



administrative tasks, along with traffic calls. At the time of the Airprox, he was working a C152 on a Traffic Service to the north, a Rans S6 on a Traffic Service transit to the south east, a Grob 109 on a Basic Service, and was in the process of receiving a handover from Benson with a Traffic Service transit to the west, with traffic to affect. The Merlin was already under a Traffic Service, later reported as 'good VMC', transiting from Shawbury to Benson at FL55. The BZN RAD was quite busy working between tracks at the time, and, during his scan, did not notice anything rapidly encroaching on the Merlin. As he started to take the non-pre-noted handover from Benson, the Merlin pilot filed an Airprox, reporting a GR4 had passed approximately ½nm in front, left to right, 200ft above and descending. By this time, traffic believed to be the GR4 was entering the low-level system on a 7001 squawk, approximately 7nm west of the Merlin, and disappeared below radar cover. The BZN RAD stated that, normally, LARS would expect to work traffic descending to low-level from London Mil Central, from the Daventry corridor, as indeed he did later on in the hour. There was nothing pre-noted to him or free-calling him during the incident. He stated he was endeavouring to provide 'the best service to all four Traffic Service aircraft in his care', and the Basic Service, and that it was his belief that the GR4 descended at such a rate from level flight in the Daventry corridor that it did not attract his attention on the scan before dealing with the handover from Benson.

## **Factual Background**

The weather at Gloucestershire A/D was recorded as follows:

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METAR EGBJ 091050Z 27008KT 240V300 9999 SCT036 21/12 Q1019
METAR EGBJ 091120Z 29010KT 9999 SCT036 21/10 Q1019
METAR EGBJ 091150Z 29009KT 9999 SCT036 22/09 Q1019
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## **Analysis and Investigation**

### **Military ATM**

This incident occurred 18.5nm NW of RAF Brize Norton (BZN), at about 1122:12 on 9 Aug 13, between a Merlin and a Tornado. The Merlin was transiting from RAF Shawbury to RAF Benson, in receipt of a Traffic Service from BZN RAD. The Tornado was descending into the Low-Flying System having exited the Daventry Radar Corridor, in receipt of a Traffic Service from LATCC(Mil) Central (CEN) Tac.

All heights/altitudes quoted are based upon SSR Mode C from the radar replay unless otherwise stated. BZN did not conduct an incident investigation in accordance with MAA RA1410. LATCC(Mil) conducted a detailed incident investigation of their Unit's involvement in the incident and made a number of useful recommendations.

The Merlin was operating under IFR and described being 'intermittently VMC' with BKN cloud at 3500ft. The GR4 crew reported VMC and assessed the cloud tops at 'approx FL60, with a base at FL45 with large open gaps which were used for the descent'.

BZN RAD described moderate workload, providing an ATS to 4 aircraft. Analysis of the radar data seemed to show that they were providing an ATS to at least 1 more aircraft and that those aircraft in receipt of an ATS were split across a relatively wide geographic area, spanning about 50nm. The BZN ATC Order Book, Part 2, Order 2 states that RAD controllers are to provide an ATS to 'a maximum of 8 ac ... simultaneously of which 4 may be in receipt of a radar service (only 2 of which can be DS)'.

CEN Tac was manned by a trainee and an instructor, reported moderate to low workload with low task complexity, and were providing an ATS to the incident GR4 and an unrelated GR4. LATCC(Mil)'s incident investigation determined that the trainee and the instructor had only recently taken over the control position, with the trainee's first transmission made 2min 59sec prior to the incident, whilst the GR4 was within the confines of the Daventry Corridor.

Prior to the start of the incident sequence, as the GR4 pilot was positioning to enter the Daventry Corridor, he advised CEN Tac that they would be “letting down to low-level as soon as we’re clear of the corridor. We’ll take a handover to Gloucester for low-level descent”. CEN Tac replied that “Gloucester are no radar, do you wish to handover to Brize?”. The GR4 crew stated that they would “remain with Gloucester for a...just for traffic information and the weather should be good”. Subsequent to completing their DASOR<sup>2</sup>, BZN RAD related that they had seen the GR4 transiting through the Daventry Corridor; however, they believed that ‘BZN LARS would expect to work ‘low-level descenders’ from London Mil Central from the Daventry Corridor.’ Consequently, BZN RAD’s mental model was that the GR4 would not commence descent on exiting the corridor as it had not been pre-noted to them by CEN Tac.

The incident sequence commenced at 1121:11 as, in response to a request from the GR4’s crew, CEN Tac instructed them to “descend flight level 4-5, report passing flight level 7-5”, which was acknowledged. Figure 1 depicts the incident geometry at this point, SSR 3A 6402 was the GR4 and SSR 3A 3710 was the Merlin.

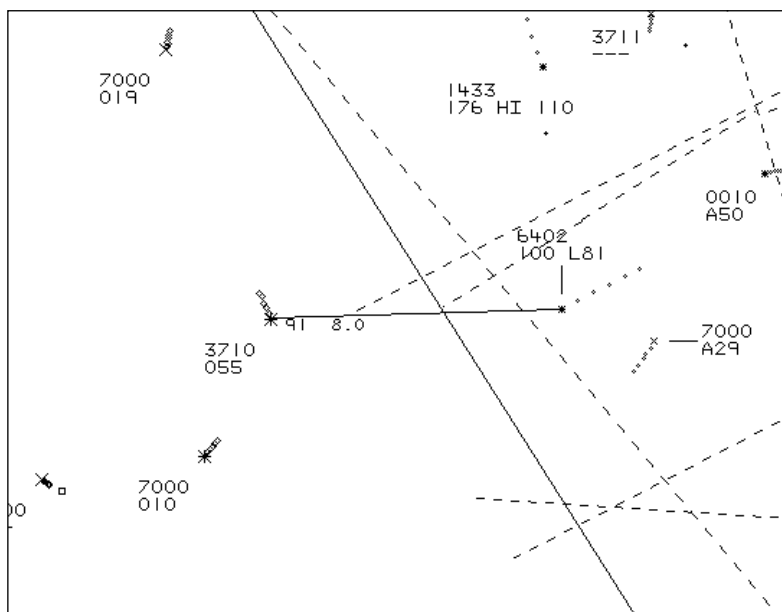


Figure 1: Incident Geometry at 1121:11

The Guidance Material to CAP 774, Chapter 3, paragraph 6 states, ‘When providing headings/levels for the purpose of positioning and/or sequencing or as navigational assistance, the controller should take into account traffic in the immediate vicinity, so that a risk of collision is not knowingly introduced by the instructions passed’. The LATCC(Mil) unit investigation determined that CEN Tac’s instructor had spotted the potential conflict with the Merlin, prior to the trainee instructing the GR4 to descend. The instructor subsequently related that, with hindsight, they realised that they should have intervened but felt that as the GR4 was in receipt of a Traffic Service, rather than a ‘higher’ level of ATS, they may have allowed themselves to be complacent and focussed their attention on other tasks.

As CEN Tac was passing the descent instruction, an unrelated Grob 109 called BZN RAD, with their initial call being passed from 1121:15 to 1121:32, to request a Basic Service. This aircraft was the 5<sup>th</sup> ac in receipt of an ATS from BZN RAD, with the other 4 being in receipt of a Traffic Service. During this transmission, at 1121:26, CEN Tac provided traffic information to the GR4 on the Merlin, advising them of “traffic west, 5 miles, tracking south-east, slow moving, indicating flight level 5-5”, which was acknowledged. During this transmission, at 1121:30, the GR4 commenced its descent to FL45, 5.5nm E of the Merlin.

<sup>2</sup> Defence Aviation Safety Occurrence Report

CAP 413, Chapter 5, paragraph 20 states that the ‘relative bearing of the conflicting traffic [should be described] in terms of the 12 hour clock, with the optional prefix ‘left or right’ as appropriate; or, if the aircraft under service is established in a turn, the relative position of the conflicting traffic in relation to cardinal points’. CAP 413, Chapter 5, paragraph 22 states that when describing the level of conflicting traffic with verified SSR Mode C information, the phrase ‘at level’ should be used.

The RT exchange between BZN RAD and the unrelated Grob 109 was completed at 1121:37, with a further 7sec exchange of RT between 1122:00 and 1122:07. At 1121:45, the GR4 advised CEN Tac that they were “*passing flight level 7-5*”. CEN TAC acknowledged the call, advising the GR4, “*Cotswold 1-0-1-4, descend to altitude 4000 feet, report approaching, report V-M-C below.*” During this transmission, at 1121:55, the GR4 can be observed on the radar replay to have turned right by about 15°; at this point, the GR4 was indicating descent through FL74, 2.6nm ESE of the Merlin. Figure 2 depicts the incident geometry at the point that CEN Tac passed the Cotswold RPS. Extrapolation of the radar data determined that, had the GR4 maintained their WSW’ly track, they would have passed about 0.9nm ahead of the Merlin.

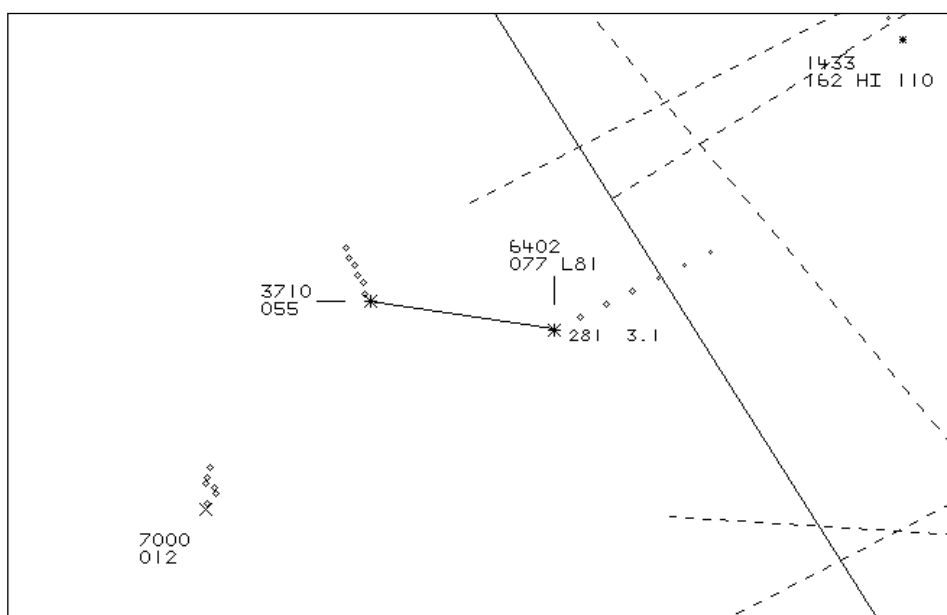


Figure 2: Incident Geometry at 1121:50

Acknowledging CEN Tac’s transmission, at 1122:01 the GR4’s crew requested an update on the position of the Merlin and were advised that it was “*directly west, one mile, tracking south-east, flight level 5-5*”. At this point, the Merlin was 1.6 nm WNW of the GR4, tracking SE’ly, maintaining FL55; the GR4 was tracking W’ly, indicating descent through FL68.

CAP 774, Chapter 3, paragraph 5 states that controllers ‘shall update the traffic information if it continues to constitute a definite hazard, or if requested by the pilot’.

The CPA occurred during a VHF RT exchange with an unrelated Chipmunk, 41.9nm SSE of the Merlin and between sweeps of the radar at about 1122:12, as the GR4 passed 0.3nm ahead of the Merlin. The GR4’s SSR Mode C showed the ac descending through FL62 at 1122:10 and FL58 at 1122:14. The RT transcript is arguably a more accurate record as the GR4 pilot acknowledged his updated traffic information at 1122:12, reporting that they were “*through 5-5...[2sec pause] now [equating to 1122:16], [GR4 C/S] is victor mike and clear of that traffic and en-route, thanks*”. CEN Tac acknowledged this call, advising the GR4 to “*squawk as required and continue with Gloucester, 1-2-8 decimal 5-5-0*”. Figure 3 depicts the incident geometry at the first sweep of the radar after the CPA and shows the GR4’s earlier right turn at 1121:55.

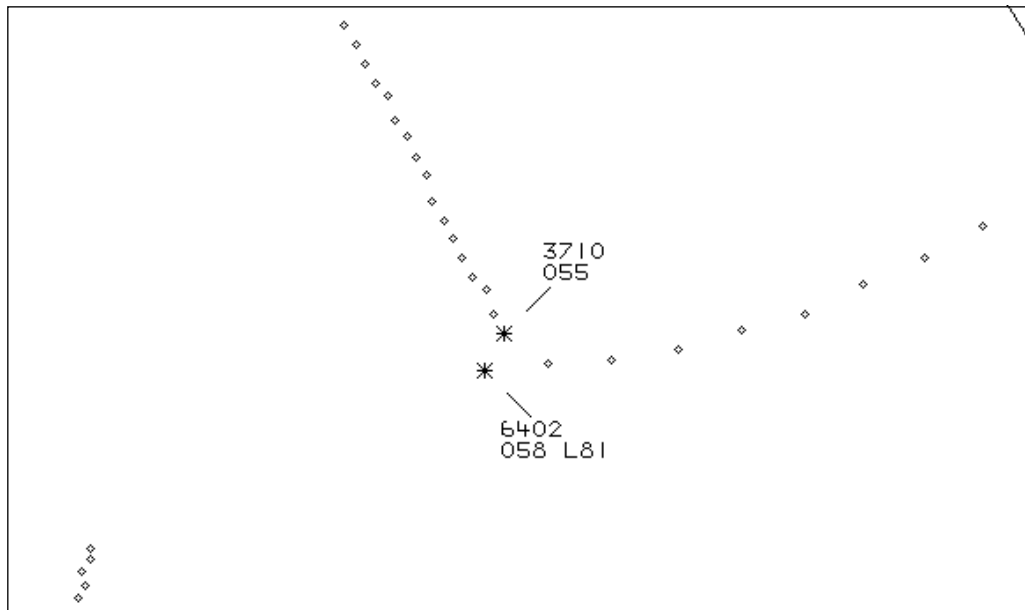


Figure 3: Incident Geometry at 1122:14

Having completed the RT exchange with the Chipmunk at approx 1122:16, BZN RAD then provided traffic information at 1122:22 to a further unrelated GA ac that was in receipt of a Traffic Service, 23.6nm SSE of the Merlin. BZN RAD did not provide traffic information to the Merlin on the GR4 during the incident sequence.

CAP 774, Chapter 3, paragraph 5 states, 'The controller shall pass traffic information on relevant traffic, and shall update the traffic information if it continues to constitute a definite hazard, or if requested by the pilot. However, high controller workload and RTF loading may reduce the ability of the controller to pass traffic information, and the timeliness of such information'.

The Guidance Material to CAP 774, Chapter 1, paragraph 9 states, 'In high workload situations, which may not always be apparent from RTF loading, it may not be possible for controllers to always provide timely traffic information and/or deconfliction advice. High workload situations may not necessarily be linked to high traffic density'. Chapter 1, paragraph 9 states that in such circumstances, 'controllers shall inform the pilot of reductions in traffic information along with the reason and the probable duration', but acknowledges that, 'it may not always be possible to provide these warnings in a timely fashion'. The ATS provided to the Merlin had not been reduced.

CAP 774, Chapter 3, paragraph 6 states, 'Whether traffic information has been passed or not, a pilot is expected to discharge his collision avoidance responsibility without assistance from the controller'.

Turning first to the involvement of the GR4 crew in the incident, their perception of the traffic information from CEN Tac was that the call at 1121:26 described 'conflicting traffic on the nose at 5000ft' and that the updated traffic information described the Merlin as being '12 o'clock, 2 miles, passing left to right'. They then described that 'to avoid this traffic the ac was manoeuvred to the left and rapidly descended through FL50 to provide a height and geographic deconfliction'. Analysis of the radar data determined that at 1122:10, as the GR4 indicated descent through FL62, its RoD increased from approx 4500 fpm to approx 6000 fpm; however, a turn to the left was not evident on radar, only the right turn that was initiated at 1121:55. The GR4 crew were asked whether they had made any deviations from track to utilise gaps in the cloud cover and they confirmed that the only turn that was taken was the reported left turn intended to provide a 'geographic deconfliction'. When the right turn evident from the radar data was mentioned to the GR4 pilot, he related that the left turn may have been reported in error. BM SPA contends that this was arguably as a result of the 5 days that elapsed between the date of the occurrence and the GR4 crew completing their DASOR. It also explains the pilot's recollection in their DASOR

that the Merlin was described as crossing left-to-right, which would have prompted a left turn to deconflict. Given the GR4 crew's perception that the Merlin was in their 12 o'clock and that CEN Tac had described the Merlin as "*tracking south-east*" at 1121:26, the GR4's right turn at 1121:55 would have been a reasonable course of action to deconflict themselves from the Merlin. However, the GR4 crew's perception of the Merlin as being 'on the nose' was faulty, due to the traffic information passed by CEN Tac at 1121:26. Whilst CEN Tac was correct in describing the Merlin to the GR4 as being west of them, the GR4 crew had not assimilated that they were tracking WSW'y within the Daventry Corridor and that consequently, the Merlin was in their 1 o'clock. The GR4 however was on a steady hdg and thus CEN Tac should have described the relative bearing of the Merlin in terms of the 12-hour clock. It is BM SPA's contention that the incorrect utilisation of cardinal points to pass traffic information to the GR4 was a contributory factor in this incident.

Despite having a low task-load, CEN Tac did not update the traffic information on the Merlin to the GR4 until requested; by that time, the update was too late to have affected the outcome of the incident. The best opportunity to have done this would have been at 1121:50 in response to the GR4 crew's transmission that they were "*passing flight level 7-5*", as the GR4 indicated descent through FL77, 3.1nm ESE of the Merlin. CEN Tac's reply however was a planned automatic response, in accordance with the unit's low-level descent procedure, to pass the RPS and instruct further descent to the Area Safety Altitude. Arguably, this indicates a lack of awareness of the developing conflict and, potentially, a reduced level of alertness. Moreover, the instructor did not intervene to prompt the trainee to update the TI, also suggestive of reduced levels of alertness. The genesis of this incident however, from the GR4/CEN Tac perspective, was CEN Tac's instruction to the GR4 to descend at 1121:11. Given that the instructor had spotted the potential conflict prior to the descent instruction, CEN Tac knowingly introduced a risk of collision by allowing the GR4 to descend. Moreover, given the steady relative bearing between the GR4 and the Merlin throughout the incident sequence and CEN Tac's low workload, BM SPA agrees with the contention in LATCC(Mil)'s incident investigation that 'good practise' would have been for CEN Tac to have re-assessed the situation and provided the GR4 with an intermediate level, stopping their descent above the Merlin.

Turning to BZN RAD's role in the incident, based on the evidence, the controller was systematically dividing their attention between each of the ac to which they were providing an ATS. Moreover, they were working at the stipulated capacity of 4 ac in receipt of a surveillance based ATS, which were spread across a relatively wide geographic area, thus complicating BZN RAD's task. At the point at which the GR4 commenced its descent at 1121:30, BZN RAD's attention was focussed on the unrelated free-calling Grob 109 to the S of BZN and remained so until 1121:41. There was then a further exchange of RT with the Grob pilot between 1122:00 and 1122:07, before BZN RAD shifted their attention to the aircraft further S of BZN. It was during this time that the CPA occurred. Thus, whilst a short 19-sec opportunity existed between 1121:41 and 1122:00, in which BZN RAD may have been able to pass traffic information to the Merlin on the GR4, BM SPA contends that this would be an inappropriate summation based on hindsight. It is clear that BZN RAD was working hard to provide an effective ATS to all those ac on frequency and it was happenstance that they elected to attend to the S'y ac before the N'y ac and thus missed the opportunity to provide TI. That said, it is reasonable to argue that their decision to do so was probably based on the fact that one of the S'y ac had been in conflict and previously provided with traffic information and that they needed to re-assess that conflict. Moreover, their mental model, albeit faulty, was that the GR4 'would' obtain an ATS from them to descend to low level and, in the absence of that information, was thus not a factor. A key learning point here for BZN personnel is that, despite the frequency with which such an event might occur, whilst a pilot 'can' obtain an ATS from them to let-down to low level, this does not mean that every pilot 'will' do so.

This incident occurred following CEN Tac's clearance to the GR4 pilot to descend to FL45. Proposed contributory factors were the utilisation of an inappropriate traffic information format by CEN Tac, the lack of a timely update to that traffic information by CEN Tac and a lack of traffic information from BZN RAD to the Merlin, caused by high workload and an incorrect mental model of the GR4 pilot's intentions.

BM SPA agrees with the recommendations made in the LATCC(Mil) investigation and continues, through the RAF ATM and ASACS STANEVAL teams, to highlight methods of 'good practice' in the supervision of trainees. Further work is being undertaken by the RAF ATM Force, taking into account what training is conducted by, and what is experienced within, other ANSPs, to understand whether training provision needs to improve and, if so, how. To support this, BM SPA commissioned an academic study to examine the HF related to the monitoring of trainee controllers and to develop a 'tool box' for use by supervisory personnel; this work is expected to be completed by December 2013.

BM SPA has requested that SATCO RAF Brize Norton works to ensure that all their ATC personnel are aware of the potential for aircraft to descend to low-level on exiting the Daventry Corridor, without seeking an ATS from Brize Norton.

## **UKAB Secretariat**

MAA Regulation 2307(1) (Avoidance of Collisions) states:

'The Aircraft Commander or handling pilot, or in the case of a Remotely Piloted Air System (RPAS) the pilot or controller, **shall** take all possible measures to ensure that his aircraft does not collide with other aircraft irrespective of whether a flight is being made with air traffic control clearance.'

The Guidance Material to MAA Regulation 2307(1), at paragraph 13, states:

'When two aircraft are converging in the air at approximately the same altitude, the aircraft that has the other on its right must give way, provided that powered aircraft will give way to aircraft towing other aircraft or objects.'

The Guidance Material to MAA Regulation 2307(1), at paragraph 26, states:

'**Collision Avoidance during IMC Flight.** To reduce the risk of a collision, flight in IMC is only permitted in the following circumstances:

- a. When in receipt of a radar or procedural service, or;
- b. Where a radar or procedural service is not available or cannot be obtained, then above 3000ft AMSL or the Safety Altitude (whichever is higher), pilots must fly at cruising levels according to the quadrantal or semi-circular rule as applicable based on the standard altimeter setting 1013.2 mb/hPa, or,
- c. When following a published approach or departure procedure, or;
- d. In an emergency, or;
- e. When special dispensation has been granted by MOD, or;
- f. Where specific approval is given in Aviation Duty Holder and Commanders' Orders.'

## **Comments**

### **HQ Air Command**

The decision to continue with a descent through the height of reported traffic at close range suggests that the situational awareness of the Tornado crew was not optimal. Whilst there was some 'non-standard' TI from CEN Tac regarding the Merlin, the Tornado crew have been exposed to similar tactical traffic calls throughout their training and could be expected to assimilate this adequately and allocate the necessary priority to deconfliction. The significant delay between the date of the occurrence and subsequent DASOR has adversely affected the fidelity of the report, including the confusion over which way the pilot turned the aircraft in response to the TI on the Merlin.

**JHC**

This does well to highlight the dangers of both assumption and complacency; in this case by both the Controller and the GR4 crew. It also calls into question the potential requirement for all IFR flying to be conducted under a Radar Service, although in this instance perhaps it would have overloaded the Controller further.

## **Summary**

A Merlin helicopter and a Tornado GR4 flew into conflict at 1122 on 9<sup>th</sup> August 2013, 10nm east of Gloucestershire A/D. The Merlin crew were transiting under IFR in intermittent VMC, in receipt of a Traffic Service; the Tornado crew were descending to low level under VFR in VMC in receipt of a Traffic Service from another agency.

## **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, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The Board first considered the actions of the ATC units involved. A military ATC member stated that traffic descending to low-level on departing the Daventry corridor to the west was routinely handed over to Brize Norton for a radar based ATS. However, this was not a mandatory requirement and, in this case, the Tornado crew stated that they would "... *take a handover to Gloucester for low-level descent*" when their intentions were queried by the LATCC(Mil) CEN Tac trainee controller. Meanwhile, BZN RAD, providing a Traffic Service to the Merlin pilot, assumed that the Tornado would not descend on exiting the Daventry corridor because it had not been pre-noted to them by CEN Tac. Members opined that this expectation may have caused the BZN RAD not to monitor the Tornado's subsequent descent sufficiently such that he could pass timely Traffic Information (TI) to the Merlin pilot. On leaving the Daventry corridor, and in response to a request from the GR4's crew, the CEN Tac trainee controller instructed them to "*descend flight level 4-5, report passing flight level 7-5*"; FL45 was below the Merlin's cruising level and therefore a conflict was knowingly introduced (the Merlin prior to the trainee instructing the GR4 to descend). CEN Tac passed TI on the LATCC(Mil) unit investigation determined the CEN Tac OJTI had spotted the potential conflict with Merlin to the Tornado crew some 15sec later, at a separation of 5nm, and further TI when an update was requested by the Tornado crew, by then at a separation of about 1nm. Members opined that the OJTI could reasonably have intervened earlier, in order to emphasise the converging nature of the Tornado's track to its pilot, and certainly when the trainee controller used non-standard phraseology when advising the Tornado crew that the Merlin was "... *west ...*" rather than using the clock-code. Some members felt that this use of incorrect phraseology may have caused a delay in the Tornado crew assimilating the TI but military pilot members were of the opinion that this was not a factor; in their view, the crew would have easily assimilated the TI due to their regular use of varying standard phraseologies such as intra-formation tactical RT. Some ATC members were of the opinion that CEN Tac and BZN RAD should reasonably have effected coordination, but other ATC members felt that this was not necessarily appropriate, and that a fundamental tenet of radar-based ATS provision was that traffic was controlled using the information available on the radar screen irrespective of the ability to coordinate it – the Merlin and GR4 were there to be seen on the radar and the controllers should have conducted their business accordingly.

Turning to the Merlin and Tornado crew's actions, the Merlin crew was transiting under IFR in 'intermittent' VMC. They were in receipt of a radar based ATS, namely a Traffic Service from BZN RAD, and therefore in compliance with the relevant MAA regulations. The Board noted that, had they been offered TI on the Tornado by BZN, then they may have been prompted to take their own avoiding action or have requested a Deconfliction Service (DS); given the prevailing in-flight conditions, members were of the opinion that the crew would have benefited from the provision of a DS in any case. In this respect, it was noted that there was anecdotal evidence that pilots often chose not to request a DS on the basis that the ensuing avoiding action turns would not allow them to



complete their mission aim. Members were unanimous in their opinion that this premise was ill-founded, and that pilots were still free to choose whether they followed ATC headings, even under a DS, informing ATC if they chose not to do so, whilst at the same time obtaining important SA on other traffic and valuable suggestions for headings to avoid conflict. As for the Tornado, on leaving the Daventry corridor, the crew elected not to obtain a hand-over to BZN RAD but to go straight to Gloucester despite the fact that Gloucester had no radar, there was considerable cloud in the area and that they had been told that the Merlin was effectively ahead and below them. Members opined that, even though they were VMC with large gaps in the cloud, they may have been overly motivated by time or routing pressures such that, in the event, the crew did not fully assimilate the Merlin TI passed to them. When the Tornado pilot realised that he was close to the Merlin, he made what the Board considered to be an ill-considered attempt to dive beneath it rather than level off above it and, in the process, this decreased the separation at CPA.

After much debate, the Board decided that the Airprox was caused because the Tornado crew descended into conflict with the Merlin, albeit having been cleared to descend by CEN Tac, and without fully compliant TI. Members also debated the risk at length and the discussion was dominated by the facts that the Tornado crew did not see the Merlin at all, and the Merlin crew only saw the Tornado on their nose as it passed by. Members opined that, although the situation had stopped short of an actual collision, the aircraft had passed sufficiently close that chance had played a major part in events.

### **PART C: ASSESSMENT OF CAUSE AND RISK**

Cause: The Tornado crew descended into conflict with the Merlin, which they did not see.

Contributory Factor(s): 1. CEN Tac allowed the Tornado crew to descend through the Merlin's level.  
2. Lack of timely Traffic Information to the Merlin crew.

Degree of Risk: A.

ERC Score<sup>3</sup>: 500

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<sup>3</sup> Although the Event Risk Classification (ERC) trial had been formally terminated for future development at the time of the Board, for data continuity and consistency purposes, Director UKAB and the UKAB Secretariat provided a shadow assessment of ERC.