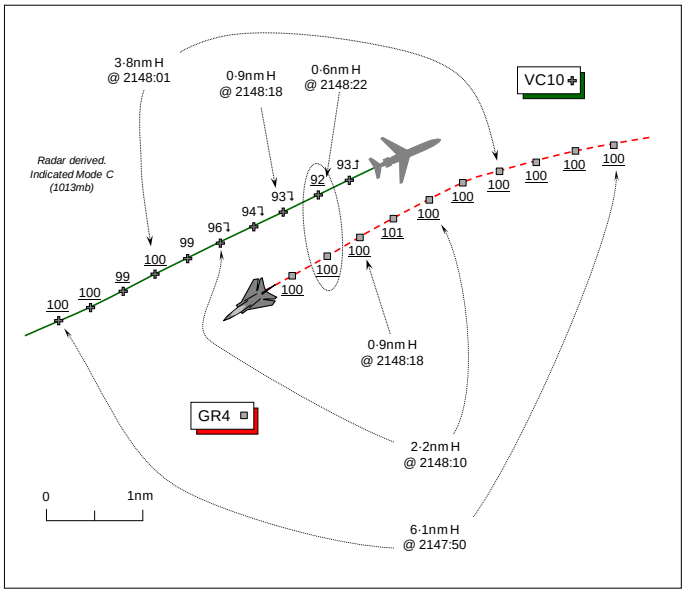
AIRPROX REPORT No 2011078

Date/Time:	12 Jul 2011 2148Z	NIGHT
Position:	5230N 00001W (9nm NNE of Wyton)	
Airspace:	London FIR	(*Class:* G)
	Reporting Ac	*Reported Ac*
Type:	VC10	Tornado GR4
Operator:	HQ Air (Ops)	HQ Air (Ops)
Alt/FL:	FL100 SAS	FL100 SAS
Weather:	VMC CLOC	VMC CLAC
Visibility:	30km	40km
Reported Separation:	2nm H	2nm H
Recorded Separation:	800ft @ 0·6nm Min H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VC10 PILOT reports the flight was tasked to one of the southern North Sea Air-to-Air Refuelling Areas (AARA 8) for high priority pre-deployment night training for a fast-jet squadron. The HISLs, nav lights and other standard ac lighting were all on. The assigned squawk was selected with Modes C and S on; TCAS is fitted.

Because of reports of poor weather over the North Sea, the crew had elected to maintain FL100 after exiting the DAVENTRY Radar Corridor (RC) for the transit towards AARA8, in order to check the weather at that level before trying any other level for suitable weather. Following their IFR FPL, after exiting the Daventry RC under a TS from London MILITARY on UHF they were given 'own nav for Area 8'. To circumnavigate the Wash Danger Areas they elected to maintain an easterly heading for a short while. After no more than a couple of minutes heading 068° at 300kt a contact appeared on TCAS at an estimated range of 3-5nm at their level. Simultaneously, TCAS enunciated a TA and within a couple of seconds or so, London MILITARY warned of a contact in their 1 o'clock, describing it as displaying 'no height information'. They immediately initiated a L turn but, during the roll-in, a DESCEND RA was received; at the same time London MILITARY confirmed the other ac was at the same level. The RA was followed, descending from FL100 to FL94; London MILITARY was informed and the unidentified ac, which was not seen visually, passed down their starboard side at an estimated distance of 2-3nm (from TCAS range discussions within the crew after the event.) Following the RA, a return to FL100 was instigated and the rest of the sortie passed without further incident. He assessed the Risk as 'high' and elaborated that it had been a quiet cockpit environment, with good visibility at night and a quiet ATC frequency. Apparently there was no squawk received from the other ac until a very late stage. An Airprox was reported to London MILITARY on 252·875MHz.

THE TORNADO GR4 PILOT (TORNADO A) reports that no hazard was perceived at the time. He was heading 257° at 300kt at the appropriate quadrantal of FL100, in VMC, he thought under a TS from Marham APPROACH, but actually still working London MILITARY. He was positioning the ac in preparation for a practice show of force that was to be carried out on a northerly heading from a rapid descent in the vicinity of Chatteris. Shortly before descending, ATC reported opposite direction traffic at FL100 just right of the nose. The pilot became visual with the traffic, displaying a large white floodlight and red strobes, at a range of 7nm and adjusted his heading by turning 10° slightly L onto 247° to increase the separation. The other ac passed 2nm to starboard with a 'low' Risk of collision.

Shortly after the CPA, he turned his ac through 180° in order to acquire the line of attack for the show of force. A rapid descent was carried out, switching enroute from London MILITARY to the LFS frequency. At the time, the TI on the other ac was considered to have come a little late, but not sufficient to warrant reporting action. [No TI was issued before the Airprox.] The Tornado's lighting was red upper and lower strobes, with navigation lights set to bright and conspicuity flash mode.

THE LATCC (MIL) LJAO EAST SECTOR CONTROLLER (LJAO EAST) reports that the VC10 had left the DAVENTRY RC and the crew was under their own navigation to AARA 8. Initially the formation of Tornado GR4s was also under her control executing general handling NE of Marham. When overhead Marham the GR4 formation reported they were splitting; one ac would remain with LJAO to go to Waddington for a pre booked PD and then to AARA8, the other switching to Marham. She believed that she only had one Tornado on frequency but this turned out not to be the case as Tornado (A) had also remained on the frequency. Tornado (A) then free called requesting GH, which was when she realised there had been a mix up. The non-squawking traffic – Tornado (A) - was then called to the VC10 crew at 12 o'clock - 5 miles - no height information, she then gave Tornado (A) a squawk. Once this was issued an SSR code of A3652 initially appeared from Tornado (A) at FL100; she re-called Tornado (A) to the VC10 at 12 o'clock - 3nm - same level. The VC10 pilot replied that he was descending in response to a TCAS RA; as he did this the A3652 changed to the LJAO assigned squawk. Tornado (A) then called visual with the VC10. Tornado (A) was subsequently identified and placed under a TS.

BM SAFETY MANAGEMENT reports that this Airprox occurred at 2148UTC, between a VC10 operating IFR in VMC receiving a TS from LJAO EAST and a Tornado GR4 - Tornado (A) - operating in VMC.

The LJAO EAST controller was operating a band-boxed position covering the LATCC (Mil) Area of Responsibility and had recently commenced her shift. Prior to the incident, the controller had been on leave for a week and was working the second night shift of a shift cycle, consisting of 2 mornings, 2 afternoons and 2 nights. At the time of the Airprox, LJAO EAST was operating on two different frequencies with a pair of Tornado GR4s (Tornado (A) and Tornado (B) - the original formation leader) conducting general handling (GH) in East Anglia on one frequency, with the VC10 en-route to AARA8, via the DAVENTRY RC, on the other. LJAO EAST transmitted simultaneously on both frequencies from 2144:07; however, they were not cross-coupled.

At 2143:25, the crew of Tornado (B) stated that the formation element of the sortie "*is complete.* [C/S Tornado (B)] *is stripping to the south, will free call Marham and* [C/S Tornado (A)] *is* [garbled] *will free call* [LJAO EAST]." LJAO EAST acknowledged this and amended the Electronic Flt Strip (EFS) to reflect that there was only one ac in the formation under control. LJAO EAST then asked the crew of Tornado (A) to confirm their intentions. Initially the crew of Tornado (A) stated that they planned to RV with the VC10 in AARA8, but then changed this to state that they planned to conduct a pre-booked practice diversion (PD) at Waddington, prior to routeing to AARA8. LJAO EAST acknowledged this and requested Tornado (A) to report steady and level. The crew of Tornado (A) replied at 2144:12 that they were, "*steady 2-4-0 at flight level 1-1-0* [sic]", which was also the heading and indicated Mode C level of Tornado (B). LJAO EAST did not formally identify, nor agree a type of ATS with the crew of Tornado (A).

At 2143:41 a primary surveillance radar contact (PSR) with no supporting SSR (Tornado (A)) appears on the radar recording, just as Tornado (B) turned L to track S, with the PSR-only contact maintaining the formation's previous southwesterly track. At 2144:18, with 3.2nm lateral separation, Tornado (B) turned south-westerly, slowly converging on Tornado (A).

At 2144:42 LJAO EAST passed TI to what they believed to be Tornado (A), stating, "*traffic believed to be your number 1 west 1 mile tracking southwest no height information*." Given this TI and subsequent events, LJAO EAST believed that Tornado (A) was the south-easterly of the two ac and the ac that had retained the SSR Mode 3A. In reality, as depicted in fig 1 below, Tornado (A) was

the north-westerly PSR-only contact S of Marham, whilst Tornado (B) was the combined (SSR & PSR) contact SE of Marham. The TI issued was acknowledged by the crew of Tornado (A).

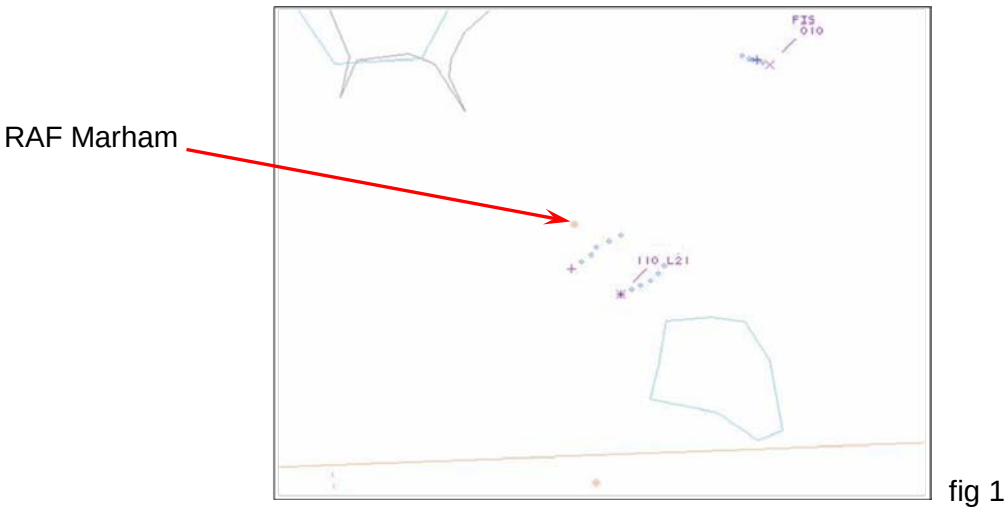


fig 1

At 2145:23, LJAO EAST made a landline call to Waddington to ask for the latest weather and confirm that they could accept Tornado (A) for a PD. This call became protracted with Waddington stating that they could not accept Tornado (A) and finished at 2146:54.

At 2145:35, the crew of Tornado (B) stated that they, "*would like to eh take a handover to Mildenhall for a pre-booked PD for radar to ILS*." LJAO EAST acknowledged this call and at 2145:47 asked the crew of Tornado (B) to confirm their position, who replied that they were, "*south-west of Marham by approximately 11 track miles*." This position information was acknowledged by LJAO EAST; however, Tornado (B) was actually 6·2nm SW of Marham with Tornado (A) 8·5nm SW of Marham. The controller's surveillance display was on a high range setting, thus reducing the angular distance between Tornado (A) and Tornado (B) on the radar display; consequently, this position information could not have been used to positively identify either ac.

At 2146:34, LJAO EAST informed the crew of Tornado (A) that Waddington could not accept them for a PD. The crew of Tornado (A) replied that they would descend to low-level for 3min, before routeing to AARA8. At 2147:20, prior to descending to low-level and with 12·5nm lateral separation between Tornado (A) and the VC10, the crew of Tornado (A) requested a, "*squawk and a traffic service*." LJAO EAST responded by instructing Tornado (A) to, "*maintain squawk of 6061*" which was the SSR Mode 3A code allocated to Tornado (B). The crew of Tornado (A) then replied that they were, "*currently squawking standby*." Immediately, LJAO EAST instructed Tornado (B) to "*squawk ident*" and for Tornado (A) to "*squawk 6062*."

At 2147:50, LJAO EAST passed TI to the VC10 on Tornado (A), stating, "*traffic right one o'clock, three miles* (the radar recording shows 6.1nm)*, opposite direction, no height information*." The VC10 crew replied that they were *"coming left";* LJAO EAST updated the TI at 2147:59 stating, "*that traffic's now indicating same level*." This update coincides with a displayed SSR code of A3652, previously issued by Marham ATC to the crew of Tornado (A) and Mode C becoming visible on the radar recording coincident with the PSR contact. At this point, 4nm lateral separation existed, with both Tornado (A) and the VC10 indicating FL100. Following their statement at 2144:12 that they were level FL110, the crew of Tornado (A) did not report descending to FL100.

At 2148:04, with 3nm lateral separation extant the VC10's L turn becomes evident on the radar recording, the crew stating that they're, "*responding to TCAS, descending*" with the descent already visible indicating FL98. At 2148:10, LJAO EAST updated the TI on Tornado (A) to the VC10 crew. A L turn by Tornado (A) becomes evident on the radar recording at 2148:12. Although the report from the pilot of Tornado (A) states that they first sighted the VC10 at approximately 7nm (equating to about 2147:43), it also states that on becoming visual with the VC10, the pilot, "*adjusted heading slightly left*." At 2148:18, the crew of Tornado (A) reported visual with the VC10, with the former crew

reporting minimum separation as about 2nm and a negligible perceived risk to flight safety; the crew of Tornado (A) did not receive TI from LJAO EAST on the VC10. The CPA is shown at 2148:22, with 0·6nm lateral separation and 800ft vertically.

Based upon the crews' reports and the radar recording, it appears that both the crew of Tornado (A) and that of the VC10 over-estimated the range at which they first detected each other's ac and the minimum separation. Consequently, this Airprox resulted from the risk of 2 ac operating in Class G airspace and the relatively late sighting of each other's ac, potentially aggravated by the fact that the event occurred at night. However, the VC10 crew had a reasonable expectation that LJAO EAST would provide TI to assist them in discharging their collision avoidance responsibilities. The fact that TI was passed relatively late to the VC10 crew is a contributory factor in this occurrence and is rooted in the mis-identification of Tornado (A).

Whilst technically Tornado (A) was not identified and placed under an ATS, it is reasonable to argue that LJAO EAST believed that Tornado (A) was under a service, albeit that they were applying the service to Tornado (B). It was not until 2147:30 when Tornado (A) stated that they were, "*squawking standby*" that LJAO EAST realised the true identity of Tornado (A). This error originated from LJAO EAST's reaction to the initial split between Tornado (A) and Tornado (B). LJAO EAST did not acknowledge Tornado (B)'s statement that they would free call Marham and a response from the controller at that point might have prompted the crew of Tornado (B) to mention that they would be remaining on the LJAO frequency. Furthermore, it appears that LJAO EAST assumed that Tornado (A) was squawking the formation's assigned SSR code and did not appreciate the fact that the formation leader would squawk. Finally, LJAO EAST did not assimilate that the crew of Tornado (B) had not free called Marham when they called at 2145:31 requesting a handover to Mildenhall, thus missing the opportunity to update the controller's situational awareness (SA). The distraction caused by the protracted landline conversation with Waddington during this time may have interfered with LJAO EAST's ability to update their SA. Although the controller has made no mention of any factors that may have affected their performance, given the nature of the errors, one possible explanation is grounded in the controller's psychophysiological state, specifically, the controller's levels of alertness and fatigue.

The TI to the VC10 crew on Tornado (A) at 2147:50, was passed at a late stage; however, given the relative positions of the two ac at the start of the exchange of RT at 2147:20 and the length of that exchange, it appears reasonable to argue that LJAO EAST passed TI to the VC10 crew as early as possible. Moreover, once LJAO EAST had identified Tornado (A), there was little opportunity for the controller to pass TI to Tornado (A) about the VC10, affording priority to the provision of TI to the VC10.

HQ AIR (OPS) comments that mix-ups like this occasionally occur. It seems that the controller's confusion was not detected by the Tornado crew in this case, and an inaccurate position report from them reinforced the controller's incorrect air picture. The controller nevertheless correctly prioritised the TI to the VC10 when she realised there was a potential for conflict. The Tornado crew's incorrect assessment of the range from the VC10 should serve as a reminder to all that at night it is impossible to visually judge distances effectively and avoidance should be verified by other means.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, a report from the air traffic controller involved and reports from the appropriate ATC and operating authorities.

Although the BM Safety Management report points out that the controller had just commenced the last night watch of the cycle, military controller Members contended that fatigue should not have been a factor here. On a different topic, the military Area controller Member explained that the controller had not cross-coupled the two frequencies in use. Therefore, although each crew could have heard the controller's RT transmissions on both frequencies, they would not have been able to

hear the other crew's reply. Hence the aircrews' SA could not have been assisted from hearing the RT transmissions.

It was evident to the Members that this Airprox had its origins in the formation split when the formation leader – Tornado (B) – called and advised he was free-calling Marham, but subsequently remained with LJAO EAST. With hindsight it was plain that it was Tornado (B) that was squawking throughout the formation's GH, although when the split occurred the controller had misidentified the ac and perceived it was Tornado (A) that was squawking. Fast-jet pilot Members were critical of the execution of this formation split which was not conducted in good order; formation leaders should make clear to ATC the disposition of the ac and remain in those positions until ATC have had the opportunity to assimilate the information. LJAO EAST could have taken a more positive stance here and ensured that the formation elements squawked appropriately when service was terminated on Tornado (B). Confusion would not have arisen if Tornado (B) had been instructed to select the general-purpose conspicuity squawk when the formation split-up and proceeded about their independent tasks. Military procedures in the UK MIL AIP (ENR 1-6-9) stipulate that crews operating at or above FL100 'must' select a conspicuity squawk such as A7000 with Mode C 'at all times', unless flying in CAS, when under an ATS an individual code has been allocated or when circumstances require the use of another special-purpose code. Thus good practice would suggest that Tornado (B) should have been instructed by LJAO EAST to squawk A7000 when the crew advised free-calling Marham, or the crew could have selected the conspicuity code without a further prompt. Moreover, it was plain that when LJAO EAST asked the crew of Tornado (A) for their level it was the same as the level (and heading) indicated by Tornado (B) - FL110. Tornado (A) had been flying independently for nearly 4min before the crew prompted LJAO EAST and asked for a squawk. The ac should not have been flying at this level without transponding Modes A and C, so an opportunity was lost here to forestall this close encounter. Fortunately, this omission was rectified just before the Tornado (A) and the VC10 flew into close quarters. Wisely, LJAO EAST's first action after issuing a squawk to Tornado (A) was to pass TI to the VC10 crew under the TS, although the Tornado's Mode C was not evident to the controller at that stage, hence the omission of height information; it was only secs later that FL100 was shown for the first time - the start of the first diagram coinciding with this point. The VC10 crew's reaction to this TI was to initiate a L turn but by that stage the ac's TCAS had detected the Mode C data from Tornado (A) as soon as it was switched on and computed the DESCEND RA, which they complied with. Without the benefit of TI from LJAO EAST or TCAS in the other cockpit, the pilot of Tornado (A) had sighted the VC10 at a range of 7nm and had turned slightly L to increase the horizontal separation. Whilst these turns were uncoordinated they were complimentary to one another and increased the horizontal separation slightly as the VC10 also descended 800ft below the level of Tornado (A). The Board concluded, therefore, that this Airprox had resulted from a conflict in Class G airspace resolved by both crews. Notwithstanding both crews' estimates that the horizontal separation was 2nm, the radar recording shows that it was significantly less at 0·6nm. Even at this short range the VC10 crew had not seen the Tornado visually. However, the crew would have been focused on their TCAS RA demands and the visibility from the VC10's flight-deck was not as good as that from the Tornado, whose crew had the VC10 in sight throughout. This led the Members to agree, unanimously, that no Risk of a collision had existed in the circumstances conscientiously reported here.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A conflict in Class G airspace resolved by both crews.

Degree of Risk: C.