medical fitness certificate.

2.6.2 Pilot's statement

The pilot stated that the client had been waiting for several weeks for the cargo to be transported, because a drought had made transport by dugout canoe impossible. The departure from Cayenne was initially scheduled for 08:30 but was delayed until after 12:30 due to logistic problems encountered by the client. A company had loaded the cargo onto the aeroplane, and the pilot had supervised the weight distribution, ensuring the lightest items were placed at the rear. He indicated that a cargo load of 1,000 kg was placed in the cabin and 60 kg in the cockpit, on the seat on his right-hand side. The pilot explained that the aeroplane was loaded to full capacity and that he had had approximately 120 kg of cargo removed to avoid exceeding the maximum weight limit.

The pilot stated that upon arrival at Maripasoula, he flew close to threshold 25 to estimate the wind conditions by observing the windsock and smoke. He observed that there was no wind and joined the middle of the downwind leg for runway 07. He then performed the usual before landing actions. He stated that he set the idle control to the HIGH IDLE position. He added that he reduced power on the base leg because he found that he was a little too fast. Once aligned, he continued extending the flaps up to 10 turns of the handle and checked their proper deployment by turning his head to observe the indicator on the wing. He explained that at that point he noticed the pitch attitude was increasing too much, so he pushed the stick, set the trim to nose-down and adjusted the power lever to increase speed. He indicated that he was aiming for 70 kt but had had the impression that the aeroplane was not responding. He explained that he then saw an indicated airspeed of between 50 and 55 kt, heard the stall warning, and felt the aeroplane stall. He indicated that he then wanted to carry out a go-around but did not have time: the aeroplane collided with the ground.

He evacuated the aeroplane through the RH door, pushing the cargo that was on the passenger seat out of the way. The pilot stated that he did not recall changing the position of the control levers upon exiting the aeroplane.

The pilot explained that he was familiar with Maripasoula aerodrome, but that he was used to encountering stronger winds there, around 10 kt.

2.7 Scope of flight information

Maripasoula is a district that is only accessible by air or river. To travel by river from Saint-Laurent-du-Maroni can take from 12 hours to several days The distance between Cayenne airport and Maripasoula aerodrome is approximately 123 NM.

For the accident flight, the transport of the cargo belonging to the client between Cayenne and Maripasoula was organised using a dry lease contract for the aeroplane and a separate contract for the piloting services. The BEA did not seek to precisely determine the conditions of the organization of the flight and in particular, the relationship between the client, the pilot and the lessor of the aeroplane. These conditions may have an impact on the type of operation of the accident flight in regulatory terms.

3 CONCLUSIONS

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

Scenario

The pilot was carrying out a cargo flight. He indicated that he made sure that the cargo was within the aeroplane's load limits and, in this respect, had refused to take on board part of the cargo. During the landing, the aeroplane was close to the maximum permissible landing weight and the aft centre of gravity limit. The outside air temperature was around 30°C.

On arriving at Maripasoula, the pilot flew close to threshold 25 to observe the wind conditions. He partially deployed the flaps (four turns of the handle). He then started his descent and carried out a continuous 180° turn to align with the final approach path at a height of around 200 ft.

On final, the pilot extended the flaps close to the maximum position. He visually checked that they were correctly deployed by turning his head. When he looked ahead again, he noticed that the aeroplane's pitch attitude was high and the speed was low. He tried to correct these parameters by increasing power but had the impression that the aeroplane was not responding as expected. At this point, the speed was below the stall speed and the pilot lost control of the aeroplane.

The nose-up torque linked to the deployment of the flaps and the centre of gravity close to the aft limit may have contributed towards the increase in the pitch attitude. The increased drag linked to the deployment of the flaps and the weight of the aeroplane close to the maximum landing weight may have contributed to the deceleration of the aeroplane and reduced the effectiveness of an input made on the power lever.

Contributing factors

The following factors may have contributed to the loss of control on final approach:

- management of the approach path and the configuration of the aeroplane which led to the manual extension of the flaps being completed and the approach stabilized in a short time period, giving rise to a high workload on final;
- insufficient monitoring of the speed on short final probably due to the pilot's high workload.