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SAFETY INVESTIGATION REPORT

Incident to the AIRBUS A320 registered F-HEPB on 11 February 2022 at Pointe-à-Pitre - Le Raizet (Guadeloupe)

Time	21:48[1]
Operator	Air France
Type of flight	Commercial air transport of passengers
Persons on board	Captain (PF), co-pilot (PM), four cabin crew members, 105 passengers
Consequences and damage	None
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 visual references during a night visual approach[2], activation of MSAW warning in base leg, off-centred final approach, missed approach

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on the QAR data, statements, radio communication recordings, as well as radar data. The cockpit voice recorder (CVR) was not preserved.

The crew were performing a flight from Fort-de-France (Martinique) bound for Pointe-à-Pitre (Guadeloupe). During the approach briefing, the two crew members planned to carry out either an ILS approach or a visual approach, conditions permitting, to runway 12.

At 21:36, when the aeroplane was at FL140, the crew contacted the Pointe-à-Pitre air traffic controller. The latter was covering the approach and tower positions. The crew informed her that they wanted to land as soon as possible. The controller proposed radar vectoring for an ILS approach to runway 12. The crew read this back and added that, conditions permitting, they would request a right-hand visual approach.

The controller transmitted the following conditions to the crew: visibility 4,000 m, quite good RVR of 5 km, FEW clouds at 1,300 ft, BKN clouds at 2,100 ft and BKN clouds at 3,700 ft.

The crew announced that they would clarify their decision once they were closer to the airport.

[1] Except where otherwise indicated, the times in this report are in local time (Pointe-à-Pitre). Four hours should be added to obtain the UTC time.
[2] Aeronautical night time: 18:21.

At 21:37, the crew descended towards 3,600 ft. The autopilot (AP) and auto-thrust management system (A/THR) were engaged.

At 21:43, the crew reported that weather conditions were excellent and requested a visual approach to runway 12. The controller cleared the aeroplane for a right-hand visual approach to runway 12.

The crew continued the descent towards 2,000 ft.

At 21:46, the aeroplane levelled off. The PF gradually reduced speed towards 180 kt. The flaps were then extended to position 1 and then 2.

At 21:47, the PF disengaged the AP and the thrust controls were moved to idle, thereby disconnecting the A/THR. The PF asked the PM to replace the flight directors (FD) with the flight path vector (Bird).

At 21:47:15, the PF initiated a right turn to join the base leg. Five seconds later, the landing gear was extended. The aeroplane was flying at an altitude of 1,900 ft.

At 21:47:40, the approach phase was activated from the MCDU[3][4].

At 21:47:51, the flaps were extended to position 3. The aeroplane reached a bank angle of 28° and an altitude of 1,430 ft.

At 21:48:03, the controller cleared AFR605 for landing on runway 12, indicating wind from 110° of 5 kt, then immediately issued a MSAW warning, instructing the crew to check their altitude immediately (*"alerte relief, vérifiez immédiatement votre altitude"*[5]). The aeroplane was then at 1,100 ft, approximately on the 160° heading, with a vertical speed of 1,570 ft/min, then 2,060 ft/min four seconds later.

At 21:48:10, the crew read back the landing clearance.

At 21:48:16, the flaps were extended to full configuration and the controller confirmed the terrain alert to the crew, instructing them to check their altitude immediately ("*je vous confirme alerte relief, vérifiez immédiatement votre altitude*").

Two seconds later, the PM announced that the crew were checking. The vertical speed dropped rapidly from 2,060 ft/min to 750 ft/min.

At 21:48:34, the crew noticed that the aeroplane was not aligned with the centreline of runway 12 and aborted the approach. The aeroplane was then 2.5 NM from the threshold of runway 12, on a path parallel to the runway centreline, 1 NM south of this centreline.

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[3] Multipurpose and Control Display Unit.

[4] The approach phase is activated automatically when the aeroplane follows the path programmed into the FMS (Flight Management System). It can also be activated manually via the MCDU. When the approach phase is activated, the FMS automatically manages the selection of the target speeds associated with the aeroplane's landing configuration and the display of these speeds on the speed scale.

[5] The controller did not remind the crew of the QNH information in her message.

The minimum height of the aeroplane[6] was 460 ft and the minimum speed recorded during the go-around was 128 kt for an approach speed of 138 kt.

At 21:48:47, the controller asked the crew where they were (“*AFR605, vous êtes où ?*”). The crew replied that they were not far away and that they were going around (“*alors on n’est pas loin, on remet les gaz AFR605*”).

At 21:49:21, the crew requested radar vectoring for ILS approach to runway 12. The remainder of the flight and the landing took place without any further incident.

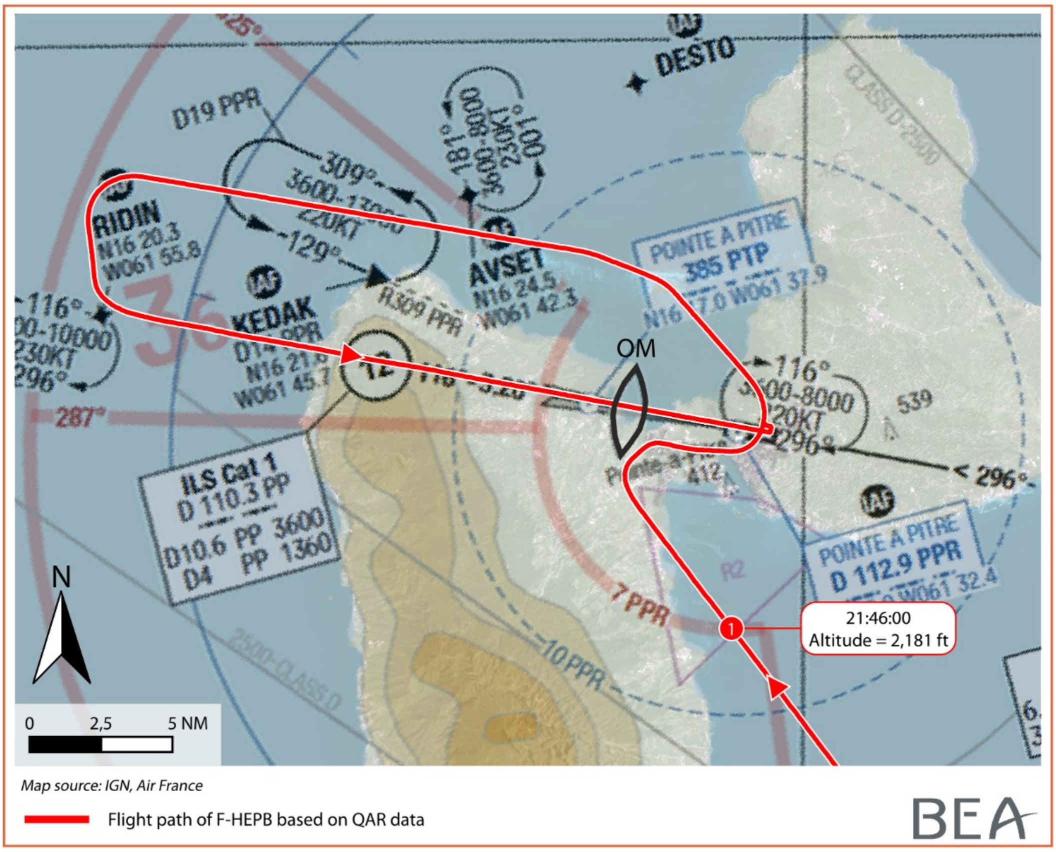

Figure 1: path of F-HEPB

[6] Radar altimeter height.

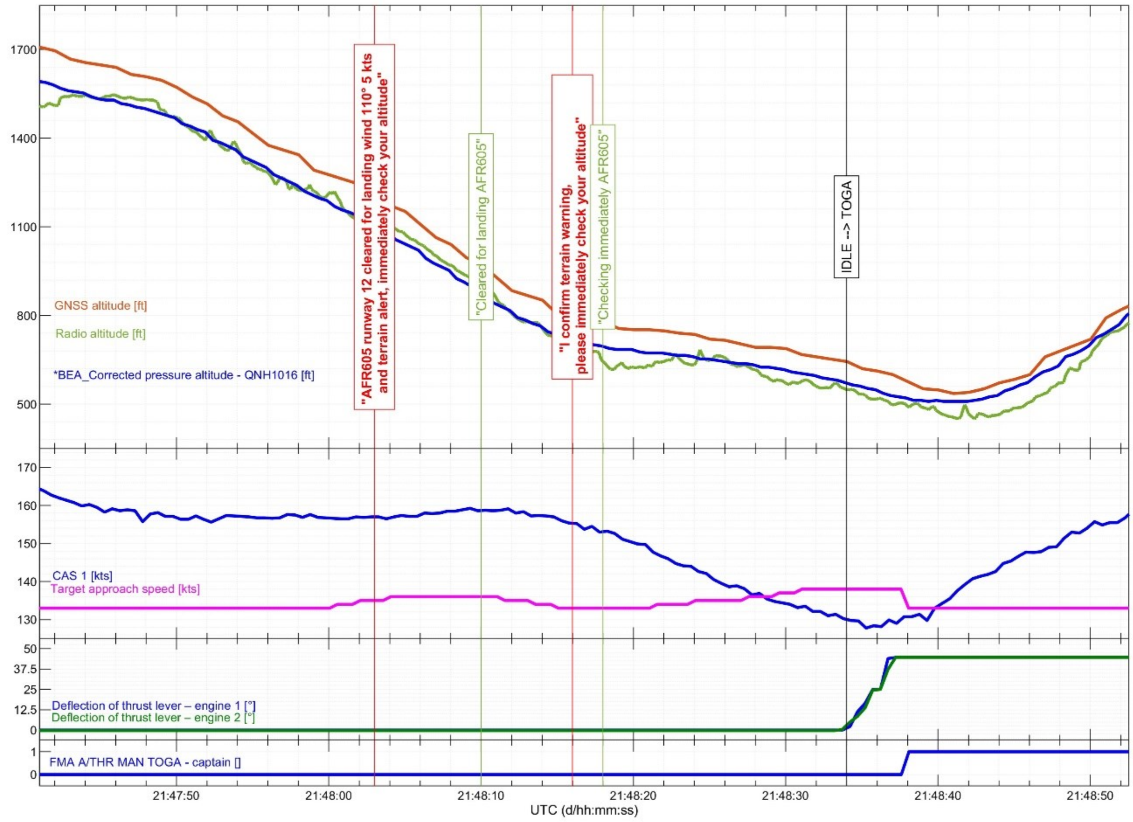

Figure 2: first approach - go-around (Source: BEA)

2 ADDITIONAL INFORMATION

2.1 Aerodrome information

Pointe-à-Pitre - Le Raizet airport has a paved runway 12/30 measuring 3,129 m long and 45 m wide. Runway 12 is not equipped with runway approach lights or centreline lighting. It is equipped with a Precision Approach Path Indicator (PAPI) set to 3.2°.

The crew used the ILS Y approach chart for runway 12. The operator did not offer a visual approach chart for this airport.

On the day of the occurrence, a NOTAM stated that the runway would be closed from 22:15, due to work on runway 12/30 and nearby.

The controllers on duty and the flight crew were aware of the work and specified that they did not feel particular pressure associated with this work. The runway lighting was set to 1, which is the usual position at night.

2.2 Meteorological information

The Meteorological Terminal Air Reports (METAR) for the airport at the time of the incident were as follows:

METAR report at 21:30
METAR TFFR 110130Z AUTO 13006G17KT 100V160 9999 -RA SCT015 BKN022 BKN043 23/22 Q1016 TEMPO 4000 SHRA SCT018TCU=

METAR report at 22:00
METAR TFFR 110200Z AUTO 13004KT 9999 FEW018/// OVC080/// 23/22 Q1016 TEMPO 4000 SHRA SCT018TCU=

The aeroplane's computers recorded wind from 100° of around 25 kt at 2,000 ft.

The cloud cover sensors at Pointe-à-Pitre are positioned at the threshold of runway 30. Pilots and controllers told the BEA that the cloud information (base height, cloud cover) may not be representative of the conditions encountered during the approach to runway 12.

2.3 Air operations information

2.3.1 Crew composition and experience

The 57-year-old captain held an Airline Transport Pilot Licence - Aeroplanes (ATPL(A)) issued in 2009 as well as an A320 type rating. His experience on the A320 (in flight hours on the morning of the day of the incident) is summarised in the table below:

Previous 72 hours	Previous month	Previous 90 days	Total
0	51 hours and 55 minutes	127 hours	7,451 hours

He had held the position of captain since 20 May 2012. He was one of the Air France pilots based at Pointe-à-Pitre since June 2021. He had already made the right-hand visual approach to runway 12 as a PF, but never at night.

The 47-year-old co-pilot held an Airline Transport Pilot Licence - Aeroplanes (ATPL(A)) issued in 2016 as well as an A320 type rating. His experience on the A320 (in flight hours on the morning of the day of the incident) is summarised in the table below:

Previous 72 hours	Previous month	Previous 90 days	Total
0	49 hours	92 hours and 58 minutes	5,730 hours

He had already made the night visual approach to runway 12 the previous week.

2.3.2 Crew statements

The captain and the co-pilot indicated that, given the information received on the ATIS frequency, they considered the ILS approach and the visual approach to runway 12 during the approach briefing. Upon first contact with the controller, they decided to anticipate the descent in order to pass beneath the cloud layer situated at around 7,000 ft. The weather conditions provided during this first radio contact with the controller were worse than the initial information received. However, both approaches were still possible.

As they passed beneath the cloud layer, the crew reported that they could easily see the island and then the facilities. They decided to make a visual approach. When they arrived abeam the runway, the PF disconnected the autopilot. He then disengaged the A/THR by setting the thrust levers to idle before turning onto the base leg. A few moments later, he asked the PM to "*manage speed*"[7].

The PM indicated that this action did not produce the expected result since the approach phase had not been activated in the FMS. He then activated the approach phase via the MCDU to display the target speeds, then he configured the aeroplane (landing gear, flaps) in sequence, monitoring the flap extension speeds. He also performed the actions associated with the landing gear extension[8]. The PM specified that during this period his workload did not allow him to look outside.

As for the PF, he indicated that he was looking outside on final for the lit runway, which was hidden by a curtain of rain. He still had sight of the ground. He added that he thought he recognised characteristic ground references and that he did not look at his navigation display (ND). When he repositioned the wings horizontally, he did not see the runway in front of him.

The PM specified that during the last turn, he received landing clearance and information from the controller asking him to check the aeroplane's altitude. He read this back, checked the QNH values displayed and then saw on his ND that the aeroplane was not on the approach path. He also noticed that the PF's ND scale had remained on 20 NM. He immediately switched it to 10 NM, located the facilities at approximately 11 o'clock from the aeroplane's position and informed the PF. They then decided to go around.

The PF indicated that he did not hear the controller's first message regarding the MSAW warning.

The two crew members indicated that during the approach briefing, they listed the threats relating to a night visual approach, the weather conditions and the terrain. They drew a circle on the ND to make them aware of the position of the terrain. They also drew a virtual axis starting from the runway to visualise the final approach path. The ILS was selected. The PM's ND was in terrain mode. They decided to reduce speed to 180 kt[9] to give themselves time to configure the aeroplane. In addition to the path, they also talked about the actions to be carried out, as well as the successive call-outs and FMA modes[10] that they would make and use in the event of a missed approach. They did not talk about the automation level they would choose for the approach.

According to the two flight crew members, they were not under any time pressure and they did not feel tired. They added that visual approaches are common at airports in the AF Caribbean base, including at night. Visual approaches reduce flight times and therefore fuel consumption. According to them, they also enable flying skills to be maintained.

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[7] This request allows the aeroplane to switch from a selected speed mode chosen by the PF to a "managed" mode in which the system displays the target speeds on the speed scale.
[8] During the landing gear extension, the PM must switch on the lights, arm the ground spoilers and announce to the cabin that landing is imminent.
[9] They usually carried out the visual approach during the day at 220 kt, reducing speed during the turn.
[10] Flight Mode Annunciator.

2.3.3 Visual approaches

2.3.3.1 Air traffic regulations

In accordance with European Regulation No 923/2012, known as "SERA" (Standardised European Rules of the Air)[11], an aeroplane in IFR flight may be cleared to make a visual approach if the pilot can keep sight of the ground and:

a) the reported ceiling level is at or above the beginning of the initial approach segment approved for this aircraft; or

b) the pilot reports at the level of the beginning of the initial approach segment or at any time during the instrument approach procedure that the meteorological conditions are such that with reasonable assurance a visual approach and landing can be completed.

2.3.3.2 Operator documents

2.3.3.2.1 Caribbean information booklet

The operator's information booklet (Caribbean network) for crews specifies that visual approaches are a standard practice inside the network[12]. They are performed at all aerodromes. This booklet describes the conditions for making visual approach as follows:

> An aeroplane in IFR flight may forgo executing, or proceeding with the execution of, a published or approved instrument approach procedure to conduct a visual approach using visual ground references if the following conditions are met:
>
> a. the pilot can see the aerodrome;
> b. the pilot is able to keep sight of the ground;
> c. the pilot considers that the visibility and ceiling are suitable for a visual approach and that landing can be completed;
> d. at night, the ceiling is not lower than the minimum altitude of the sector, or of the path to be taken to join the circuit, where applicable[13];
> e. in controlled airspace, the pilot has received a visual approach clearance.

The booklet then includes the section of the operator's Operations Manual (OM) on visual approach (part A 8/4/2):

> At night, pilots must have the EGPWS and display its "Terrain" function on at least one ND.
> See general conditions (refer to OM A/rules of the air/RCA3) CLEARANCE, RVR (or VIS) ≥ 800 m;
>
> - AP and FD off (except in specific cases, see OM B or C);
> - all relevant navigation means (FMS, radio-electrical equipment, visual references, VASI, PAPI, etc.) must be used in order to avoid any confusion over the runway or aerodrome;
> - at least one validated navigation means (FMS, radio aid, VASI, PAPI) must be used to calibrate the final glidepath;
> - pilots must ensure increased monitoring to avoid collisions, particularly with respect to VFR traffic;

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[11] Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation (Version in force on the day of the incident).

[12] Visual approaches account for around 80 % of approaches inside the network.

[13] The cloud ceiling announced by the tower was close to the height of the alignment path.

From a practical point of view:

- Visibility, sight of terrain and ground, clearance, sight of traffic ahead;
- At night: EGPWS, Terrain on ND, ceiling above safety;
- Briefing, context: safety;
- Recommended use of A/THR.

Overfamiliarity through overuse of visual approaches and the reduction of margins are the main risks here.

THREATS
Fairly marked turbulence on short final to runway 12 (wind, trees) - The A/THR is sometimes slow to react.
Weather: thunderstorms are frequent at the ILS 12 interception altitude (3,600 ft), RNAV 12 or visual approach can help avoid the area.
No centreline: particular alertness required at night because of few visual references, vertical speed (as in FDF, CAY, PAP, SDQ). Importance of the role of the Pilot Monitoring.

VISUAL APPROACH TO RUNWAY 12
Whether left-hand or right-hand, the target point is the pseudo outer marker located 4 NM from the threshold and not coded on the approach path at 1,400 ft. This OM11 point exists in the FMS (used by LOC 12). May be used in FIX INFO.
For a right-hand approach, the France Telecom antenna located at 2,000 ft (max 180 kt) and the prison (abeam at 600 ft) are useful references.

2.3.3.2.2 Approach stabilisation criteria and call-outs expected from the PM

The approach stabilisation criteria are defined as follows in Part A of the OM:

The aeroplane is stabilised on final approach when the following conditions are met:

- gear/flaps in landing configuration;
- aeroplane on the published path (horizontal path and glidepath) at the approach speed;
- thrust consistent;
- before landing C/L carried out.

The stabilisation minimum height is: 1,000 ft AAL in IMC conditions and 500 ft AAL in VMC conditions.

These values are hard stops, not targets:

- if the aeroplane is not stabilised at the minimum height, a go-around must be carried out;
- below the stabilisation minimum height, only slight corrections are permitted to correct minor deviations from the stabilisation conditions.

Below the stabilisation minimum height, a go-around must be carried out:

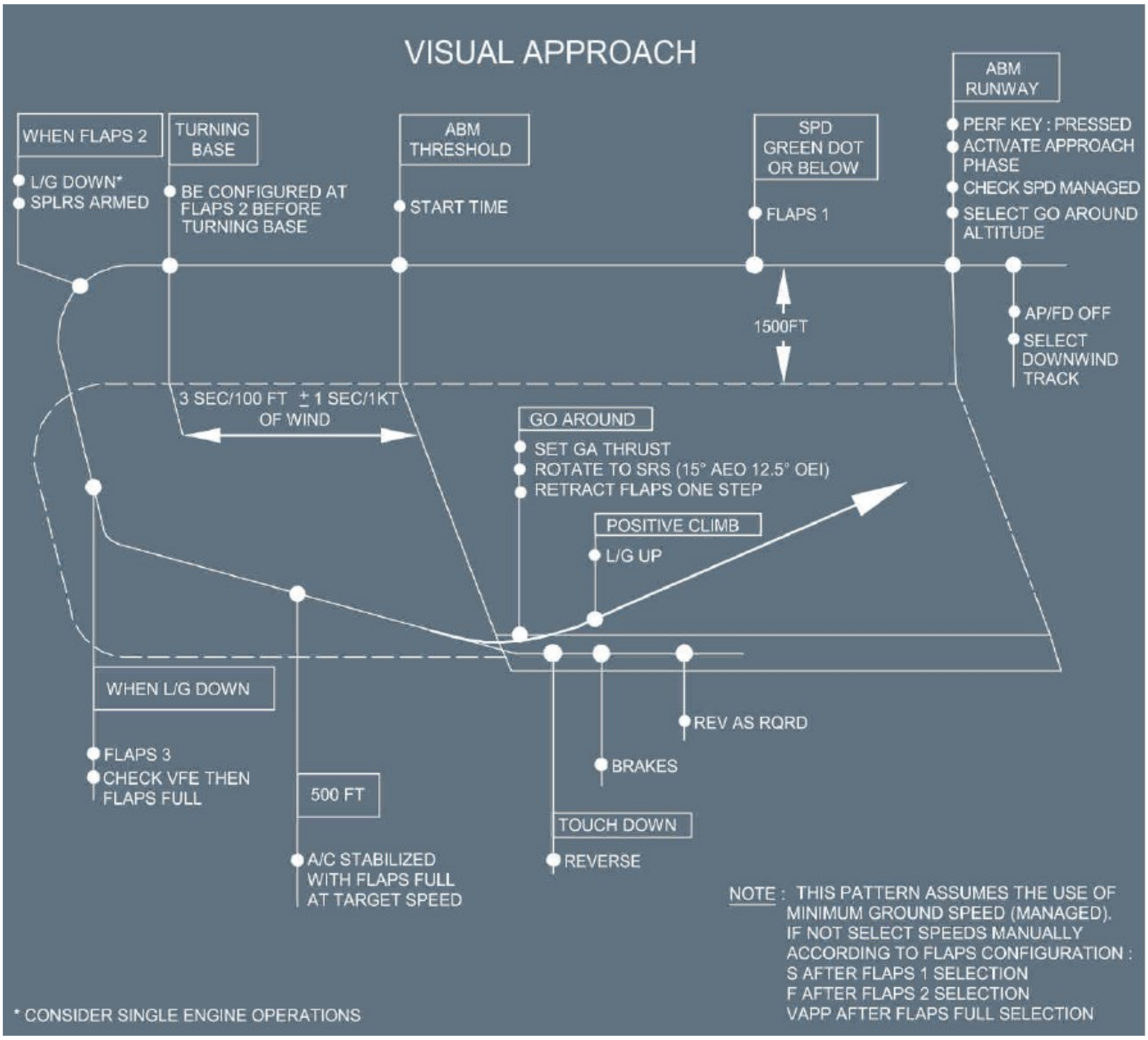
- as soon as a pilot calls out “Go around”;
- in the event of an EGPWS (TAWS) warning (except in the event of specific aeroplane/approach configurations discussed in the briefing);
- In the event of successive deviation call-outs by one of the pilots, or if the stabilisation conditions are not met quickly enough.

According to the FCOM[14], standard deviation call-outs must be made by the PM, taken into account, and promptly corrected by the PF if:

- speed decreases below VAPP[15]-5 kt or exceeds VAPP +10 kt;
- attitude is less than -2.5° or more than +10°;
- bank angle exceeds 7°;
- vertical speed exceeds -1,000 ft/min.

2.3.3.3 Typical visual approach circuit

The Airbus FCOM specifies the circuit and the following actions for visual approaches.



"A/THR use is recommended with managed speed"

Figure 3: typical visual approach circuit (Source: Airbus)

The Air France OM uses the same flight profile.

[14] Flight Crew Operating Manual.
[15] Approach speed.

2.3.3.4 Benefits of visual approach

The visual approach is often used, air traffic permitting, to reduce flight times. This time saving often comes with a fuel saving, therefore reducing harmful emissions. For Pointe-à-Pitre, this time saving can equate to five flight minutes; operational flight plans provided to the crews regularly have aeroplanes arriving late at the ramp by five minutes. This planning can lead the crew to shorten paths.

Moreover, visual approaches are sometimes considered as approaches that enable pilots to maintain their piloting skills by reducing the use of automation (AP/FD). The automatic thrust management systems, designed to maintain an indicated airspeed, can be used or disconnected. In the latter case, the crew’s workload increases significantly.

Airline strategies vary. Some prohibit night visual approaches, while others allow pilots to carry them out if conditions permit.

Some operators use visual approach charts on which gates associated with speeds, configurations and altitudes are plotted. Sometimes this information is integrated by the operators into the FMS databases, enabling lateral and/or vertical monitoring on the onboard instruments. These tools increase the situational awareness of crews.

Between 2020 and 2022, five night-time MSAW warnings involving Air France aeroplanes were recorded at Pointe-à-Pitre.

All took place during visual approaches. Four occurred while the aeroplanes were turning at high vertical speeds. The Directorate of Flight Safety issued a recommendation in 2021, stating that strict monitoring of vertical speed during the last turn should be promoted.

2.3.3.5 Measures taken following the incident

After the examination of the event, the operator published instructions for all crews on all sectors:

- give a full briefing, specifying the key points of the flight path (references overflown, speed, configuration), to facilitate monitoring;
- use all relevant navigation means: FMS, radio-electrical aids, etc.;
- in the event of loss of visual contact with the aerodrome, the crew must abort the approach;
- use the A/THR in “speed”mode to avoid flying below the manoeuvring or approach speed and to free up time for the PM, who is very busy on this type of approach;
- use the “terrain” function at night on at least one ND;
- in the event of an MSAW warning, stop descent immediately, check altitude and altimeter setting and climb back to safe altitude if necessary;
- at any time during the approach, in the event of a doubt regarding position or a loss of visual reference: go around.

LIDO published a detailed visual approach chart for Pointe-à-Pitre. Precise gates associated with altitudes are plotted on it. A RNAV visual approach aid including these navigation gates was integrated into the FMS database of the A320 fleet.

Finally, Air France published a company NOTAM specifying that in order to make a night visual approach, at least one of the pilots must have performed a night visual approach before. It is recommended that the pilot with experience of this night approach should be the PF. Furthermore, in the event of loss of visual contact with the aerodrome, even temporarily, a go-around must be carried out immediately. In the event of a MSAW warning, the crew are to immediately follow the instructions in OM A (stop descent, check QNH value, climb back to safe altitude if necessary).

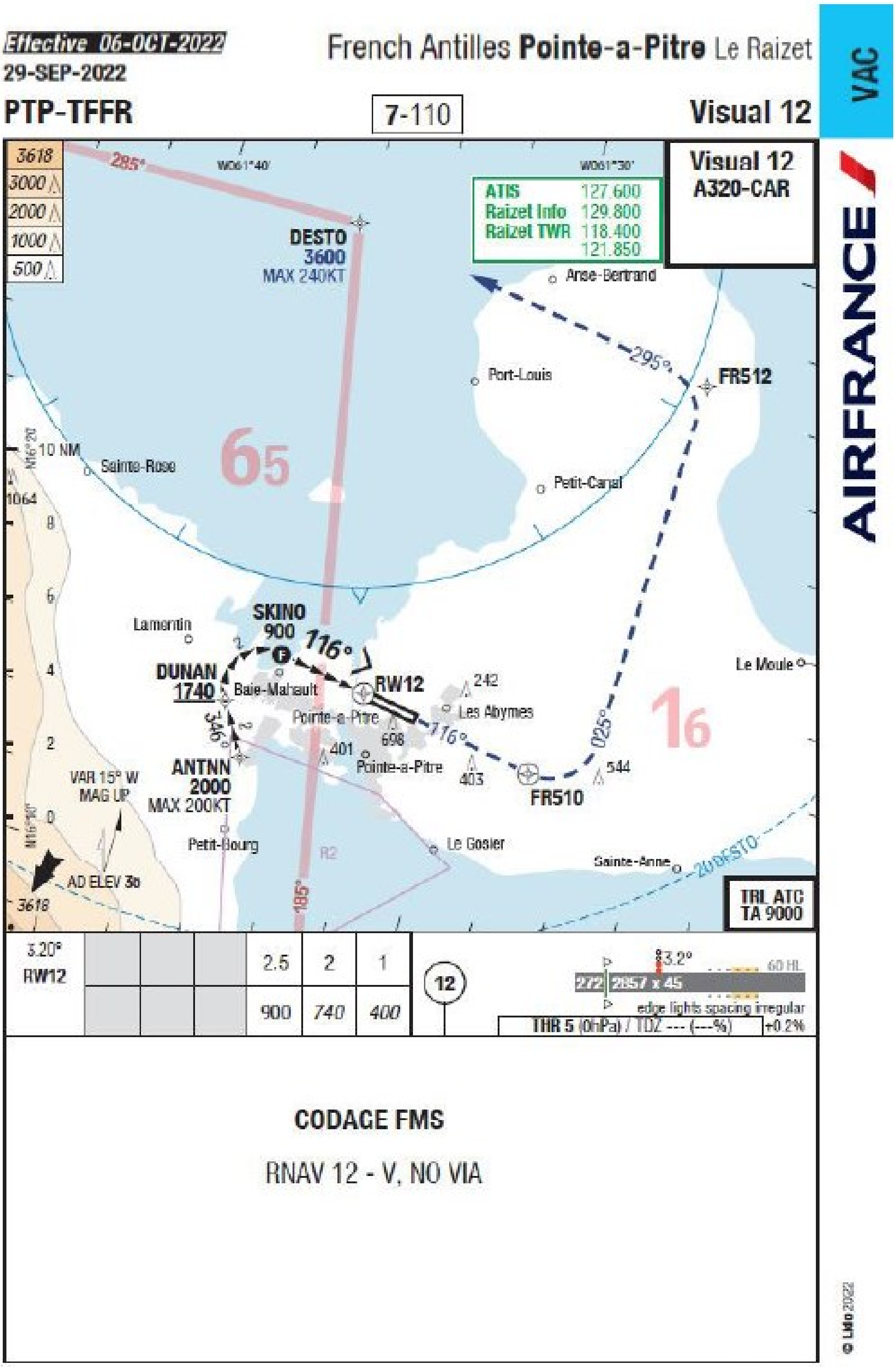


Figure 4: visual approach chart for Pointe-à-Pitre - Le Raizet (Source: Air France / LIDO)

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2.4 Air navigation service information

2.4.1 Statements from controllers on duty

For the controller on duty and her assistant colleague, the Air France flight was the last scheduled flight of the day and the working atmosphere was normal, without any particular stress. They indicated that the crew of the Air France flight requested a visual approach. They added that at night, they have very poor visibility of the airport environment and that they rely on the horizontal visibility values given by the sensors located at the threshold of runway 12.

The controller said that while she was clearing the crew to land, she heard the MSAW warning. She immediately issued a message over the radio to the crew of the Air France flight, asking them to check their altitude. This message went unanswered and the controllers reported that they saw on their radar that the aeroplane continued to descend at a vertical speed of around 1,600 ft/min. The controller repeated the message, asking the crew to check their altitude.

2.4.2 MSAW[16] system

The MSAW system is used to warn air traffic controllers about an aeroplane flying dangerously close to the ground and obstacles. It is a predictive tool for preventing CFIT[17] situations. There are different activation modes set to take into account the local environment.

In this incident, the MSAW warning most likely activated due to the aeroplane's high vertical speed. The controller alerted the crew of the activation of the warning. The PM heard the message without reading it back, but the PF did not hear it. The controller repeated the message 13 seconds later and the PM acknowledged the message over the frequency.

2.5 EGPWS[18]

The crew statement and the QAR data showed that no EGPWS warning was activated during the approach to indicate to the crew that they were getting increasingly closer to the ground.

Analysis of the flight parameters made it possible to determine that no EGPWS mode should have been activated, so the EGPWS did not malfunction.

A simulation carried out with the manufacturer of the EGPWS showed that if the aeroplane had continued its descent on a path parallel to the runway centreline and 1 NM away, a "too low terrain" warning would have been activated on board at a radar altimeter height of approximately 245 ft.

[16] Minimum Safe Altitude Warning.
[17] Controlled Flight Into Terrain.
[18] Enhanced Ground Proximity Warning System.

3 CONCLUSIONS

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

Scenario

During the night descent, estimating that the weather conditions were favourable, the pilots requested a visual approach, which the controller cleared.

After starting to prepare the aeroplane, before turning onto the base leg, the PF disconnected the automation, including the A/THR. He asked the PM to "*manage speed*" in order to have the speed targets calculated by the FMS. The approach phase was not activated. The PM activated the approach phase via the MCDU.
He then carried out the actions associated with the landing gear extension (arming the ground spoilers, switching on the lights, announcing the imminent landing to passengers) before extending the flaps to position 3. Throughout this period, which lasted more than one minute, the PM's workload did not allow him to monitor the path sufficiently.

Fifteen seconds after switching off the automation, the PF initiated a right turn towards the base leg and then the final. Faced with a few cloud banks and precipitation, the PF lost sight of the runway for a few moments. The initial bank angle of 15° finally increased to 28°. With this bank angle and a north-easterly wind, the aeroplane stayed within the desired path. In addition, the vertical speed increased to -2,000 ft/min. The erroneous path in the vertical and horizontal profiles and the high vertical speed were not detected.

When the controller announced and then repeated the information about the MSAW warning, the crew realised their mistake. They checked their position using the ND and, realising that the aeroplane was not aligned with the runway centreline, they decided to go around. After radar vectoring and an ILS approach, the landing took place without further incident.

Contributing factors

The following factors contributed to the crew's decision to follow a night visual approach path in weather conditions that were finally adverse:

- a wish to optimise the path and flight times;
- the crew's desire to maintain flying skills without using automation;
- the frequent use of these flight paths in this flight sector.

The following factors contributed to the aborted visual approach:

- the threat, not identified during the approach briefing, due to the PF's position (left seat) for a right-hand circuit;
- the underestimated risk of encountering low-height clouds;
- the decision to use the automation level corresponding to daylight conditions (A/THR switched off), which resulted in a heavy workload for the crew and degraded the performance level of both pilots.

Safety lessons

The visual approach is often seen as an approach that allows pilots to maintain their flying skills. Indeed, this procedure requires precise control of the aeroplane's path and energy. The use of the

A/THR, as recommended by the operator's OM and the manufacturer, reduces the crew's workload. Pilots can also effectively train to fly without the A/THR on a straight path associated with a 3D-approach operation.

Performing a semi-direct, night visual approach when there are cloud banks or rain, without using the A/THR, constitutes an accumulation of constraints which can lead to a reduction in safety margins.

It is up to each operator to define its operational policy concerning visual approaches and the operational conditions for carrying them out.

When visual approaches are permitted, it seems important that operators develop decision aids to enable crews to objectively and simply determine whether it is appropriate to make a visual approach (appropriate weather conditions, environment, recent experience, etc.).

These decisions aids should also enable crews to define how to make such an approach (use of automation, FMS documentation, tailored charts, etc.), according to a risk assessment carried out at operator level.

Such a risk assessment should be regularly reassessed based on safety events that have occurred and on flight analysis data, so that decision aids can be adapted in line with this reassessment.