Unavailability of transponder, unavailability of ACAS, difficulties with, or loss of radiocommunication and datalink, degraded approach and landing capabilities, dangerous loss of separation

SERIOUS INCIDENT	INCIDENT	SERIOUS INCIDENT
AIRBUS A320-251N registered EI-NSF	AIRBUS A321-252NX registered PH-YHA	AIRBUS A321-252NX registered PH-YHC
Aer Lingus Teoranta	Transavia Airlines C.V.	Transavia Airlines C.V.
Passenger commercial air transport		
20 September 2024 around 07:30[1]	13 January 2025 around 21:20	29 April 2025 around 10:30
en route		

Note: this interim report is solely based on information known to the BEA at this stage of the investigations. It does not prejudge the conclusions that the BEA may draw in the final reports relating to these three investigations.

1 HISTORY OF THE FLIGHTS

Note: the following information is principally based on the CVR[2] and FDR, statements, radiocommunication recordings, radar data and Flightradar24 data.

For the three flights concerned, the difficulties with, or loss of radiocommunication and the unavailability of the transponder and/or ACAS are explained by a failure of the DRAIMS (Digital Radio and Audio Integrated Management System).

1.1 Serious incident to the Airbus A320 registered EI-NSF operated by Aer Lingus on 20 September 2024, en route[3]

The crew of the Airbus A320neo registered EI-NSF, took off from Dublin airport (Ireland) at 06:24 bound for Bordeaux-Mérignac airport, with the call sign EIN50V. The captain was the PM and the co-pilot, the PF on this flight.

Around 15 min before the start of the descent, in cruise at FL 330, the crew were in contact with an air traffic controller in Brest ACC[4] and received the instruction to take a direct route to Cognac VOR-DME (CNA). The captain started to hear crackling in his headset.

[1] Except where otherwise indicated, the times in this report are in Coordinated Universal Time (UTC).
[2] The glossary of abbreviations and acronyms frequently used by the BEA can be found on its web site.
[3] For this flight, the CVR data was no longer available when the investigation was opened.
[4] Area Control Centre.

The crew observed that the RMP 1 (Radio Management Panel) screen alternated between a normal display and an amber **VHF PAGE NOT AVAIL** message and the RMP 2 screen alternated between a normal display and a blank screen. The crew also reported the repeated activation of the following ECAM alerts and memos associated with the illumination of the Master Caution button and the transmission of a Single Chime signal **NAV ATC/XPDR STBY, TCAS STBY, COM RMP 2 OFF, COM RMP 1 FAULT**.

At 07:22, the aeroplane disappeared from the controller's radar screen. The latter called the crew to carry out a radio check. The crew replied that they had a problem with the communication system and their transponder. The controller asked them to maintain FL 330. The messages transmitted by the crew were received with a poor sound quality and aural warnings could be heard in the background. Radio contact was then lost. The aeroplane temporarily reappeared twice on the controller's screen before disappearing at 07:27 until the end of the flight. The Brest ACC controller warned the Bordeaux ACC controller of the arrival of an aeroplane without radar contact in his sector.

The crew indicated that they attempted to reset[5] each RMP several times and to select the transponder code 7600, without success. The crew specified that the cockpit had fallen into complete silence and that they could not hear each other in their headsets. The crew thought that they would be intercepted by military aircraft. The captain consulted the air-ground communication failure procedure in the operations manual (see paragraph 3.1). He indicated that being in VMC, he followed the corresponding part of the procedure which specified to land at the closest suitable airport. He considered that this airport was the destination airport, Bordeaux-Mérignac. He chose to descend as per his flight plan and as programmed in the FMS, in order to comply with the altitude constraints of the arrival and approach procedures. This strategy also allowed him to minimise flight time.

The coordination between the various civil control units and the military units started. Bordeaux ACC informed the CMCC[6] that this aeroplane had lost its transponder and informed them that it seemed to be visible on Flightradar24[7].

Brest ACC initiated the alert phase (ALERFA) with the ARCC[8] at 07:31. Brest ACC called Cognac-Châteaubernard airbase 709 to inform them of a loss of radio and radar contact with EI-NSF which could potentially interfere with their areas. The military controller indicated that he could see the aeroplane on Flightradar24 and on the primary radar.

Brest ACC reported the loss of radio and radar contact to the CAPCODA-TN[9]. No in-flight assistance was mentioned in this exchange.

Brest ACC transferred responsibility for the aeroplane to Bordeaux ACC and transmitted over the radio, the Bordeaux ACC frequency.

---

[5] The crew set each RMP to OFF and then ON.

[6] Military coordination and control centre

[7] Internet site to track the position of aeroplanes (see paragraph 5).

[8] Aeronautical Rescue Coordination Centre.

[9] Air operations planning and execution and air defence centre. This organisation is responsible for in-flight assistance and for activating Quick Reaction Alert resources in the event of an aircraft interception. At the time of this serious incident, these missions were carried out by the CNOA (national air operations centre).

This transmission would not be received by the crew and went without a response.

At 07:33, the crew started the descent.

At 07:34, Bordeaux ACC called Cognac-Châteaubernard airbase 709 which informed them that the aeroplane was at 30 NM and 350° with respect to the airbase, and mentioned possible assistance from military aircraft by the activation of the Quick Reaction Alert.

The crew indicated in their statement that RMP 2 was active again and that they could only transmit on the 121.800 Mhz frequency[10]. In this region, this frequency corresponds to the ground frequency at Tarbes-Lourdes-Pyrénées aeroport. Radio contact was made at 07:34 between the Tarbes-Lourdes-Pyrénées controller and the crew. The crew asked the controller to relay their position and their intentions to the Bordeaux-Mérignac approach control centre.

The crew recovered the possibility of changing the radio frequency and transmitted a message on the emergency frequency 121.5 MHz and then on the Mérignac approach frequency (121.2 MHz)[11], without receiving a response. Radio contact was finally re-established at 07:39 on 121.5 MHz with Mont-de-Marsan CDC[12]. The crew reported that they were in descent to FL 80 on STAR CNA 2K. They confirmed to the military controller that they did not require assistance and asked for a radio frequency.

At 07:41, Bordeaux ACC, which was also monitoring frequency 121.5 MHz, asked them to contact "Bordeaux" on frequency 132.990 MHz[13].

Bordeaux ACC informed the Bordeaux-Mérignac approach controller that radio contact with the crew had been re-established on 121.5 MHz and that the aeroplane was in descent to FL 80 on a standard arrival starting at "Cognac". The two controllers discussed the altitude of the aeroplane and both confirmed that they could see it at FL 330 on Flightradar24. A potential conflict with the British Airways Euroflyer flight EFW59L was mentioned. The Bordeaux-Mérignac approach controller indicated to the Bordeaux ACC controller that he was expecting the aeroplane to carry out holding patterns at VAGNA[14] and that he could see it on the primary radar.

The distress phase (DESTRESFA) was also activated at 07:41 by Brest ACC.

At the same moment, the minimum separation between flights EFW59L and EIN50V was 3.2 NM horizontally and around 175 ft vertically (Figure 1, points ★).

At 07:42, the crew contacted Bordeaux ACC on 132.990 MHz. They reported that they were in descent to FL 80 on the CNA 2K arrival procedure and when asked by the controller, indicated that they were flying through FL 125 (Figure 1, point ①). After being transferred to the approach controller, the crew reported that they were descending through FL 100 to FL 80 (point ②).

---

[10] This frequency corresponds to the Dublin ground frequency used by the co-pilot at the beginning of the flight.

[11] The AIP indicates that this frequency is used only when instructed to do so by air control. The LIDO chart used by the crew did not mention this information.

[12] Detection and control centre, military regional air control centre.

[13] One of the Bordeaux ACC radio frequencies.

[14] Initial Approach Fix (IAF) for arrivals from CNA, for which there is a published holding procedure.

The controller asked the crew to confirm their flight level and then asked flight EFW59L to turn left onto heading 090° (point 3). The two crews of flights EFW59L and EIN50V read back this message at the same time and both crews turned onto heading 090° (points 4 4). At this point, flight EFW59L was 500 ft below flight EIN50V. This double read-back was not picked up by the controller.

The crew of EIN50V transmitted a "PAN PAN" message. The crew indicated in their statement that the ILS 23 frequency was not automatically selected by the FMS and that they could not select it manually on their MCDU. The crew envisaged carrying out a RNP approach. Finally, they used the RMP STBY NAV[15] function and managed to select the ILS 23 frequency. After two holding patterns flown at VAGNA IAF, the crew were cleared for the ILS 23 approach and then landing. The crew landed without further incident.

During the stopover, a maintenance organisation tested the transponder and the two RMPs. The test results revealed no anomaly. The return flight proceeded without any particular incident.

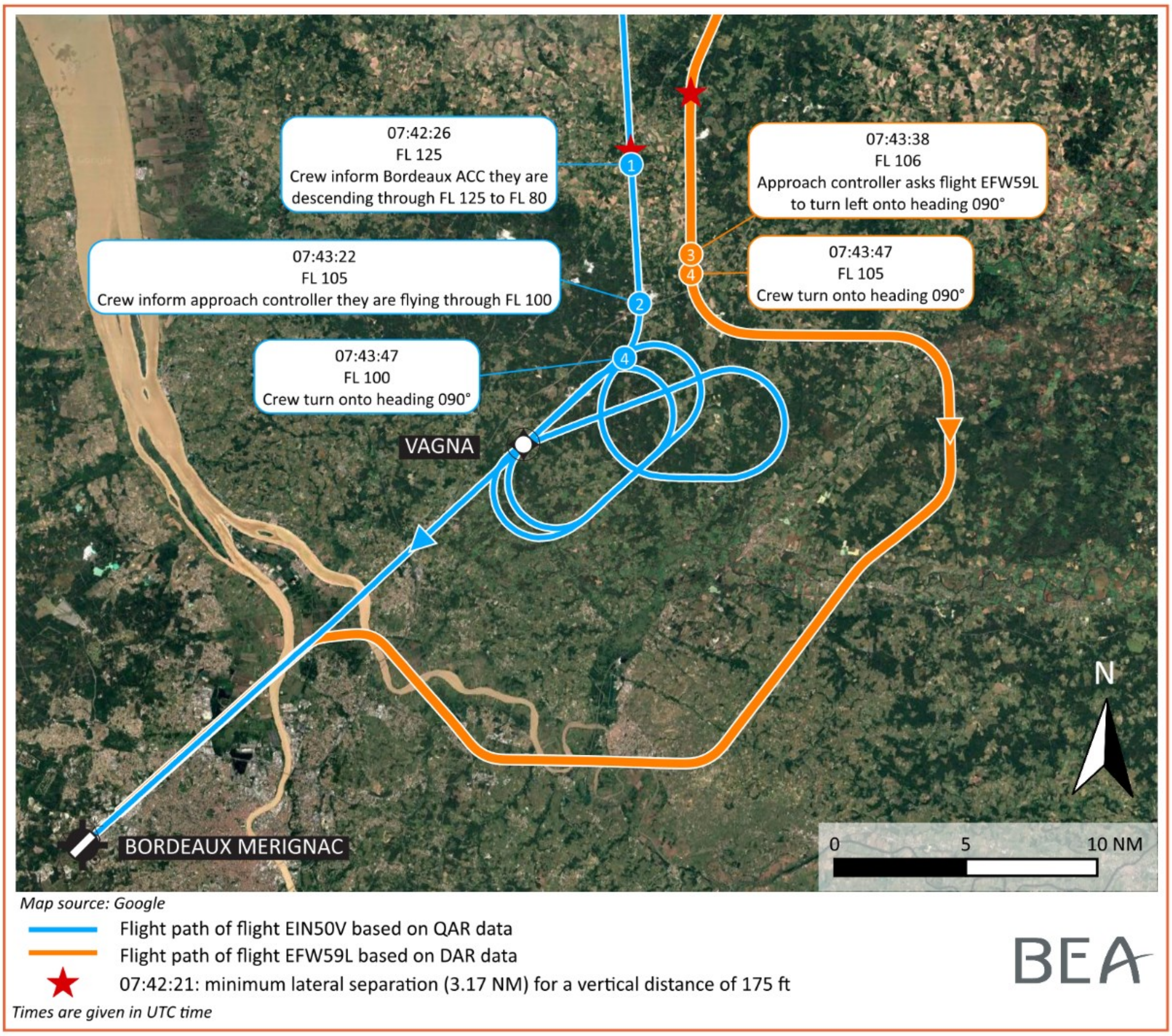

Figure 1: flight path of flight EIN50V during the loss of separation with flight EFW59L

[15] Degraded mode for setting and selecting radio-navigation equipment via the RMPs.

1.2 Incident to the Airbus A321 registered PH-YHA operated by Transavia on 13 January 2025, en route

The crew of the Airbus A321neo registered PH-YHA, took off from Federico-García-Lorca de Grenade-Jaén airport (Spain) at 19:24 bound for Amsterdam Airport Schiphol (The Netherlands), with the call sign TRA59M. The captain was the PF and the co-pilot, the PM on this flight.

In cruise at FL 340, the crew were in contact with Bordeaux ACC. At 20:48, the crew indicated that the ECAM alerts **NAV LS TUNING DISAGREE** and **NAV ATC/XPDR STBY** appeared along with the ECAM **TCAS STBY** memo. The STBY NAV function was activated without a crew action on the two RMPs and the radio frequencies of both RMPs were desynchronised. Repeated instances of the TCAS passing into STBY mode were recorded on the FDR.

Between 20:48 and 21:07, the aeroplane disappeared six times from the radar screens and reappeared with what seemed to be a random transponder code (2107, 1001, 2110, 2111) that did not correspond to the code selected by the crew. Mode C was lost intermittently and the transponder IDENT function was activated several times without a crew action[16].

The audio function was lost several times on the co-pilot's side: the co-pilot received no signal in his headset and transmitted a radio message that was not received by the control centre.

The alert phase (ALERFA) was activated by Bordeaux ACC at 20:57.

The crew indicated in their statements that they could not process the ECAM messages as they continuously appeared and disappeared. The crew then tried to reset each RMP.

At 21:07, the crew were transferred to Brest ACC on the 125.965 MHz frequency. The crew selected this frequency and transmitted a message to the Brest ACC controller but the message was received on the previous frequency (Bordeaux ACC frequency). The crew then informed the Bordeaux ACC controller that they could no longer change radio frequency. The only frequencies that were usable were the Bordeaux ACC frequency (132.430 MHz) and the emergency frequency 121.5 MHz. Bordeaux ACC informed Brest ACC of this situation; the latter indicated that they could not accept the flight in these conditions.

The crew transmitted a “PAN PAN” message at 21:10 and indicated that they had radio, transponder and TCAS problems. The crew asked to divert to Paris-Orly. The Bordeaux ACC controller refused this and asked them to turn left onto heading 190° to divert to Bordeaux Mérignac airport.

Bordeaux ACC called the Bordeaux-Mérignac approach control centre to inform them of the arrival of flight TRA59M. The ACC asked if the Bordeaux-Mérignac controllers could transmit on 121.5 MHz. The Bordeaux-Mérignac approach control centre indicated that they had a standby radio with which they might be able to transmit on 121.5 MHz. The Bordeaux-Mérignac approach controller emitted a test message and Bordeaux ACC confirmed that they had received it.

The captain, anticipating a potential loss of all communications, asked the Bordeaux ACC controller if he could obtain anticipated approach and landing clearances.

---

[16] In total, between the appearance of the failure and the end of the flight, 85 Mode C losses and 224 untimely transponder code changes were recorded in the radar data.

The Bordeaux ACC coordinated with the Bordeaux-Mérignac approach control centre and they agreed to give the crew a limit clearance[17] to 5,000 ft at point ETPAR to give time to ensure that the crew were in fact in contact with the approach on 121.5 MHz. At 21:25, the crew were cleared for the RNP05Z approach and transferred to the approach controller on 121.5 MHz.

The crew sent a "PAN PAN" message on 121.5 MHz, radio contact was made with the Bordeaux-Mérignac approach control centre. The distress phase (DETRESFA) was activated at 21:27 by Bordeaux ACC. The crew were not able to activate the FMS approach mode nor were they able to arm the guidance modes associated with the RNP approaches. The crew then used the TRK and FPA modes to manually select the route and approach slope. The crew landed without further incident.

During the stopover, a maintenance organization carried out functional tests on the Multi-Mode Receiver (MMR) and the TCAS. No failure was identified. Once the tests had been completed, the crew decided to completely de-energize and then energize the aeroplane in order to reinitialize all the systems.

At 00:33, the crew took off from Bordeaux-Mérignac to fly to their initial destination. On retracting the landing gear, the crew indicated that they saw the **TCAS STBY** memo appear on the ECAM without the associated ECAM alert. The radio functioned normally.

The controller informed the crew that he was not receiving the correct transponder code (1000 selected by crew, 1001 displayed on the controller's radar screen), nor the altitude information that should be associated with it. As the crew were unable to select another transponder code, the flight was refused by Bordeaux ACC. The crew turned around and landed at Bordeaux-Mérignac at 01:05. The aeroplane was grounded at Bordeaux in order for the operator to analyse the failure.

1.3 Serious incident to the Airbus A321 registered PH-YHC operated by Transavia on 29 April 2025, en route

The crew of the Airbus A321neo registered PH-YHC, took off from Elche Miguel Hernández d'Alicante airport (Spain) at 08:42 bound for Amsterdam Airport Schiphol (The Netherlands), with the call sign TRA21Q. The captain was the PM and the co-pilot, the PF on this flight.

During the climb, the captain started to hear crackling in his headset[18]. In cruise, when making a frequency change, the crew observed that the changes made on RMP 1 were not synchronized with RMP 2 but that those made on RMP 2 were taken into account by RMP 1.

From 10:24, the crew reported repeated activations of the **NAV ATC/XPDR STBY** ECAM alert associated with the illumination of the Master Caution button, the transmission of the aural Single Chime signal and the appearance of the **TCAS STBY** ECAM memo.

At 10:26, the aeroplane was at FL 360. The captain, in radio contact with Reims ACC, carried out a radio check and also asked if his transponder was being received. The audio quality was degraded

[17] When a crew receive a limit clearance, they cannot continue the flight beyond the limit specified by the controller without being authorized.

[18] In his statement, the captain indicated that he had also perceived crackling in his headset during the previous flight, during the descent. This crackling is recorded in the CVR and was present as soon as the aeroplane was started up for the occurrence flight.

and the aeroplane was still visible on the radar.

At 10:28, the controller informed the crew of the loss of radar contact and asked them to switch to their other transponder[19]. The crew replied that there were problems on both transponders. Radar contact was re-established a short time later. The transponder code transmitted to the radar was 2000. Radar contact was lost again at 10:30, and would remain lost until the end of the flight
(Figure 2, point 1).

Due to the repeated display of ECAM alerts and the screen alternating between a blank screen and a normal display on RMP 2, the co-pilot switched OFF RMP 2. The alerts ceased. The co-pilot then switched it back ON, the alerts reappeared. The co-pilot then switched OFF RMP 2 again at 10:29 and left it switched off until the end of the flight.

During this period, Reims ACC called the Maastricht en route control centre (MUAC) several times about flight TRA21Q. The MUAC controller advised that he could still see them *"as a primary target"* and specified that in the absence of a transponder and flight level information, the aeroplane should descend into the airspace managed by the Paris and Brussels control centres.

Reims ACC called the military units (Cinq-Mars-la-Pile CDC and CAPCODA-TN) to inform them of the loss of radar contact. The CDC indicated that they could see the aeroplane by means of their primary radar.

At 10:31, the controller confirmed the loss of radar contact to the crew. The crew indicated that they were abeam point SULEX, at FL 360.

At 10:34, the controller asked the crew of flight NSZ8TQ[20] flying at FL 360 in his sector, to turn 10° to the left in order to manage another conflict, and then asked the crew of flight TRA21Q to turn towards CMB[21]. The crew of TRA21Q indicated that this required them to turn 90° to the right. The controller then asked the crew to head to point LUMIL and to make a left-hand 360° turn on arriving at this point (point 2).

Reims ACC called Paris ACC to inform them of the loss of radar contact with flight TRA21Q and to coordinate the descent of this flight[22] as MUAC refused to take it in its airspace. Reims ACC indicated to Paris ACC that it would like to have the aeroplane descend to FL 240 and the two centres agreed that Reims ACC would keep the aeroplane on the frequency at this level.

Reims ACC called Brussels ACC who refused to take the flight, saying that they did not have "a primary" and that they would not be able to see it at all.

After starting their left-hand 360° turn, the crew called Reims ACC to obtain instructions for the rest of their flight after completing the turn. The controller asked them to make 360s again on

---

[19] In the event of a transponder failure, the controller's operational procedures specify that the controller shall ask the crew to use the second transponder.
[20] Málaga (Spain) - Göteborg (Sweden) flight operated by a Norwegian company with a Boeing 737 Max registered LN-FGF.
[21] Cambrai VOR used as a reference for a published en route holding pattern.
[22] In this area, the airspaces situated below FL 265 are managed by Paris ACC and those situated above are managed by Reims ACC.

arriving at LUMIL as MUAC refused their flight and they were going to have to descend to avoid their airspace.

The controller asked the crew of flight NSZ8TQ to turn onto heading 350° and to descend to FL 340 (point 3). At this point, the aeroplane was flying on heading 022°.

The controller informed the crew of flight TRA21Q that they were also not accepted by Brussels ACC and that they were going to have to divert to Lille-Lesquin airport.

At 10:42, the controller asked the crew of flight TRA21Q to descend to FL 300 and to continue the 360s overhead LUMIL (point 4). The controller asked the crew of flight NSZ8TQ to turn 30° to the left (point 5).

Reims ACC called MUAC to inform them that flight TRA21Q was descending to FL 300. MUAC requested that the flight not enter their airspace. Reims ACC replied that they would try but that they could not see the aeroplane.

At 10:43:23, flights TRA21Q and NSZ8TQ closed in to each other to a minimum distance of 3.9 NM, and with a vertical separation of approximately 1400 ft (points ★). As the transponder of flight TRA21Q was in STBY mode, no TCAS alert or ATC Short Term Conflict Alert (STCA) could be activated. As flight TRA21Q was no longer displayed on the controller's radar screen, he did not detect this loss of separation. The crews of the two aeroplanes did not detect it either.

At 10:44, the crew confirmed to the controller that they could land at Lille.

Reims ACC called Brussels ACC; the latter indicated that they had managed to see flight TRA21Q on their radar screens[23]. They added that the Amsterdam ACC could see it on the primary radar and that consequently, the latter accepted the transfer of flight TRA21Q. The Brussels control centre, Paris ACC and Reims ACC agreed on the conditions for transferring the aeroplane which must be stable at FL 240 at the border and en route to point DENUT.

At 10:46, the controller informed the crew of flight TRA21Q that finally, they could proceed to their destination and cleared them to descend to FL 240.

At 10:50, the crew of flight TRA21Q informed the Reims ACC controller that they were stable at FL 240. The latter cleared them to proceed to point DENUT. Two minutes later, the flight was transferred to Brussels ACC on frequency 127.230 MHz. The captain selected this frequency on RMP 1 and reported that they were at FL 240 heading towards DENUT. This message was received on the Reims ACC frequency. After switching RMP 1 back to the Reims ACC frequency, the captain selected the Brussels frequency again and managed to hear and transmit.

During the frequency change between the Brussels and Amsterdam ACCs, the captain continued to hear the Brussels frequency in the background, in addition to the Amsterdam frequency. This background noise then faded away.
The Amsterdam ACC transferred flight TRA21Q to a dedicated frequency to avoid frequency changes. The crew performed an ILS approach and landed at 11:26 without further incident.

---

[23] The Brussels control centre has data from primary radars. The primary radar track was correlated with the flight plan of the aeroplane at around 10:43 which allowed the controllers to identify the flight.

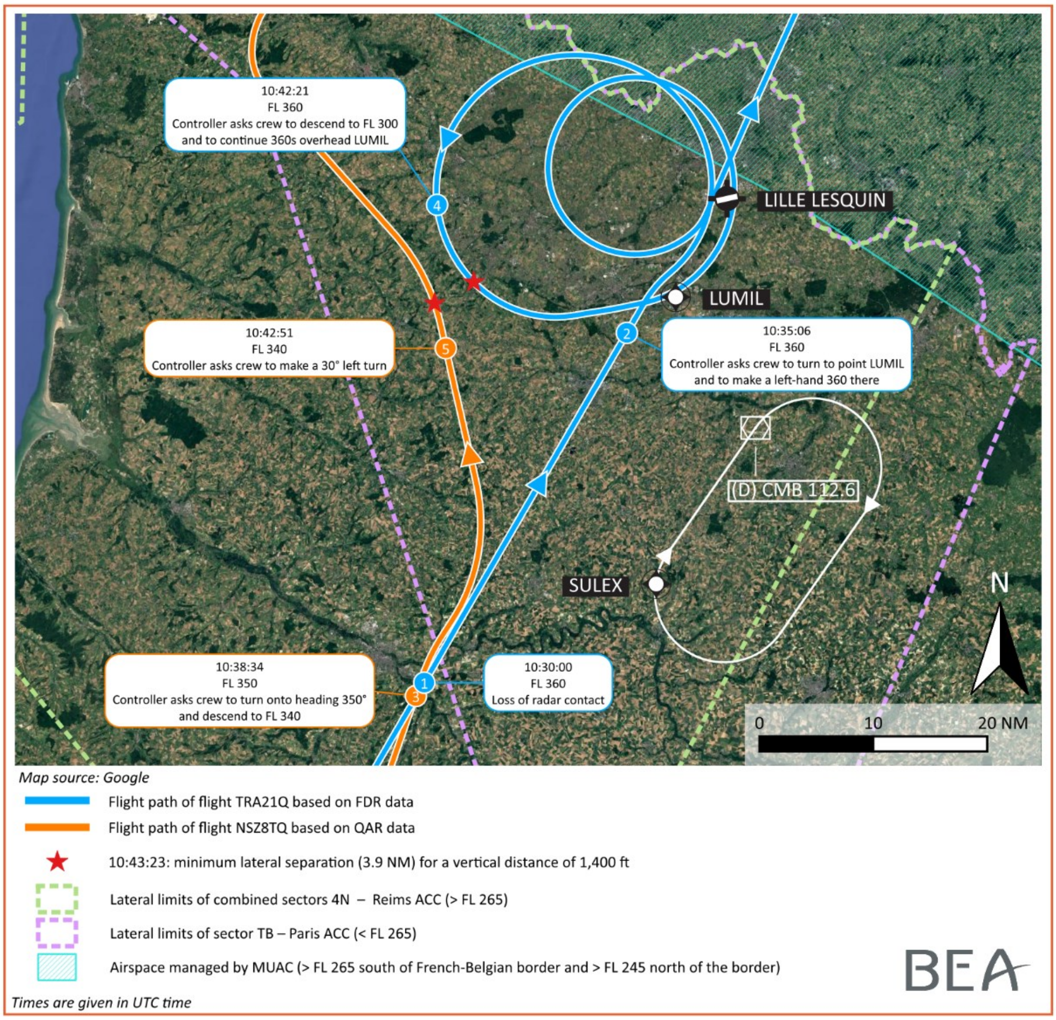

Figure 2: flight path of flight TRA21Q during the loss of separation with flight NSZ8TQ

1.4 Similar events

As part of the investigations into these three incidents, initial searches for similar occurrences were carried out in the European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS) database. The DSNA (the French air navigation service provider), Eurocontrol and Airbus also carried out searches in their respective databases. In addition, the BEA questioned several Airbus neo operators.

At this stage, these searches have identified six other similar occurrences in the A320neo family and one on the A330neo, between March 2023 and April 2025. Occurrences considered similar are those in which radiocommunications were affected, as well as the operation of the transponder and/or TCAS and/or radio navigation systems. However, these searches are not exhaustive and it is therefore likely that the number of similar events is actually higher.

2 AEROPLANE INFORMATION

2.1 Description of DRAIMS system

The DRAIMS (Digital Radio and Audio Integrated Management System) forms part of the communication system (see Figure 3). It contributes to the communication (VHF/HF radios, SATCOM, cabin interphone, etc), aural alerts (FWS, TAWS), surveillance (transponders, ACAS) and radionavigation (MMR, DME, VOR, ADF) functions. For the radionavigation function, the DRAIMS acts as a back-up to the FMS.

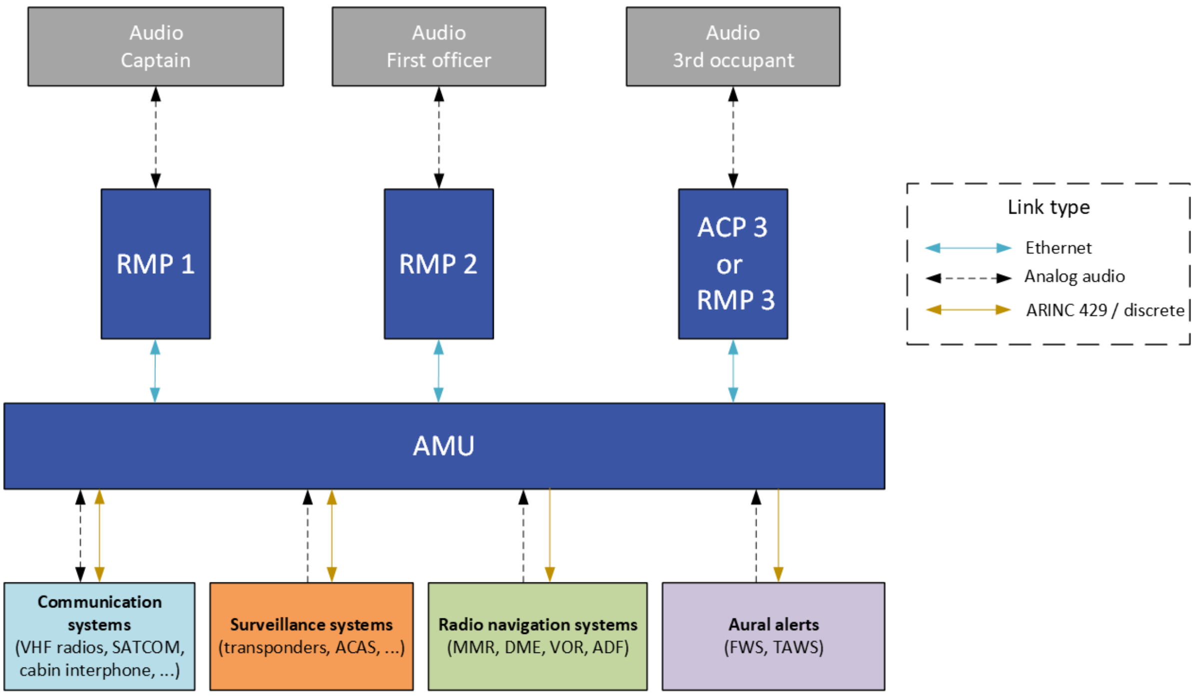

Figure 3: simplified architecture of DRAIMS (source: BEA)

The DRAIMS is composed of:

- two RMPs (Radio Management Panel): interface connected to the crew's audio equipment, and used to configure the audio communication, transponder, ACAS and, as a backup, radio navigation systems (see Figure 4);
- an AMU (Audio Management Unit): a computer that connects the RMPs to external systems (VHF radios, transponders, ACAS, etc.);
- an ACP (Audio Control Panel), or a third RMP depending on the configuration: an interface connected to the third person's audio equipment, mainly used to communicate with ground personnel when the aeroplane is on the ground.

Figure 4: DRAIMS RMP (source: Airbus, annotations BEA)

The DRAIMS began to be installed on some of the A320neo family aeroplanes manufactured from February 2022, some of the A330neos manufactured from March 2024, and the A350s manufactured from November 2024 (see paragraph 2.3 for the number of aeroplanes concerned).

2.2 Description of failure

Due to a lack of robustness in one of the AMU components to Ethernet micro-cuts, the AMU may switch to degraded mode, leading to erratic processing of the Ethernet data flow between the RMPs and the AMU.

The AMU may then send erroneous messages that could compromise the correct functioning of the interfaced systems, with possible repercussions on all functions dependent on the DRAIMS system: control of communication means (radio, SATCOM, CPDLC), aural alerts, control of the transponder and the TCAS, back-up control of the radionavigation means.

The erratic nature of the failure makes it impossible to predict, with certainty, its operational consequences on the functions controlled by the DRAIMS. Nevertheless, the following consequences have been observed during the incidents and during simulator or test bench tests carried out during the investigation at the manufacturer's:

- On operation of RMP 1 and 2:
  - different information displayed on the two RMPs (for example, radio frequencies, ACAS mode, transponder code);
  - alternating different displays (normal display, blank screen, **VHF PAGE NOT AVAIL** or **RMP NOT AVAIL** messages).

- On communications and aural alerts:
  - degraded audio quality of the crew microphone (robotic voice, crackling);
  - impossible to change VHF frequency;
  - display of a selected VHF frequency that is different from the active VHF frequency;
  - loss of the radiocommunication capability, intercom and aural warnings via RMP 1

and/or 2.
   - Unavailability of SATCOM voice communication;
   - Unavailability of CPDLC communication.

- On surveillance functions:
   - impossible to change transponder code;
   - transmission of a different transponder code to that displayed by the crew;
   - erratic changes in the transponder code;
   - loss of part of the transponder functions (loss of Mode C and/or Mode A and/or Mode S);
   - untimely activation of transponder IDENT function;
   - transponder switching to standby (except on A350, see paragraph 2.3), making ADS-B unavailable;
   - instability of TCAS mode;
   - TCAS switching to standby.

- On radio navigation functions:
   - impossible to set and to select radio navigation systems via the MCDU;
   - impossible to set and to select radio navigation systems via the RMP STBY NAV function;
   - impossible to switch to STBY NAV mode or to return to AUTO mode.

- On approach and landing capabilities:
   - unavailability of certain types of approach and certain guidance modes.

Once the failure has appeared, the number of functions affected among those listed above is variable and can evolve during the flight (losses or recoveries of certain functions).

2.3 Description of patch

A modification to the AMU software has been developed by the manufacturer (Thales) for the A320neo family and certified by EASA. This modification prevents the failure described above from having consequences on the DRAIMS and its peripheral systems. This new version of the software includes:

- internal monitoring of the component that causes the failure;
- an automatic restart mechanism for this component as soon as the failure is detected;
- additional checks performed by the AMU to prevent corrupted messages from being sent to interfaced systems.

This modification was the subject of an Airbus Service Bulletin, made mandatory by the EASA Airworthiness Directive 2025-0118, effective on 4 June 2025. The retrofit of A320neos in service began in April 2025 and is expected to be completed in the second half of 2026 according to Airbus. The EASA Airworthiness Directive requires that the software modification be completed by 4 December 2026. As of 1 July 2025, of the 1062 A320neos delivered without the patch, around 110 have received the software modification.

For the A330neos, certification of the patch is currently underway. As of 1 July 2025, 30 aeroplanes are equipped with this system.

On the A350, a failure of the DRAIMS cannot force the transponder into standby because the system architecture[24] is different. Nevertheless, a similar software upgrade will be implemented in the next version of the DRAIMS on the A350. As of 1 July 2025, 25 A350s are equipped with the DRAIMS.

2.4 Temporary procedures

Pending implementation of the patch, Airbus has drawn up two temporary procedures, one for the A320neo family, OEB 63 (Operations Engineering Bulletin, see paragraph 2.4.1) and a second one for the A330neo, OEB 58 (see paragraph 2.4.2), to enable crews to carry out corrective actions in flight to recover certain lost functionalities (at least, the transponder's capability to transmit). These procedures are each the subject of a temporary amendment to the aeroplane flight manual, made mandatory by an EASA airworthiness directive, effective 26 February 2025[25].

Airbus distributed these procedures to all its customers via an FOT (Flight Operator Transmission) and presented it to all the operators during a webinar on 5 March 2025.

In addition, two other temporary procedures (Temporary Abnormal Behaviour (TAB)) for the A320neo family were drawn up by Airbus to handle RMP de-synchronization problems (see paragraph 2.4.3) and audio quality problems (see paragraph 2.4.4), identified shortly after the DRAIMS was entered into service.

For the A350, as the failure of the DRAIMS cannot force the transponder into standby, it was considered that a temporary procedures was not necessary.

2.4.1 OEB 63: *Dual loss of RMP data synchronization leading to loss of control of radiocommunication, transponder or standby navigation*

An OEB is a temporary procedure for crews that must be applied under specific conditions to ensure safe operation of the aeroplane. An OEB is applicable until a permanent solution is installed in the aeroplane. The OEB is inserted in the aeroplane's QRH, and standard operating procedures require that the applicable OEBs are reviewed and discussed before each flight.

This OEB is in the "RED OEB" category, indicating that non-compliance may have a significant impact on flight safety.

OEB 63, applicable for the aeroplanes in the A320neo family, specifies that the procedure applies when the crew can no longer manage communications on both RMPs.

---

[24] Airbus indicates that on the A350, the transponder is not set to standby via the RMPs but via another interface (MFD, MultiFunction Display).

[25] Airworthiness Directive 2025-0037 for the A320neo family and Airworthiness Directive 2025-0043 for the A330s. The Airworthiness Directive 2025-0037 has since been incorporated in and superseded by the Airworthiness Directive 2025-0118 effective on 4 June 2025.

DUAL LOSS OF RMP DATA SYNCHRONIZATION LEADING TO LOSS OF CONTROL OF RADIO COMMUNICATION, TRANSPONDER OR STANDBY NAVIGATION

Ident.: OEBPROC-63-00028498.0001001 / 05 FEB 25 - IN CREATION
Criteria: (P20240)

ECAM ENTRY

None

PROCEDURE

Apply the following procedure when the flight crew cannot manage the communication on both RMP 1 and RMP 2.

Figure 5: OEB entry conditions (source: Airbus)

The procedure requires the crew to perform a manual restart of the AMU by pulling and then re-engaging the two AMU circuit breakers.

If the restart does not correct the problem, the crew are instructed to switch off both RMPs and only use ACP 3 (or RMP 3, depending on the configuration). The operational consequences for the rest of the flight are as follows:

- If the DRAIMS configuration includes an ACP 3:
  - VHF communications remain frozen on the last frequency used[26] and are only possible via a headset connected to ACP 3;
  - aural alerts are only available via a headset connected to ACP 3;
  - the transponders can no longer be set; Mode A automatically switches to 7600;
  - the TCAS can no longer be set; it automatically switches to TA/RA mode;
  - the setting of the radionavigation means is no longer available if the STBY NAV mode was active.

- If the DRAIMS configuration includes an RMP 3:
  - the communications and surveillance (transponder, TCAS) functions can be set via RMP 3. All associated settings must be checked;
  - the setting of the radionavigation means is no longer available if the STBY NAV mode was active;
  - the aural alerts are available in all the cockpit headsets.

During the stopover in the incident to PH-YHA, the crew de-energised and then energised the aeroplane in order to restart all the systems. The inability to control the transponder and TCAS persisted during the following flight.

2.4.2 OEB 58: *Dual loss of RMP data synchronization leading to loss of control of radio communication, transponder or standby navigation*

This OEB, applicable to the A330neo, has the same title and describes the same entry conditions as the OEB for the A320neo family.

[26] The last frequency used by the RMP may be different from the last frequency selected and displayed by the crew.

A manual restart of the AMU is not possible on the A330neo as the circuit breakers cannot be accessed from the cockpit. The procedure therefore requires RMP 1 and RMP 2 to be set to OFF and to manage communications with RMP 3[27]. As in the configuration with three RMPs on the A320neo:

- the communication and monitoring (transponder and TCAS) functions can be set via RMP 3. The crew are asked to check all the associated settings;
- the setting of the radionavigation means is no longer available if the STBY NAV mode was active;
- the aural alerts are available in all the cockpit headsets.

2.4.3 TAB: *Loss of RMP data synchronization that results in the loss of one RMP*

This operational recommendation applies to the A320neo family when RMP 1 or RMP 2 no longer sends data to the other RMP or to the systems connected to the AMU. As a result, the display of the two RMPs is no longer synchronised and the control of the functions managed by the DRAIMS is affected.

It recommends switching off the affected RMP and using ACP 3 (or RMP 3, depending on the configuration) as a replacement. On the affected side, the pilot must use his/her headset, as the hand-held microphone and speakers are inoperative.

2.4.4 TAB: *Noises that may result in the loss of audio communications*

This operational recommendation applies to the A320neo family when specific noises (such as crackling) are identified in the captain's or co-pilot's headset or speaker. These noises may then intensify until communications are no longer audible.

It recommends switching the RMP affected by these noises, OFF and then ON. If restarting is not effective, it indicates switching OFF the affected RMP and using ACP 3 (or RMP 3, depending on the configuration), as a replacement. On the affected side, the pilot must use his/her headset, as with the RMP switched off, the hand-held microphone and speakers are inoperative.

3 LOSS OF RADIO AND/OR RADAR PROCEDURES

The European regulations[28] and the ICAO standards and recommended practices[29] include general procedures for the cases of a radio failure and a transponder failure. Local procedures for certain aerodromes also exist in the AIP.

3.1 Radio failure

At the time of the incidents, radio failure procedures in force[30] provided for two scenarios depending on weather conditions:

---

[27] There is no configuration with an ACP3 on the A330neo. All the aeroplanes are equipped with three RMPs.
[28] European regulation (EU) No 923/2012, known as SERA.
[29] ICAO 4444, paragraph 15.3.3.
[30] An update to the radio failure procedure came into force on 1 May 2025 in the SERA. This update had not yet been implemented in France at the time of writing this report. The significant changes are the extension of the time allowed for controllers to take the radio failure into account (increased from 7 to 20 minutes) and the introduction of a new transponder code (7601) dedicated to radio failure in VMC conditions to indicate the crew's intention to land as quickly as possible.

- in Visual Meteorological Conditions (VMC), the crew shall display transponder code 7600, continue their flight in VMC, land at the nearest suitable aerodrome and report their arrival by the most expeditious means to the appropriate air traffic services unit;
- in Instrument Meteorological Conditions (IMC), the crew must hold the last assigned speed and level, or the minimum flight altitude if higher, for 7 minutes from the latest of three specific moments (reaching the last assigned flight level, selecting transponder code 7600, or being unable to report their position at a compulsory reporting point). The crew shall then adjust their speed and level in accordance with the filed flight plan. If the aircraft was being radar vectored or having been directed by ATC to proceed offset using area navigation (RNAV) without a specified limit, it must rejoin the last received and acknowledged route no later than the next significant point, taking into consideration the applicable minimum flight altitude. It then continues on this route to the destination aerodrome. The current flight plan, including authorized changes, is authoritative for flight paths, levels and descent times.

This procedure is included in the Transavia and Aer Lingus operations manuals. The Transavia manual also specifies that air traffic control will assume that an IFR flight will follow the IMC option described above. The Aer Lingus operations manual does not specify this.

This procedure is included in the operations manuals (OM) of the French ACCs concerned by these three incidents. In the event of a radio failure, the procedure anticipates that the crew will be able to use a transponder to report the failure to air traffic control. Furthermore, the quick-reference cards available to controllers provide for the use of the transponder's IDENT function to identify the type of radio failure (reception, transmission or total). Certain quick-reference cards specify that it is also possible for the ATC to contact the operations department of certain operators so that the latter can send a message to the crew via the ACARS[31].

In the case of Bordeaux Mérignac airport, the local procedure published in the AIP stipulates that, in the event of a radio failure, the aircraft will arrive at the IAF at the last flight level received. When the failure occurs during cruise and persists until the approach, as in the incident to EI-NSF, this procedure may be incompatible with compliance with the flight plan specified in the general procedure described above.

3.2 Transponder failure

When en route, the procedure in the event of a transponder failure described in the European regulations stipulates that if the failure is total, the ATC units shall endeavour to ensure that the flight continues to the destination aerodrome. However, the pilot may experience certain restrictions or even be denied access to certain airspaces. In some cases, the pilot may be asked to return to the departure aerodrome or any other aerodrome acceptable to both the operator and the air traffic control units.

This procedure assumes that the crew are able to use a radio to communicate with air traffic control.

This procedure is included in the operations manuals of the French control centres concerned by these three incidents. It appears also in the Aer Lingus and the Transavia operations manuals.

---

[31] Aircraft Communication Addressing and Reporting System.

In the case where both transponders have failed or are in standby, the **NAV ATC/XPDR 1+2 FAULT** or **NAV ATC/XPDR STBY** ECAM messages draw the crew's attention to this but no particular action is required.

3.3 Radio and transponder failures

Neither European regulations nor ICAO documents have specific procedures for simultaneous radio and transponder failures. Nor does this scenario appear in the Aer Lingus and Transavia OMs.

The French control centres concerned by these three incidents have quick reference cards that correspond to the simultaneous loss of radio and radar contact. The procedures in the Brest ACC and Bordeaux ACC include actions to:

- recover radar contact (switch to single radar display, display all display layers, display transponder codes that are usually filtered);
- recover radio contact (use distress frequency, radio relay with another aircraft).

In the French ACCs, the ability of air traffic controllers to provide control services is then severely impaired. The use of information from other civil or military control units (see paragraph 4.5) is therefore the only way to obtain up-to-date information on the aircraft's position. It is therefore preferable that large safety margins with respect to other traffic are applied, given the impossibility of knowing the crew's intentions in real time.

According to the statements collected from controllers during the investigation into the incident to EI-NSF, dual radio and transponder failures are not covered in simulator exercises during refresher training in abnormal and emergency situations. The exercises cover a transponder failure and a radio failure, but independently of each other.

4 ATC INFORMATION

4.1 Flight display tools

Two systems are currently used by the air traffic controllers in the ACCs in France:

- EEE, ERATO Environnement Electronique (Brest ACC and Bordeaux ACC);
- 4-FLIGHT (Reims ACC, Paris ACC and Marseille ACC).

The radar tracking data associated with these en-route systems is solely provided by secondary radars.

In the event of a total transponder failure, the only way to view the aircraft's actual position is to use a primary radar. In this case, altitude information is no longer provided by the civil primary radars[32].

With the EEE system, an aircraft with a total transponder failure is no longer displayed on the controllers' screens.

With the 4-FLIGHT system, a FPASD[33] is displayed which shows the position of the aircraft with a total transponder failure. This position is calculated by the system based on the flight plan data (see Figure 6).

---

[32] Some military primary radars can provide an estimated altitude of the detected track.
[33] Flight Plan Air Situation Display.

Both systems display on the radar screen, a “track marker”, showing the last detected position and alerting controllers to the loss of detection of the flight in question.

Figure 6: illustration of track marker (in amber) and of F-PASD (in blue) displayed during the serious incident to PH-YHC (source: DSNA)

In certain approach control centres, particularly at Bordeaux-Mérignac, the radar display is enhanced by information from a locally installed primary radar. Air traffic controllers can thus follow the horizontal flight path of a flight experiencing a total transponder failure. This requires the successful identification of the corresponding track. Furthermore, the range is generally limited (for example, it is 80 NM around Bordeaux-Mérignac airport).

Some foreign area control centres (Maastricht and Brussels ACC) also have information from primary radars. Controllers in these centres then have the possibility of displaying the position of a flight experiencing a transponder failure on their screens without external assistance, for example from the military. In addition, the track based on the primary radar can be automatically correlated with information from the flight plan data.

4.2 Communications by CPDLC

The CPDLC is a means of communication via a text-based data link. According to a directive from the DSNA Operations Division, the CPDLC is a complementary means of communication to ground-to-air radiocommunication. It can only be used after initial two-way voice contact has been established, in order to ensure that voice communication can be resumed if necessary. In exceptional circumstances, it may be used in certain cases where there are problems with voice communication.

In the event of a radio failure, the CPDLC may become the only means of communicating with a crew.

In the event of a total transponder failure, the use of the CPDLC may be degraded according to the systems used by the ACCs:

- with the EEE system, controllers can no longer use the CPDLC to communicate with the crew of the affected flight because clearances sent via the CPDLC are based on the flight's radar label and this disappears when there is a transponder failure;
- with the 4-FLIGHT system, CPDLC functionality is still available via the FPSAD.

4.3 Aeronautical emergency frequency 121.5 MHz

The frequency 121.5 MHz is the internationally defined aeronautical emergency frequency.

According to European regulations[34], this frequency is used in urgent situations, and in particular:

- to provide an unused frequency between an aircraft in a distress or urgent situation and a ground station when normal frequencies are being used by other aircraft;
- to provide a VHF communication channel between aircraft and aerodromes, not normally used by international air services, in the event of an urgent situation;
- to ensure air-ground communication with aircraft when a failure of on-board equipment prevents the use of ordinary channels;
- to provide a common VHF communication channel between civil aircraft and intercepting aircraft or intercept control units, and between civil or intercepting aircraft and air traffic services units in the event of interception of the civil aircraft.

The frequency 121.5 MHz is implemented at the following locations (requirement ATS.OR.405 (b)):

- all area control centres and flight information centres;
- airport control towers and approach control units serving international airports and international alternate airports;
- any other location designated by the competent authority, when the use of this frequency is deemed necessary for the immediate reception of distress calls or for the purposes specified in the previous paragraph.

In the serious incident involving EI-NSF, it was found that some control centres did not have a transmission capability on 121.5 MHz via their main radio channel[35]. As a result, they were unable to communicate directly and effectively on this frequency, which is intended, for example, to help re-establish communications with an aircraft.

The DSNA has stated that its objective is to equip all sites concerned by the above regulations with transmission and reception capabilities. The deployment schedule has not yet been defined.

4.4 En-route holding

The AIP France states that, "*To cope with sudden and unexpected difficulties of traffic flow, an aircraft may be required to remain on hold in one of the patterns described […]*".

These patterns may only be used on ATC instructions and under radar supervision.

---

[34] European regulation (EU) 2017/373 (requirement ATS.OR.405(b)) and (EU) 923/2012 (requirement SERA.14095(d))

[35] At the date of the incidents involving EI-NSF and PH-YHA, Bordeaux Mérignac approach control centre did not have this capability. It did not contact the crew of EI-NSF on this frequency and used a standby radio unit with a limited range to contact the crew of PH-YHA.

Unless otherwise specified in the descriptive documents, these holding patterns can be used under certain conditions of altitude, minimum bank angle and maximum speed.

These holding patterns can be displayed on the air traffic controllers' radar screens. These patterns are also coded in the aircraft's FMS, which provides a common reference point for air traffic controllers and crews regarding the aircraft's flight envelope and standard flight paths.

In the incident involving PH-YHC, the controller considered using the en-route holding pattern located at CMB and instructed the crew to proceed to this VOR. The pilot of PH-YHC then replied that this would mean a significant alteration to the flight path (an alteration of 90°).

The CMB holding pattern interferes with numerous airways located in the control sector of the incident as well as in a neighbouring sector. Not wanting to generate conflicts outside his sector, the controller chose to use the airspace around the LUMIL point by having the aircraft perform 360° turns. This space is located outside the published route network and in an area of his sector where there was initially no interfering traffic.

In order to follow the controller's instruction, the crew performed 360 turns by gradually adjusting the heading knob. There is an FMS function to create a holding pattern at the aeroplane's current position or at a given waypoint. This function can also be used to programme a 360° turn, by specifying a zero outbound time or distance. However, this is not a standard en route operation for a pilot.

4.5 Reporting abnormal situations and assistance from military units

Civil air traffic control services must report any abnormal situation to the military air defence chain as soon as possible[36].

The military units have a network of primary[37] and secondary radars covering the entire territory. This network can enable them to provide assistance to any civil aircraft that reports difficulties. This is carried out in the scope of assistance to persons in danger.

A distinction can be made between a situation that is simply worrying (urgent situation, ALERFA phase) and a situation that warrants immediate assistance (distress situation, DETRESFA phase). In an urgent situation, an assistance operation is only initiated on request by the pilot of the aircraft in difficulty. In a distress situation, an assistance operation is initiated immediately.

Assistance consists of undertaking one or more of the following operations:

- communicating to the assisted aircraft, with or without the assistance of another aircraft, the information necessary to continue or abort the flight by helping it to perform certain manoeuvres;
- having the assisted aircraft intercepted by another aircraft and, if necessary, assisting it until it lands at a location chosen or imposed by circumstances.

[36] According to the operational memorandum of understanding between the DSNA/DO and the Air Defence and Air Operations Command (CDAOA) on aviation security.
[37] These primary radars provide an approximate radar position and altitude.

In mainland France, the service that centralises and decides on initiating the interception to assist aircraft in distress is CAPCODA-TN.

5 INTERNET SITE FOR TRACKING FLIGHTS IN REAL TIME

Flightradar24 is one of the websites that tracks air traffic in nearly real time. Created in 2007, its purpose is to display information on commercial and private flights using the ADS-B data transmitted by the transponders equipping the aircraft. An aeroplane equipped with ADS-B determines its position using a satellite positioning system (GNSS) and periodically sends this position and other information to ground stations and other ADS-B-equipped aircraft in the area.

Should an aircraft stop transmitting ADS-B data, and if the user settings allow it, Flightradar24 extrapolates the aircraft's position and continues to display the flight at the last known altitude and speed, following the route specified in the flight plan, if known. The information provided by Flightradar24 is therefore not a reflection of reality and it cannot be used to obtain information in the event of a transponder failure, as it is this equipment that transmits ADS-B data. To know the source of the data (ADS-B data or estimations), it is necessary to select the flight on the Flightradar24 chart and consult the flight information in question (see Figure 7).

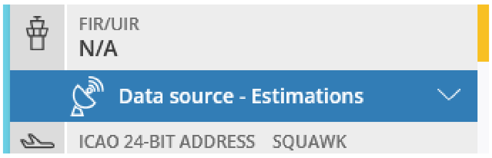

Figure 7: indication of the source of Flightradar24 data

During the serious incident involving EI-NSF, the civil and military air traffic controllers used this general public flight tracking tool to try to obtain information on the aeroplane's position. The flight path displayed by Flightradar24 during the incident after the transponder was lost was estimated as follows:

- extrapolation for 120 s in a straight line, of the flight path preceding the loss of ADS-B data;
- then, as per the flight plan filed, up to the last point before the IAF;
- lastly as per a direct flight path to the known destination aerodrome.

Thus, during the incident, the flight remained displayed at FL 330, on a route different from the route actually followed by the aircraft (see Figure 8). For the controllers, this information could appear consistent with the radio failure procedure then in force for flights to Bordeaux-Mérignac; this procedure indicated that the crew should report at the IAF at the last level received. The extrapolated flight level information provided by Flightradar24 may have influenced the air traffic controllers' awareness of the situation and their decision-making.

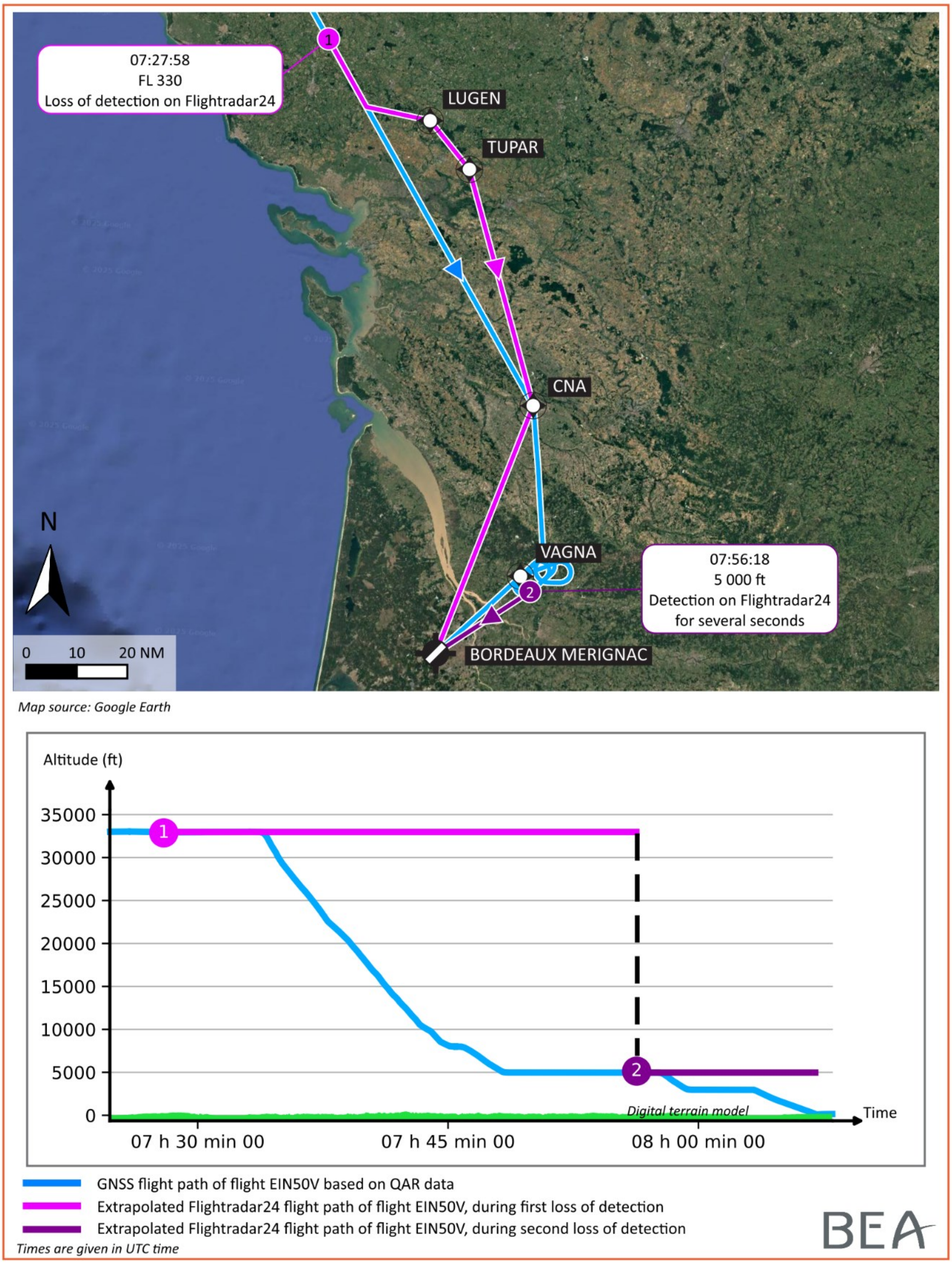

Figure 8: comparison of GNSS flight path with Flightradar24 estimations for flight EIN50V

In early April 2025, the DSNA Operations Division issued a national bulletin to provide feedback and raise awareness of the risks associated with using Flightradar24 in the event of a transponder failure.

This document emphasises the unreliability of the information transmitted by Flightradar24 in the event of a transponder failure. The use of Flightradar24 in an operational context is not prohibited as such.

6 SAFETY ISSUES

The safety messages below are solely based on the information which came to the knowledge of the BEA during the investigation. They are not meant to apportion blame or liability.

The DRAIMS allows pilots to interact with radiocommunications, transponders, the aeroplane's TCAS and radio navigation systems. It is installed on certain aeroplanes in the A320neo family and on the A330neo and A350.

This system has a failure mode, not anticipated during development and certification, which can have multiple consequences and affect, in particular, communication means (radio, SATCOM, CPDLC), aural alerts, transponder operation and availability, TCAS availability, approach and landing capabilities and the availability of associated guidance modes, and the standby selection of radio navigation systems. Once the failure has appeared, the number of functions affected is variable and can evolve during the flight.

A software patch has been developed by Airbus and Thales for the A320neo family and was certified by EASA in December 2024. This patch is now installed on newly manufactured aircraft and a retrofit is underway on all aircraft in service. At this stage, it is expected that all the aeroplanes concerned in the A320neo family will be equipped by the end of 2026. A patch is currently being certified for the A330neo. For the A350, a similar patch will be introduced in the next DRAIMS version. As of 1 July 2025, around 950 A320neo, 30 A330neo, and 25 A350 in service are not yet corrected with this patch.

Pending the retrofit of all the aeroplanes, Airbus has drawn up two temporary procedures, one for the A320neo family (OEB 63) and one for the A330neo (OEB 58). Both OEBs have been made mandatory by an EASA Airworthiness Directive, effective 26 February 2025. When the OEB entry conditions are met, the procedure for the A320 family requires a manual restart of the AMU in flight (see paragraph 2.4.1). The procedure for the A330 requires RMP 1 and RMP 2 to be set to OFF and the use of RMP 3. There is no other procedure available to crews to deal with this failure. On the A350, as the failure of the DRAIMS cannot force the transponder into standby, it was considered that a temporary procedure was not necessary.

Three incidents, two of which were classed as serious by the BEA, have occurred in France over a roughly seven-month period. Seven other incidents, six involving the A320neo family and one involving the A330neo, have been identified at this stage of the investigation, making a total of ten incidents in approximately two years. Due to the nature of the failure, it is likely that there will be other incidents before the entire fleet is retrofitted.

These three incidents, and in particular the one involving PH-YHC, show that the appearance of this failure and its management in real time can compromise all the safety barriers designed to prevent a mid-air collision.

Consequently, the BEA draws the particular attention of operators and air navigation service providers to the following points:

- a failure of the DRAIMS affecting transponders cannot be handled in the same way as a conventional transponder failure. In fact, switching to the second system may not be possible and does not resolve the underlying failure, as was the case in the three incidents investigated by the BEA;

- in the event of a DRAIMS failure, the availability of on-board systems may vary over time, with certain functions being lost or regained in a random manner. In particular, before leaving a published flight path or ATC route, the possibility of a deterioration leading to a total loss of radiocommunications and radar contact must be taken into account;

- in cruise flight, and particularly in RVSM airspace where the use of the autopilot is mandatory, following a holding pattern is preferable because it generates less work for the crew than performing a 360° turn. This is all the more important if the crew is otherwise particularly engaged in managing the failure. It also means that the aeroplane will follow a predictable and repeatable flight path from one full pattern to the next;

- in area control in French airspace, the loss of the transponder leads to the loss of radar contact, ADS-B data and as a consequence, the ATC safety nets. It also generally results in the TCAS not being available;

- in the event of a total transponder failure, the data presented by flight tracking sites, such as Flightradar24, does not correspond to the actual position of the aeroplane. Military units can provide an indication of the position and an approximative estimation of the altitude based on their detection system or initiate in-flight assistance, upon the control centre explicitly requesting this from CAPCODA-TN. Certain foreign border control centres, such as Maastricht and Brussels, have a display enriched by primary radar data;

- two of the three incidents also demonstrated the need for a control unit to be able to transmit on the 121.5 MHz aeronautical emergency frequency. This frequency may sometimes be the only one that can be used to establish radio contact with the crew;

- on the flight deck side, these three incidents highlight the importance of monitoring the 121.5 MHz aeronautical emergency frequency, as the failure of the DRAIMS can make it impossible to change radio frequencies.

7 CONTINUATION OF SAFETY INVESTIGATIONS

The three safety investigations will particularly focus on the following topics:

- analysis of the DRAIMS failure;
- development and certification of the DRAIMS;
- procedures and training for controllers in abnormal and urgent situations;
- radio failure and/or transponder failure procedures;
- possibility to access primary radar information to manage an aircraft with a transponder failure;
- coordination with military units for in-flight assistance for aircraft in difficulty or in a distress situation;
- transmission/reception capabilities of control units on the aeronautical emergency frequency.

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