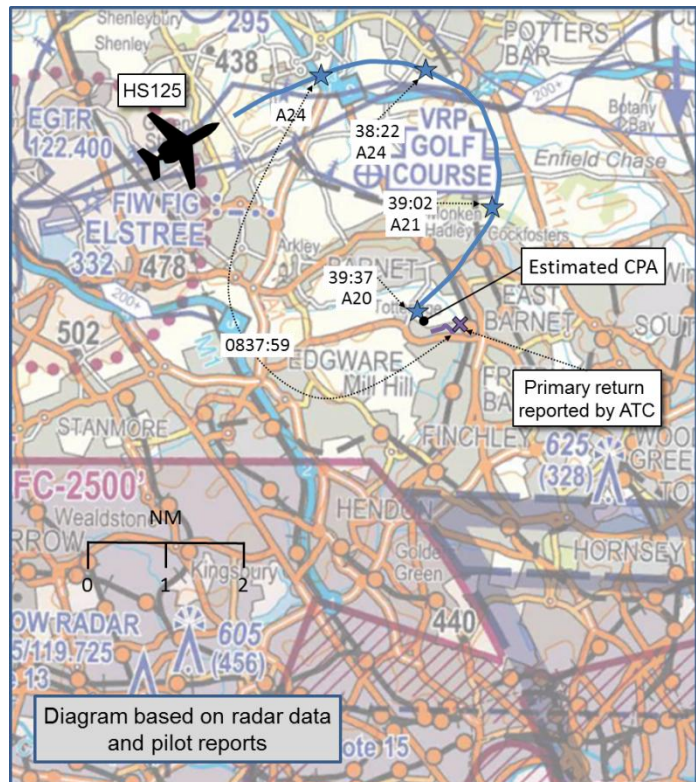


AIRPROX REPORT No 2014157**Date/Time:** 21 Aug 2014 0837Z**Position:** 5137N 00012W
(5.25nm SE Elstree)**Airspace:** London FIR (Class: G)**Aircraft 1** **Aircraft 2****Type:** HS125 Untraced Light Aircraft**Operator:** HQ Air (Ops) Unknown**Alt/FL:** 2100ft NK
QNH (1016hPa)**Conditions:** VMC NK**Visibility:** 30km NK**Reported Separation:**
0ft V/50m H NK V/NK H**Recorded Separation:**

NK V/NK H

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE HS125 PILOT reports flying a white aircraft with HISLs, navigation lights, beacon and taxi lights illuminated, and squawking transponder Modes 3/A, C and S; the aircraft was fitted with TCAS and the crew were in receipt of a Traffic Service from the Northolt Approach controller. Whilst flying the downwind leg of a radar-vectored pattern for an ILS to RW25 at RAF Northolt, the crew received Traffic Information from Northolt Approach on an unidentified radar contact, with no height information, to the southeast of them. The crew made a visual scan to 'clear the area', and then Approach instructed them to turn right, on to 180°, at 2400ft QNH for the base-leg. The Traffic Information was updated but the controller reported that the contact was intermittent and fading, and asked the crew if they were happy to 'turn against' the traffic. The crew could see an aircraft in the position indicated by Approach, it was not shown on the TCAS display, and they considered that it was not a threat so they confirmed they were happy to accept a turn. Approach issued a right-turn on to a heading of 220° to intercept the localizer, and instructed the crew to descend to 2000ft QNH; whilst the aircraft was turning, Approach confirmed that the previous conflicting traffic had faded from the radar display. The crew continued to look out but lost sight of the other aircraft as they turned and commenced the short descent. At approximately 2200ft QNH the left-hand flight-director failed, and both pilots looked into the cockpit momentarily. At around 2100ft, the crew resumed their look-out and immediately saw a dark-coloured, high-wing, single-engine aircraft, with yellow markings on it, in their left, 9 o'clock position, around 50m away, and at the same level. The light-aircraft appeared to be heading 270°, straight and level as it passed behind the HS125; there was no indication on the TCAS display. Details were passed to Approach, but the controller could not see the conflicting aircraft on the radar display.

The pilot noted that, apart from their brief look into the cockpit, which he considered was reasonable given the failure of the flight-director; both pilots had been maintaining a diligent lookout throughout the approach. He observed that, had they configured the aircraft a little earlier, and therefore been flying a little slower, they would very likely have collided with the other aircraft. Whilst acknowledging that pilots always need to keep a good lookout, the pilot observed that primary radar was an important aid in this busy piece of airspace and was surprised to find that the radar had not detected the conflicting aircraft at around 2000ft when the known base of radar coverage in the area was 400ft, he thought. He opined that improvements in the primary radar coverage in the area or the

implementation of a Transponder Mandatory Zone could reduce the likelihood of similar occurrences happening in the future.

He assessed the risk of collision as 'Very High'.

THE LIGHT-AIRCRAFT PILOT could not be traced despite extensive tracing action, including contacting owners of all aircraft matching the unusual colouring reported.

THE APPROACH CONTROLLER reports operating in a combined Approach and Director Role, with a low task-difficulty and workload, providing a Traffic Service to the HS125 crew at 2400ft (QNH 1016hPa) and a heading of 070°, in the Radar Training Circuit. Approach noticed a primary radar contact tracking east-bound, around 5nm southeast of Elstree, which seemed to be shadowing the heading of the HS125. He passed Traffic Information on the primary contact to the HS125 and asked if they were happy to turn towards the ILS against the primary radar contact. The crew asked the controller to 'standby', and shortly afterwards reported that they were happy to turn against the other aircraft. Approach instructed the crew to turn right on to 220° and, whilst the aircraft was turning, the conflicting primary radar contact stopped and then disappeared from the radar display. The controller recalls informing the HS125 crew that the conflicting return had disappeared, and then instructed them to descend to 2000ft in order to enter the London CTR at the correct altitude. The Approach controller passed the HS125's inbound details to Northolt Tower and then the pilot reported that he had been involved in an Airprox with an aircraft at the same level, in their 5 o'clock position; the controller 'double-checked' the radar and confirmed that there was no conflicting return on the display; this information was passed to the crew and they were then handed over to Northolt Tower at 5.5nm, established on the ILS.

He perceived the severity of the incident as 'Medium'.

Factual Background

The weather at Northolt at 07950 was recorded as:

METAR EGWU 210750Z 23003KT CAVOK 12/08 Q1016 BLU NOSIG

Analysis and Investigation

Military ATM

The radar replay was analysed, along with the tape transcript, and a discrepancy of around 2min 30sec is apparent between the radar replay and the transcript; the incident has been reported to RAF (U) Swanwick and NATS and the discrepancy remains. The radar replay has been correlated with the transcript to synchronise the information and produce the factual data.

A copy of the tape transcript is below:

From	To	Speech transcript	Transcript time	Radar time
NLT	BAE 125	[BAE 125 callsign] there's traffic south east of you at the moment, 3 miles, err similar heading, height unknown. Are you happy to turn against that traffic?	0835:32	0838:05 Figure 1
BAE 125	NLT	[BAE 125 callsign] affirm.	0835:41	
NLT	BAE 125	Roger sir, turn right heading 220 degrees, report the localiser established, checks complete.	0835:51	0838:25 Figure 2
NLT	BAE 125	[BAE 125 callsign] previously reported contact has now faded from radar, south of you at the moment, 2 and a half miles, err height unknown.	0836:20	0838:34 Figure 3

From	To	Speech transcript	Transcript time	Radar time
NLT	BAE 125	[BAE 125 callsign] descend altitude 2000 ft.	0836:30	
BAE 125	NLT	[BAE 125 callsign] and we've just err passed err a contact, co-level, just in our 5 o'clock.	0837:58	0840:06 Figure 4
NLT	BAE 125	Roger, there's nothing seen on radar at the moment. It's probably the previous contact. It's not been showing for about the last minute and a half.	0838:08	

The Traffic Information was passed as 'southeast, 3nm, no height' (Figure 1).

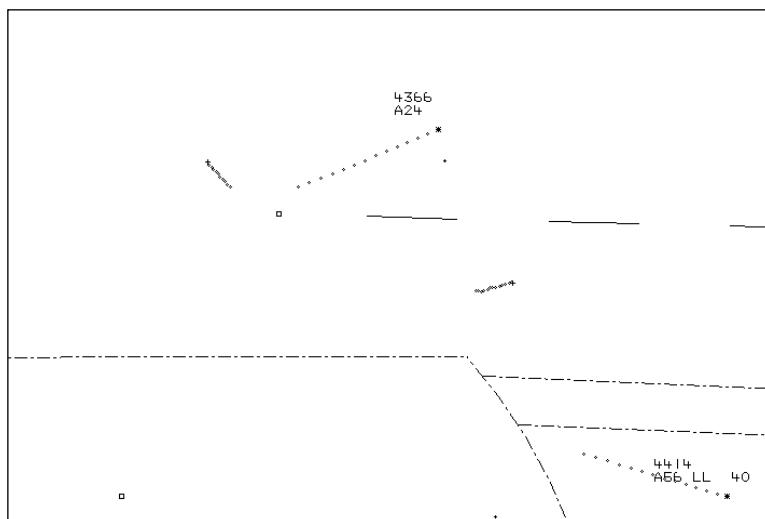


Figure 1: Traffic Information at 0835:32; radar replay at 0838:05; Primary contact southeast at 3nms (BAE125 squawking 4366).

The next instruction from the controller was to turn right onto 220° to pick up the ILS Localiser. The conflicting traffic can be viewed by its trail but the primary contact had disappeared from radar.

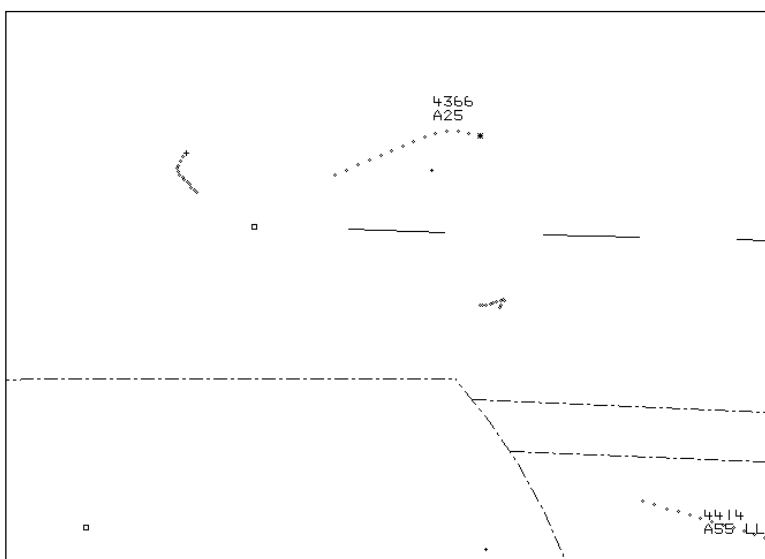


Figure 2: At 0835:51 on transcript and 0838:25 on radar replay as the BAE 125 is in the right turn.

The conflictor had faded from radar and the information was passed to the pilot as 'south, 2.5nm, height unknown' (Figure 3).

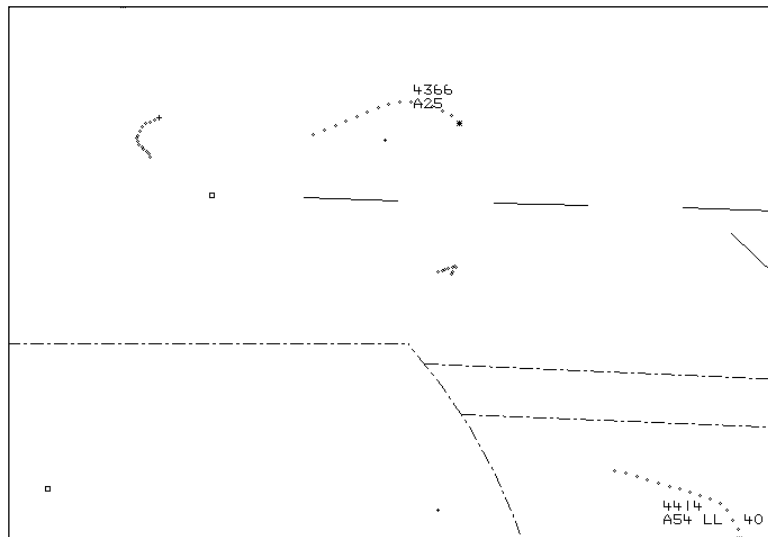


Figure 3: At 0836:20 on transcript and at 0838:34 on radar replay, as the controller reported the conflict fade from radar.

The crew declared the Airprox in their 5 o'clock position with nothing showing on radar (Figure 4).

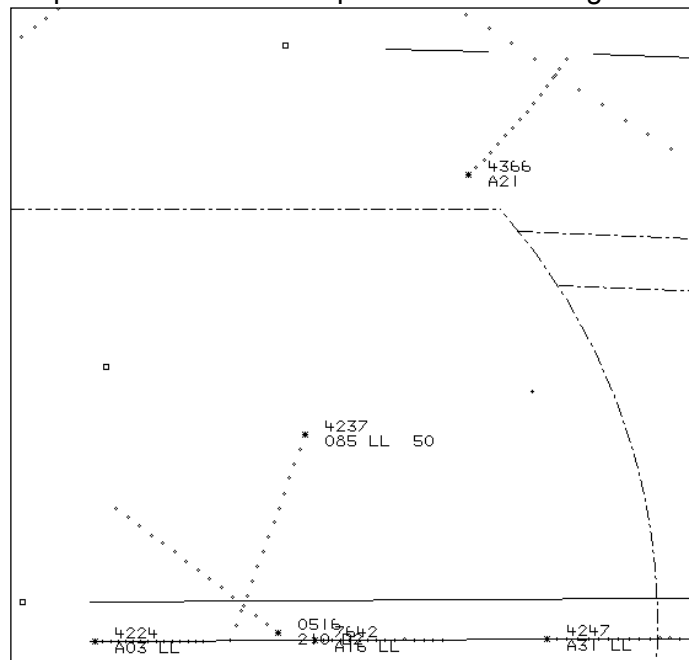


Figure 4: At 0837:58 on transcript and estimated at 0840:06 on radar replay, as Airprox is reported by the crew.

ATC had called the traffic, as per the terms of a Traffic Service, and requested if the pilot was content to turn against the reported contact. In the subsequent Unit investigation, the pilot had reported that he was visual with a contact, in the approximate location of the reported track, and decided to take the turn. Traffic Information had been passed previously in the radar circuit and the controller, with one track on, had been scanning for conflictors. The controller then made the crew aware when the primary contact disappeared from radar, which will have placed more of an emphasis on the need for a robust lookout. The standard radar pattern can be modified for traffic deconfliction, but the airspace to the north of Northolt limits the controller with fewer options for applying different altitudes, or extending the turn inbound, due to other CTRs. The radar circuit can be flown between 2000ft and 2400ft in Class G, limited by Luton and Stansted CTRs. The controller was involved in a protracted conversation with the Tower Controller, who was temporarily controlling from the Runway Caravan, but no other information could have been provided to the aircrew due to the radar fade. An investigation into the radar performance did not find any unserviceability.

The pilot of the BAE 125 recalled being passed Traffic Information and becoming visual with a contact in the area (it is not known for certain if this was the other aircraft involved in the Airprox). Once visual with an aircraft in the reported position, the crew were content to turn inbound as it was not considered a confliction; as they were turning right and descending, the lookout was obscured and the crew were planning a 'dead wing check' upon rollout. The crew had visually cleared the area before the turn and descent. The failure of the Flight Director caused the crew to look in to the cockpit for several seconds, but as the first sighting was at 50m, an earlier 'heads up' lookout may have increased separation and provided a chance to take avoiding action. The crew did not get a TCAS warning and a post-check inspection confirmed that TCAS was serviceable; however, the other aircraft did not appear to be transponding from the radar replays.

The main barriers to prevent this Airprox were radar-derived information, and aircrew lookout. TCAS does not provide a warning against non-transponding aircraft; it is not known what equipment was used by the other aircraft involved but there was no secondary radar return shown on the replays. The radar-derived information was a partial barrier because the other track faded from primary radar cover. Lookout was also partially absent because of the HS125's profile in a descending turn so that it was likely to have obscured conflictions from the field of view. Furthermore, a distraction provided by the Flight Director fail meant that the crews were momentarily not scanning for traffic. A local Occurrence Safety Investigation was conducted and it made a number of recommendations, which included: a review of radar performance in the area (the primary contact disappeared at 2000 feet), an increased awareness for local crews of the operating environment and a potential review of the airspace between Heathrow and Stansted with a view to adopting a Transponder Mandated Zone. Northolt are conducting a safety assessment to review the circuit and local traffic patterns, with potential to keep the radar circuits at 3000ft inside controlled airspace.

NATS Systems Investigation

An initial analysis of the recorded radar data from the Bovingdon, Heathrow 10 and Stansted 10 radars indicated a primary radar return in the position indicated by the Northolt Approach controller. The base of radar cover in the area of the Airprox was estimated to be between FL14 and FL15 [1481-1581ft QNH 1016hPa]. However, there was an anomaly between the timings of the voice and radar recordings and so further investigation is being carried out to determine if the primary contact was still detected at the time of the Airprox.

UKAB Secretariat

The HS125 pilot reported that the light aircraft was heading west; if this was correct then the HS125 was overtaking it and the HS125 pilot was required to keep out of its way by altering course to the right.¹ The radar return shows an aircraft initially heading east; if this was correct then the aircraft were more-or-less head-on so the pilots of both aircraft were required to alter course to the right.² However, both pilots had equal responsibility for avoiding collisions and for ensuring that did not fly in such proximity as to create a danger of collision.³

Comments

HQ Air Command

This incident prompted an investigation on the unit concerned, which identified a number of contributory factors (such as radar detection in the area and carriage of transponders). That said, and assuming that the Airprox aircraft was in fact the contact that faded from radar, opportunities existed to minimise the chances of the 2 aircraft flying into proximity. Having accepted the turn

¹ Rules of the Air, 2007, Rule 11, Overtaking

² Rules of the Air 2007, Rule 10, Approaching Head-on

³ Rules of the Air 2007, Rule 8, Avoiding Aerial Collisions

into the traffic it was incumbent upon the HS125 crew to maintain separation visually, particularly since the radar contact was primary only and therefore lacking in the information provided to the controller by SSR. A minor in-cockpit issue led to visual contact being lost by the HS125 crew which was only regained on roll out from the turn, more or less at CPA. Many ac operate in Class G airspace without transponders, so crews of TCAS-equipped ac flying in Class G airspace need to be aware that lookout is more likely to detect a confliction than TCAS. Nonetheless, it is not unreasonable for a pilot under Traffic Service to expect radar to detect an aircraft at that height in that area (radar cross-section of the target dependant) and further investigation into any possible technical issues is warranted. Additionally, a review of the radar pattern heights at Northolt is underway to establish if the patterns would be better suited to the controlled airspace that exists above the current pattern height.

Summary

An Airprox occurred between an HS125 and an untraced light aircraft, at around 2100ft QNH, in Class G airspace, as the HS125 was being vectored for an ILS approach to Northolt RW25. The HS125 crew were in receipt of a Traffic Service from Northolt Approach, had been passed Traffic Information on a primary radar return and, having seen an aircraft in the reported position, confirmed that they were happy to turn towards the ILS. The crew then saw a light aircraft pass in their 5 o'clock position, at the same height, around 50m away; the Northolt controller reported that the aircraft return had faded from the radar display; expected minimum altitude for radar cover in the area was 1481-1581ft (QNH 1016hPa on the day).

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the crew of the HS125, transcripts of the relevant RT frequency, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

By the time of the Board meeting NATS had completed a reassessment of the radar data with the timing anomaly taken into account. They confirmed that there was no radar data detected at the time that the HS125 pilot reported that the Airprox happened. NATS confirmed that their engineer's assessment of the base of radar cover for that area was accurate, and observation of other radar plots in the area at other times supported this assessment. The Board were therefore perplexed as to why the light-aircraft had not been detected, and concluded that the only logical conclusions were that either: the aircraft was some sort of micro-light with a radar cross-section of less than 1m²; it was a normal-sized light-aircraft presenting an unusual aspect to the radar such that it presented an unusually small cross-section; or some aspect of the HS125's angle of turn compared with that of the light aircraft created the impression of the light-aircraft being at the same level as the HS125 when it was in reality a few hundred feet below and therefore close to the base of radar cover. Board members debated this aspect at length: some members opined that there was not sufficient data to assess the cause and risk and wanted to allocate a Degree of Risk of D; others thought that the HS125 pilot's report had been very clear and detailed and that, even if there was some illusion at play, the encounter was uncomfortably close, that chance had played a significant part in preventing collision, and therefore they thought the risk should be A. After much debate, in the end the Board agreed that the risk would be assessed as Category A.

Turning to the cause, the Board noted that the HS125 pilot had made an open report in an honest attempt to highlight that there may be radar deficiencies in the area or that adjustments to the Northolt radar patterns warranted deeper examination. Members applauded his motivation and noted that this was a good sign of a sound safety reporting culture. Nonetheless, whilst appreciating that the Flight Director failure presented an unwelcome distraction to the crew, members were clear that the crew had seen a light aircraft before turning, had accepted a turn towards it, and had then lost sight of it during the turn before re-acquiring it when it was too late to take any action. Recognising that the HS125 pilots' options were limited once they had committed to the turn, the Board questioned the decision to continue a turn towards a known threat once the crew had lost sight (even before the Flight Director failure had distracted them). The Board therefore concluded that the cause of the

Airprox was effectively a non-sighting by the HS125 crew, and that distraction caused by the Flight Director failure and the crew losing sight of the other aircraft had been contributory factors.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively a non-sighting by the HS125 crew.

Contributory Factors:

1. Despite turning towards a known threat the HS125 crew did not maintain an effective lookout.
2. The HS125 crew were distracted by the Flight Director failure.

Degree of Risk: A.

ERC Score⁴: 100.

⁴ Although the Event Risk Classification (ERC) trial had been formally terminated for future development at the time of the Board, for data continuity and consistency purposes, Director UKAB and the UKAB Secretariat provided a shadow assessment of ERC.