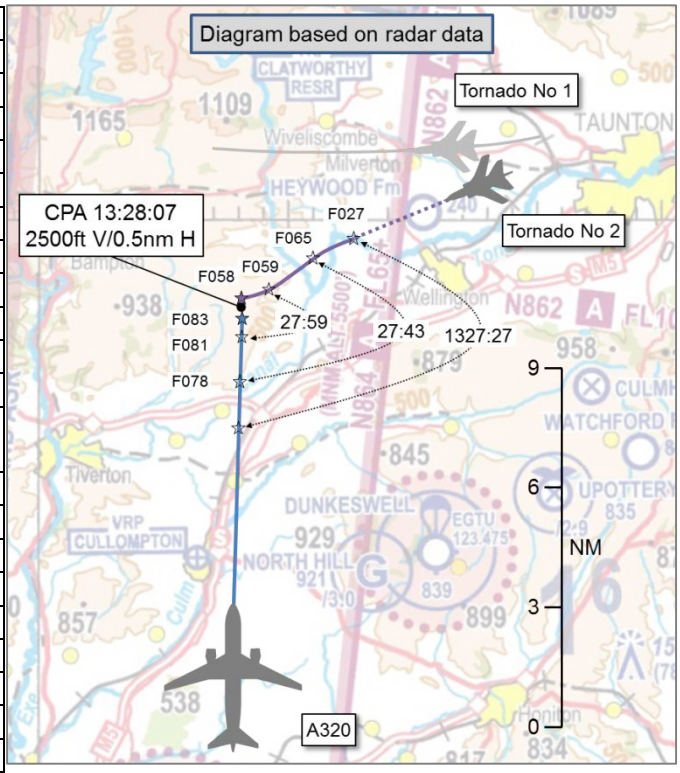
AIRPROX REPORT No 2015204

Date: 18 Nov 2015 Time: 1328Z Position: 5058N 00322W Location: 10nm W Taunton

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	A320	Tornado
Operator	CAT	HQ Air (Ops)
Airspace	Airway N864	London FIR
Class	A	G
Rules	IFR	VFR
Service	Radar Control	Traffic
Provider	Cardiff	Yeovilton
Altitude/FL	FL83	FL58
Transponder	A, C, S	A, C, S
Reported		
Colours	Company	Grey
Lighting	Strobe, nav, beacon	HISL, nav
Conditions	IMC	IMC
Visibility	In cloud	In cloud
Altitude/FL	FL80	FL60
Altimeter	SPS	SPS
Heading	~ northeast	260°
Speed	NK	NK
ACAS/TAS	TCAS II	TCAS II
Alert	RA	RA
Separation		
Reported	2525ft V/0.42nm H	'2500ft'
Recorded	2500ft V/0.5nm H	



THE A320 PILOT reports descending from FL80 to FL70, as instructed by Cardiff Approach, when they received a TCAS RA 'Climb Climb'. He followed the TCAS RA until 'Clear of Conflict', when he was instructed by Cardiff to maintain FL80. He reported the TCAS RA by radio. The pilot noted that they were requesting weather deviation at the time of the Airprox.

He assessed the risk of collision as 'Low'.

THE TORNADO PILOT reports that whilst flying at low-level, the weather deteriorated below the required weather limits. A low-level abort[1] was initiated and flown until above safety altitude (3400ft). Whilst levelling, a TCAS RA commanded 'Descend Descend' followed by 'Level Off'. The crew followed the TCAS RA and were aware of an airway base above at FL65, with conflicting traffic 2500ft above that.

He assessed the risk of collision as 'Low'.

THE CARDIFF CONTROLLER reports he was the OJTI[2] whilst overseeing a trainee on radar, the radar position was band-boxed. The A320 was inbound from the south and was descending to FL70, 10nm south of EXMOR reporting point. Two contacts were observed transiting east to west, with only one displaying Mode C (observed at 4100ft). This was believed to be fast jet traffic under the airway [N864]. A handover had just started when the A320 pilot made a call relating to TCAS which was difficult to understand. The trainee asked the A320 pilot to 'say again', to which the reply again was

[1] An emergency manoeuvre designed to enable the pilot to fly away from the ground and to reach safety altitude with the minimum delay. A typical procedure would be to roll the wings level whilst selecting full power (including reheat if fitted) and transferring to instruments, with a 4g pull to a 30° nose-up attitude and levelling off once past safety altitude.
[2] On the Job Training Instructor.

TCAS related but not clear. STCA had started to flash, at which point the trainee instructed the A320 pilot to maintain FL80 and passed Traffic Information on the conflicting aircraft, squawking 4322 and believed to be working Yeovilton Radar. The next call from the A320 pilot was 'clear of conflict' and radar vectors were then resumed.

THE YEOVILTON CONTROLLER reports a formation of two Tornados were attempting to conduct a descent to low-level to the west of Yeovilton, in receipt of a Traffic Service from Yeovil Radar and under control of a trainee LARS controller. The aircraft had been descended to 2000ft on the QFE (1007hPa) and, having obviously been unable to achieve VMC below, requested a climb to get above an area of high ground, which the aircraft were approaching. The aircraft climbed to 2500ft and then 3000ft and, after a request for a further climb and a separate squawk for the formation number 2, the aircraft were instructed to climb to 4000ft and a separate squawk was issued, with the primary radar contacts being observed to separate and diverge. The Screen Controller took over due to the complex and unique nature of the task at hand, as the aircraft were heading west and under Airway N864. At this point, and before a service had been provided to the formation number 2, the SSR Mode C of the formation number 2 was observed to change rapidly from FL014 to FL068, with a civil aircraft about 1nm south, in N864, showing a Mode C of FL083. The formation number 2 was instructed to descend to 5000ft (base of N864 was FL65) and traffic was called, upon which the formation number 2 pilot responded 'Roger, taking TCAS RA'. Both aircraft were then observed to continue west, with the formation leader electing to climb to re-join with the formation number 2.

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

THE YEOVILTON SUPERVISOR reports he was first alerted by the LARS controller informing him that the formation number 2 was inside controlled airspace and responding to a TCAS RA. The supervisor looked at his radar repeater screen and observed a 4322 Squawk with Mode C of FL068 inside N864 (base level FL65). There was civil traffic within 2nm indicating Mode C FL083 which was slowly descending. As the controller had taken prompt and effective action already, and the aircraft was responding to TCAS RA, he monitored the situation until it was resolved, and then provided relief for the controller. He then received a call from Cardiff ATC and they discussed the incident; the Cardiff controller informed him that they would be raising a report and he stated Yeovilton were doing the same. A telephone call was received later from the Tornado formation number 2 pilot to discuss the event. He said that he was performing an emergency low-level abort at the time and thanked the controller for his actions and also for not "getting into the cockpit" after receipt of the TCAS RA.

Factual Background

The weather at Yeovilton and Exeter was recorded as follows:

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METAR EGDY 181250Z 21018KT 9999 -RA FEW010 BKN022 14/10 Q1010 WHT BECMG 5000 -RA SCT010 BKN015 GRN=
METAR EGDY 181350Z 22016G29KT 9999 FEW010 BKN020 15/12 Q1009 WHT BECMG 6000 -RA SCT010 BKN015 GRN=
METAR EGTE 181320Z 22017G27KT 9999 FEW015 BKN020 14/13 Q1010=
METAR EGTE 181350Z 25017KT 220V280 8000 SHRA FEW013 BKN022 14/13 Q1010=
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Analysis and Investigation

CAA ATSI

The A320 pilot was under a Radar Control Service with Cardiff Radar. The Tornado was one of a flight of two on a low-level training sortie which, as a formation, had been receiving a Traffic Service from Yeovilton Radar, but no service had been separately agreed with this Tornado at that time.

At 1327:54, a contact with the transponder code allocated to the Tornado formation leader (4320) was observed below controlled airspace, 5.3nm ahead of the A320 (code 5531) which was passing FL78 in the descent to FL70 (see Figure 1).

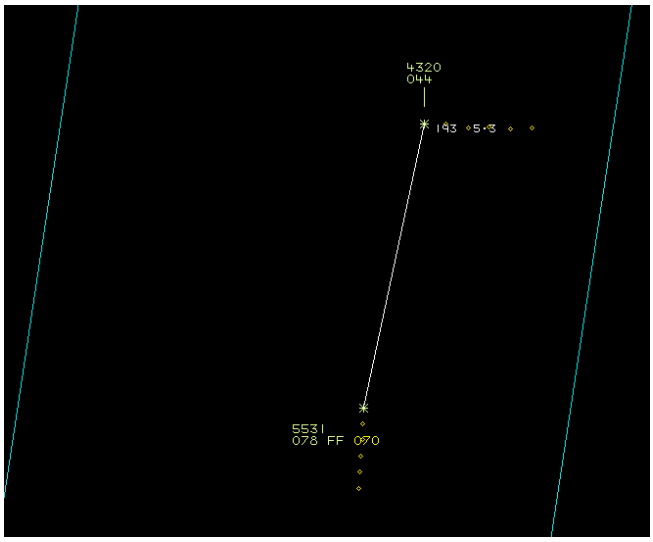

Figure 1 – 1327.54

At 1328:00, the A320 pilot reported a TCAS RA. The Swanwick radar recording coincidently showed a new contact with SSR code 4322, (allocated to the second of the two Tornados to allow the pair to split and climb separately), much closer to the A320 and indicating FL64 with the A320 apparently already responding to the TCAS RA, in the climb passing FL79 (see Figure 2).

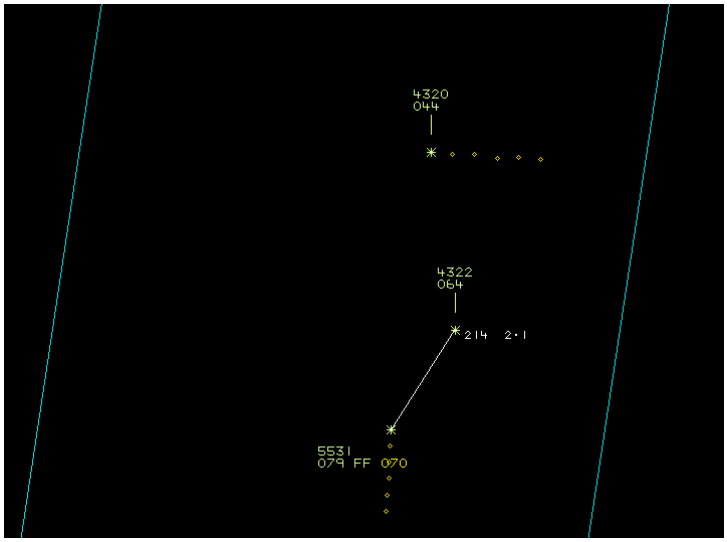

Figure 2 – 1328:00

CPA, took place at 1328:12 with the Tornado, which had descended from FL64 to FL54, having then climbed again to FL58 (Figure 3).

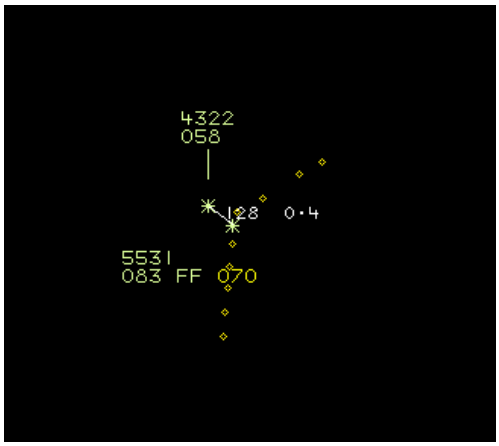

Figure 3 – 1328:12

The Cardiff controller was a high-hours trainee who had not been able to fully understand the TCAS report from the A320 pilot, and instead reacted to an STCA by instructing the A320 pilot to stop descent at FL80.

The No2 Tornado pilot reported carrying out an emergency low-level abort in deteriorating weather conditions and was climbing to a level above the 3400ft safety altitude in that area. Whilst levelling off, the Tornado pilot also reported receiving a TCAS RA.

Military ATM

The No 2 Tornado was in communication with Yeovilton LARS, but was not under a FIS at CPA; the Airbus was in CAS, under a Radar Control Service with Cardiff Radar.

The Yeovilton LARS controller applied a Traffic Service to the Tornado formation at 1320:16 and limited the service at 1324:05 due to the limits of surveillance radar cover. At 1326:24, the formation leader requested a climb, and the LARS controller instructed a climb to '4000 feet initially' at 1326:39 (see Figure 1).

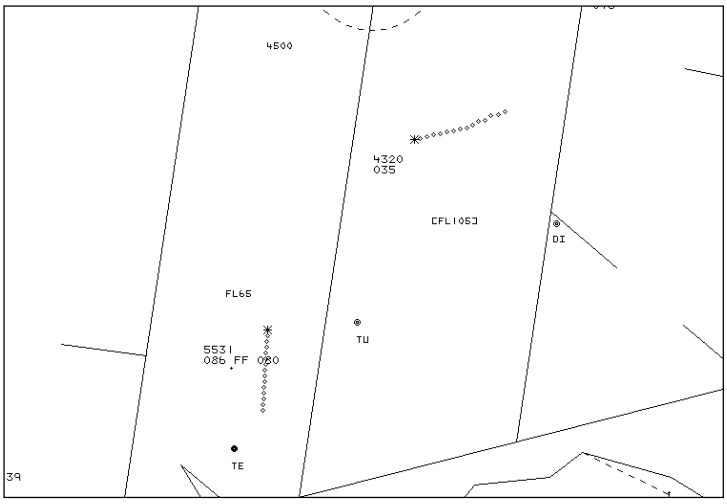

Figure 1: 1326:39 (A320 squawk 5531; Tornado leader squawk 4320)

At 1326:42, the formation leader confirmed the climb to 4000ft and requested a separate squawk for the formation No2, who was allocated squawk 4322. At 1327:04 (see Figure 2), the formation leader confirmed that it was not fit low-level and the crew would be looking to climb to a VMC layer and to re-join with Tornado No2.

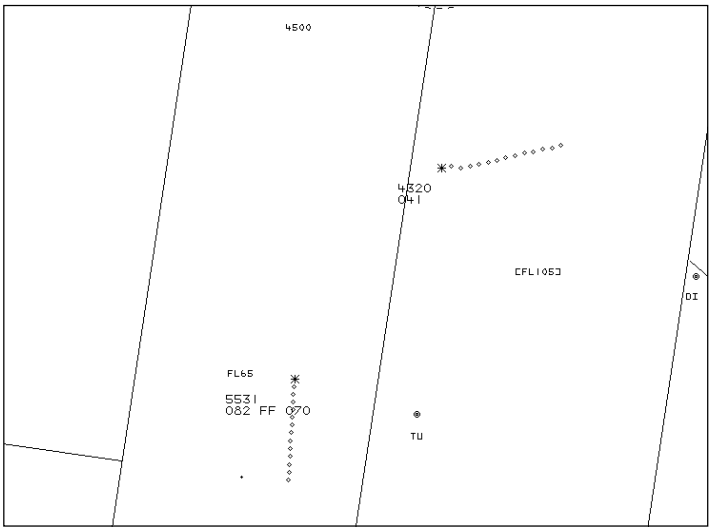

Figure 2: 1327:06 - Tornado No2 requested climb to VMC

At 1327:16, the LARS controller asked if the Tornado formation members required vectors for re-join. At 1327:39 (see Figure 3), the formation leader confirmed, "*no vectors yet, request a further climb to VMC layer*."

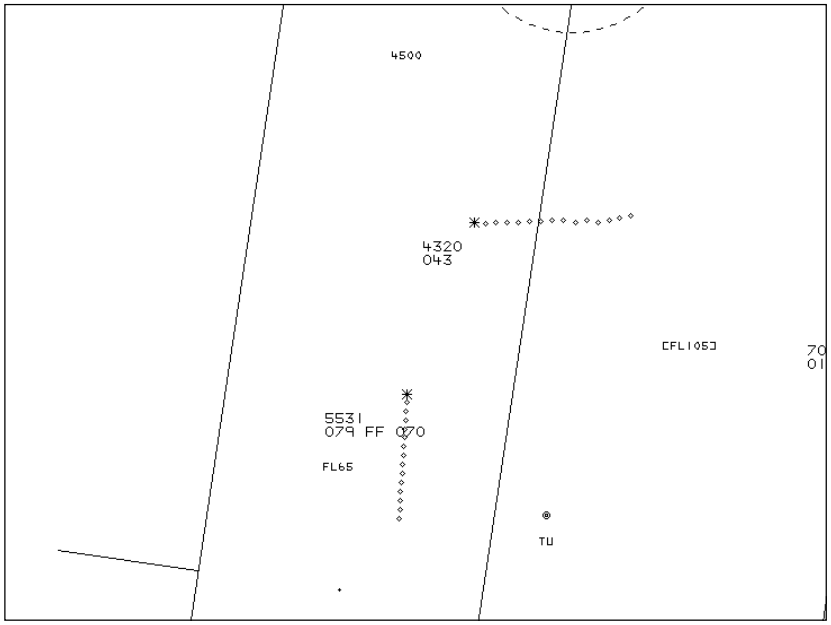

Figure 3: 1327:39 – formation leader requested climb to VMC layer

At 1327:45 (see Figure 4), the LARS controller transmitted, "[Tornado No2 C/S]*, stop climb flight level … correction, descend to altitude 5000 feet, traffic southwest at 2 miles, tracking north, 1800 feet above in the airway*." The RAC radar replay did not show the allocated Tornado No2 squawk at that stage.

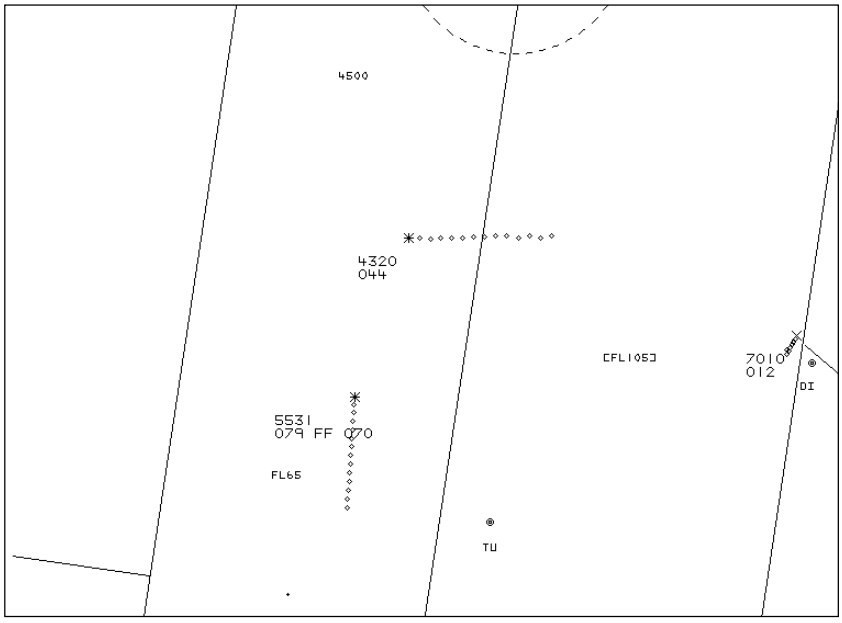

Figure 4: 1327:46 – LARS controller instructed Tornado No2 to descend

At 1327:56 (see Figure 5), Tornado No2 responded with a TCAS RA that was acknowledged by the controller.

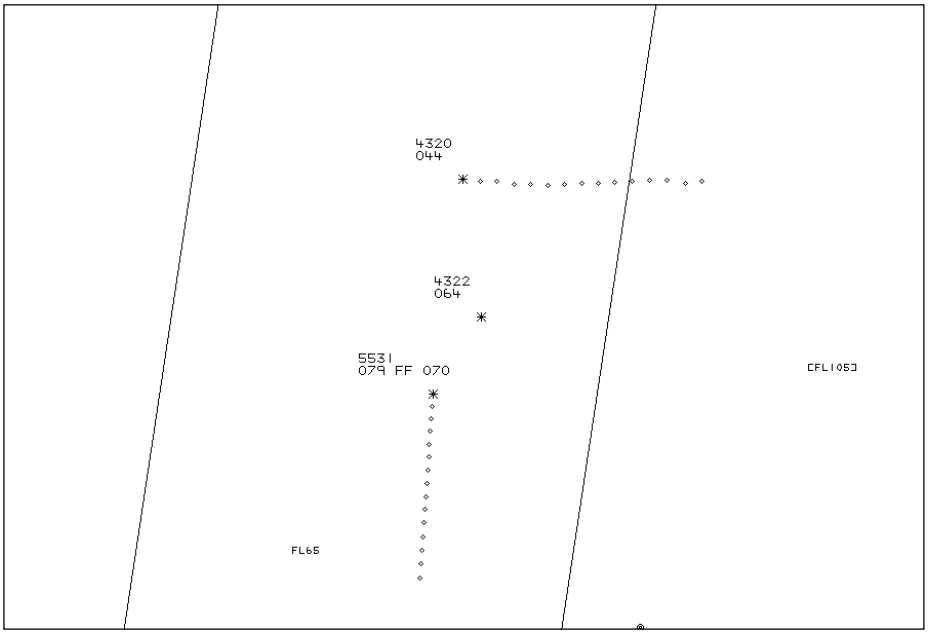

Figure 5: 1327:56 – Tornado No2 (4322) TCAS RA

The CPA was estimated at approximately 1328:07 with 0.5nm horizontal separation and 2500ft feet vertical separation.

Tornado No2 had been flying at low-level when deteriorating visibility had forced the crew to conduct a low-level abort. The No2 Tornado crew were IMC throughout the abort and were unable to manoeuvre aggressively to level flight because of the risk of becoming disorientated.

The LARS controller had applied a limited Traffic Service to the formation due to the limits of surveillance cover. The initial climb to 4000ft would have kept the Tornado formation below the airway base of FL65. It is not known when the No2 Tornado squawk appeared on Yeovilton radar but the controller issued a descent instruction with Traffic Information at 1327:45, approximately 22sec before CPA. The controller did not identify the No2 Tornado, or place the aircraft under a service but fulfilled his duty of care by prioritising the descent instruction and passed Traffic Information on the A320. Once the No2 Tornado pilot declared a TCAS RA, no further instruction was issued by the LARS controller until the pilot reported clear of traffic, post-CPA.

UKAB Secretariat

The A320 and Tornado pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard[3].

Occurrence Safety Investigation

Deteriorating weather conditions forced [Tornado No2 C/S] to carry out an emergency low-level abort. This was conducted safely, in accordance with [Tornado Force SOPs]. As the pilot initiated the recovery to level flight, the attitude and rapid rate of climb of the aircraft caused the TCAS to register a confliction with a civilian A320 in the airway above them and issue an RA to descend. The crew responded correctly to the RA. As [Tornado No2 C/S] reached top of climb it inadvertently infringed on the base of Airway N864 for a brief period. As all crew members acted in accordance with their training and SOPs during the incident, this OSI will make no recommendations relating directly to the incident.

[3] SERA.3205 Proximity.

Comments

HQ Air Command

The Tornado crew involved in this incident acted entirely appropriately and in accordance with their training and Force SOPs. A low-level abort in a military fast jet is a necessarily highly dynamic manoeuvre and a pilot's ability to conduct it satisfactorily is tested at least annually in both the live and synthetic environments. When conducting a low-level abort, the pilot will apply full power (including reheat if equipped) and commence a climb to above safety altitude; only once passing safety altitude will the pilot then start to recover the aircraft to level flight. If VMC, this can include overbanking to arrest the rate of climb as quickly as possible; however, if IMC (as in this case) then the recovery to level flight is less dynamic to mitigate the risk of disorientation. In this case, this led to the Tornado 'ballooning' into controlled airspace but, being above safety altitude, also allowed the pilot to respond correctly to the TCAS RA. At least two barriers to MAC were effective in this case (ATC and TCAS) and the controllers in this incident should be commended for their rapid intervention when the conflict became apparent, despite not having formally identified the Airprox Tornado.

Summary

An Airprox was reported when an A320 and a Tornado flew into proximity at 1328 on Wednesday 18th November 2015. Both pilots were operating under IFR in IMC, the A320 pilot in receipt of a Radar Control Service from Cardiff Approach and the Tornado pilot in communication with Yeovilton but not yet in receipt of a Service.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members first discussed the Tornado pilot's low-level abort manoeuvre and agreed that it appeared that he had flown into an area of presumably rapidly deteriorating weather conditions where it had been necessary to conduct such a manoeuvre in order to minimise the risk of CFIT. The risks of disorientation and potential loss of control during the manoeuvre in IMC were not insignificant, and consequently his controlled instrument recovery to level flight (which would only have been commenced once he had passed safety altitude), had required significant altitude. The resulting triggering of TCAS RAs in the Tornado and A320 were attributed to the high rate of climb of the Tornado during its abort manoeuvre wherein TCAS, not knowing the intentions of the Tornado pilot to level off, would have assumed that the high rate of climb would continue and thereby result in a conflict. Members commented that TCAS RA alerts are based on the projected time to closest approach and are preceded by a TA which can be up to 48sec before CPA (although in this highly dynamic situation the RA was likely to have been closer to the CPA). In the event, it was noted that the Tornado and A320 pilots' manoeuvres had resulted in a vertical separation of 2500ft at CPA.

Members then discussed whether the Tornado pilot had infringed the airway, and noted that both the Yeovilton and Cardiff controllers had reported observing the Tornado above FL65. The Swanwick MLT showed the Tornado climb to the base of the airway and then descend, and the Burrington radar head indicated FL66. It was agreed that the Tornado pilot may have infringed the airway but that it was not clear, neither was it clear that it had any specific bearing on the Airprox in that a TCAS RA would have been generated whether the Tornado had entered the airway or not. Notwithstanding, some members thought that the Tornado crew had chosen an unfortunate location to conduct the descent into low-level; underneath an airway, in an area which was at best in marginal weather conditions, and therefore with a low-level abort a likely contingency. Members agreed that the Tornado crew may have been better served by a descent 10 track miles further on, which would have allowed for a weather abort without Class A airspace above at FL65.

Members also discussed the Cardiff trainee controller's reaction to the A320 pilot's TCAS RA. It was noted that the trainee had assimilated that the A320 pilot had 'made a call relating to TCAS' and that the only calls pilots should make regarding TCAS was that of 'TCAS RA' and 'Clear of conflict'. Members agreed that it may be indicative of generally unnecessary pilot calls concerning TCAS that the trainee controller had not immediately associated the 'call relating to TCAS' with a TCAS RA; the importance of adherence to RTF phraseology was reiterated.

A military ATC member commented that in this incident strong barriers were in place to mitigate collision risk and that they had worked: the Tornado crew were aware of the airway, the Yeovilton controller had acted immediately, and both aircraft TCAS had provided warnings and alerts which the crews had followed. The Board quickly agreed that the cause had been that the high rate of climb of the Tornado had triggered TCAS RAs in both aircraft - a feature of TCAS design - but that, notwithstanding the uncertainty about whether the airway had been penetrated or not, normal safety standards and procedures had pertained.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Tornado pilot's high rate of climb during a low-level abort resulted in TCAS RAs.

Degree of Risk: E.