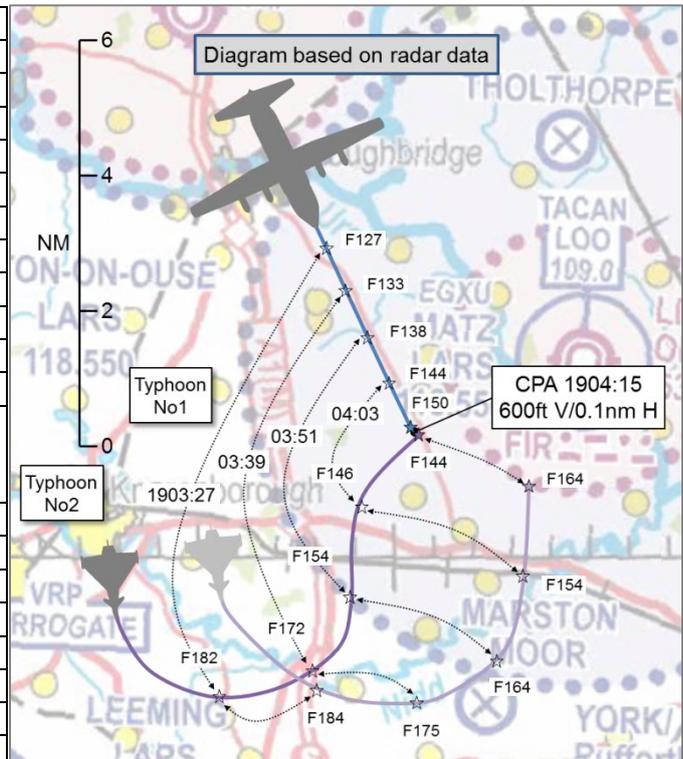


**AIRPROX REPORT No 2016021**

Date: 24 Feb 2016 Time: 1904Z (Night) Position: 5402N 00119W Location: near Linton-on-Ouse

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

Recorded	Aircraft 1	Aircraft 2
Aircraft	C130	Typhoon
Operator	HQ Air (Ops)	HQ Air (Ops)
Airspace	London FIR	London FIR
Class	G	G
Rules	IFR	VFR
Service	Traffic	Traffic
Provider	Swanwick Mil	Swanwick Mil
Altitude/FL	FL150	FL144
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	Grey
Lighting	HISL (white), nav	Anti-collision, nav, night glow strips
Conditions	VMC	VMC
Visibility	10km	>10km
Altitude/FL	FL150	14410ft
Altimeter	SPS	RPS (1022hPa) <sup>1</sup>
Heading	160°	360°
Speed	180kt	350kt
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	<500ft V/<500ft H	Not seen by Typhoon No2
Recorded	600ft V/0.1nm H <sup>2</sup>	



**THE C130 HERCULES PILOT** reports that during climb-out from Leeming he was handed over from Leeming Approach to Swanwick Mil for a departure on runway track climbing to FL190. Shortly after being handed over, two TCAS contacts appeared 3500ft above descending at a range of 4nm and immediately gave a TCAS TA with significant rate of closure; both pilots visually identified the aircraft at 3nm. ATC informed him of the traffic as a TCAS RA ‘Maintain Vertical Speed’ was given. The handling pilot followed the RA and, once clear, ATC was informed. The first Typhoon passed right-to-left underneath the aircraft at less than 500ft, the second passed at the same level to the left.

He assessed the risk of collision as ‘High’.

**THE TYPHOON FORMATION LEAD PILOT** reports leading a pair, tasked with supporting an Exercise at RAF Leeming. During initial planning, it was decided that a move of the exercise to RAF Dishforth would be sensible in order to deconflict with other activity taking place at Leeming. During pre-flight planning, the Typhoon pilot tasked his Squadron operating authority with investigating C130 air activity associated with an Exercise NOTAM in proximity to Dishforth and Leeming; it was revealed that all activity would be complete prior to the Typhoon pair’s take-off. A CADS submission was made, and revealed 2 foreign air force C130s would be operating ivo Dishforth, not above 500ft. As a result the Typhoon pair briefed a minimum altitude of 5000ft for the sortie to ensure safe separation from traffic. No further CADS activity was present in the area. In the descent for the exercise the radios became particularly bad, with both Swanwick and the Joint Terminal Attack Controller (JTAC) difficult to hear. The following events then occurred:

<sup>1</sup> Humber RPS reported as 1010hPa.

<sup>2</sup> Minimum separation from Typhoon No2. The lead Typhoon passed 1300ft above the C130 at a range of 1.9nm.

At 1901:55, the Typhoon flight was cleared by Swanwick to operate in the block 10,000-20,000ft ivo Dishforth and call one-minute to completion. This call was stepped on by the other radio now being used to talk to the JTAC, but was heard and acknowledged by the Typhoon flight, now passing 27,000ft in the descent. Another call from Swanwick was made informing the Typhoons that there was traffic southwest 3nm heading southwest passing FL70 for FL190, this was acknowledged; however, the Typhoon flight's perception was that they were well above that traffic heading south, and that a left turn through east onto north would keep them apart. At 1902:22 the Typhoon flight was given a Traffic Service. At 1903:22, from the cockpit tapes it can be heard that Swanwick informed the Typhoon flight that the traffic was now at FL120; however, this communication was stepped on by the JTAC. It was acknowledged by the Typhoon flight who considered the track to be behind them, below them and to the west. A left-hand hook-turn was commenced and, looking into the turn passing through east, the lead Typhoon pilot gained visual on Night Vision Goggles (NVG) with traffic to the north at a range of 3-4nm. He perceived the aircraft to be laterally closer than expected, but posing no threat of a collision due to a large difference in height and visual contact being maintained. During this turn, a call could be heard from Swanwick "[Typhoon No2 C/S] previously reported traffic your nose similar altitude". This call was again stepped on, but acknowledged by the Typhoon leader who, still visual, called the formation to climb assuming a risk to the Typhoon No2 must be present even though he perceived that the formation would pass safely. At no time was the conflicting traffic heard speaking on the Swanwick frequency. At 1904, the noted Airprox time, Typhoon leader was at 15590ft and Typhoon No2 at 14410ft.

He assessed the risk of collision as 'Low'.

**THE SWANWICK MIL CENTRAL CONTROLLER** reports that at the time of the incident she was working Central only. At the time of the handover of the C130 from Leeming, she was coordinating a Cleared Flight Path (CFP) with Scottish Sector 29 for the C130 and so the ATCO I/C stepped in as a Planner to take the handover. The C130 was handed over by Leeming climbing to FL190 to route POL-SWB-Jersey. Swanwick(Mil) NE were working a pair of Typhoons in the Vale of York. At the time of handover, and on initial contact with the C130, the Typhoon flight were well above, descending to FL200 in the same direction. Due to them being well above, no Traffic Information was called. When the Typhoon flight were approximately 5nm south of the C130 they were given the block 10,000-20,500ft, at which point they turned towards the C130, still descending. The controller called them and was informed by the C130 pilot that he had received a TCAS RA and to stand by. At the point of merge it appeared that one contact was at FL142 and the other was at FL146. The Typhoons carried on tracking north and were not a factor again.

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

**THE SWANWICK MIL CENTRAL SUPERVISOR** reports that he took the initial handover from Leeming on the C130 because the Central controller was negotiating a CFP with Scottish S29. The C130 was, he recollected, heading 160° and either approaching or passing FL100 cleared by Leeming to FL190. At the time, he noticed two contacts overhead the C130, however, they were indicating FL245 so were no factor. The Central Controller communicated with the C130 and, at that point, the Swanwick Mil Central Supervisor became busy with other tasks. The next time he took notice was when the Central Controller notified him that the C130 pilot was reacting to a TCAS RA and had called Central to standby. He did not witness how close the Typhoons came to the C130; however, the Central Controller told him she believed the radar contacts had merged with a height separation of around 400ft reading on the radar display. He spoke to Swanwick North East Sector who was working the Typhoon flight, who informed him that they had called the C130 to the Typhoon flight on 4 occasions. There was no further interaction between the aircraft after this.

**THE SWANWICK MIL EAST/NORTH-EAST TAC RIGHT CONTROLLER** reports that with the Controller I/C as Planner, he had been handed over a pair of Typhoons from the North Sector. These were the only aircraft on frequency. They were in the block FL340-FL350 and had requested the altitude block 10,000-20,000ft on the 'lowest regional' to operate in the Dishforth area on a discrete frequency. As they approached Durham Tees Valley, they were issued a descent to FL200 and

transferred to the discrete frequency. As the aircraft were descending, they were passed Traffic Information on an aircraft departing Leeming. The aircraft was approximately FL105 and the pair of Typhoons were still in the descent to FL200. The Typhoon crews were told that the departing aircraft was climbing to FL190. As the Typhoons passed the Leeming outbound transiting further south, they were given their altitude block on the local pressure of 1010hPa. They were re-issued with Traffic Information on the Leeming outbound as they started to manoeuvre back towards it. At this time he believed that they were also passed the aircraft's type (C130) as well. As they continued to manoeuvre, the Short Term Conflict Alert (STCA) activated white. The pair of Typhoons continued to manoeuvre and descend towards the Leeming outbound. At approximately 3nm, as the pair continued to turn and descend, Traffic Information was again given to the Typhoon No2 pilot and he was asked to report visual. There was approximately 400ft separation showing between the No2 Typhoon and the Leeming outbound. The lead Typhoon was heard on the frequency trying to confirm with the No2 whether or not the No2 was visual with the Leeming outbound; the No2 Typhoon pilot replied that he was not. As the Traffic Information was being passed, the STCA turned red. After passing the Leeming outbound, the pair of Typhoons continued to operate in their block without further incident.

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

**THE SWANWICK MIL EAST/NORTH-EAST SECTOR SUPERVISOR** reports he was sitting in as planner as the TAC was receiving the silent handover on the Typhoon flight. He observed a Central squawk depart Leeming and telephoned Leeming to ask for Traffic Information. He was informed that it was a C130 departing for POL climbing to FL190. In return, he passed Traffic Information to Leeming on the Typhoon flight including their intended operating altitude of 10,000-20,000ft on the Humber RPS, 1010hPa. He passed the information on the C130 to the TAC, who passed the Traffic Information to the Typhoon flight. At this point, the Typhoon flight were descending to FL200. Once south of the Leeming outbound, and still heading away, the Typhoon flight were given the requested block. He heard the TAC update the Traffic Information on the C130 on at least another 2 occasions as the Typhoon flight turned to manoeuvre towards the aircraft. The Typhoon leader acknowledged the Traffic Information calls but did not report visual. It was rather concerning to see the Typhoon flight continue to manoeuvre towards the C130 when the Traffic Information had been called at similar levels to which they appeared to be operating. Shortly after the STCA went off, Central called to say that the C130 had experienced a TCAS RA against the Typhoon No2. Separation appeared to be 400ft. He called the Duty Authoriser of the Typhoon Squadron to discuss the occurrence who said he would get the pilot to call him. The Typhoon flight leader called later to discuss. He said that the Traffic Information passed by Swanwick was good and that they had been operating with NVG, in fairly poor weather with poor radios, whilst listening to a JTAC on the ground. However, he had seen the C130 early on, but had not informed Swanwick as such. As the pair manoeuvred, the lead aircraft perceived that the C130 was not a threat and was surprised to learn that separation had been observed as only 400ft. He explained how a tactical pair operate, and that the lead pilot takes responsibility for avoiding other traffic. He said that the crews would fully debrief, including examining their radar replays. He acknowledged that a call to say if they were visual or not with the C130 would have been useful to the TAC controller.

**THE LEEMING APPROACH RADAR CONTROLLER** reports that the Airprox was reported on Swanwick Mil Central's frequency after he had handed the C130 over to them. He received Traffic Information on 2 Typhoons from Swanwick Mil East just after the C130 was airborne from RW16. He was told that the 2 Typhoons were looking to operate in the Dishforth area between 10,000-20,000ft. He gave Swanwick Mil East Traffic Information on the C130 and told them that he would be handing the C130 over to Swanwick Central shortly. He then proceeded to conduct a full radar handover to Swanwick Mil Central and no Traffic Information was passed by him to the C130 on the 2 Typhoons because he deemed that they were no factor at the time. The air picture was such that the Swanwick Central Controller also did not deem it necessary to call the traffic to them during the handover. He was only made aware of the Airprox when he came into work the following evening.

## Factual Background

The weather at Linton-on-Ouse was recorded as follows:

METAR EGXU 241850Z AUTO 32003KT 9999 // BKN033/// BKN060///04/M01 Q1016=

## Analysis and Investigation

### Military ATM

An Airprox occurred on 24 February 2016 at 1904, ivo RAF Linton-On-Ouse between a C130 and a Typhoon aircraft; both aircraft were under a Traffic Service with RAF(U)Swanwick. A portion of the transcript between Swanwick NE and the Typhoon flight is reproduced below:

From	To	Speech Transcription	Time
NE	Typhoon	[Typhoon flight C/S] are you happy to accept own separation under VFR in the upper air, correction controlled airspace.	1900:48
Typhoon	NE	Affirm [Typhoon flight C/S].	1900:48
Typhoon	NE	[Typhoon flight C/S] looking for the er lowest regional please to work er ten to twenty.	1901:14
NE	Typhoon	[Typhoon flight C/S], lowest regional pressure Humber 1010, be advised traffic from, from [Typhoon leader C/S] south west 3 miles, tracking south, indicating flight level 70, climbing flight level 190.	1901:20
Typhoon	NE	Copied, [Typhoon flight C/S] set 1010.	1901:35
Typhoon 2	Typhoon 1	Set	1901:38
NE	Typhoon	[Typhoon flight C/S] operate in the block altitude 10,000 to altitude 20,000 feet, report one minute to completion.	1901:49
Typhoon	NE	Stepped on, say again.	1901:58
NE	Typhoon	[Typhoon flight C/S], operate in the block altitude 10,000 to altitude 20,000 feet, report one minute to completion.	1902:01
Typhoon	NE	10 to 20 wilco on 1010.	1902:08
NE	Typhoon	On leaving controlled airspace, traffic service.	1902:16
Typhoon	NE	Traffic service roger.	1902:20
Typhoon 1	Typhoon 2	Convert to three fifty knots.	1902:23
Typhoon 1	Typhoon 2	[Typhoon lead C/S] descend angels one two, [Typhoon No2 C/S], angels one four	1902:30
Typhoon 1	Typhoon 2	[Typhoon flight C/S] hook left.	1902:58
NE	Typhoon	[Typhoon flight C/S] previously reported traffic now north 7 miles, tracking south indicating flight level 125 climbing to flight level 190, C 130 J.	1903:18
NE	Typhoon 2	[Typhoon No2 C/S] traffic previously reported north 3 miles tracking south indicating similar altitude report visual.	1903:58
Typhoon 1	Typhoon 2	[Typhoon No1 and No2 C/S] climb now	1904:06
Typhoon 1	Typhoon 2	[Typhoon No2 C/S] check	1904:17
Typhoon 2	Typhoon 1	[Typhoon No2 C/S], say, say again	1904:18
Typhoon 1	Typhoon 2	Confirm visual with the Hercules	1904:19
Typhoon 2	Typhoon 1	Negative and 140.	1904:21
Typhoon 1	Typhoon 2	Copied, you just went underneath the Hercules, how's your radios two?	1904:23

A portion of the tape transcript between Swanwick Central and the C130 is below:

From	To	Speech Transcription	Time
Central	C130	[C130 C/S] traffic 12 o'clock er 10 miles manoeuvring in the block 100-205	1903:36
C130	Central	I got him 4 miles er do you know what he is doing?	
Central	C130	Er [C130 C/S] er negative he's currently tracking north indicating FL150 descending	
Central	C130	Yep RA standby	
C130	Central	Er yeah Swanwick [C130 C/S] we've just had er TCAS RA on a pair going through our level	1904:16
Central	C130	[C130 C/S] yeah we just speaking to the sector now they turned straight towards you, we are just trying to figure out what happened	
C130	Central	Not a problem [C130 C/S]	
Central	C130	[C130 C/S] you can now climb FL280	

At 1901, The Typhoon flight were provided with the regional pressure and called traffic by the NE controller as, "... be advised traffic from, from [Typhoon leader C/S] south west 3 miles, tracking south, indicating flight level 70, climbing flight level 190." At 1903, (Figure 1), the NE controller updated traffic as, "[Typhoon flight C/S] previously reported traffic now north 7 miles, tracking south indicating flight level 125 climbing to flight level 190, C 130 J".

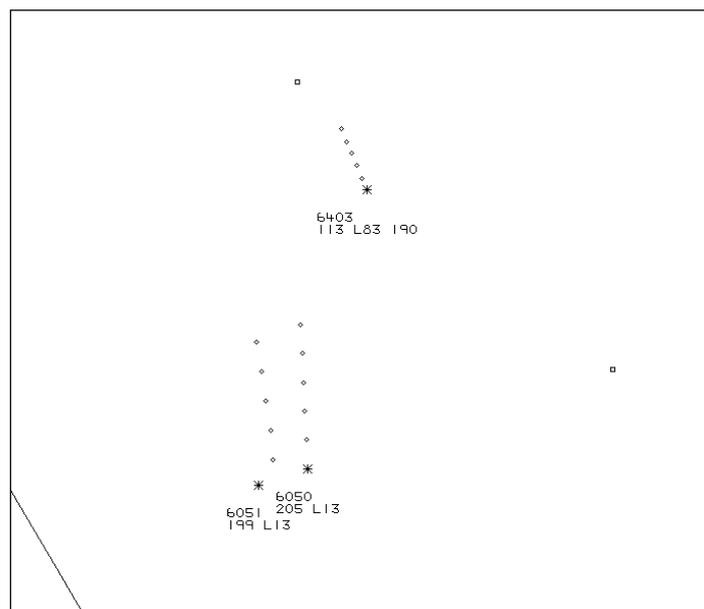


Figure 1: Geometry at 1903:00 Typhoon Ld/No2 6050/6051; C130 6403

At 19:03:36, the Central controller called traffic to the C130 pilot, "[C130 C/S] traffic 12 o'clock er 10 miles manoeuvring in the block 100-205." The C130 crew responded with, "I got him 4 miles er do you know what he is doing?" The controller updated with, "[C130 C/S] er negative he's currently tracking North indicating FL150 descending."

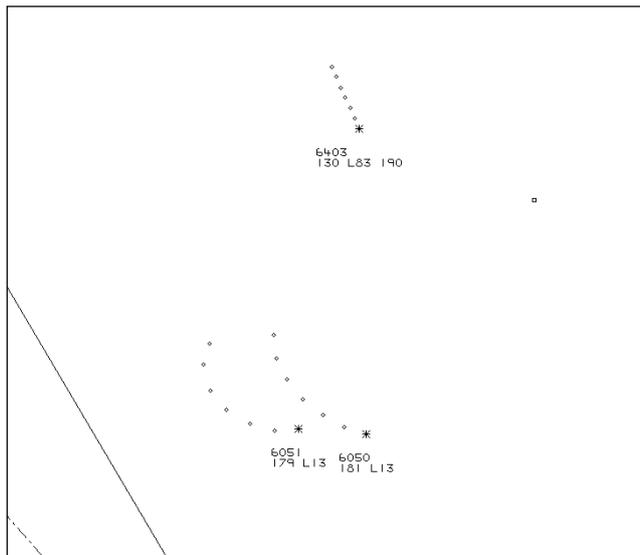


Figure 2: Geometry at 1903:30

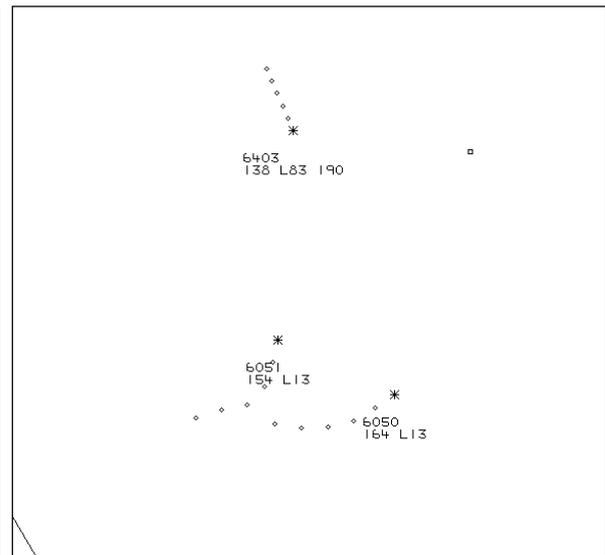


Figure 3: Geometry at 1903:51

At 1904 (Figure 4), the NE controller transmitted, “[Typhoon No 2 C/S] traffic previously reported north 3 miles tracking south indicating similar altitude report visual.”

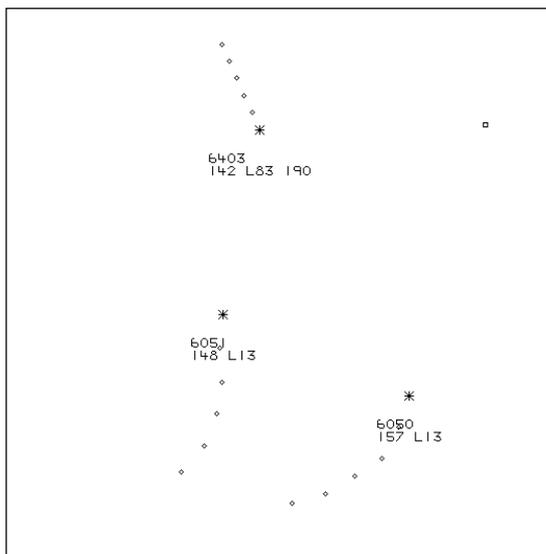


Figure 4: Traffic Information to Typhoon 2 at 1904

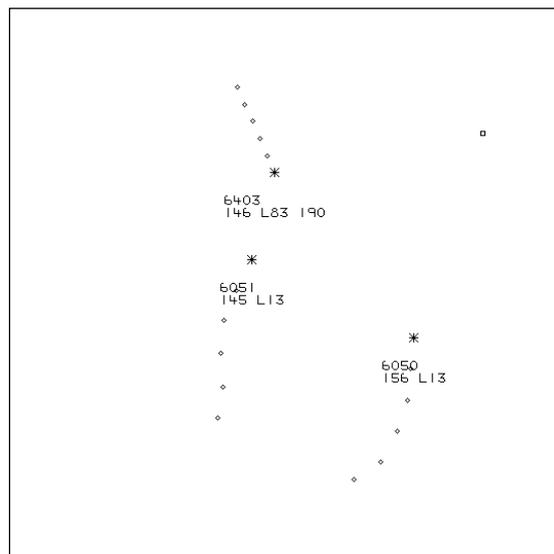


Figure 5: Geometry at 1904:06

CPA was estimated at 1904:15 (Figure 6).

The TCAS RA was declared by the C130 crew at 1904:16

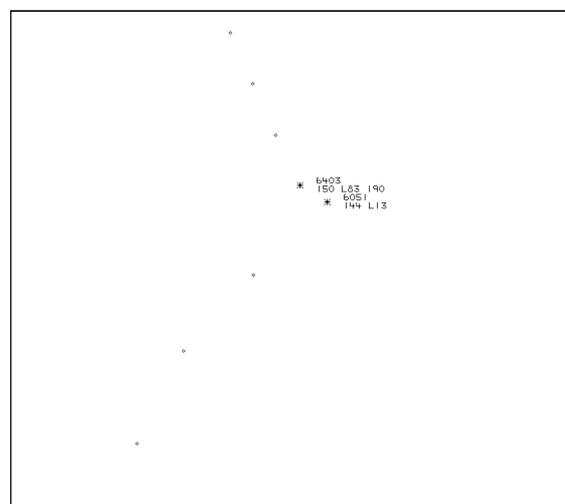


Figure 6: CPA at 1904:15

Leeming handed the C130 to Swanwick Central at 1902; at the time of the handover, the C130 was at FL80 (climbing to FL190, requesting FL280) and the Typhoons were indicating FL239 and FL249. It was deemed at the handover time that the traffic would not be called to the C130 and both controllers accepted this. Given the large height difference and fact that Swanwick would be working all tracks, it was understandable that both controllers did not deem information necessary at the handover stage. The NE controller provided 3 sets of Traffic Information to the Typhoon pilots and Central passed information to the C130 pilot. (The full accuracy of the Traffic Information to the Typhoons could not be fully corroborated). As all parties were under a Traffic Service, the controllers would be expected to pass information to allow crews to maintain separation. As per CAP774, the aircrew were responsible for collision avoidance and a mixture of Traffic Information (and TCAS for the C130) assisted with information on other airspace users.

The Typhoon pilots were conducting training with a JTAC on the ground, and it appears that the communication with the JTAC often 'stepped on' the Traffic Information from ATC. However, the Typhoon lead commented that the information was assimilated, and that the crew considered the C130 not to be a threat. Information was initially passed in relation to the Typhoon lead aircraft; however, the final piece of information from the NE controller seems to have been specifically to the No 2 Typhoon with traffic co-altitude, at 3nm; there was a sense of urgency as the Typhoon pilot was asked to report visual with the C130. To put the actions into context, the Typhoon pilots were speaking to two agencies (with associated workload and RT problems) and the initial information was passed in respect to the lead element, with the wingman having the Airprox.

### **UKAB Secretariat**

The C130 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>3</sup>. If the incident geometry is considered as converging then the C130 pilot was required to give way to the Typhoon<sup>4</sup>.

### **Occurrence Investigation**

The Typhoon flight was tasked with supporting Ex ADVANCING THUNDER. The Close Air Support (CAS) task (VUL time 1900-1930) was originally given to RAF Coningsby but then passed to 6 Sqn as Coningsby could not support. The Typhoon lead reported that the CAS was 'not much use to them for training' because without tanker support they only had approx. 22 mins on task before they had to return to Lossiemouth. This was due to the distance from Lossiemouth to Dishforth and a strong headwind on RTB. The Typhoon flight checked CADS before departure and noted no traffic at their planned operating altitude of 5000ft-20000ft in the Dishforth area. Their planned CAS iso Ex ADVANCING THUNDER did not have a dedicated NOTAM. The Typhoon lead was aware that it was No2's first night CAS sortie and he had limited experience of using NVGs. The lead had done 'quite a bit' of Night CAS on the Typhoon and felt he was experienced using NVGs due to current Typhoon and previous Tornado F3 experience. No2 reported that this was his first night CAS sortie and he did not have much previous experience flying with NVGs (approximately 4 sorties).

The lead reported that the brief, start-up, take-off and transit to the CAS area was uneventful. He had briefed No2 to stay above him in the descent to the operating block so that if he became 'blind' he could simply level off and remain deconflicted. On arrival in the CAS area, the weather was worse than expected with poor air-ground visibility from 20,000ft; however, they were able to remain VMC. He reported that under normal circumstances as a pair of Typhoons conducting CAS both aircraft would monitor Swanwick and JTAC on the radios; however, the lead would have the volume higher on the JTAC frequency and the wingman would have the volume higher on the airspace frequency (so that calls were not missed). However, in this instance he was working both frequencies equally as lead due to an inexperienced wingman. In hindsight, he

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<sup>3</sup> SERA.3205 Proximity.

<sup>4</sup> SERA.3210 Right-of-way (c)(2) Converging.

noted that he probably checked in with the JTAC a little earlier than he would have normally (and before they were fully established in the CAS area), driven by the short 'on-task' time available due to fuel. During the Hook Left onto a Northerly heading and descent to 12,000ft the lead became visual with both his wingman and the Hercules. He observed that No2 was lower than him and swept forward but did not correct it at the time because he saw no imminent safety issue and elected to leave it as a learning point for the debrief. Due to his previous SA of the traffic (he believed it was heading Southwest) he did not assess there to be a collision risk with No2, albeit the Hercules was 'closer and higher than he expected'. At 1904:10 he called "[Lead and No2 C/S] climb now" but this was purely following Swanwick's traffic call to No2 and he still believed that there was no risk of a collision.

No2 reported that upon reaching the CAS area he had one radio monitoring Swanwick and one radio on the JTAC frequency, both approximately the same volume. He found it difficult to keep SA on the radio calls due to the workload of formatting on the lead aircraft at night and lots of comms stepping on each other. He rolled out of the Hook Left slightly ahead and below the leader which made the formation more difficult (contrary to the brief where he was told to remain higher than lead in the descent - he acknowledged this was a handling error). Throughout the sequence of events he was not aware of the Hercules and never saw it; the first he knew about it was from the call from the lead at 1904:26.

## Comments

### HQ Air Command

This was an alarming incident which has been subject to a thorough internal investigation. As a tactical pair, the formation leader takes responsibility for the avoidance of other traffic, in this case the lead was also working both the Air Traffic frequency as well as the ground controller's frequency due to the fact the number 2 was inexperienced. There were quite a few incidences of the ground controller inadvertently and unknowingly stepping on Air Traffic calls. However, despite the lead Typhoon acknowledging Traffic Information on several occasions, it appears that his mental model of the situation was incorrect. Furthermore, when he became visual with the Hercules, the depth perception limitations of NVGs led him to believe that there was still no risk of collision. It was only when Swanwick (correctly) provided Traffic Information directly to the second Typhoon that the lead initiated what he believed would be avoiding action for the pair (the instruction to climb). The second Typhoon (the one which actually had the Airprox) had not heard any of the Traffic Information and did not see the C130 throughout the incident. The internal investigation has already identified some recommendations which include fitting of a CWS on Typhoon, refresher training on depth perception limitations whilst on NVGs, and reminding aircrew of the importance of prioritising Traffic Information calls where there is potential conflict.

## Summary

An Airprox was reported when a C130 and a pair of Typhoons flew into proximity at 1904 on Wednesday 24<sup>th</sup> February 2016. The C130 pilot was operating under IFR in VMC and the Typhoon pilots were operating under VFR in VMC. Both were in receipt of a Traffic Service from Swanwick Mil on different sectors. Traffic Information was passed to the pilots involved. The C130 pilot received a TCAS RA to 'maintain vertical speed'.

## **PART B: SUMMARY OF THE BOARD'S DISCUSSIONS**

Information available included reports from the pilots and controllers concerned, area radar and RTF recordings and reports from the appropriate ATC and operating authorities.

The Board was first briefed by the HQ Air member on the circumstances leading up to the Airprox. He explained that the Close Air Support (CAS) task for exercise 'Advancing Thunder' had originally been allocated to RAF Coningsby but, because they had not been able to support this operation, it had been passed to RAF Lossiemouth. This had resulted in a long transit from Lossiemouth to

Dishforth for the Typhoons. Consequently, they had only been able to remain in the task area for about 20 minutes. Because of this short time scale, the Typhoon leader had contacted JTAC earlier than normal, prior to the CAS area. The member pointed out that because the Typhoon No2 pilot had been inexperienced at flying under Night Vision Goggles (NVG), and had not conducted a CAS mission at night, the leader had decided to take over extra responsibilities including having the volume of both the JTAC and ATC frequencies at a high level. Normally the leader would have the volume higher on the JTAC frequency and the No2 would have the volume higher on the ATC frequency. In this way calls should not be missed or the information not assimilated, as they had appeared to be on this occasion. After receiving Traffic Information about the C130, the leader had believed that it had been heading south-west rather than south. Additionally, although he had been informed that the C130 had been passing FL70 for FL190, his perception had been that the formation was well above the traffic. Misjudging the position and routing of the C130, the Typhoon formation had made a 'Hook Left' turn on to a northerly track which had taken them towards the C130. The leader had then seen the C130 and No2, which had been below him, but he had not considered that there had been a collision risk. When he had heard Traffic Information being passed directly to No2 about the C130, he had transmitted for both Typhoons to 'climb now' but had still believed that there had not been a risk of a collision. The No2 did not climb or obtain visual contact with the C130.

The HQ Air member added that prior to departure from Lossiemouth a telephone call had been made to Leeming Ops to ascertain whether there was any other traffic involved in the exercise likely to be in the Typhoons vicinity on their arrival. They were informed that other activity would be completed before they arrived. However, no mention had been made about the C130's departure from Leeming routing through the area, presumably because the request had related just to exercise traffic.

The Military ATC Terminal member then briefed the Board on the ATC aspects of the Airprox. He reported that the C130 and the Typhoons were in receipt of a Traffic Service from Swanwick Mil, although under the control of different sectors. The C130 was on the Central sector and the Typhoons on the E/NE sector. He explained that although these sectors were in the same operating room they were not adjacent but would have had the same radar information and the ability to communicate with each other by telephone. He commented that Leeming ATC had routed the C130 off the standard departure route from the airfield to assist in shortening its routing to Controlled Airspace. However, this routing had placed the C130 on a track through the JTAC activity, which Leeming would have been aware of. It had not been considered necessary, because there had been no immediate conflict, to issue the C130 pilot with Traffic Information about the Typhoons before he was transferred to the Central sector. The Central controller had issued Traffic Information to the C130 pilot when the aircraft were approximately 4nm apart. The C130 pilot had seen the traffic on TCAS (had received a TA) and had reported that shortly afterwards he had gained a visual sighting. He had then received a TCAS RA to 'Maintain vertical speed'. Meanwhile, the Typhoons had been in communication with, and in receipt of a Traffic Service from, the E/NE sector. Two sets of Traffic Information had been issued to the formation, the second time when the C130 had been 7nm north of them passing FL125. The controller had continued to monitor the situation and, realising that Typhoon No2 was conflicting with the C130, had issued Traffic Information directly to its pilot rather than to the formation callsign as normal.

The Board welcomed these direct briefings from the military members, which had addressed the many aspects leading up to the Airprox. A lengthy discussion then took place into the cause of the Airprox and a number of factors were discussed. These included: Leeming ATC vectoring the C130 towards a known fast-jet exercise area; whether the geometry was a simple conflict in Class G airspace or whether the No2 had effectively flown into conflict with the C130; whether the No2 had effectively been vectored into conflict by the leader, (who had been responsible for the safety of the formation, and had called the No2 to turn during the 'hook-left' manoeuvre whilst knowing that the C130 was present); or whether the leader had simply allowed his No2 to fly into conflict with the C130 due to lack of more positive formation control. Mention was also made of the Rules of the Air; depending on perception of the Typhoons' rate of descent, it could be argued that the C130 pilot was technically required to give way to the Typhoon formation<sup>5</sup> if they were considered to be 'at

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<sup>5</sup> SERA.3210 Right-of-way (c)(2) Converging.

approximately the same level'. In the end, it was agreed that the dynamic nature of the Typhoon formation's flightpath put the onus on them to avoid the C130 that they turned towards. This put the emphasis for collision avoidance onto the Typhoon lead pilot who was responsible for ensuring his formation's safe flightpath. The Board recognised that the Typhoon leader was operating under a high-workload with an inexperienced No2 and considerable pressure to complete the mission within tight time- and fuel-constraints. Some members thought that this was when the supervisory alarm bells should have been ringing for the Typhoon leader in that it appeared to them that he was trying too hard to ensure mission success at the cost of being able to 'stand back' from the situation and make an early decision whether to abort the CAS run. He had not been able to fully assimilate the C130 Traffic Information calls, was operating both radio frequencies and was aware his wingman was inexperienced and that this was his first night CAS mission. Although not mentioned specifically in the reports, other Board members also wondered whether the Typhoon radar would have been able to provide a warning on the C130 and thus help the formation to avoid it by providing relative range and position information. In this regard, the radar would have been an effective collision warning system and they wondered why it had not been effective in this incident.

After much debate, the Board decided that the cause of the Airprox was that the Typhoon formation had manoeuvred into conflict with the C130. However, they considered that there were a number of contributory factors; principally:

1. It was noted that the Typhoon leader had elected to take on additional responsibilities, especially with regard to listening to two operational frequencies, in order to protect his inexperienced No2 from becoming overloaded. Normally this communication task would have been split between the two crews and it was apparent that the leader had lost situational awareness of the C130 probably because he had been overloaded. This was considered to be a contributory factor to the Airprox.
2. The Board also noted that it had been reported that the No2 had only carried out four sorties of night flying with NVGs, and that this had been his first night CAS sortie. The Board wondered whether such an inexperienced pilot should have been allocated to such a demanding time- and fuel-constrained sortie on his first NVG CAS mission. It was considered that the inexperience of the No2, which had undoubtedly affected the leader's operation, had been a contributory factor.
3. The Board had been surprised to be informed that a NOTAM had not been produced for the 'Advancing Thunder' exercise. Although Leeming would have been aware of the exercise details, a NOTAM would have ensured that other traffic, notably the C130 crew, would have been aware of the potential for fast-moving jet traffic being close to their intended routing. This lack of specific promulgated information on the CAS exercise was considered to be a contributory factor.

The Board then turned its attention to the risk and noted that, although the two aircraft had passed close to each other horizontally, they had been separated by 600ft vertically. The Board considered that in normal daytime operation in Class G airspace this would probably be classified as having no risk of a collision. However, they felt that there were a number of issues which indicated that safety margins had been reduced below the norm in this particular incident (Category B risk). Firstly, because it had occurred at night (with the pilot concerned being inexperienced using NVGs), the Board were concerned that he had not seen the C130 despite the fact that he had passed through its level on a conflicting track about 10 seconds before the CPA. Secondly, members thought that it had been fortuitous that the No2 pilot had not assimilated the climb instruction issued by his leader because, if he had, this would probably have resulted in him climbing towards the C130's level (and if he had initiated a high enough rate of climb the C130's TCAS may not have been able to resolve the situation). On the other hand, although this was clearly a worrying incident with a potentially catastrophic outcome, the Board did not consider that it represented a situation where separation had been reduced to the minimum (Category A risk). Although the potential had been present for a far more serious outcome, in the event, the C130 pilot had received a TCAS RA only to 'Monitor vertical speed'; which indicated that the TCAS had calculated that separation could be achieved without

changing the existing C130 climb parameters. Because the No2 Typhoon had not climbed, the TCAS 'monitor' RA had been sufficient in resolving the conflict, and the two aircraft had in fact passed 600ft apart vertically. Consequently, it was considered that although safety margins had been much reduced below the norm, the incident was not a Category A, and the Board therefore categorised the Airprox as risk Category B.

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

Cause: The Typhoon formation manoeuvred into conflict with the C130.

Contributory Factors:

1. The Typhoon leader allowed himself to become overloaded.
2. Inexperience of the Typhoon No2 pilot.
3. Lack of specific promulgated information on the CAS Exercise.

Degree of Risk: B.