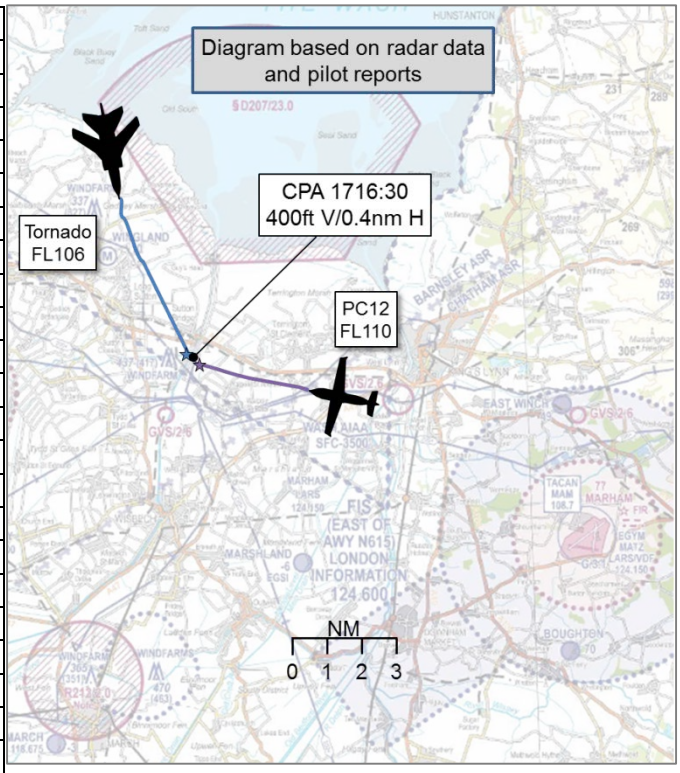
AIRPROX REPORT No 2015206

Date: 19 Nov 2015 Time: 1716Z (Night) Position: 5244N 00011E Location: Near Holbeach Range

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Tornado	PC12
Operator	HQ Air (Ops)	Civ Pte
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	IFR
Service	Basic	Traffic
Provider	Marham	London Mil
Altitude/FL	10,520ft	FL110
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	Grey/Black
Lighting	NK	NK
Conditions	VMC	VMC
Visibility	>10km	20km
Altitude/FL	10,000ft	FL110
Altimeter	QFE (1007hPa)	QNH (1013hPa)
Heading	160°	330°
Speed	300kt	260kt
ACAS/TAS	TCAS II	TCAS I
Alert	TA	TA
Separation		
Reported	500ft V/0.2nm H	0 V/1000m H
Recorded	400ft V/<0.4nm H	



THE TORNADO PILOT reports that after completing a 30° strafe pass at Holbeach AWR, the aircraft was turned downwind and a climb commenced to 12000' on range QFE. The medium-level pattern took the aircraft outside the range danger area and he had a Basic Service with RAF Marham Zone Controller. Due to having a pair in the strafe pattern, the TCAS was selected to TA (to avoid nuisance RAs from the wingman; every turn downwind was accompanied by a TA against the wingman). A 'traffic traffic' warning was heard from the TCAS and the pilot obtained visual with an aircraft approximately 500ft above, on a reciprocal heading, which may have infringed the AWR airspace he though; he thought it unlikely that without NVGs the crew would have been visual in time to take avoiding action. Holbeach were asked if they had any joining traffic, to which they replied negative. RAF Marham had not passed any information on approaching traffic and appeared to be unaware of any likely confliction. The Tornado pilot commented that had he not been alerted by TCAS, then the range pattern would have been in direct confliction with the other aircraft. He also commented that, due to the limited size of RAF Holbeach airspace, the medium-level strafe pattern requires aircraft to exit the airspace on every pass. He reported that inside the range airspace RAF Marham were unable to provide more than a Basic Service, and that it was unworkable to get a Traffic Service each time the aircraft left the range and then degrade to Basic Service as it re-entered the range for multiple strafe passes. The pilot reported that the crew were also dealing with an aircraft system malfunction at the time and were trying to diagnose the problem.

He assessed the risk of collision as 'Medium'.

THE PC12 PILOT reports that the final point on his filed flight plan was BANEM (approximately 25nm NE of Wattisham); from this point the flight plan remained IFR but outside controlled airspace on a direct track to his destination. He made an early descent to minimize headwinds and exit light icing. Leaving BANEM his route remained west of Danger Area D207 (Holbeach Range), and the flight was handed over to London Military Control from London Air Traffic Control. Routing northwest from

BANEM more favourable weather was found at approximately FL110. Passing southwest abeam Marham, he was advised of two military contacts in the vicinity of EGD207. TCAS indicated one contact approximately 3000ft below and ahead of his track. As the TCAS contact was approached, the second aircraft was observed climbing and tracking towards him. The military controller was asked for advice on the route or intentions of the other aircraft, but the military aircraft was working another unit and so no information was available. He decided to maintain level and heading and be prepared to avoid the other aircraft visually. The military aircraft passed down his left-hand side at approximately 0.5nm whilst climbing through his level. Shortly thereafter, a second aircraft (or the same aircraft for a second time) was observed on TCAS approaching his position from the north at a similar level. The other aircraft appeared to be flying on various headings and levels. Advice from the military controller was requested and it was decided to maintain heading and level but eventually a right turn was made.

He assessed the risk of collision as 'Medium'.

THE MARHAM CONTROLLER reports that the Tornado formation departed RAF Marham as separate units under individual Traffic Services, reduced as standard due to limited surveillance performance. The Tornado formation requested a Traffic Service whilst in the range which was denied; their service was downgraded to a Basic Service and they changed to the range frequency without informing him. He observed the Tornado formation manoeuvring as separate units both inside the confines of EGD207 and up to approx. 6-7nm to the south, outside the danger area. He observed an aircraft with a Swanwick (Mil) squawk transiting on a track between RAF Marham and RAF Cranwell with SSR Mode C indicating FL110. He recalled passing Traffic Information to one of the Tornado formation (at this time both squawking 7002) referencing the unknown Swanwick track with regard to RAF Marham, giving details of the projected routing and the SSR Mode C read-out. Concurrently, he was working 2 individual GR4 aircraft departing from RAF Marham whose departure route was in the vicinity of RAF Holbeach. He stopped the first departing aircraft at FL100 against the Swanwick (Mil) track prior to handing it over to Swanwick (Mil), and the second departing aircraft at FL90 against the first departing aircraft to facilitate handover. At this point his priority was with provision of Traffic Information and control instructions to the two departing GR4 aircraft.

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

THE HOLBEACH CONTROLLER reports that he was the duty Air Weapons Range Controller at the time of the incident. The Tornado formation joined the range at 1710. At 1715, the Tornado lead asked him if there were any other aircraft in the range as he had seen another aircraft about 500ft-1000ft above him; he was at 9000ft at the time. As the controller recalled, the Tornado lead was carrying out right-hand circuits [UKAB note: in fact the Tornados were carrying out left-hand circuits] and the other aircraft must have been heading east at the time. He called Marham Radar to ask them if they could see any other aircraft in the range and they said there were just the 2 aircraft wearing squawk 7002 in the range and one other aircraft outside the range to the east climbing to FL90. He relayed this information to the Tornado lead who replied that he had experienced an Airprox due to the location of the other aircraft.

THE LONDON MIL CONTROLLER reports that he was controlling the PC12 routing from BANEM to Gamston; it was handed over at FL200 and he provided a Traffic Service throughout his transit. He advised the PC12 pilot that Holbeach range was active to 23,000ft, and to remain to the south and west. Initially, the range was active but no traffic was operating in it. As the PC12 pilot transited towards the Marham overhead, he requested an initial descent to FL100, which was approved. The Tornado formation were pre-noted out of Marham but then subsequently cancelled as they were departing for the range. Marham then pre-noted him of two other aircraft, both departing to the North for the Vale of York area. At this time, the PC12 was northeast of Marham, and the two aircraft operating under 7002 squawks with Holbeach were operating to the south and west of the range. Having passed Traffic Information on these two aircraft, he agreed with the PC12 pilot that the descent should initially be stopped at FL120 to attempt to provide some vertical separation. An advisory turn on to west was also applied to try to keep the PC12 to the south of the manoeuvring aircraft. He continued to call the traffic as accurately as possible, with height changes being difficult to

assess due to the radar update rate. As the Tornado formation finished their second run, they came back out of the range to the west and then south, up to between 5nm and 8nm outside the confines of the range. At this time, the PC12 pilot had levelled at FL120 and was around 6nm to the south of the Danger Area, still heading west. One of the Tornados passed to the east of the PC12; however the second came out of the range and tracked towards the PC12, climbing; the PC12 pilot requested a heading to remain clear of the Tornado. He informed the PC12 pilot to maintain his heading as he could not guarantee a good heading to avoid the Tornado due to their unpredictable manoeuvring profile. He observed the two contacts merge with between 500ft and 1000ft separation. The PC12 pilot was passed constant Traffic Information on the conflicting Tornado and called visual with the traffic. When the PC12 had passed the Tornado traffic and was clear of the range to the west, he re-commenced his descent to FL70 and was handed over to Doncaster Radar without further incident.

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

Factual Background

The weather at Holbeach was recorded as follows:

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METAR EGYH 191650Z 26012KT 9999 FEW040 SCT250 08/06 Q1009 BLU
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Sunset occurred at 1559 and Civil Twilight ended at 1638.

Analysis and Investigation

Military ATM

An Airprox occurred on 19 Nov 15 at 1715, near Holbeach Air Weapons Range (AWR), between a Tornado GR4 and a PC12. The PC12 was under a Traffic Service with RAF (U) Swanwick and the GR4 was under a Basic Service with Marham ATC, as well as being in RT communication with Holbeach AWR. The PC12 pilot was in straight–and-level cruise at FL110 in VMC and was informed of two military aircraft in the vicinity of D207. His TCAS had detected the military aircraft but the exact details of the military profile were not known as they were working another unit.

Sections of the tape transcripts between Swanwick (Mil) (SWK)/PC12 and Marham ATC (MRM)/GR4 are below:

From	To	Speech	Time
MRM	GR4	[GR4 C/S], entering the range, Basic Service.	17:09:48
SWK	PC12	[PC12 C/S], traffic 12 o'clock, one five miles manoeuvring [garbled] Tornado currently indicating flight level one zero five climbing.	17:12:20
SWK	PC12	It's – there's two contacts in that vicinity, both believed to be operating in er, with Holbeach range though not necessarily staying in the confines.	17:12:34
PC12	SWK	That's understood we will be remaining clear to the south west of Holbeach, [PC12 C/S].	17:12:40
SWK	PC12	[PC12 C/S] the first, er, aircraft now left 11 o'clock, seven miles crossing in the left hand turn to head back into the range.	17:13:00
SWK	PC12	No problem. There is a second one behind him, er, just looking to assess where he's going.	17:13:15
PC12	SWK	Thanks, are they both level or are they climbing?	17:13:21
SWK	PC12	Ah, both look level at the moment, ah, both look like they are holding about five miles to the south of the range at flight level one one five, do you want to stop descent against?	17:13:24
PC12	SWK	Yeah we'll stop descent one two zero against that traffic [PC12 C/S].	17:13:36
MRM	GR4	[GR4 C/S] traffic north west of Marham, 5 miles, tracking north west, indicating FL120, descending.	17:13:44
MRM	GR4	[GR4 C/S] the range track is, correction, previously called traffic is in your 4 o'clock at…3 miles [inaudible] altitude.	17:13:58

From	To	Speech	Time
SWK	PC12	The closest contact left ten o'clock at five miles is currently crossing left to right, indicating flight level one two two now slowly descending.	17:14:00
PC12	SWK	Er, roger, yeah we have got him visual and, er, we can take a heading against that, if um, if you can advise us.	17:14:09
SWK	PC12	That's fine, turn left that should put you behind him.	17:14:19
PC12	SWK	OK we'll take a left turn [PC12 C/S].	17:14:23
SWK	PC12	Come left by twenty that should work.	17:14:25
PC12	SWK	Left twenty, yeah looks like he's turned away.	17:14:28
GR4	MRM	[GR4 number 2 C/S] contact.	17:14:32
PC12	SWK	[PC12 C/S] gonna descend back down to flight level, er, one hundred.	17:15:01
SWK	PC12	[PC12 C/S] that's understood, er, descend now flight level one hundred.	17:15:08
SWK	PC12	Sorry, another Tornado outbound please flight level one one zero.	17:15:16
PC12	SWK	Flight level one one zero, [PC12 C/S].	17:15:20
SWK	PC12	[PC12 C/S], traffic right, er, two o'clock, five miles tracking towards indicating flight level eight five, that's the first one of the two Tornados.	17:15:56
PC12	SWK	Yeah, [PC12 C/S] got that, erm, again we can take a heading if, er, if you can advise us.	17:16:11
SWK	PC12	Looking at this maintaining heading would work best.	17:16:20
PC12	SWK	Ok, keep the heading [PC12 C/S].	17:16:24
SWK	PC12	Ah, now passing underneath you, five thousand feet [*controller meant 500 feet*].	17:16:26
PC12	SWK	Thanks, we're now visual.	17:16:30

Traffic Information from Swanwick was provided to the PC12 pilot at 1715:56 (Figure 1).

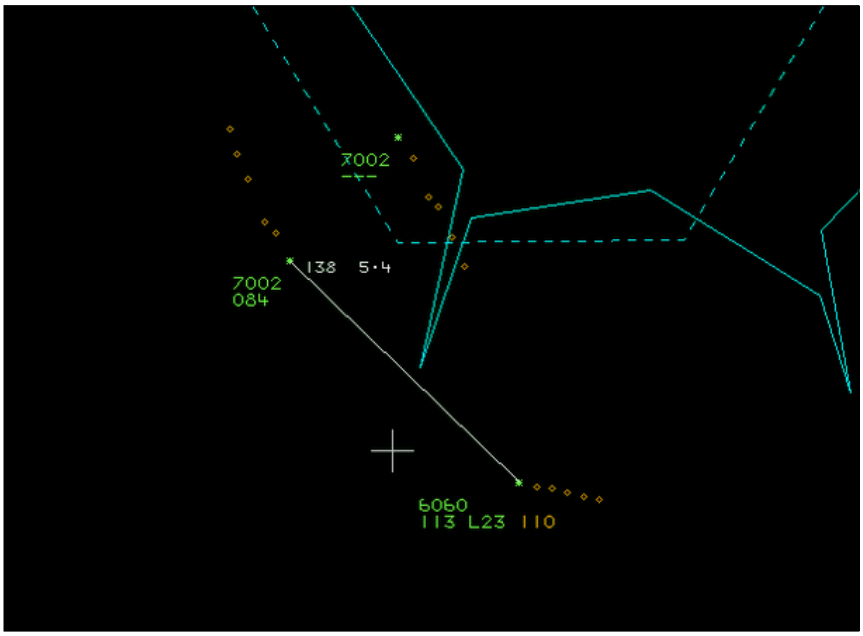

Figure 1: Traffic Information at 1715:56

The PC12 pilot requested advice on a heading at 1716:11 and, at 1716:20 (Figure 2), the controller suggested the PC12 maintain heading. CPA was estimated at 1716:30 with 0.4 nm horizontal separation and 500 ft height separation. Figure 3 was taken immediately prior to CPA.

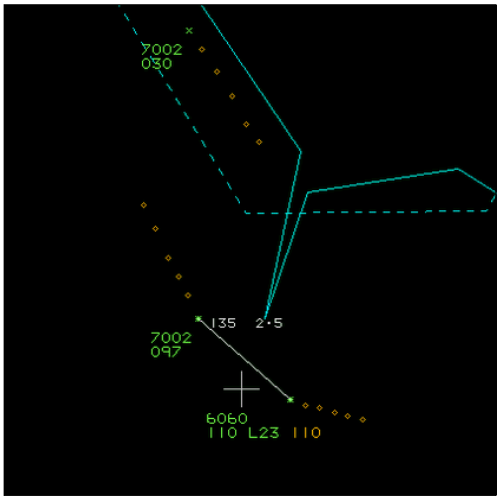

Figure 2: Geometry at 1716:20

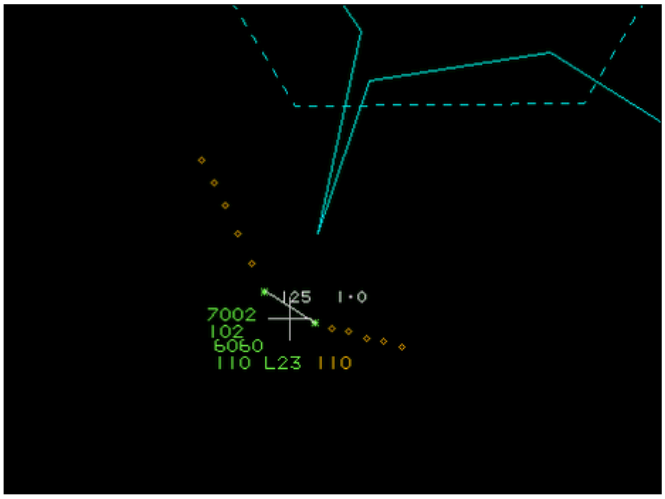

Figure 3: Geometry at 1716:26

The Swanwick controller had initially stopped the PC12 descent to provide vertical separation against range activity. From the transcript, it is apparent that there was constant RT between controller and pilot. The controller was non-standard in some phraseology but demonstrated duty of care by passing Traffic Information and attempting to use headings and flight levels to separate. Prior to CPA, the PC12 pilot had requested a heading and the controller advised him to maintain heading; the heading was on a closing geometry with the Tornado but the controller had to contend with other aircraft, the confines of the AWR and a much faster conflicting aircraft conducting high-energy manoeuvres. The controller felt that he could not guarantee a good heading due to the Tornado's unpredictable profile and the large differences in aircraft speed. An update on the Traffic Information may have been beneficial just prior to the Tornados passing beneath as the PC12 pilot called visual at CPA.

Marham ATC had placed the Tornados operating in the AWR under a Basic Service as per local instructions. Aircraft operating in Holbeach's range use a 7002 squawk and can often be below Marham's radar coverage; it is also impractical for Marham ATC to maintain track-ident and coordination functions on multiple aircraft allocated range squawks in Holbeach. The controller had a high workload and prioritised Traffic information to other outbound fast-jets. However, Traffic Information was passed to the Tornados, demonstrating duty of care considering the Basic Service. The Holbeach controller was not equipped with surveillance radar and was not in a position to provide information on activity outside the range. The controllers acted in accordance with CAP774 in terms of service provision but all controlling parties may have felt compelled to provide more than the regulation stipulates. The PC12 pilot requested vectors and may have been more comfortable with a Deconfliction Service. CAP774, Section 3.6, states:

> 'Deconfliction is not provided under a Traffic Service. If a pilot requires deconfliction advice outside controlled airspace, Deconfliction Service shall be requested.'

The Tornados wanted a Traffic Service but only a Basic Service was offered by Marham due to radar cover; it was subsequently acknowledged that RAF(U) Swanwick are in a position to provide a Traffic Service to range traffic.

The Tornado crews were conducting 30° strafe passes and were downwind at 12,000ft range QFE at the time of the Airprox. The strafe pattern took them outside of the confines of the Holbeach AWR. TCAS was selected to TA because both aircraft were in close proximity. Following a 'traffic warning', the Tornado crew gained visual contact with the PC12, 500ft above. The crew commented upon the lack of Traffic Information from Marham and that ATC seemed to be unaware of the confliction. Under a Basic Service, ATC had no obligation to call traffic; however, traffic was called, and the formation had confirmed contact 2 minutes prior to CPA. The crew also had to deal with diagnosing an aircraft system problem. The crew commented that the PC12 route was in direct confliction with the range pattern but the PC12 crew were in Class G airspace under the control of military ATC and were unlikely to be aware of the patterns flown at

the range. The Tornado crew estimated the first TCAS contact was at 7000ft with 3nm separation; however, the crew continued to climb to be at 10500ft at CPA. Holbeach is limited in size and it is known that certain profiles exit the range confines; because a Traffic Service is not available from Marham, it is unworkable for crews to switch between Traffic and Basic Services as they cross the range boundary.

Post-incident, the units involved have reviewed the provision of an ATS to find the best service available. Holbeach is reviewing the size of its boundary and all ranges are expecting to fit Hi-Brite Air Surveillance pictures within the financial year. The range construct is to provide safety and segregated airspace in the final phases of a weapon release profile; providing wider situational awareness to controllers through a radar picture will assist them in providing traffic Information to crews. All control elements acted in accordance with the CAP774. If it is impractical for Marham to provide a radar service to range aircraft, Swanwick are able to provide a service, depending upon traffic levels and controller workload.

UKAB Secretariat

The Tornado and PC12 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].

Comments

HQ Air Command

This incident highlights the limitations of 'see and avoid' by night. The dimensions of military danger areas are kept as small as reasonably possible in order to create the minimum impact on other airspace users. It is common for Tornados conducting medium-level strafe patterns to exit the reserved airspace due to performance limitations of the aircraft; the Tornado crew had a plan for this, and the limitations of alternating between a Basic Service within the range and a Traffic Service when outside the range are clear. Operating procedures for this type of profile are being reviewed (including a reassessment of the dimensions of all air-to-ground weapons ranges) and, specific to the Holbeach area, a possible modification to ATS provision SOPs for aircraft whose weapon profiles necessitate operating both inside and outside the reserved airspace.

Summary

An Airprox was reported when a Tornado and a PC12 flew into proximity at 1716 on Thursday 19th November 2015. The Tornado was operating under VFR in VMC and the PC12 under IFR in VMC; the Tornado pilot in receipt of a Basic Service from Marham, and the PC12 pilot in receipt of a Traffic Service from Swanwick (Mil).

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from the pilots of both aircraft, transcripts of the relevant RT frequencies, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The Board started their discussion by reviewing the size of the Holbeach Air Weapons Range (AWR) and noted that it was deliberately minimised to ensure that as much of the surrounding airspace is released to other users as possible. Although a laudable aim in itself, they commented that this results in some AWR users leaving the range whilst conducting highly-dynamic manoeuvres and profiles as they reposition prior to commencing further runs. Acknowledging the HQ Air Command comments regarding a review of AWR dimensions was welcomed. Members wondered whether there might be a case for a stepped increased boundary at medium-level (perhaps 5000ft) which would provide better segregation for the types of manoeuvre being flown in this incident whilst also

[1] SERA.3205 Proximity.

retaining the ability for GA aircraft to use the airspace below. Also, for night operations, the use of NOTAMs might be considered in order to warn other airspace users that high-energy manoeuvres might be being conducted outside the range boundary. Pilot members with fast-jet experience had sympathy with the problems of trying to change Flight Information Service during frequent entries and exits from the range during weapons profiles; they felt that the answer lay more in the design of the AWR airspace to properly segregate the range activity rather than expecting fast-jet crews to assimilate Traffic Information whilst engaged in complex and demanding weapon release profiles that required their full attention. Notwithstanding, and noting that the AWR controllers cannot give anything more than a Basic Service within the range, it was acknowledged that Swanwick (Mil) can give a Traffic Service to aircraft operating within an AWR, and the Board welcomed the HQ Air Command initiative to see how this might be used to best effect.

The Board then discussed the actions of the Tornado crew and noted that they had continued to climb towards the PC12 even though they had apparently received the first TCAS contact at a separation of 3nm when they were at 7000ft altitude (the PC12 being at FL110). Military members commented that during such range profiles, deconfliction of aircraft within the range pattern often relied on crews maintaining procedural separation and a known ground track, and so the crew may well have been concentrating on ensuring this in order to avoid setting up a conflict with their own wingman. The Board also wondered if the Tornado crew had fully assimilated all the information on the PC12 given that they were also dealing with a system malfunction at the time; the fact that they did not recall Marham giving them Traffic Information was evidence of this.

Turning to the PC12 pilot's actions, some members noted that he had been given numerous calls of Traffic Information about the Tornados, had had a fairly protracted discussion with ATC, and yet had still routed towards the range area and had not asked for a Deconfliction Service; as such, they felt that the onus for avoiding the Tornados lay with him by routing further away from the AWR. Other members thought that the PC12 pilot was asking all the right questions of ATC, had asked for a suggested vector, and had simply run out of options to avoid the Tornado as it approached him at a high-speed and a high rate of climb. All agreed that a Deconfliction Service would have been more appropriate for the PC12 pilot in order to take full advantage of ATC's better situational awareness of the overall geometry.

The Board then looked at the actions of the Air Traffic controllers. They felt that the Swanwick (Mil) controller had given timely and adequate Traffic Information to the PC12 pilot, and they also noted that he had stopped the PC12's descent in an endeavour to maintain separation. Notwithstanding, a Military ATC member pointed out that normally a controller would have contacted the AWR to find out the intentions of the traffic in the range, but that this didn't happen on this occasion. Although this is not always possible due to controller workload, he felt that better liaison between Swanwick (Mil) and Holbeach might have provided valuable information to assist in this case. Concerning the RAF Marham controller, the Board commended him for passing Traffic Information on the PC12 to the Tornado crew regardless of the fact that they were under only a Basic Service; it had simply been unfortunate that they had not assimilated this information.

The Board debated in depth the cause and risk of the Airprox. Some members believed that the Tornado crew had had sufficient information from TCAS at 3nm separation to stop their climb; they thought that the Tornado crew had effectively continued to climb into conflict. Others thought that the PC12 pilot could have done more to route away from the AWR given the information he had from ATC; given that he was required to give way to the Tornado, they thought that it had been the PC12 pilot who had flown into conflict. The Chair suggested that elements of both arguments applied, and that the incident was probably best described simply as a conflict in Class G airspace; a vote was taken and the majority agreed. Looking at the risk, the Board noted that both pilots had received TCAS TAs, that the Tornado was visual with the PC12 before CPA, and that 400ft vertical and 0.4nm horizontal separation had been achieved. As a result, they agreed that although this had been close to being a more serious incident, there had, in the end, been no risk of collision and that timely and effective action had been taken; risk Category C.

The Board discussed briefly whether a recommendation should be made regarding the AWR size and boundary but, in light of the fact that HQ Air Command were already conducting a review, decided as a result that a recommendation would be nugatory.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A conflict in Class G Airspace.

Degree of Risk: C.