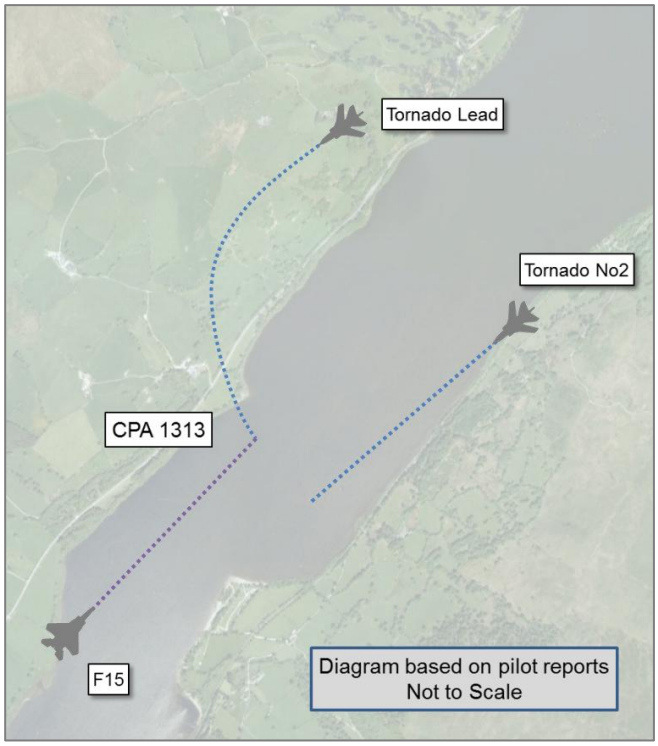
AIRPROX REPORT No 2015009

Date: 4 Feb 2015 Time: 1313Z Position: 5253N 00337W Location: Lake Bala

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Tornado GR4	F15E
Operator	HQ Air (Ops)	Foreign Mil
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	VFR
Service	None	None
ACAS/TAS	TCAS II	Not fitted
Alert	TA	N/A
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	Dark grey
Lighting	Nav, HISLs	Nav, HISLs
Conditions	VMC	VMC
Visibility	40km	40nm
Altitude/FL	800ft	500ft
Altimeter	agl	agl
Heading	180°	040°
Speed	420kt	540kt
Separation		
Reported	300ft V/0ft H	300ft V/0ft H
Recorded	NK	



THE TORNADO PILOT reports leading a formation pair, conducting low-level flying in Wales. The formation was approaching Lake Bala from the northeast, on a south-westerly track. The leader identified another aircraft on data-link, about 10nm southwest of his location at low altitude, with a northerly vector. Having called the contact to the No2 pilot on the intra-formation frequency, the leader also made a call on the Low-Level Common frequency, to highlight the formation's presence, but received no reply. As the leader made a pre-planned left-hand turn over Lake Bala, from heading 230° to 145° and climbing for terrain avoidance, the crew received a 'Traffic, Traffic' alert from the TCAS. As they had received the same alert on every previous cross-over turn, they assumed it had again been caused due to the proximity of the No2 and remained 'heads-out' to acquire the aircraft previously indicated by data-link as approaching from the south. As they turned, the rear-seat crew member saw an F15 pass directly beneath their aircraft, heading northeast along the lake. The pilot noted that the Airprox occurred approximately 30sec after the initial data-link detection. He also noted that the crew did not recall seeing any conflict on the TCAS screen, nor were they able to correlate the Traffic Alert, with either the No2 Tornado or the approaching F15E; both crew members were concentrating on lookout to try to visually acquire the conflicting traffic. The other aircraft in the formation was not fitted with data-link or TCAS. Its crew relied upon the calls from the formation leader, but did not see the conflicting traffic until after CPA.

He assessed the risk of collision as 'High'.

THE F15 PILOT reports conducting a planned low-fly in Wales from south to north. The crew had data-link information on the Tornado formation for about two minutes prior to the close-pass but did not notice due to task saturation executing the low-fly. As the pilot turned to proceed north down Lake Bala, there was radar awareness of the Tornado formation at about 7nm that also went unnoticed due to preparation for a simulated attack. The Tornado formation's advisory radio call over the Low-Level Common frequency was slightly broken and not understood. The F15 pilot became visual with a Tornado at a range of about 1.5nm, over Bala Lake, as the Tornado formation was executing a descending turn in the opposite direction. The F15 pilot bunted to descend below the Tornado as it

passed overhead. At this point another Tornado was seen, which passed closely off the right hand side. The pilot noted that CADS was filed but with incorrect timing due to a change in plan and miscommunication with mission planning members.

He assessed the risk of collision as 'High'.

Factual Background

The weather at RAF Valley was recorded as follows:

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METAR EGOV 041250Z 34012KT 9999 FEW032 06/M03 Q1025 BLU NOSIG
METAR EGOV 041350Z 35012KT 9999 FEW031 SCT250 06/M03 Q1025 BLU NOSIG
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Analysis and Investigation

UKAB Secretariat

The Tornado and F15E pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard[1]. A video recording of the Head-up Display (HUD) from Tornado 2 (on the left of the formation) demonstrated that the approaching F15E presented extremely poor visual contrast against higher terrain in the background (to the south). The F15E was more easily discernible in the infra-red image, but this was not presented in the HUD in either aircraft and became apparent only at a late stage, probably as the lead Tornado pilot commenced his left turn; by which time he would have been looking across to the Tornado 2 to ensure deconfliction in the turn.

Occurrence Investigation

The Occurrence Investigation identified that: the approaching F15 was masked from the Tornado crews by terrain, hindering radio calls and aircraft systems and visual acquisition; the formation turn necessitated lookout in directions other than that of the approaching F15; and the F15 sortie was not correctly entered on CADS, denying the crews awareness of potential confliction.

Comments

HQ Air Command

It is now standard practice within the Tornado Force to conduct a Safety Investigation into all reported Airprox. In this incident, the investigation concluded that the largest single factor was terrain masking, in that it was likely that the acquisition of the other aircraft visually, through RT, by TCAS and via data-link were all hindered to some degree by the topography. It also serves to highlight that all technology has its limitations, and that caution needs to be exercised when using technology to cue the visual scan to a particular volume of airspace. The data-link information indicated to the Tornado crew that the F15E was at 2000ft, so it is likely that they were searching for the aircraft above the horizon. It is understood that resident foreign forces adhere to the CADS SOPs as published in the UK Military Low Flying Handbook but, that the F15E's route was not on CADS, is disappointing because this removed an opportunity to deconflict before flight; it may be worth revisiting squadron procedures to establish why a system that usually works well was ineffective in this case. Effective lookout is the final barrier in the avoidance of mid-air collision, and this was degraded in all aircraft due to crew workload; fortunately the F15E pilot saw the Tornado in time to bunt to avoid.

[1] SERA.3205 Proximity.

USAFE

This is the type of Airprox that CADS was designed to prevent but, obviously, the programme is only as good as the input. In this case maintenance issues delayed the departure of the intended pair's sortie which then went ahead as a singleton; the low-flying booking was amended but, unfortunately, the original CADS input was not. As a result of the Airprox the squadrons have implemented a new procedure to ensure that CADS information is correct and that aircrew cannot launch without knowledge of any late changes to relevant NOTAMs and/or CADS conflicts en route.

Summary

An Airprox was reported when a Tornado GR4 and a Boeing F15E flew into proximity at 1313 on Wednesday 4th February 2015. Both crews were operating at low-level 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), a copy of the Head-up Display video recording form Tornado 2 and reports from the appropriate operating authorities.

The Board considered both the crews' actions and the effectiveness of systems designed to provide barriers to mid-air collision (MAC) at low-level. The Tornado crews had correctly planned and briefed their sortie and had the added barrier of the recent fitment of TCAS equipment in the lead Tornado aircraft. The Board noted that fitment of a collision warning system to the Tornado fleet had been the subject of much debate, and were heartened overall at its introduction. Notwithstanding, it was also noted that the lead Tornado crew had stated that their TCAS had generated a TA during every formation turn, and members remarked that use of equipment in regimes for which it was not initially designed often had unintended consequences. In this case, the repeated TCAS TA warnings during formation turns probably served to inure the crew against what was also probably a TCAS TA on the approaching F15E, and the highly dynamic nature of the Tornado's turn meant that azimuth angle-of-arrival for the TA display was likely to be erroneous anyway. Members were aware that these effects were well understood and briefed to crews, but noted that this incident served as an extreme example of the limitations of a system primarily designed for use between CAT aircraft in CAS.

A military aircrew Board member reminded the Board that CADS was not a collision avoidance tool but provided broad situational awareness. In this case, the F15E crew had changed their low-level booking due to a late change in plan but, unfortunately, this had not resulted in an updated CADS input. Consequently, the Tornado formation were not aware of the updated F15E route timings. He opined that, had the confliction been know about by the GR4 crews following amendment of the F15's timings, then the indications provided by other GR4 on-board systems (data-link, radar and TCAS) might have been used to better effect in the knowledge that the confliction existed.

In the event, the lead Tornado aircraft rear-seat crew member saw the F15E as it passed beneath them in their left turn, but the Tornado 2 crew did not see the F15E until it had passed. This was effectively a non-sighting by both these crews because there was no time to warn the lead pilot to take effective avoiding action. Although the Tornado No2 crew would be monitoring the leader's turn, the military member reminded the Board that it was their specific responsibility during this type of turn to continue to clear the area ahead and outside the leader's turn. Unfortunately, either terrain obscuration or lack of contrast meant that they had not seen the approaching F15E. The F15E crew were commended for their frank report, effectively highlighting their task saturation during the simulated attack profile at low-level. Members also noted that, despite this, it had been the F15E pilot's visual acquisition of the lead Tornado which, albeit late, had allowed him to bunt below it and break what was undoubtedly a collision vector between the two.

Members noted that both crews' reports assessed a miss-distance of 300ft vertically. With an effective closing speed of almost 1000kt, and with the F15E reportedly passing directly under the lead Tornado, members agreed that, in this instance, safety margins had been much reduced below normal; all of the barriers had been degraded, many as an unavoidable consequence of operating at low-level, and one due to an unfortunate planning error, which had now been addressed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A late sighting by the F15E crew and effectively a non-sighting by the Tornado crews.

Degree of Risk: B.