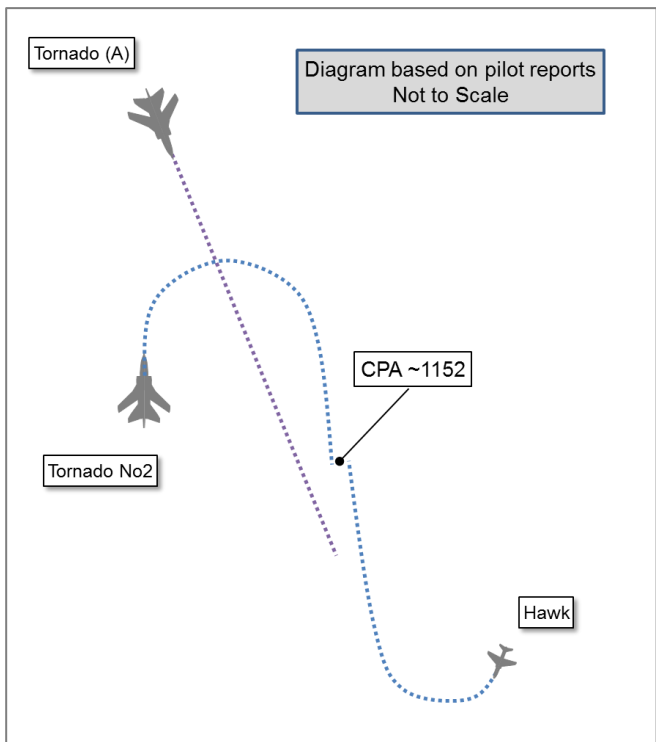


AIRPROX REPORT No 2015018

Date: 6 Mar 2015 Time: 1152Z Position: 5524N 00150W Location: 4nm west of Alnwick

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Tornado GR4	Hawk T1
Operator	HQ Air (Ops)	HQ Air (Ops)
Airspace	Scottish FIR	Scottish FIR
Class	G	G
Rules	VFR	VFR
Service	None	None
Altitude/FL	NK	NK
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	Black
Lighting	NK	NK
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	900ft	NK
Altimeter	agl	
Heading	160°	NK
Speed	450kt	NK
ACAS/TAS	Not fitted	Not fitted
Separation		
Reported	'450ft'	'<1000ft'
Recorded	'367ft' ¹	



THE TORNADO PILOT reports conducting 2v1 evasion training² as the No2 of a pair with a Hawk simulating an opponent aircraft. During the penultimate engagement, a non-formation pilot [Tornado (A)] reported on the Low-Level Common frequency that they were ‘north of Milfield glider site, heading east at low-level’. The No2 Tornado rear-seat crew member replied on the same frequency that ‘[Formation C/S], 2 x GR4s are currently engaged at low-level with [Hawk C/S], approximately 10nm southeast of Milfield’³. Once the engagement had finished, the pair turned onto a south-westerly heading and, due to limited fuel remaining, the Hawk pilot engaged for one final presentation. This presentation saw the pair turn hard right towards the Hawk, who ‘threatened’ the lead aircraft of the pair. No2 was positioned 2-3nm north of the lead and Hawk aircraft, in a right hand turn, at about 800-1000ft agl. During the turn, an unknown Tornado [Tornado (A)] passed directly under No2, heading south at low-level. They saw the Hawk turn towards Tornado (A), 0.5nm ahead (in the mistaken belief that it was turning towards the No 2 Tornado of the pair). A last-ditch reaction by the Hawk pilot saw it pull off from Tornado (A) and pass left-to-left with them at a visually assessed range of 400-500ft, with increasing lateral and vertical separation. Post-flight interrogation of aircraft sensors indicated a lateral displacement at CPA of about 325ft. The pilot noted that Tornado (A) route had not been entered on CADS when the formation walked to their aircraft at 0915. He also noted that, given the previous RT conversation on Low-Level Common, and Tornado (A) pilot’s subsequent awareness of the planned 2v1 evasion training, the formation crews believed Tornado (A) would avoid their position or call if passing nearby.

He assessed the risk of collision as ‘Medium’.

THE HAWK PILOT reports being tasked as a low-level opponent against the Tornado formation pair. As the formation was routing southbound from Milfield towards the Hexham gap, they ‘received SA’

¹ The slant range, as recorded by on-board systems.

² A pair of aircraft manoeuvre in mutually supporting formation at low-level whilst a third aircraft simulates an opponent and attempts to manoeuvre into a position of advantage.

³ Tornado(A) transmission was made at 1147:15 and the Tornado No2 transmitted at 1148:27

that Tornado (A) was routing east from Milfield. The pilot's perception was that the Tornado (A) crew had elected to remain clear of the 2v1 activity, being aware of the evasion in the more congested airspace to the south. At about 1150, the Hawk engaged the Tornado pair leader, the southern aircraft of the pair, in a right-hand turn. No2 was positioning to the north, and the Hawk pilot was expecting a kill shot from the No2 within a few seconds. Having engaged the lead Tornado for about 270° of turn, and without a kill shot from No2, the Hawk pilot switched to engage a Tornado to the north, which was southbound and nose-on. As he passed this Tornado, he noticed it did not have under-wing stores fitted, unlike the Tornado pair he was tasked to support. Immediately concerned that his situational awareness was degraded, he climbed and began a visual search to the north. He quickly acquired the formation No2 and, assessing that the two aircraft were about to infringe mandated separation minima, turned and climbed away. The pilot stated that he mistook the southbound Tornado passing through the middle of the engagement to be the formation No2, when it was in fact Tornado (A).

He assessed the risk of collision as 'High'.

THE TORNADO (A) PILOT reports conducting a transit sortie from Lossiemouth to Marham, including low-level currency training. During planning, it was apparent from their CADS input (at 0935) that there were several conflicting formations in the Northumberland area. Their aircraft became available earlier than was expected and, at 1015, the CADS takeoff time was moved forward to 1115. During out-brief with the squadron duty authoriser at approximately 1025, additional verbal de-confliction information was obtained regarding another formation, and the CADS 'fly-through' facility was used. Aware of the other planned routes on CADS, at 1147:25 the crew made an information call on the Low-Level Common frequency, "[C/S], single GR4, 5 miles southwest of Kelso, flowing east toward the glider site". There was no response until over one minute later, when the 2v1 (Airprox) formation replied, informing them that they and a Hawk were operating 10nm southeast of Milfield glider site. At the time, this placed the formation near the planned route for Tornado (A). Tornado (A) was not fitted with TCAS or data link, and the crew therefore had no information as to which direction the formation was moving during their evasion. Tornado (A) crew were also not aware of the status of other traffic operating in the area (7 Tornados, 2 Hawks and a Typhoon). The crew elected to follow their planned route, as entered in CADS, and concentrate on visual lookout. When south-abeam Milfield, Tornado (A) turned 30° right onto a heading of 120°. At about 1150:00, the Tornado (A) pilot became visual with one aircraft in the 12 o'clock, which he believed to be moving in a south-westerly direction. Aware that this was likely to be the 2v1 formation he looked for, and visually acquired the wingman 3sec later. At this stage there appeared to be no conflict with the formation crossing ahead with a lateral separation of at least 2 miles. The Tornado formation was then seen to manoeuvre hard towards them. Aware that the formation may have been reacting to their presence, and to increase their visual conspicuity, the Tornado (A) pilot 'wing waggled'⁴. The Tornado formation continued to turn towards them but the crew assessed the best course of action was to maintain heading. They cleared their flight path between the two formation aircraft, wing waggled again to indicate they were not part of the evasion activity and, at 1150:50, made another call on the Low-Level Common frequency, "[Tornado(A) C/S] in the middle of you, flowing South". The nearest formation Tornado was to the west of Tornado (A), at a range estimated to be about 1500ft, and with height deconfliction, as they passed abeam on approximately a 160° aspect. This Tornado appeared to have a Hawk descending into its 6 o'clock position at short range. The Tornado (A) pilot gave another pronounced wing waggle and continued to track south.

Factual Background

The weather at Newcastle was recorded as follows:

METAR EGNT 061150Z 24017G28KT 200V260 9999 SCT028 11/04 Q1024

⁴ Rolled from side to side to emphasise their position.

Analysis and Investigation

UKAB Secretariat

The Tornado and Hawk pilots shared an equal responsibility for collision avoidance⁵ but the nature of evasion training is such that the pilots involved are not required to operate in accordance with the Rules of the Air/SERA.

Occurrence Investigation

The Occurrence Investigation found that the loss of separation was caused by the Hawk pilot mis-identifying Tornado (A) as the formation No2, resulting in a late sighting of the No2 and loss of separation minima. Factors in the incident were assessed as the complexity of maintaining situational awareness in a highly dynamic environment; the 2v1 crews' perception that Tornado (A) was intending to route clear of the evasion area; and a lack of ACAS/TAS and data-link equipment fitted to the aircraft.

Comments

HQ Air Command

A thorough Safety Investigation followed the reporting of this Airprox, which found that the Hawk crew misidentified Tornado (A) as the formation No2 and consequently separation from Tornado 2 was eroded. However, a number of barriers to MAC were weakened or missing in this incident:

1. All missions were correctly input on CADS but not all crews had the same information due to differing take-off times.
2. Radio deconfliction was attempted but there was a degree of (flawed) assumption as to what each aircraft would do.
3. None of the aircraft involved had an ACAS or data-link capability to aid SA.

The major lesson here is one of communication. The opportunity to positively deconflict over the radio existed but was not taken, possibly due to workload at the time whilst 'fighting' the aggressor aircraft. Additionally, Tornado (A) could have chosen to avoid the area entirely but the crew also had their own training aims to consider and had planned to deconflict through increased lookout. It is notable that the Hawk crew did not consider the incident an Airprox, rather an infringement of the training rules with respect to the minimum separation during evasion training.

Summary

An Airprox was reported when a Tornado GR4 and a Hawk T1 flew into proximity at about 1152 on Friday 6th March 2015. Both pilots were operating under VFR in VMC, not in receipt of an Air Traffic Service.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from the pilots of both aircraft, radar photographs/video recordings (which did not show the incident geometry in detail) and reports from the appropriate operating authority.

The Board first considered the actions of the Tornado crews and Hawk pilot and the efficacy of barriers designed to mitigate collision risk at low-level. The Tornado 2v1 evasion sortie had been planned to include air-to-air refuelling prior to entering the low-flying system. Consequently, the

⁵ SERA.3205 Proximity and as reflected in Military Flying Regulations.

Tornado formation crews had walked to their aircraft before the Tornado (A) crew had entered their route on CADS and were therefore unaware of it. Members noted that this was an unavoidable situation, which served to emphasise that CADS was only capable of being a tool to support awareness of potential conflict rather than a solution to prevent it. For his part, the Board noted that the Hawk pilot had got airborne some time after the Tornado formation had launched, but it was not known whether this was before Tornado (A) crew had entered their route on CADS. However, what was established was that the Tornado (A) crew were able to view the Tornado formation planned route on CADS, and therefore that they had SA before getting airborne on the position, timing and area of the 2v1 evasion sortie, along with the other CADS sorties in that part of the Low Flying System. The Board wondered therefore whether they had conducted a robust risk assessment regarding their choice of low-flying route based on this information.

The Board noted that the low-level common frequency used by both Tornado(A) crew and one of the Tornado formation crews had provided mutual SA as to the location of each party. This, the Board opined, had given the best opportunity to avoid the subsequent incident, but neither party had acted positively on the information. Unfortunately, it resulted in a misapprehension on the part of the Tornado formation in that they expected the Tornado (A) crew to use their SA in order to avoid the evasion training area. In fact, the formation had no such priority but, given that the Tornado (A) crew were aware of the Tornado formation's location and route, (which also correlated with the CADS entry), members felt that the Tornado (A) crew would have been better served by avoiding the specific area of evasion training given the formation's likely pre-occupation with each other. Members also felt that the Tornado (A) crew had had further opportunity to make an avoiding turn when they saw the Tornado formation ahead, and that continuing to fly into the area of known evasion training had been contributory to the Airprox.

When considering the RT calls made on low-level common, Board members also felt that the aircrafts' crews had missed an opportunity to update their positions and intentions in order to maximise their SA. It was recognised that an evasion sortie is a high-workload event, but members felt that the radio could have been used to greater effect, either by the Tornado formation to update its position and activity; by the Tornado (A) crew to update their position and intentions; or by either to request an updated position from the other. That the radio was not used more effectively to deconflict was considered by the Board to be contributory to the Airprox.

The Board recognised that the Airprox itself was highly dynamic wherein high-energy manoeuvres by the Tornado formation and Hawk were combined with the Tornado (A) crossing through the formation as they manoeuvred. The Tornado 2 crew first saw Tornado (A) as it passed under them, and some Board members felt that this had been an opportunity to call a halt to the evasion manoeuvring on the radio. The Hawk pilot had inadvertently started to engage Tornado (A) because his SA did not include its presence; he had quickly realised his error when he saw that the Tornado he was engaging did not have the same under-wing stores configuration as the formation. It was unfortunate that his subsequent manoeuvre brought him closer to Tornado 2 whilst initially unsighted with it, and the Board therefore felt that his inadvertent miss-identification of Tornado (A) as Tornado 2 had been contributory to the Airprox because it had focused his attention on the interloper at the expense of maintaining a robust all-round lookout.

Ultimately, the Board agreed that the cause of the Airprox was that the Hawk pilot flew into conflict with Tornado 2. They noted that he had seen it when close to CPA and had manoeuvred away, but considerable debate ensued about the efficacy of this manoeuvre. Some members were of the opinion that the Hawk pilot's sighting was at such a late stage that little more could have been done to avoid collision, and that providence had played a major part in events. However, on balance, it was felt by the majority of members that the Hawk pilot had taken sufficient avoiding action to prevent collision, but that the closure speed and slant range at CPA had been such that safety margins had been much reduced below the normal.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Hawk pilot flew into conflict with Tornado 2.

Contributory Factors:

1. The Hawk pilot mis-identified Tornado (A) as Tornado 2.
2. The Low-Level Common frequency was not used effectively to deconflict.
3. The Tornado (A) pilot flew into an area of known evasion training.

Degree of Risk: B.