BEA

# SYNTHESIS ON UNSTABILISED APPROACHES



KAZOAR 01 53 06 32 22



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



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RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE L'ÉCOLOGIE,
DU DÉVELOPPEMENT
ET DE L'AMÉNAGEMENT
DURABLES

**WARNING**

This Synthesis was produced from data collected by the BEA during their inquiries into the following events. The events marked with an asterisk are described in the pages which follow:

the accident of the 21st December 1987 at Bordeaux to an Embraer 120, registration F-GEGH;
the accident of the 20th January 1992 at Strasbourg to the Airbus A320 registration F-GGED;
the serious incident of the 2nd July 1993 at Santo Domingo airport with a B747-100, registration F-BPVF*;
the serious incident of the 24th September 1994 at Paris Orly with an Airbus A310, registration YR-LCA;
the accident of 30th June 1997 at Florence Airport to an ATR 42, registration F-GPYE;
the serious incident of 23rd November 1997 at Paris Orly with an MD83, registration F-GRMC;
the serious incident of 13th January 1998 at Montpellier Fréjorgues, with a CRJ-100 registration F-GLIK*;
the accident of 6th November 2002 at Luxembourg to a Fokker 50, registration LX-LGB*;
the accident of 22nd June 2003 at Brest Guipavas to a CRJ-100 registration F-GRJS*;
the serious incident of 21st March 2004 at Nantes, MD83 registration SU-BMF*.

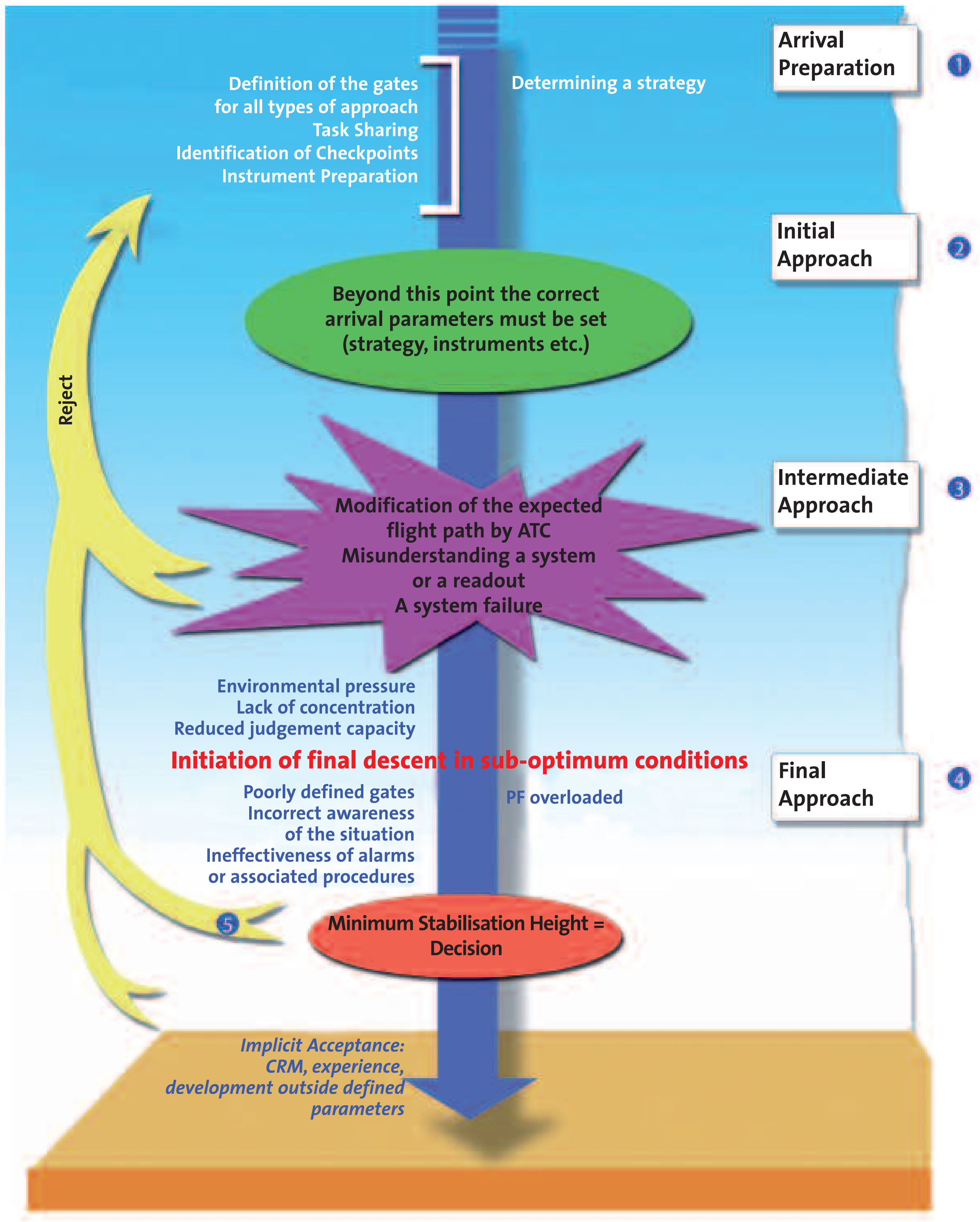
In accordance with Annexe 13 of the International Convention on Civil Aviation, Directive 94/56/CE and with the Code of Civil Aviation (Book VII), the work of the BEA is not aimed at assigning blame or evaluating individual or collective responsibilities. Its sole aim is to draw lessons from events which can be used to prevent future accidents.

As a consequence, the use of this document for ends other than accident prevention could lead to erroneous interpretations being made.

BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile
MINISTERE DES TRANSPORTS, DE L'EQUIPEMENT, DU TOURISME ET DE LA MER

## SUMMARY

# THE 5 PHASES OF THE APPROACH




The unstabilised approach can be described by a chronological chain of individual factors which can interfere with the crew's management of the flight (see diagram). There are two critical phases of note: the final segment, during which the aircraft closes with the ground with reduced obstacle clearance margins; and the go-around, which although it is a segment entirely separate from the approach, is not necessarily executed under conditions foreseen by the procedure designer.

1 **Arrival Preparation**
This phase allows the crew to define a joint plan of action and pre-activate the required information sources to manage possible unforeseen events which may occur during the approach. It is generally carried out at the end of the cruise. The crew define a strategy, notably by taking into account the environmental constraints (traffic management by ATC, meteorological information, design of the procedure etc.). What they do later is potentially affected by changes unforeseen at this stage.

2 **Initial Approach**
A change to the transition flight path (such as cancellation of a programmed hold, poorly interpreted meteorological phenomena etc.) or a change in the type of approach, whether decided by the crew (or by one of the crew members not challenged by the others) or by ATC, can upset the joint plan of action set up beforehand. These changes are generally accepted by the crew: poor communication can prevent them challenging it. The significant increase in rhythm which follows reduces the capacity of the crew to manage the continuation of the approach.

3 **Intermediate Approach**
Anything which happens during this phase to change the planned flight path has an especially marked impact if the crew have already been disrupted during the earlier phases. Among these events, has especially been noted the case of a non-functioning automatic intercept of the approach path, or a gap in operators' system knowledge – both flight crews and ATC controllers (automation, deceleration distances, with or without wind, in level flight or in the descent etc.). The crew can be affected by time pressure, felt keenly for instance while approaching the runway. Their flight management is altered, which can manifest itself by a delay in configuring the aircraft, its deceleration, etc. Extra pressure can be added if the intermediate segment is shortened or cancelled by ATC.

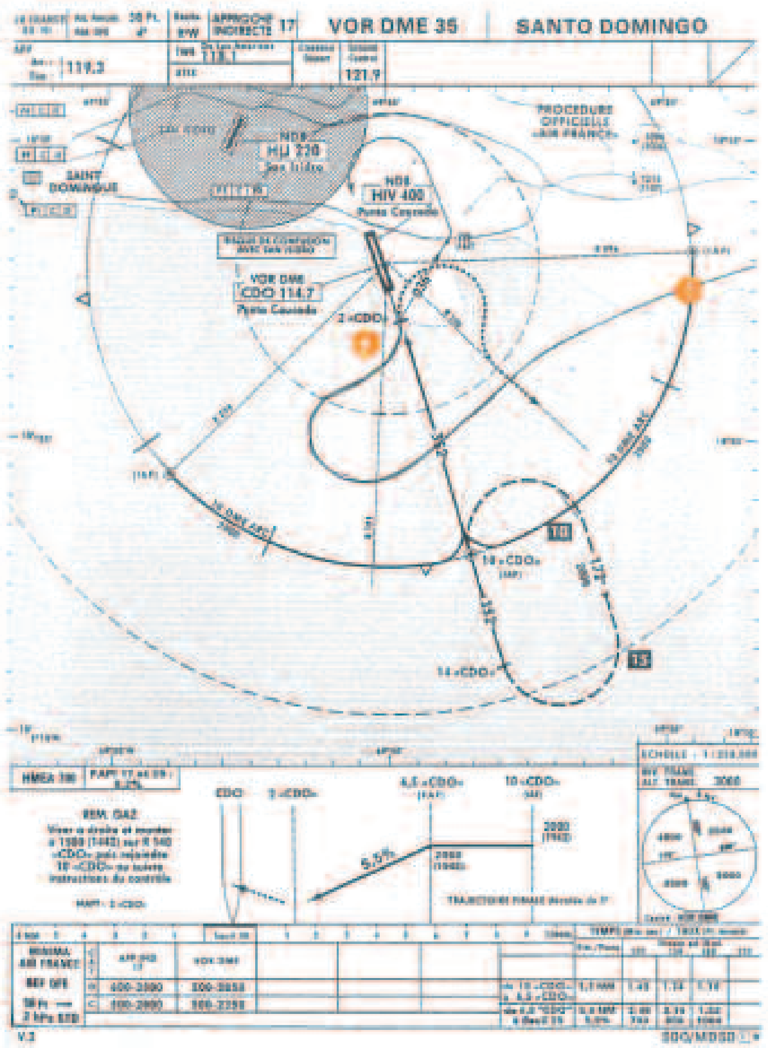
4 **Final Approach**
The events which occur during this phase manifest in different ways according to whether it is a visual approach, a non-precision approach, a Cat. I ILS or a Cat. II/ Cat. III ILS approach and according to what occurred during the previous approach phases. In terms of the type of descent manoeuvre to be performed, the determining factors include the crew's professional ability, knowledge of the aircraft's automation, crew co-ordination or even confidence in the crew's abilities or in each of its members.

5 **Go-Around**
The Go-Around is an effective safety barrier if it is executed in time. The decision to go-around depends on the crew's awareness of the situation. The go-around is one of the approach segments but in reality it may be flown outside the flight path defined by the chart. This introduces the difficulty for the crew of positioning the aircraft relative to the published flight path.

# INCIDENT INVOLVING A B747-100 AT SANTO DOMINGO, 2ND JULY 1993 AT 19:56 UTC

**Event:** runway overrun following a visual approach and landing during a rain shower.

**Flight Environment:** this is a short day time stage, following a long haul flight from Paris Charles de Gaulle to Saint Martin which left at 9:15 UTC, with a flight duration of 08:13. Thunderstorm cells are present along the route. The runway is water contaminated, with the presence of rubber. The FO is the PF. The crew has received no CRM training. A single controller in the tower covers the approach, tower and ground frequencies.




**1 From H - 2h to H - 1h 45min: Flight Preparation**
During preparation of the second stage at Saint Martin, the meteorologicalfile given to the crew contains the 16:00H METAR for Santo Domingo, indicating wind from the south east. The long range TAF forecasts for the 24H period following 18:00H: 120°/10kt 9999 SCT20 PROB 20 TEMPO 7000 TSSH SCT017CB BKN018 BECG 0103 070/05kt SCT 1800. The FO fills in a Landing Data Card anticipating an ILS17 arrival, flaps 25°. $V_{ref}$ is 133kts for a weight of 210.8 tonnes. The quantity of fuel uplifted is sufficient for a 30 minutes hold at the destination.

**2 H – 30mins: VOR DME 35 Arrival Briefing**
With no ATIS available at the destination, the crew contacts ATC en-route to Santo Domingo and obtains the following information: wind calm, runway 35, visibility 8km, scattered clouds at 8000 feet.

When the PF announces "it's runway 35, wind calm" the Captain replies "you will do a right downwind". The PF carries out a briefing for the VOR DME 35 approach, noting that the approach path is offset from the runway centreline. Despite this briefing, the Captain seems to favour a visual approach.

**3 H – 24min: Announcement that Runway 17 is in service**
During the hand-over to Santo Domingo, the en-route controller indicates that runway 17 is in service and the wind is 120°, 10kts. The PNF says "we'll see at the last moment"; the PF replies that he has prepared a go-around for both QFUs. The minima displayed are for the ILS 17. The crew avoid cumulonimbus clouds. The controller is without radar and regularly asks the crew their DME distance from CDO. With the descent started, the "Descent Checklist" is performed.

**4 H – 10min: Announcement that Runway 35 is serviceable**
During contact with approach, ATC announces QFU 35 and a wind of 030°, 05kts. The aircraft passes through FL90, descending at 260kts for FL60 about 42D from CDO. The autopilot is disengaged. The PNF enters the heading 352° on his HSI. At the request of the controller, the aircraft is maintained at FL60 up to 25D and then while at FL40 approaches 10D. The PNF is trying to establish visual contact with the runway.
The PF asks for the Approach Checklist.

**5 H – 4min: Visual Approach to Runway 35 Right Hand.**
The controller clears them for a VOR 35 approach. The PNF finds the runway. He requests and obtains permission for a right hand visual approach. The PF leaves FL40 at 240kts for 2000 feet. He turns left about 40° to regain the VOR DME 35 FAF (at 6.5D).
The Flight Engineer starts the Approach Checklist and simultaneously the crew configure the aircraft (gear down and flaps 1°).

At H – 1min 25s, the aircraft is in the landing configuration, flaps 25° at 1470ft and 179kts.

The crew feel windshear, confirmed by the INS 1 readout and increase the approach speed by 20kts.

The crew carry out the pre-landing checklist. A brief GPWS alarm sounds at about 900ft, while the controller announces "runway wet now". The PF reduces the vertical speed.

The Captain makes several reassuring remarks about the conduct of the approach.

**6 Interception of the final approach path and landing in a squall**
The PF does not take into account the PAPI indications.
The wind screen wipers are started by the PNF. At 163ft a brief GPWS alarm sounds. Near 80ft, the lateral visibility worsens. The flare is performed in a violent squall, mainly with the help of altitude callouts from the Flight Engineer. At touchdown the thrust reversers are operated and maximum braking applied. The crew have a sensation of aquaplaning. The aircraft leaves the runway and comes to a stop 150 metres beyond the end of the runway

An IATA report on Santo Domingo airport before this event underlined deficiencies in its meteorological services and problems with its runway. This had not been communicated to flight crews.

The normal landing configuration (flaps 30°) had become flaps 25° on some aircraft in the fleet. The crew had not yet received any training with this limitation. The flaps 30° configuration was still usable for safety reasons, such as landing on a short runway. The LDA at Santo Domingo for runway 17 is 3,350 metres.

**First Change in the Plan of Action**
ATC does not pass on any information about the reduction in measured visibility or the presence of CBs, nor the recent showers and thunderstorms at Santo Domingo.

The briefing does not cover the minimum stabilisation height (500 feet for a visual approach according to company rules). The preparation of a descent plan control card is not performed for the non-precision approach even though the approach chart only mentions the height at passing through the FAF.

**Second Change in the Plan of Action**
Some uncertainty about the QFU remains.
The Captain, familiar with the region, envisages a visual approach; the FO has prepared an instrument arrival.
At this stage, the arrival briefing is considered finished.

**Third Change in the Plan of Action**
Switching off the autopilot increases the PF's workload.

**Decision to Execute a Visual Approach**
The crew want to maintain the freedom to manoeuvre during the descent to avoid thunderstorm cells.

The crew lower the gear before the flaps to descend more quickly.

The aircraft is now above the flight path, with air speed varying between 163 and 170kts.

The crew does not hear the information on the runway state, masked by the alarm.

The PF's correction increases the deviation from the nominal descent path.

The Flight Engineer who terminates the Landing Checklist does not make the "500 feet" callout. There is no unstabilised or go-around callout.

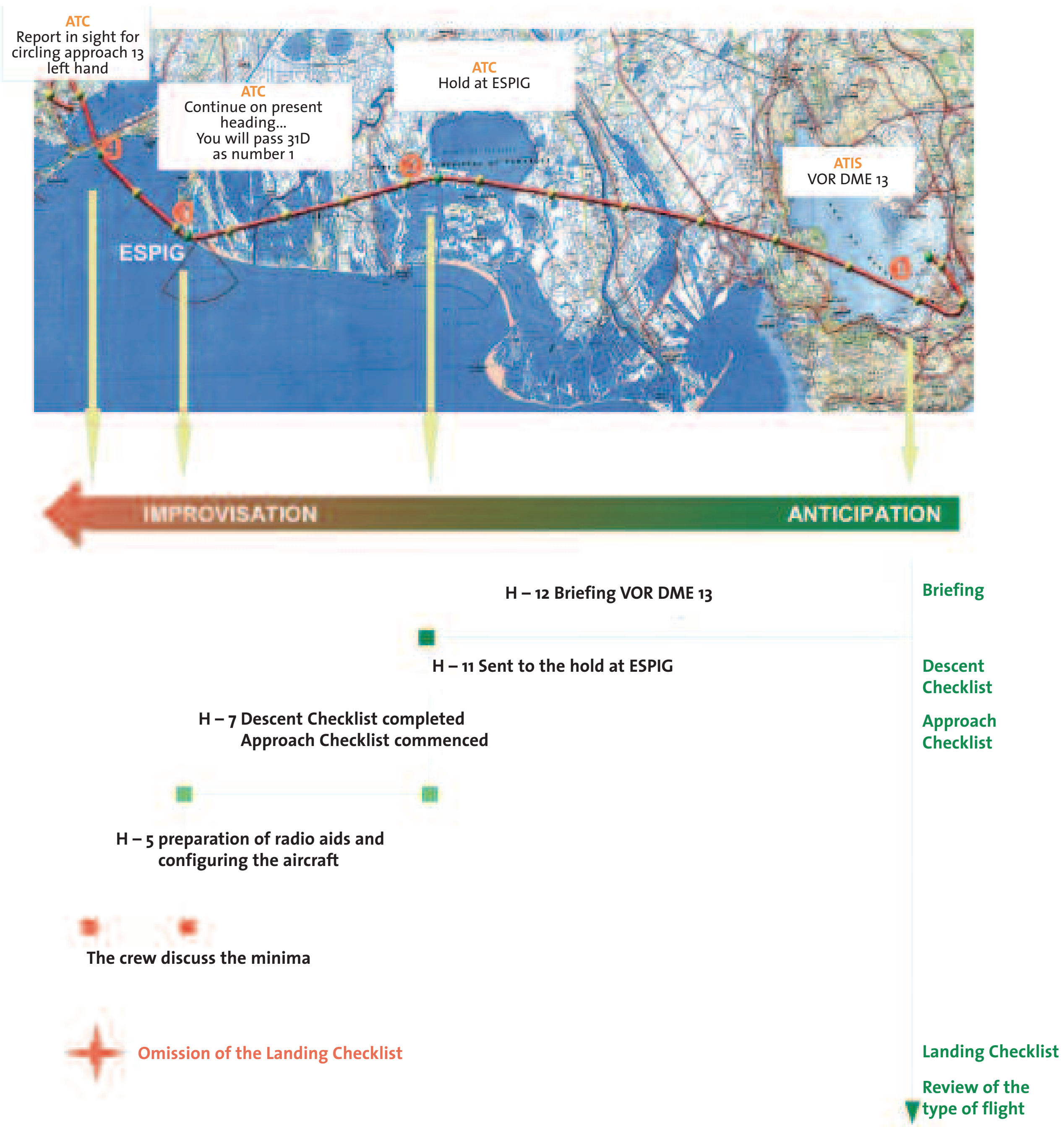
The PF noted that the PAPI was locked below the approach flight path.

Touchdown occurs at 147kts. The descending slope of the runway is more pronounced over the last 1200 metres. This information is not mentioned explicitly on the approach or aerodrome chart. 39 seconds expired between the wheels touching down and leaving the runway.

# INCIDENT INVOLVING A CRJ-100 AT MONTPELLIER FREJORGUES, 13TH JANUARY 1998 AT 23:03 LOCAL TIME

**Event:** runway overrun following an indirect circling approach.

**Flight Environment:** the landing occurs at night after an 18 minute flight and a 35 minute stop-over. It is the fourth and last stage of the day for the Captain and the second for the FO, who is PF. One controller in the tower covers the approach, tower and ground frequencies.




**1 Preparation for the VOR DME 13 Left Approach**
During the previous arrival at Marseilles Provence, the crew listen to the ATIS (Mike) at Montpellier. The flight information file given to them during the stop-over contains the meteorological observations at 21:00H. The aircraft takes off at 22:44.

About 3 minutes after take off, the aircraft reaches FL80, its cruising altitude, headed for the FJR VOR. The Captain listens to the ATIS (November) which states: "Arrival procedure VOR DME 13 left, wind 140°, 26-32kts, visibility 10km, light rain, SCT1100, BKN 3000..."
The crew prepare the Landing Card: $V_{ref}$ at flaps 45° is 125kts, i.e. $V_{app}$ of 135kts given the wind forecast. They start a standard briefing for the VOR DME 13 left approach.

**2 H - 11min: Descent to ESPIG**

During first radio contact, the controller, changing their arrival path, directs the crew towards "ESPIG descending to FL60". He warns of turbulence in the vicinity of the procedure turn for the VOR DME 13 approach.

He suggests to the crew to "hold at ESPIG for the approach of the first aircraft on 31 right, which [will indicate] if conditions are favourable for a circling approach".

The crew proceeds towards the hold. The PNF asks for the weather at the field. The controller states "10km, SCT1100, rain, occasional gusts, showers, BKN 3000 ft". The crew are cleared to continue the descent to 4000ft.

The descent checklist with the item "Briefing completed" is finished.
The approach checklist is started.

**3 H – 6min: Radar Vectoring for 31 Right**
The controller tells the crew: "continue on this heading to 2000ft radar, you will be Number One for 31 Right". The crew sets up the instruments for the ILS 31 procedure. They select flaps 20° and reduce speed to 160kts. The preceding crew are cleared to land on 13 Left. They report clouds at 600ft. The controller asks their opinion on whether the procedure can be executed by the following crews. He receives no reply.

The CRJ establishes itself on the localiser at 2000 feet.

**4 H – 4min: Circling Approach 13 left-hand**
The controller tells the crew: "continue and report the runway in sight for Circling Approach 13 Left". The crew start the descent on the glideslope and the PF tells the PNF about his concerns about the minima for the Circling Approach. The PNF listens to the meteorological information gained by the preceding crew, relayed by the controller.
The crew agree to start the Circling Approach at 500ft, flaps 30°, with an airspeed of 145kts. The PF disengages the autopilot, then the flight director and asks for the radar to be turned off.

The aircraft reaches 600ft downwind left-hand for runway 13 Left.
The PNF gives the PF the necessary instructions to remain in visual contact with the runway. A windshear alarm during the last turn makes the crew select 30° flaps and increase speed by 5kts (i.e.$V_{app}$ of 150kts).
The aircraft experiences windshear for a second time.
After the wheels touchdown, the Captain requests maximum thrust reverser. The PF asks the PNF to help him brake. The Captain asks the PF to switch off the nacelle anti-ice. The crew determine that selection of reverse thrust is not possible. The aircraft leaves the runway.

The latest METAR for Montpellier, 44 minutes before takeoff, notes the cloud base has fallen (SCT 1200 to 1000 ft).

The ATIS (November) recorded 48 minutes beforehand differs from the 22:00H METAR, in which the cloud base is at 1000ft (SCT). It also confirms an increase in wind compared to the ATIS (Mike) from 26 to 32kts.

Between 22:15 and 22:20, there was a squall at Montpellier Airport (1.8 to 2mm of rain). This was not reported in the observations transmitted to the crew.

**First Change in the Plan of Action**
The suggested procedure depends on information transmitted by an aircraft that voluntarily chose 31 right followed by a Circling Approach. Preparation by the crew for this approach is delayed.

There is no communication between the PF and the PNF regarding ATC's suggestion, nor on accepting this new plan of action. One can note that the frequency is saturated.

The briefing carried out for the VOR DME 13 becomes obsolete.The briefing is not carried out again in accordance with the new information.

**Second Change in the Plan of Action**
The hold at ESPIG is cancelled and the crew commence an ILS approach. Their workload increases. The callout "Approach Checklist Complete" was omitted.

The feasibility of a visual manoeuvre is subject to the meteorological information transmitted by the crew of the preceding aircraft.

**Third Change in the Plan of Action**
The PNF, preoccupied with listening to the frequency, does not reply to the PF's queries.

After having taken the joint decision to restrict the descent to 500ft, the crew start the Circling Approach at about 600 feet. The MDA for the Circling Approach is 780 feet.

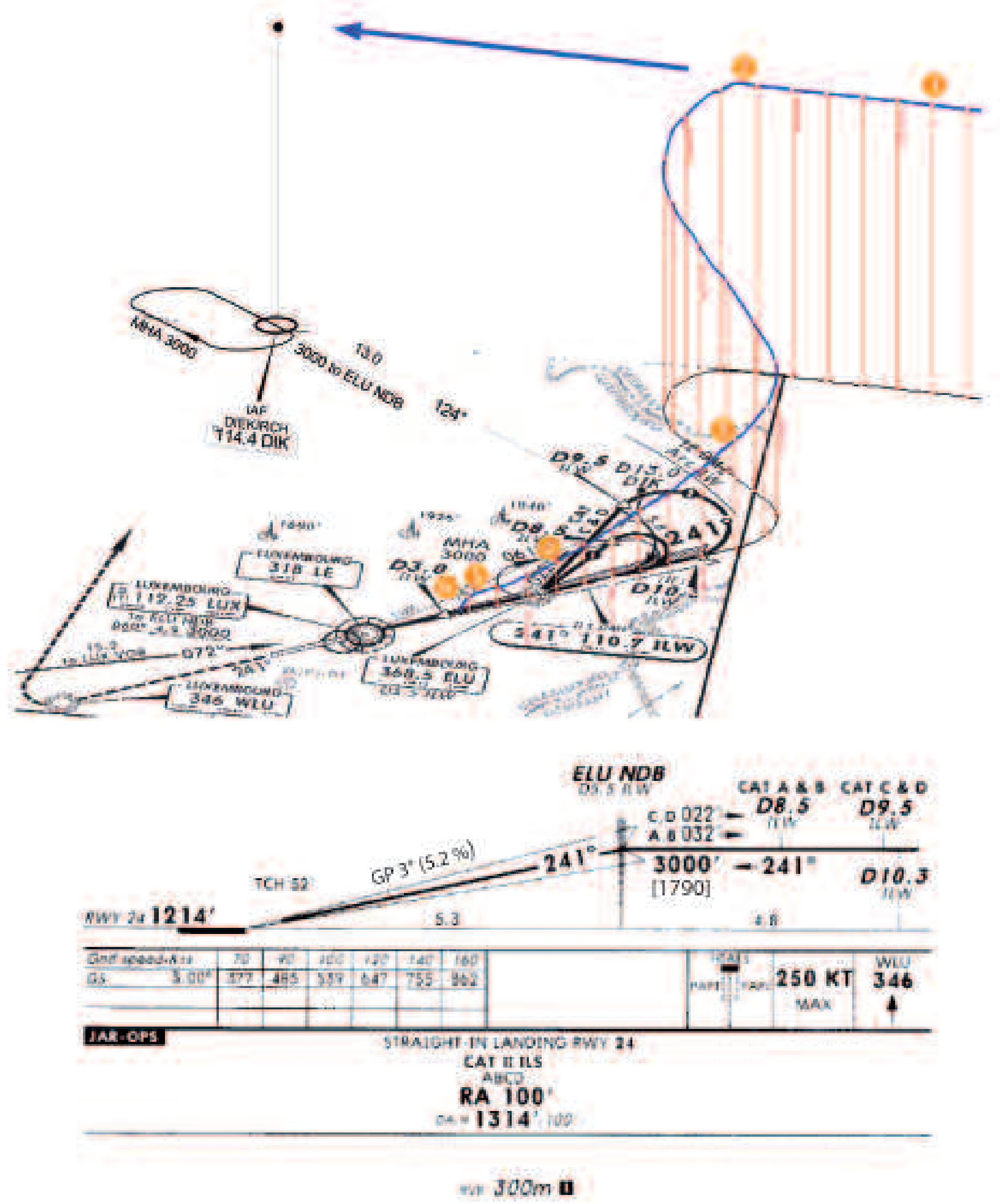
The crew's workload increases again when the autopilot is switched off.

The pre-landing checklist is not performed.

Nacelle anti-ice was used. The Captain was able to think there might be a failure in the automatic anti-ice cut-off system when the thrust reversers were selected. They had been disarmed during the climb. The item "Thrust Reversers Armed" is in the landing checklist.

**Event:** Emergency landing after double engine failure on final approach.

**Flight Environment:** at the end of a flight from Berlin to Luxembourg, the aircraft is directed to the hold at the DIK DVOR. The Captain is the PF. Before entering the hold, the crew are radar vectored for the ILS. Persistent fog covers the airfield. A single controller in the tower covers the tower and ground frequencies.




**1 H – 15min: Vectoring towards the hold**
The crew contact their operations department, who confirm that the visibility is below the Cat. II minima (300m) and that a diversion to Sarrebrück is envisaged. The controller asks the crew to enter the hold at the DIK DVOR at FL90. Speed is reduced to 160kts.

**2 H – 7min: Vectoring towards finals**
About 10nm before DIK, the controller clears a descent to 3000ft on QNH 1023, heading 130°. The captain calls operations again to find out the RVR.

At H - 4min, while the aircraft is passing through 6000ft, 13nm from the airfield, the controller gives an intercept heading of 220°, clears the crew for the 24 approach and then transfers them to the tower. The RVR is still below the Cat. II minima.

**3 H – 3min: Start of Final Approach**
The Captain asks the FO to warn the controller that if the RVR is less than 300m at ELU, they will go-around.
The crew start the pre-approach actions (setting up the instruments and the DH, instructions to the passengers, pressurisation etc.). They pay attention to the RVR information transmitted to other aircraft.

**4 H – 1min: Decision to go-around**
Six seconds before the FAP (ELU, situated 5.3nm from the threshold of 24) the FO starts the pre-approach checklist, which takes 23 seconds. Shortly after passing this beacon, the Captain decides unannounced to execute a go-around.

**5 H – 45s: Re-continuation of the approach**
Ten seconds after the Captain has decided to go around, the controller communicates the last RVR, which is 300 metres. The Captain decides to re-continue the approach. The aircraft is at a height of 1786ft, at a distance from the threshold of about 4nm and at an airspeed of 155kts in a clean configuration.

**6 H – 42s: Propellers enter Beta Mode**
The captain retards the throttle levers, down to the flight-idle stop (the throttle levers therefore depend on the secondary safety system) and then puts the aircraft into the descent. The FO suggests lowering the flaps and then the gear. While the gear is lowering, the secondary safety device fails and the throttle levers retard further. The propellers enter Beta mode. The violent increase in drag makes the aircraft uncontrollable. The crew shut down both engines before carrying out an emergency landing.

The aircraft and the crew are limited to Cat. II.

The crew has not yet carried out the approach briefing for Luxembourg.

**Change in the Controller's Strategy**

Airspace constraints limit the number of aircraft in the hold. The crew are dubious about the controller's strategy and the feasibility of landing.

The FO remarks that the controller has let them go ahead of other aircraft. The priority given to them in the absence of the required RVR puts pressure on the crew.

The message is not transmitted. The operator, with more restrictive rules than the official limits, requires its crews not to start final approach if the RVR is not met by the FAP. One can note that a hold is possible at ELU but was not envisaged given the number of aircraft on approach. The crew accelerate their actions to conform with the controller's approach clearance. The distribution of tasks does not follow the operator's Cat II. Procedures.

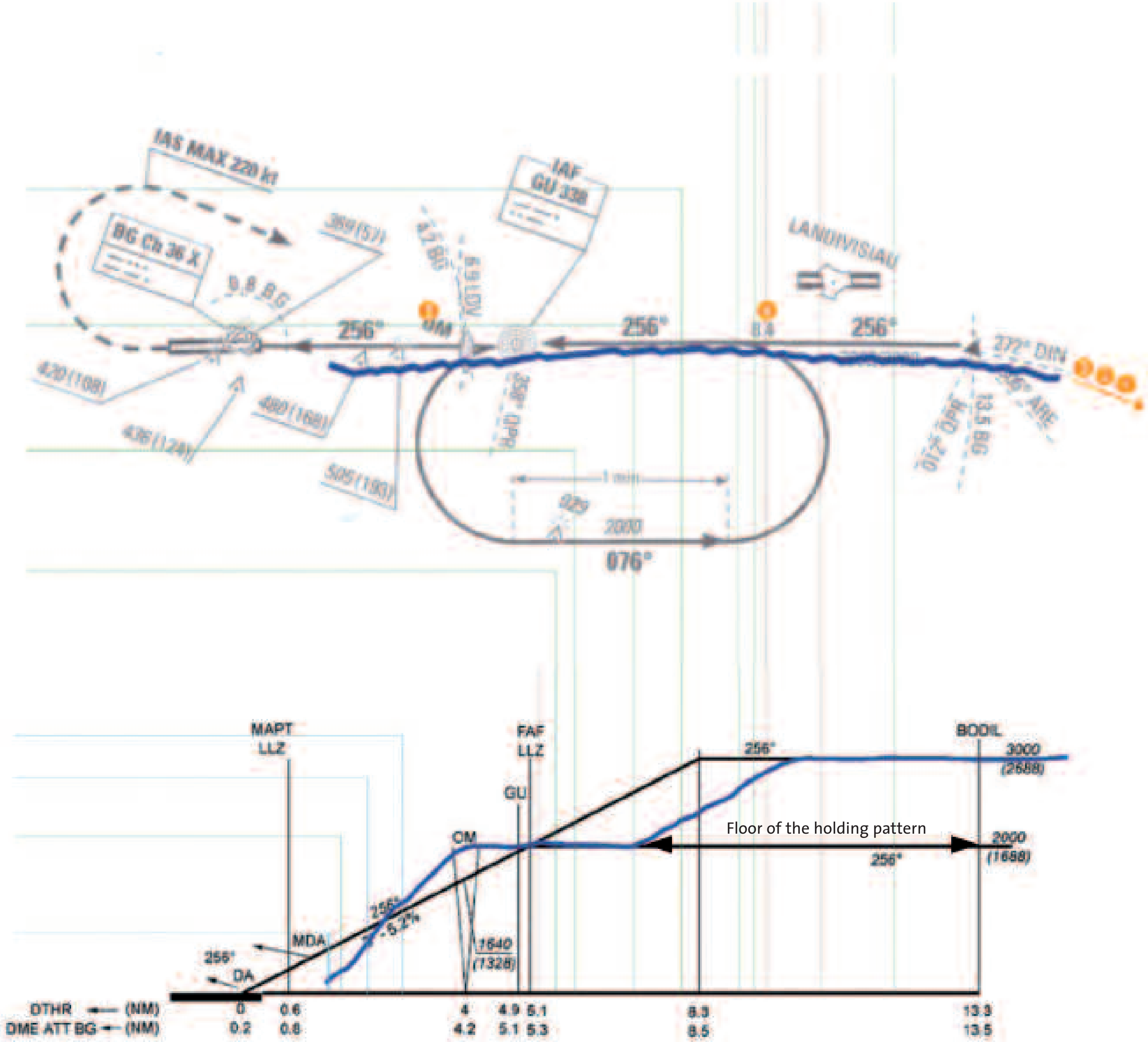
The ELU beacon was passed 10 seconds ago. This go-around is not followed by a change in either flight path or in configuration.

**Change of Plan by the Captain**
The communication from the controller whom the crew had informed of their minima sets off this decision. There is no Outer Marker or equivalent on this approach and the height between the start of final descent and the threshold is less than 2000ft.

A malfunction in the anti-skid box, caused by the gear deployment signal, removes the secondary safety system which in flight prevents the propellers entering the ground range from flight idle.
The failure of the system locking the secondary stop-pin was not known to the pilot. It had been mentioned by the manufacturer but had not been widely communicated to the crews.

**Event:** collision with the ground after a go-around from the DA (DH).

**Flight Environment:** the crew is returning to their base during the fourth and last stage (35min) after a stop-over of 18 minutes. The flight is being carried out at night. The Captain is the PF. On the ground the FO is a simulator instructor (SFI). Cumulonimbus clouds are present along the route and the crew is surprised by fog on arrival. Cat. II and Cat. III approaches are suspended for maintenance work. A single controller in the tower coves the approach, tower and ground frequencies.






**1 From H – 1 hour to H – 42min: Flight Preparation**
When the crew leave Nantes at 21:09H, the 20:00H TAF given to them does not mention the fog at the destination.

**2 H – 30min: Listening to the ATIS and Arrival Preparation**
During the climb, the PNF listens to the 21:00H ATIS (Tango) and says to the PF: "ILS 26 left, visibility 800m, fog, broken at 200 with CBs above, 1007". In the cruise at FL220, the crew ask the controller for permission to avoid cumulonimbus clouds.
At H – 15min, shortly before beginning the descent, the PF carries out a standard arrival briefing for an ILS 26 left and the PNF enters the relevant speeds into the FMS. $V_{ref}$ for the calculated landing weight is 132kts.
The "Start Descent" checklist is carried out at the PNF's initiative. The crew are interrupted by ATC who tells them they are No. 2 and asks them to reduce speed.

**3 H – 12min: Heading towards BODIL and hold expected at GU**
The approach controller tells the crew to expect a circuit in the hold at GU. The crew set up the FMS for the hold. They engage LNAV mode on the FMS, heading towards BODIL.
At H – 7min, the controller confirms the hold while telling the crew that "the fog is covering the ground again".
H – 6min, 34s: the Captain states his intention to carry out a Cat.II approach. The FO replies that it is not authorised.
H – 3min 42s: the controller clears them to descend to 2000ft on the QNH.

**4 H – 3min 21s: Hold Cancelled**
The controller announces: "Previous aircraft has landed, continue the approach, report the Outer Marker".
The PNF replies "will report Outer Marker, continuing on approach path". The controller does not receive this message.
The aircraft is about 9.5D from the BG DME at 2900ft QNH, descending to 2000ft QNH at 180kts, flaps 8°. The PF carries out the necessary actions prior to arming Approach mode (activation of HDG mode, tuning VOR 1 to the ILS DME frequency and selecting VOR mode).
The aircraft is on the localiser path without the autopilot capturing it.

The controller calls the crew: "You are ready for the approach?... Report Outer Marker".

The crew continue putting the aircraft into the landing configuration.
At about 7D, two minutes before landing, the aircraft stabilises at 2000ft in level flight but is no longer on the localiser path. It does not intercept the glideslope. The crew carry out the pre-landing checklist.
The controller clears the aircraft to land and announces "cloud base now less than 100ft and RVRs of 800m and 900m".

The go-around altitude of 2000ft (1688ft AAL) is entered.
The PF tries to engage Vertical Speed mode to get back on the glideslope from above. The aircraft continues to deviate and crosses the Outer Marker at 2000ft (vs. a correct crossing altitude of 1640ft) without any aural or visual alert occurring.

**5 H – 1min 10s: Start of Final Descent**
As the aircraft is crossing the descent path controlled by the autopilot, the Captain selects APP mode and calls this out. HDG and VS modes remain active.
The aircraft passes below 1000ft AAL in the descent without any callout.
The rising runway is displayed on the ADI at 60ft radio altitude. A correction is made by autopilot to regain the centreline.
Callouts "500", GLIDE SLOPE and SINK RATE are made by the GPWS. The PF disconnects the autopilot.
Callouts "300" and GLIDE SLOPE (7 times) are then made, then "100".
The PF pulls the nose up. The aircraft experiences an unfavourable wind gradient of 10kts between 25oft and the ground.
The aircraft arrives at DA without a callout. The PF calls out and initiates a go-around. The airspeed continues to decrease to 115kts while the pitch attitude decreases to -5° in four seconds. A second before impact the GPWS calls out PULL UP.

The 21:00H METAR (9 minutes before block departure and 15 minutes before take-off) does mention the fog. This information was not given to the crew.

The ATIS also mentions that the Cat. II ILS is out of service. Cockpit communication is infrequent during this phase of nearly 12 minutes and are practically all about avoiding CBs. Another aircraft in contact with Brest Approach carries out an arrival via BODIL and is cleared for the ILS 26.

The crew expect a straight-in approach

**First change in the Plan of Action**

The crew get ready to perform the holding circuit programmed into the FMS. The Captain tells the air hostess than they are expecting a circuit in the hold.

This altitude corresponds to the floor of the hold: the glide-slope interception altitude on a straight-in approach is 3000ft QNH.

**Second change in the Plan of Action**
This phraseology could have influenced the crew: it does not imply that the decision is up to them, contrary to the format "cleared for the approach". This late and unexpected change in clearance is accepted implicitly by the pilots.

During the next 25 seconds, the crew's workload is increased significantly (deceleration, configuring the aircraft and starting descent, selection of Autopilot/Flight Director modes), limiting their availability.
The fact they have a hold programmed into the FMS and are in LNAV mode increases their work load.
APP mode was never activated. No reading of the mode annunciator panel was heard.
The controller also continues to communicate with the aircraft that is on the ground.

The wind makes the aircraft deviate towards the south of the centreline without the crew realising.
The glideslope active callout is not made.
During an approach in difficult meteorological conditions, excessive radio-communications can distract the crew.
The fact that the go-around altitude is identical to that of the aircraft in level flight did not facilitate the engagement of VS mode.
The two pilots seem to concentrate their attention on managing the vertical flight path without detecting the lateral deviation.

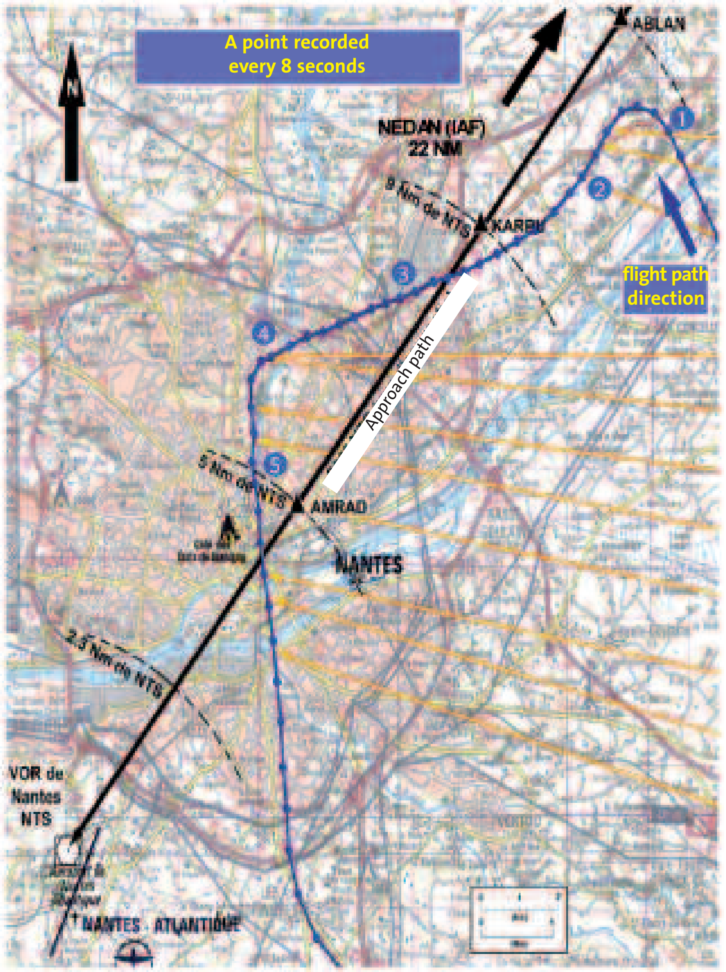
**Final approach beyond the deviation-limits**
The criteria for engaging APP mode are not met, since the aircraft is outside the localiser beam where the autopilot can capture it.
This callout could have helped the crew become aware of their situation.
The operator had not chosen the option for a "1000" callout on the GPWS.
In addition the operator's procedures did not link the callout "1000 feet" by the PNF with the notion of minimum stabilisation height.

The speed decreases to 120kts (i.e.$V_{ref}$ – 12kts). The aircraft is not equipped with an automatic speed maintenance system.

# INCIDENT INVOLVING AN MD83 AT NANTES, 21[ST] MARCH 2004 AT 02:28H LOCAL TIME

**Event:** Go-around during VOR DME approach outside the flight protection envelope.

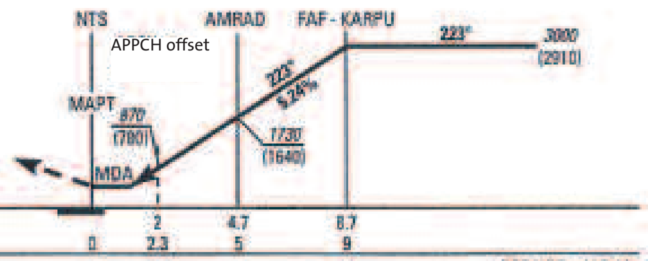
**Flight Environment:** this is the second stage out of the four planned. The aircraft, arriving from Luxor 16 hours late, is the only traffic in the airport vicinity. Strato-cumulus clouds with a 500 – 900ft cloud base associated with a warm front are covering the area and producing heavy drizzle. The wind is from 260° at 20-26kts and the visibility is 4km. The FO is the PF. The pilots are carrying out this approach for the first time. The crew has not received any CRM training. A single controller in the tower covers the approach, tower and ground frequencies.




TA : 5000

Missed Approach: at the MAP, climb straight ahead on NTS 223R. At 1000ft (910) climbing right turn to 3000ft (2910), intercept NTS 310R to rejoin the 15D DME arc right turn, unless instructed otherwise by ATC.
Do not turn before the MAP.

Climb to 1000 (910) before accelerating in level flight.




MNM AD : distances verticales en pieds, RVR et VIS en mètres. REF HGT : ALT AD

| CAT | VOR/DME OCH : 357 | | MVL | |
|---|---|---|---|---|
| | MDA (H) | RVR | MDA (H) | VIS |
| A | 450 (360) | 2500 | 610 (520) | 1500 |
| B | 470 (380) | 2500 | 610 (520) | 1600 |
| C | 500 (410) | 3000 | 950 (860) | 2400 |
| D | 520 (430) | 3000 | 950 (860) | 3600 |

| DME NTS NM | 8 | 7 | 6 | 5 | 4 | 3 | 2 |
|---|---|---|---|---|---|---|---|
| ALT | 2685 | 2365 | 2045 | 1730 | 1410 | 1090 | 775 |
| (HGT) | (2595) | (2275) | (1955) | (1640) | (1320) | (1000) | (685) |

*The Minimum Descent Altitude (MDA) is defined in two different ways:*

*ICAO: altitude specified in a non-precision approach or visual manoeuvre below which descent may not be made without visual references.*

*USA: the lowest altitude, expressed in feet above mean sea level, to which descent is authorised on final approach during an instrument approach procedure without a glideslope.*



**1 Shortening the Transition Flight Path**
After listening to the ATIS, the crew prepares for the VOR DME approach to runway 21. The aircraft is directed by the controller directly to ABLAN, situated 3nm after the IAF. The crew are then "cleared final".
The Captain reads it back and adds that he "will leave 3000ft for 500ft established". The intercept angle with the approach path is 107°.

**2 Interception using the Autopilot**
On engaging VOR/LOC mode, the aircraft executes a turn and positions itself parallel to the approach path, offset to the left. In the space of 20 seconds, the crew announce that they are aligned, realise they are to the left of the extended centreline (223°), enter HDG SEL mode to get back on the approach path with a heading of 250°, receive landing clearance and commence final descent in VS mode about 0.5nm before the FAF.

**3 Interception using the Autopilot**
When the aircraft meets the approach path, the captain asks the PF to maintain the heading to avoid an area of red echoes close to the final approach path which appear on the weather radar. The aircraft crosses the approach path.
The crew experience meteorological phenomena (turbulence, strong wind, precipitation) and give a large part of their attention to the weather radar. The descent continues at a rate of between 700 and 1000 ft/min. The aircraft is heading into a wind increasing in strength. This combination of factors drives the aircraft well below the nominal approach profile.
At 6D from NTS, the aircraft is situated at about 500ft QNH.

**4 Return towards the Approach Path.**
While the aircraft returns towards the final approach path, the controller intervenes to tell the crew they are too low. The time which passes before they react by starting a go-around is in the order of 23 seconds.

**5 Decision to Go Around.**
In coming out of the turn which brings them back towards the final approach path, the aircraft comes out of the layer of cloud about 400ft above the ground and the Captain becomes aware of the anomalous situation. That is when he initiates the go-around.

**ATC Practices**
For environmental reasons, the published transition path specifies a DME arc at 15nm. The ATC controllers had got into the habit of directing aircraft directly to an intermediate point without for all that it being under radar control. During first contact with the pilot the controller felt relatively confident, given the quality of the phraseology and the English used. He did not doubt the ability of the aircraft to intercept the approach path automatically, and was not alerted to the intentions of the crew by the Captain's read back.

This announcement by the crew that they were aligned prompts the landing clearance from the controller which, in turn, appears to initiate the start of the descent. The crew's workload increases dramatically.
The controller was thinking to help the pilot by giving some of his clearances early.

**Leaving the protection margins**

The PF is distracted by this request.
The observed echoes are ground echoes from high-rise buildings below the approach path and not from thunderstorm activity.

The tired crew perceive the meteorological conditions they encounter as confirmation of a thunderstorm.

The altitude of 500ft corresponds to the MDA and the lowest altitude the Captain had set for level flight up to the MAP. Altitude must be greater than 1730ft between 9D and 5D.

The controller had not envisaged keeping watch on the flight path before finals.

The management of the approach and the communication difficulties between the crew members did not allow them to identify the excessive flight path deviations, which should have led them to break off the approach earlier.