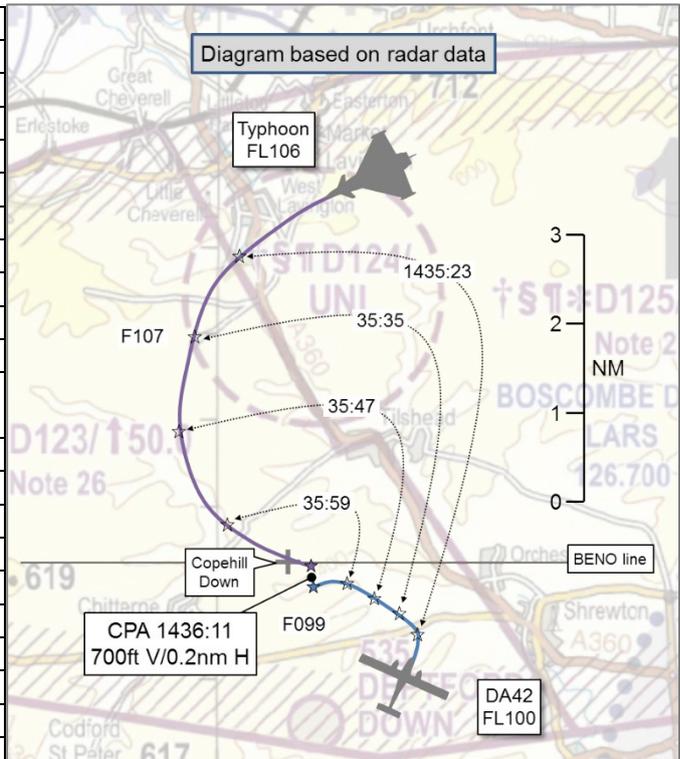


**AIRPROX REPORT No 2019010**

Date: 17 Jan 2019 Time: 1436Z Position: 5112N00158W Location: EG D123

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

Recorded	Aircraft 1	Aircraft 2
Aircraft	DA42	Typhoon
Operator	Civ FW	HQ Air (Ops)
Airspace	EG D123	EG D123
Class	G (Danger Area)	G (Danger Area)
Rules	VFR	VFR
Service	Basic/Procedural	Basic/Procedural
Provider	Boscombe/JTAC	Boscombe/JTAC
Altitude/FL	FL099	FL106
Transponder	A, C, S	A, C, S
Reported		
Colours	White, blue, orange	Grey
Lighting	Nav, land, taxi	HISL, nav
Conditions	VMC	VMC
Visibility	50km	>10km
Altitude/FL	10000ft	10500ft
Altimeter	RPS (1014hPa)	QNH (NK hPa)
Heading	285°	NK
Speed	111kt	280kt
ACAS/TAS	G1000 TAS	Not fitted
Alert	TA	N/A
Separation		
Reported	300ft V/80m H	Not seen
Recorded	700ft V/0.2nm (~360m) H	



**THE DA42 PILOT** reports operating in the Salisbury Plain Training Area (SPTA), EG D123/125, in support of a CAS<sup>1</sup> exercise. He had been cleared into the exercise Restricted Operating Zone (ROZ) by the TACP<sup>2</sup> at altitude 10,000ft on the RPS. The comm plan was to flow Boscombe Radar, Salisbury Ops, ROZ Control (TACP) and then to the FAC<sup>3</sup>. On Salisbury Ops check-in, the pilot was made aware of a Hawk in altitude block 6-8000ft and a Typhoon at 18000ft. Each were operating on individual discrete frequencies with separate FACs. During the exercise, a BENO<sup>4</sup> line of 270°-090° on Copehill Down was set, with the DA42 to operate south of it – he set his OBS line on the G1000 MFD accordingly for awareness. By visual contact and information from the TAS, the pilot became aware of an aircraft operating within the DA42's altitude allocation but north by 7nm. An enquiry was made to Salisbury Ops which confirmed it was the Typhoon. It was subsequently noted on two occasions that the Typhoon had crossed south of the BENO line (measured on the G1000 range ring) by 3.75nm and at altitudes of 600ft above and 400ft below that of the DA42 (remaining at 10000ft) and at a range of 6nm laterally to the southeast. During a simulated attack on a target in Copehill Down village (on the BENO line), on a Mandatory Attack Heading of 285° and a target distance of 2.5nm, the DA42 was overflowed by the Typhoon (executing a left turn) above and to the right. At the time the DA42 was at 9700ft following a pilot-initiated descent. The DA42 pilot exited the ROZ to the south to a distance of 10 miles. The incident was reported to the FAC along with a request for differential height blocks before re-entry could be considered. The DA42 pilot was informed that the Typhoon would be off-task within minutes.

He assessed the risk of collision as 'Medium'.

<sup>1</sup> Close Air Support

<sup>2</sup> Tactical Control Party.

<sup>3</sup> Forward Air Controller.

<sup>4</sup> BENO is a deconfliction tool used to procedurally separate aircraft operating in the same area. In this case, 'BE NO further north than a line through Copehill Down' for the DA42 and 'BE NO further south...' for the Typhoon.

**THE TYPHOON PILOT** reports that he had a conflict with a DA42 in the SPTA of which he only became aware after he had landed.

**THE JTAC<sup>5</sup> INSTRUCTOR** reports supervising a trainee JTAC who approved the Typhoon into the ROZ on the ROZ Control frequency in the block 18-20,000ft amsl. The Typhoon pushed to a discrete frequency. The Typhoon was made aware of the DA42 operating in the area and there was initial confusion about a simulated GR4 asset which was clarified as the DA42 on station, which the Typhoon acknowledged. There was a Hawk on station at 6-8000ft amsl, a helicopter below 500ft agl and the DA42 at 10,000ft amsl. Deconfliction measures were a BENO line enforced east-west through Copehill Down, DA42 remain south, Typhoon remain north. The DA42 was operating on another frequency to simulate operational TTPs<sup>6</sup> and SOPs<sup>7</sup> in line with split-element engagement where ground forces will conduct dual target attacks simultaneously. The Hawk conducted hot bombing and returned to base. The Typhoon was approved 250ft-15,000ft and to remain north of the BENO line, the DA42 to remain south of the BENO line. Confusion may have occurred with the wording of the approval to 'operate 250ft-15000ft, BENO still in force'. Having been given the allocated altitude block (250ft-15000ft), the Typhoon established at the same level as the DA42. Communication between the JTAC and Typhoon pilot led to an unclear understanding of air users. He commented that JTAC Instructor intervention could have occurred earlier to clarify that all players understood the deconfliction measures in place. Deconfliction plans were briefed but due to miscommunication, other assets leaving, and a BENO line this led to an unclear understanding by the Typhoon pilot that the DA42 was operating to the south.

**THE SPTA TRAINING SAFETY OFFICER** reports that the airspace had been delegated to the JTAC who was controlling all assets involved. A number of aircraft were under the control of the JTAC and a deconfliction plan was in place to maintain separation between aircraft.

**THE SPTA SENIOR AIR OPS OFFICER** reports that although the incident occurred in STPA airspace, the airspace had been delegated to the JTAC who was controlling all assets involved. Having delegated the airspace, the controller's task was to monitor the surrounding airspace to ensure there were no infringements but the [responsibility for] separation [of aircraft within the SPTA] rested with the JTAC.

**THE BOSCOMBE SATCO** reports that although both pilots had initially been provided with a Traffic Service by Boscombe, a Basic Service was applied when within the SPTA range complex and pilots were advised of this.

## Factual Background

The weather at Boscombe was recorded as follows:

METAR EGDM 171450Z 32014KT 9999 FEW030 05/M04 Q1015 BLU NOSIG=

## Analysis and Investigation

### UKAB Secretariat

The DA42 and Typhoon pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard<sup>8</sup>. If the incident geometry is considered as head-on or nearly so then both pilots were required to turn to the right, unless to do so would force a crossing of flight paths<sup>9</sup>.

<sup>5</sup> Joint Terminal Attack Controller. Equivalent to FAC.

<sup>6</sup> Tactics, Training and Procedures.

<sup>7</sup> Standard Operating Procedures.

<sup>8</sup> MAA RA 2307 paragraphs 1 and 2.

<sup>9</sup> MAA RA 2307 paragraph 13.

## Coningsby Occurrence Investigation

Sequence of Events: the following information was supplied by the Typhoon pilot:

The Typhoon was operating as a singleton (#2 of a pair, but a late-comer due to an engineering delay) conducting CAS with live strafe as part of a CAS exercise in SPTA.

- On arrival, cleared into the range at 6-8000ft. The CAS stack had a 'live' Hawk 250ft-5000ft conducting CAS with live bombing, a 'live' DA42 and a 'simulated' Tornado GR4 in the block 10-12000ft. All aircraft were on the same JTAC frequency.
- The terms 'live' and 'simulated' were as described by the JTAC. Routinely, a 'simulated' CAS asset is not a real aircraft, but instead a person on the ground using a radio pretending to be an aircraft, which is what the Typhoon pilot believed the GR4 to be in this scenario.
- Waited for the Hawk to finish bombing and depart the range before he could strafe. Therefore requested a higher altitude block to save fuel. The JTAC cleared him to exit the range to the north, climb to 15-16000ft and re-enter, maintaining north of a BENO line east/west through Copehill (southern part of SPTA), which he did.
- Shortly after, the DA42 moved to a different area and on to a different frequency. The Hawk returned to base. The JTAC said that there was still a 'simulated' GR4 operating below him.
- The JTAC began working on the strafe scenario so he requested to move to a lower block to get a better view of the targets on the ground. The JTAC told him that all other live players had departed the range, that there were no more conflicts and that he had all of the ROZ (D123 and D125) from 250ft-15000ft (apart from some LL rotary which he was aware of). He subsequently descended and operated between 10000ft-10500ft of which he informed the JTAC. Setting up for each strafe pass, he was at about 10500ft (10000ft above target level) on an approximate line of attack of 330°, which required him setting up to the south of the target, in the southern half of the training area. He was not aware of any conflicting traffic. His SA was aligned with what the JTAC had told him – no more live players and all airspace from 15000ft and below was his aside from LL rotary.
- 5 minutes before departing SPTA, the JTAC told him to maintain north of the previously described BENO line which he did (he subsequently believe this was likely due to the DA42 having just reported the conflict on a different frequency).
- After landing he spoke to the TACP for the sortie debrief, who mentioned that the DA42 pilot had reported a conflict with him. The TACP stated that the JTAC controlling him had used the 'wrong comm', had incorrectly described the CAS stack to him and that they were taking this away as a big learning point. He also informed him that the 'simulated' GR4 was in fact the 'live' DA42, replicating the function of the GR4, they recognised that this was non-standard parlance and could lead to confusion.
- He phoned the DA42 crew, who said that they were at 10000ft in SPTA and felt that he got too close to them in the southern part of SPTA. He was unaware of the DA42 at the point of conflict and hence did not know his exact position or altitude when it occurred. Given what the JTAC had told him about the airspace, his focus was on working the LDP, looking out towards the middle of the CAS wheel, and maintaining within the SPTA airspace (although he was able to spill out of the range as required while holding a Traffic Service from Boscombe Approach).
- The DA42 pilot reaffirmed his conclusion that the JTAC had incorrectly described the CAS stack and did not have a suitable deconfliction plan. The DA42 pilot said they were content that the cause of their concern had been identified and did not mention submitting an Airprox.
- The conflict was discussed at length in the sortie debrief with both the authorising officer and formation lead. They all concluded that the main issue was the comm used by the JTAC informing him that he now had all the airspace to himself. They discussed whether he should have double checked what was meant in detail, but concluded that that mindset would be equivalent to cross-examining every CAS stack/ATC deconfliction comm. If the JTAC or range controller tells you about the deconfliction plan and location of other assets, it is not questioned if it fits in with the mental model.

- They also discussed the fact that the JTAC was trying to use a BENO line to deconflict 2 live assets working the same CAS Ex in the same training area at the same altitudes. They concluded that the use of a BENO line is great for temporary deconfliction for changing height blocks or conducting attacks, but isn't as robust as altitude deconfliction for prolonged use in a routine CAS stack, working target areas in close proximity. They debriefed this point with the JTACs which they agreed with and said it had formed the basis of their learning points. Having now seen the DASOR submitted by the DA42 pilot, it highlighted that a BENO line was an ineffective safety barrier, as the DA42's target was on the BENO line and their line of attack heading (285°) would have resulted in the aircraft skimming along very close to the line.
- They discussed if they should put in a DASOR, however, they collectively concluded that they wouldn't. He wasn't aware of any conflict while airborne; the DA42 pilot sounded happy about it when he spoke to him and the main take away was the JTAC's use of comm to describe the CAS stack and their use of deconfliction methods. He only found out that morning that Cobham had submitted an Airprox. In hindsight, he stated he should have submitted one.
- An additional point of discussion was use of the [Mode A] vs [Mode B] on one of the Head-Down Displays (HDD). With other players in the stack, [Mode B] could have provided the additional SA to prevent conflict, and would likely have helped in this scenario; however, given that his SA was that there were no other live assets, he felt that [Mode A] was more useful given the CAS training he was conducting.
- What would he do differently next time? He would perhaps consider requesting the ATC Traffic Service to give Traffic Information calls within the range as well as outside of it. However, in reality, ATC often prefer to limit traffic calls to those outside of the range (as was the case here) and the increased level of comm would no doubt distract from the training. Deconfliction within the range is normally conducted by the JTAC or range controller, which would remain his preferred option. He would give more consideration to having [Mode B] on the HDD if in busy airspace, apart from when engaged in a simulated attack. He thought it unlikely he would directly question every stack update, deconfliction plan or cleared altitudes in a good comms environment if it fitted in with the SA picture.

The Investigation findings were as follows:

The Typhoon was flown into conflict with the DA42 because the Typhoon pilot was unaware of the presence of DA42. Both aircraft were operating on different JTAC frequencies, thus denying each other positional SA; however, the use of separate fire-net frequencies for different assets is SOP. In some circumstances a second 'admin' frequency is used as a safety monitor as well as a check-in/check-out frequency but this is impracticable if multiple assets are involved.

The student JTAC is reported as describing the DA42 as 'simulated', leading the Typhoon pilot to believe that the airspace was clear. The student JTAC is also reported to have informed the Typhoon pilot that the range airspace was clear and he was free to manoeuvre between 250ft and 15000ft. In reality, the student JTAC believed that the Typhoon pilot was aware that the BENO was still active, that it would be honoured, and the Typhoon would be geographically deconflicted from the DA42.

JTAC instructors are using this incident to highlight the importance of timing of instructor intervention.

**Perception:** The Typhoon pilot erroneously believed that he was the sole asset operating in the SPTA, and therefore, free to manoeuvre without constraint. This mental model was derived from information passed to him from the JTAC, who informed him that a 'simulated GR4' was in the airspace, rather than a DA42 replicating a GR4.

**Decision:** Given the Typhoon pilot's lack of awareness of other assets in his operating airspace, his decision to cross the BENO set by the JTAC was understandable and reasonable.

**Execution:** Routine questioning of the information passed to pilots on other airspace users is not called for; therefore, the Typhoon pilot's selection of HDD [Mode A] rather than [Mode B] is consistent with training and tactics.

**Summary:** Execution of the exercise occurred having established an erroneous situational awareness that the risk of MAC had been mitigated to zero. It is widely accepted that operations involving multiple air assets simultaneously and in concert engaging enemy assets from within the same airspace may

require operations on multiple separate radio frequencies, but it is limited by the maturity of the C2 system. Successful operations depend on correctly identifying friendly, neutral and enemy aircraft, and, without effective C2, is extremely difficult to implement.

## Comments

### HQ Air Command

In this incident, the plan to avoid barrier was defeated by miscommunication/misunderstanding of a lateral deconfliction line, which led to the Typhoon pilot believing that he was the only air asset above 250ft AGL and being given permission to operate up to 15,000ft – this permission was only valid to the north of the line. The ATS barrier was essentially not used as, although both aircraft were receiving a BS from Boscombe Down, the reality was that deconfliction was expected to be procedurally effected by the JTAC. When the DA42 pilot, using onboard sensors (including TAS), identified that the Typhoon had penetrated to the south of the line, and at an altitude that conflicted with his own cleared altitude, he questioned this with Salisbury Ops; a call to the TACP to inform them of what had just occurred may have served better to clarify the true air picture – including deconfliction – to all players. Whilst conducting a simulated attack, the DA42 pilot sighted the Typhoon above and to his right and so elected to descend, exit the area and seek clarification regarding the deconfliction plan.

This Airprox shows that it is essential to use all tools at our disposal to mitigate the risk of MAC. It is acknowledged that a TS inside the SPTA would almost certainly detract from the achievement of training objectives. It is noteworthy that the Electronic Conspicuity barrier functioned as it should, but obviously this only works with cooperating equipment. Typhoon currently has no CWS but the provision of a suitable solution remains a high priority. Thus, lookout during all phases of flight is essential – even when one thinks one fully understands the air picture.

## Summary

An Airprox was reported when a DA42 and a Typhoon flew into proximity in the Salisbury Plain Training Area at 1436hrs on Thursday 17<sup>th</sup> January 2019. Both pilots were operating under VFR in VMC, both in receipt of a Basic Service from Boscombe Down and procedural deconfliction from the JTAC.

### **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 operating authorities. Relevant contributory factors mentioned during the Board's discussions are highlighted within the text in bold, with the numbers referring to the Contributory Factors table displayed in Part C.

Members first discussed the role of the JTAC and agreed that there had been miscommunication between the trainee JTAC and the Typhoon pilot which had resulted in the Typhoon pilot believing he was cleared to use the entire ROZ, not to remain north of the BENO line which was the JTAC's intent (**CF1 & CF4**). Members noted that aircraft deconfliction in the 'CAS stack' was conducted entirely procedurally, there was no surveillance available to the JTAC (**CF2**), and that this form of training reflected the reality of operations. However, surveillance was available from Boscombe Down and some members wondered whether that could be used to greater effect in a safety capacity. After further discussion it was agreed that the complexity, intensity and nature of CAS operations were such that an additional safety comms channel would probably not be practical due to the likely delay between the Boscombe controller noticing a conflict and relaying this information to the JTAC or pilots. In the event, the Typhoon pilot crossed the BENO line (**CF3**) because his mental model was that he was the only aircraft in the ROZ at that altitude (**CF5**). Members commented that it would be prudent for pilots to obtain positive confirmation that a BENO line was no longer active before crossing it, rather than assume it was no longer active based on other information.

For his part, the DA42 pilot had additional SA on the Typhoon, derived from his TAS, and was aware that it was approaching as he conducted a target run. Hence, although the Typhoon pilot did not see the DA42, the DA42 pilot was able to take avoiding action (**CF6**). Members agreed that, in hindsight, when the DA42 pilot became aware that the Typhoon had crossed the BENO line on two previous occasions it may have been more effective for him to contact the TACP, rather than Salisbury Ops, who could then directly liaise with the JTAC to question and correct the Typhoon pilot's mental model.

Members then discussed the SA available to the Typhoon pilot and wondered whether it was possible for the radar to be employed in an air-to-air mode until committed to the target; in that way allowing for greater likelihood of detection of potentially conflicting tracks. Members commented that the DA42 was not a 4<sup>th</sup> generation air-superiority fighter, yet the pilot had had much greater awareness of the Typhoon and its conflicting flight path than did the Typhoon pilot. Discussion then turned to the employment of a BENO line and members agreed that although it was effective for target/weapon effects deconfliction, it was not necessarily effective for aircraft deconfliction. Having a target on the BENO line (as was the case for the DA42) also eroded its effectiveness as a deconfliction measure due to the necessity of aircraft delivering munitions to approach into close proximity.

Regarding the risk, the Board felt that although high closure rates could increase risk in an event where separation might otherwise be considered sufficient, in this case the DA42 pilot's SA was such that he had been able to take timely and effective action.

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

#### Contributory Factors:

CF	Factor	Description	Amplification
<b>Ground Elements</b>			
<b>• Regulations, Processes, Procedures and Compliance</b>			
1	Organisational	• Organisational Documentation and Publications	Inadequate regulations or procedures
<b>• Situational Awareness and Action</b>			
2	Human Factors	• Traffic Management Information Provision	Not provided, inaccurate, inadequate, or late
<b>Flight Elements</b>			
<b>• Tactical Planning and Execution</b>			
3	Human Factors	• Incorrect Decision/Plan	Incorrect or ineffective execution
4	Human Factors	• Accuracy of Communication	Ineffective communication of intentions
<b>• Situational Awareness of the Conflicting Aircraft and Action</b>			
5	Contextual	• Situational Awareness and Sensory Events	Pilot had no, or only generic, Situational Awareness
<b>• See and Avoid</b>			
6	Human Factors	• Monitoring of Other Aircraft	Non-sighting by one or both pilots

Degree of Risk: C.

Recommendation: Nil.

#### Safety Barrier Assessment<sup>10</sup>

In assessing the effectiveness of the safety barriers associated with this incident, the Board concluded that the key factors had been that:

<sup>10</sup> The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).

**Ground Elements:**

**Regulations, Processes, Procedures and Compliance** were assessed as **partially effective** because the JTAC's deconfliction between the Typhoon and the DA42 did not fully function.

**Situational Awareness of the Confliction and Action** were assessed as **ineffective** because the JTAC did not identify the impending conflict, did not have access to surveillance, and could not therefore monitor the aircrafts' flightpaths.

**Flight Elements:**

**Tactical Planning and Execution** was assessed as **ineffective** because the Typhoon pilot inadvertently crossed the BENO line.

**Situational Awareness of the Conflicting Aircraft and Action** were assessed as **partially effective** because although the Typhoon pilot was not aware of the presence of the DA42 south of the BENO line, the DA42 pilot was aware that the Typhoon was in the operating area.

