

## **AIRPROX REPORT No 2014212**

**Date/Time:** 10 Nov 2014 1813Z (Night)

**Position:** 5556N 00026W  
(60nm E of St Abbs Head)

**Airspace:** Scottish FIR (Class: G)

**Aircraft 1** **Aircraft 2**

**Type:** Falcon 20 Tornado GR4

**Operator:** Civ Comm HQ Air (Ops)

**Alt/FL:** FL190 FL190

**Conditions:** VMC VMC

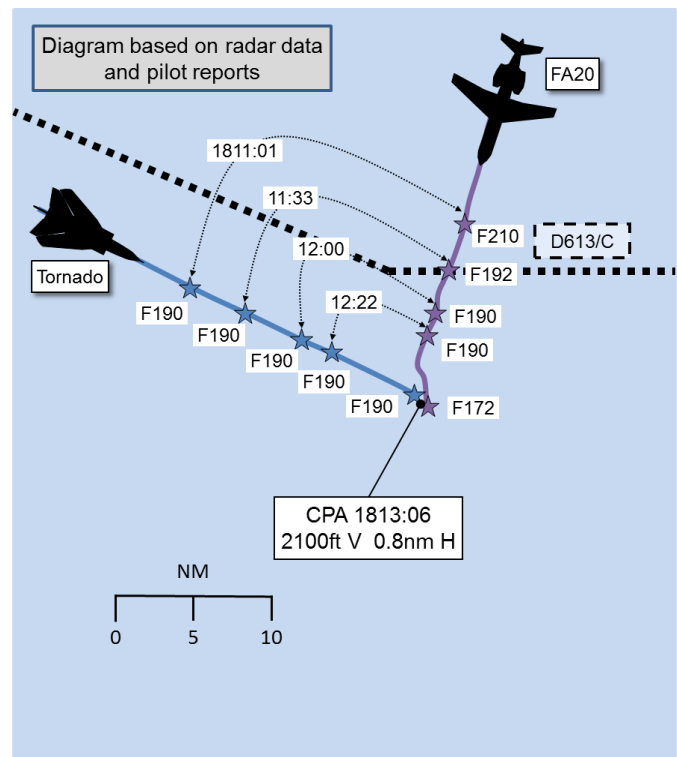
**Visibility:** 30km 30km

**Reported Separation:**

0ft V/3nm H NK V/NK H

**Recorded Separation:**

2100ft V/0.8nm H



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

**THE FALCON 20 (FA20) PILOT** reports flying a blue aircraft with HISLs and navigation lights illuminated, under IFR in VMC, squawking transponder Modes 3/A, C and S, with TCAS II operating, and in contact with a 1ACC controller. On completion of a military training sortie in D613, a descent from FL260 to FL190 was requested from 1ACC, along with a radar handover to Swanwick(Mil) for transit to the south-west. The descent to FL190 was completed, and the squawk and frequency for Swanwick(Mil) were received, acknowledged and set just prior to exiting D613C on a heading of approximately 200°. When they transferred to the Swanwick(Mil) frequency, the FA20 crew could not check in because there was a 'high comm intensity' between 'Psycho' formation and Swanwick(Mil). The crew noted a 'pop-up TCAS track' on their display, indicating approximately 5nm away in their 2 o'clock, co-altitude at FL190. The TCAS track then rapidly indicated a TA, and appeared to be on 'an apparent collision course'. The crew made an immediate decision to take avoiding-action, turning left through 30°, with an immediate descent of approximately 4000fpm through FL180, continuing until they levelled off at FL160. During the initial descent (prior to passing FL180) the TA upgraded to an RA with a 'DESCEND, DESCEND' command. The RA command was 'immediately adhered to' and the crew estimated from the TCAS track position that the horizontal flight paths of both aircraft crossed with the aircraft separated by approximately 1000ft.

He assessed the risk of collision as 'High'.

**THE TORNADO PILOT** reports flying with red HISLs, flashing navigation lights and wing-tip lights illuminated, squawking transponder Modes 3/A, C and S. They were carrying out an instructional sortie, including electro-optical work, close formation and night air-to-air refuelling for a student who was experiencing NVG<sup>1</sup> operations for the first time. They were transiting to AARA<sup>2</sup> 7 at FL190, in receipt of a Traffic Service with Swanwick (Mil), and their routing took them 4nm to the West of the D613 complex's southwestern corner. On passing this point, the instructor noticed a set of strobes, with what appeared to be a high closure rate, passing from their 10 o'clock position to beneath them. The crew could not tell how close the lights were, or whether or not they belonged to co-ordinated traffic; the instructor tried to ask Swanwick(Mil) for Traffic Information, but couldn't contact them due to the high volume of 'domestic chat' from multiple callsigns exiting the D613 complex at the same

<sup>1</sup> Night Vision Goggles

<sup>2</sup> Air-to Air Refuelling Area.

time. Eventually, the crew received information that another aircraft had exited the D613 complex and that it wasn't co-ordinated traffic. Shortly afterwards, the FA20 crew checked-in on the frequency, stating that they were at FL160. The instructor reports that ATC then controlled the situation and they were able to continue with their sortie.

He assessed the risk of collision as 'Low'.

**THE 1ACC CONTROLLER** reports controlling the FA20 crew in the D613 complex under a Basic Service. When the crew reported that they were ready to leave D613, they were instructed to contact Swanwick(Mil) and ensure good two-way communication before exiting the D613 airspace. The 1ACC controller was not aware of the Airprox until the following day.

**THE 1ACC SUPERVISOR** reports recalls that the controller's account is accurate and that, prior to being released, the FA20 crew, who had been on a Basic Service around the D613B/C border, were told "service terminates; ensure good two-way before exiting the airspace". The Supervisor recalls checking with the controller to ensure that this had been done, and the controller confirmed that it had. The Unit's workload was assessed as 'Low' and the controller's workload was assessed as 'Medium to Low'.

**THE SWANWICK(Mil) CONTROLLER** reports working during a busy session, with multiple callsigns freecalling for recovery from D613 to their respective bases; at the same time he was also working other aircraft, on the same frequency, routing from RAF Lossiemouth towards AARA 7. Throughout this period the controller reports that traffic levels were high and there were numerous long periods of communication on frequency between him and the crews, and also between the crews of different aircraft. During one of these periods he noticed that the Tornado, whose crew were in receipt of a Traffic Service, was routing towards AARA7 and had conflicting traffic 10nm to its northeast, converging at a similar level, just leaving D613C. On several occasions the controller tried to pass Traffic Information to the Tornado crew only to be blocked by other transmissions. Eventually Traffic Information was passed when the aircraft were within 1nm; by this time the conflicting traffic was descending through FL165. Shortly afterwards, the FA20 crew freecalled on the Swanwick(Mil) frequency stating that they had been trying to contact the controller for the last few minutes; the controller was then able to confirm that the FA20 was the aircraft that had been conflicting with the Tornado.

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

**THE SWANWICK (Mil) SUPERVISOR** reports that the evening shift had four controllers for the North Sector; Primary Planner, TAC 2, the Supervisor and one spare controller. The Supervisor had been liaising with 1ACC to plan for the aircraft departing D613; squawks and the ICF<sup>3</sup> had been allocated, and the Supervisor had explained that aircraft were to remain inside D613 until two-way communication had been established with Swanwick (Mil). The Primary Planner was already controlling the Tornado en-route to the tanker, and had allocated a number of F15s and civilian flights to TAC 2. During the 'recovery period' with a lot of aircraft leaving D613, there was a lot of 'internal chatter' between the crews. The FA20 left D613 during this period and, due to the high traffic-loading on the frequency, could not establish two-way communication with the Swanick (Mil) controller for several minutes. The Primary Planner attempted to pass Traffic Information to the Tornado crew but, by the time the FA20 crew had checked-in and there was a space on the frequency, the Traffic Information was quite late. During this busy time, the Supervisor opened a Primary TAC position to try to ease the controller's workload and to help with external calls. The Supervisor assessed the Unit's workload as 'High to Medium' and the controller's workload as 'High'

## Factual Background

Due to a technical failure, the RT and radar for 1ACC had not been recorded.

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<sup>3</sup> Initial Contact Frequency

## Analysis and Investigation

### Military ATM

The Swanwick tape transcript is below; the Swanwick (Mil) callsign is 'London Mil' (LMIL):

From	To	Speech	Time
Psycho	LMIL	Swanwick Military Psycho	1810:14
LMIL	Psycho	Psycho21 flight err Swanwick Mil pass your message	1810:19
Psycho	LMIL	Psycho21 flight currently on 994 31 to 34000 RTB Lossiemouth	1810:22
LMIL	Psycho	Psycho21 flight roger what squawk does Psycho21 have	1810:32
Psycho	LMIL	Psycho21 squawk 4617 23 squawk 4610	1810:36
LMIL	Psycho	Psycho21 roger identified err what level do you require when leaving the MDA	1810:44
Psycho	LMIL	Request Flight Level's 31 to 340	1810:51
LMIL	Psycho	Roger report established in the block 310 to 340, are you joining up as a four ship	1810:55
Psycho	LMIL	We're maintaining as 2 elements, single speaking unit 5 mile radar trail	1811:00
LMIL	Psycho	Roger so Psycho 21 22 in the first formation and err 23 24 in the second	1811:06
Psycho	LMIL	Affirm	1811:12
LMIL	Psycho	Roger	1811:13
Psycho	Internal formation call	Psycho set 1013 correct FLIGHT LEVEL 31 - 340	1811:15
LMIL	Psycho	Psycho 21 identified Traffic Service confirm happy err MARSAS <sup>4</sup> against the second formation	1811:42
Psycho	LMIL	Psycho internally MARSAS	1811:50
LMIL	Psycho	Psycho	1811:54
Psycho	LMIL	Psychos contact Turbo BRA 340 15	1811:56
LMIL	Psycho	Psycho roger err I believe they're just coming across to me as well	1812:05
Psycho	LMIL	Psycho	1812:08
Turbo	LMIL	Swanwick good evening Turbo on handover Flight Level 365	1812:11
LMIL	Turbo	Turbo err Swanwick Mil identified Flight Level 365 what type of service	1812:18
Turbo	LMIL	Requesting Traffic Service inside the confines of 613 looking for a visual recovery to Lossiemouth	1812:25
LMIL	Turbo	Turbo Roger Traffic Service	1812:32
LMIL	Psycho	Psycho 21 Traffic Service, Psycho 23 Traffic Service	1812:38
Psycho	LMIL	Traffic Service Psycho	1812:42
Psycho	Turbo	Psycho21 internal call Turbo	1812:48
Turbo	Psycho	Go ahead	1812:51
Psycho	Turbo	We were passed by our controller that it was IRMs	1812:53
Axis2	LMIL	Swanwick, Axis 2	1812:58
Turbo	Psycho	Copied thought that was IRMs at Edinburgh {unintelligible}	1813:02
Psycho	Turbo	{unintelligible} thanks	1813:08
LMIL	Axis2	Axis 2 apologies there's traffic 12 o'clock ½ mile tracking south indicating FLIGHT LEVEL160	1813:10
Axis2	LMIL	Copied is he under your control	1813:18
LMIL	Axis2	Negative he is wearing one of my squawks, but he hasn't called me yet	1813:20
Vader	LMIL	That's Vader we're on freq throughout now and just awaiting for Psycho to finish talking, we're now levelling FLIGHT LEVEL160, Traffic Service please	1813:26

At 1809:35 (Figure 1), 1ACC Surveillance Director called the CRC Boulmer to inform them that the sortie was complete and the FA20 was returning to base. At 1810:15, the FA20 changed from a 0075 to a 4616 squawk, in D613, tracking south in a steady descent to FL190.

<sup>4</sup> Military Accepts Responsibility for the Separation of Military Aircraft – used to confirm that pilots in the same formation are happy to take their own separation from other formation aircraft.

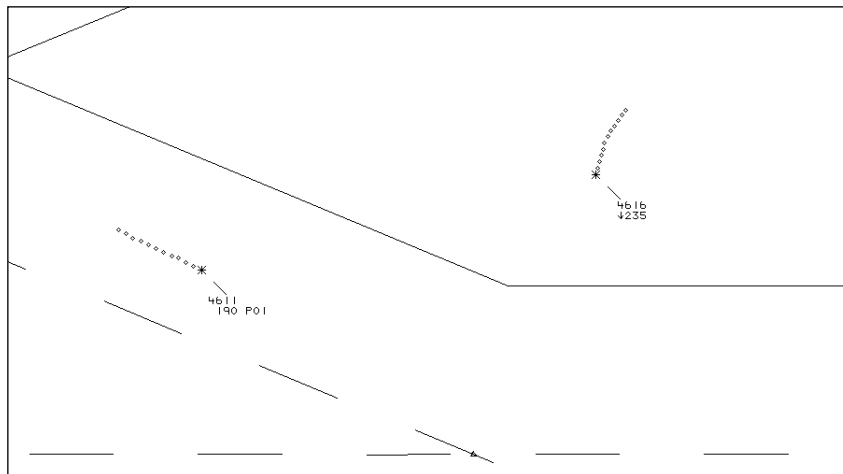


Figure 1: FA20 squawk change at 1810:15 (Tornado squawk 4611; FA20 squawk 4616).

At 1810:19, Psycho formation (Typhoons) called Swanwick, resulting in numerous RT calls until 1812:08. The FA20 departed D613 at 1811:27 with 13.7nm horizontal separation from the Tornado (Figure 2).

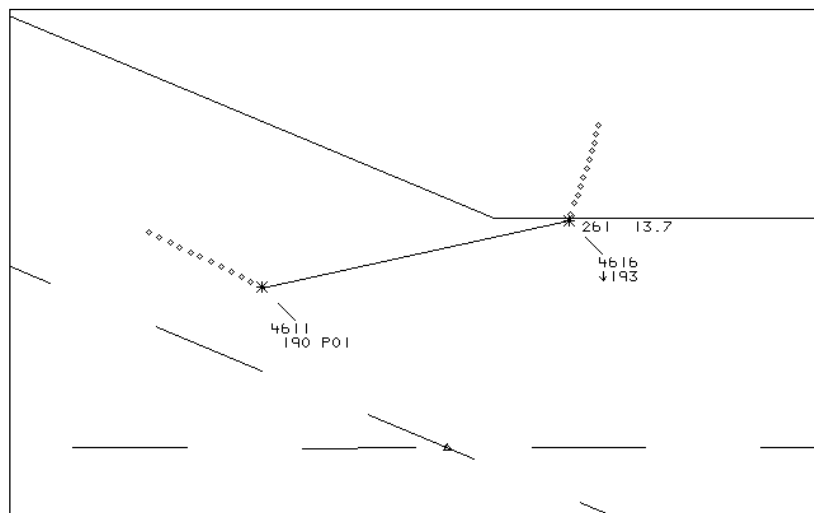


Figure 2: Geometry at 1811:27 as the FA20 departed D613.

At 1812:11 (Figure 3), a Turbo callsign (single Typhoon) called for handover at FL365.

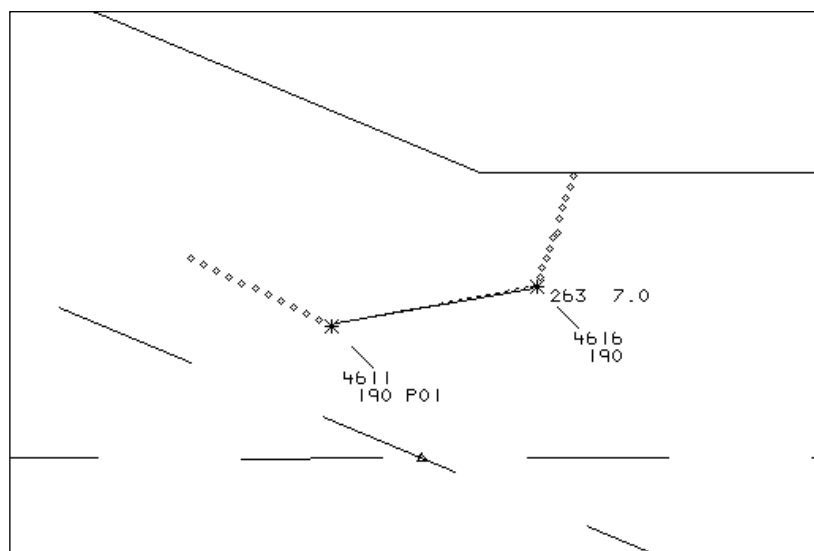


Figure 3: Geometry at 1812:11.

At 1812:38 (Figure 4), Turbo and Psycho were placed under Traffic Services, with 3.5nm horizontal separation and 100ft height separation between the Airprox tracks.

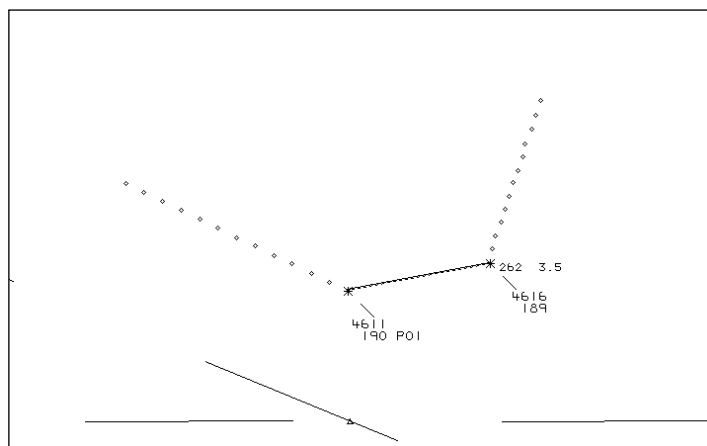


Figure 4: Geometry at 1812:38.

At 1812:48, Psycho requested an internal call with Turbo and with no comment from the controller, an internal conversation began. The Tornado called Swanwick at 1812:58 (Figure 5).

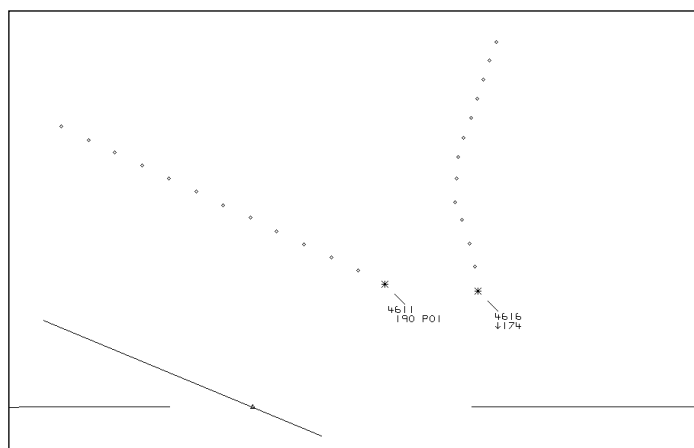


Figure 5: Tornado radio call at 1812:58.

The controller managed to get on air at 1813:10 (Figure 6) to transmit, “[Tornado callsign] *apologies, there’s traffic 12 o’clock, half a mile, tracking south indicating FL160.*” The CPA was estimated at 1813:11 with 0.8nm horizontal separation and 2100ft vertical separation.

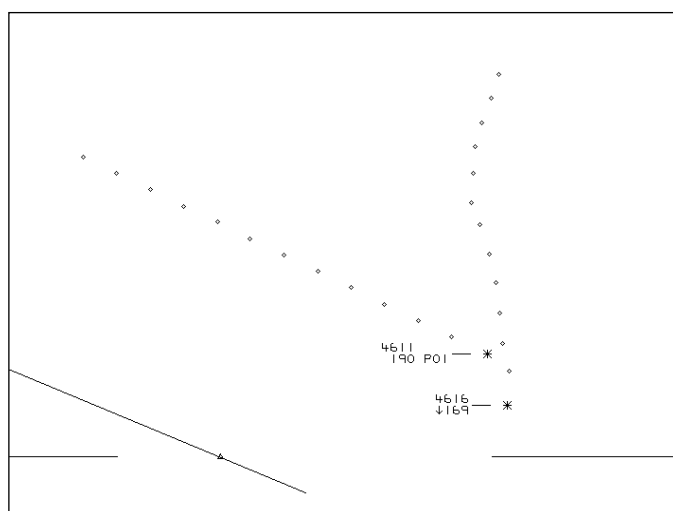


Figure 6: Traffic Information at 1813:10.

The Tornado replied at 1813:18 with, *“Copied is he under your control yet?”* Swanwick replied at 1813:20 with, *“Negative, he is wearing one of my squawks but he hasn’t called me yet.”* At 1813:26, the FA20 crew called, *“That’s [FA20 callsign] we’re on frequency throughout now and just waiting for Psycho to finish talking. We’re now levelling FL160, Traffic Service.”*

The 1ACC controller recalled informing the FA20 crew not to leave the D613 complex until good two-way communication with Swanwick (Mil) had been established, and releasing the aircraft 15nm prior to the boundary. No tape transcript was available for the investigation due to a technical fault with the deployable 1ACC equipment. The FA20 pilot does not state when he was released but did have the squawk, frequency and descent to FL190, prior to reaching the boundary. The Tornado was not called to the FA20 crew due to the ranges involved when they were instructed to contact Swanwick.

The FA20 crew had been instructed to remain inside D613 until two-way with Swanwick but there was a long delay establishing communication and the FA20 pilot elected to continue on his route, under VFR in Class G airspace, and monitored TCAS in lieu of receiving a Traffic Service. The Tornado pilot was without any form of Airborne Collision Avoidance System (ACAS) and was not as aware of the potential conflict until there was only an estimated 1.5nm horizontal separation. The Tornado instructor, in the back-seat, saw the FA20’s lights but the report suggests that the exact closing geometry details and distances would have been difficult to judge.

When the FA20 crew had tried to call, the frequency was busy with the controller and aircrew discussing squawks, levels, formation configuration, types of service and recovery states. The background transmissions meant that the Tornado pilot could not query the traffic that they could see, and the controller became involved with controlling Typhoon callsigns on recovery. As per the CAP774 (Ch1, para 1.2 and Ch3, para 3.5), both pilots were responsible for collision avoidance and Traffic Information under a Traffic Service was subject to controller and RTF loading. The Primary Planner had used the TAC2 position and TAC2 had one civilian flight on frequency, with two further aircraft from the same company pre-noted; in addition a formation of 4 x F15s was also pre-noted. The Primary Planner had the Tornado crew on frequency and pre-notes for Psycho (4 x Typhoons), Turbo (single Typhoon), and the FA20. The TAC2 was in-situ before the Airprox occurred. The Supervisor had received pre-notes on the aircraft from 1ACC, and had then passed them on to the Primary Planner; however, the Supervisor was not aware of the other pre-notes and traffic on the Primary Planner’s frequency. The Primary Planner’s frequency became overloaded and the Supervisor had become busy taking calls regarding the night’s flying activities. Not expecting the FA20 to leave D613 until in two-way contact on RT, the controller was focussed on the Psycho and Turbo recovery profiles, identification and applying Traffic Services; with approximately 2.5nm between the Tornado and the FA20, the Typhoon formations used the frequency as an ‘internal chat frequency’, without the controller’s permission. In the Primary Planner’s report, it was stated that he had attempted to pass Traffic information to the Tornado crew on several occasions. The Primary Planner did not pass the Traffic Information until the aircraft were at a range of 0.5nm apart, and there were occasions, as shown in the transcript, where priority was given to aircraft not yet under a service.

The normal barriers to an incident of this nature would be radar-derived Traffic Information, TCAS and ‘see-and-avoid’. The FA20 crew ultimately resolved the conflict using information from TCAS. Traffic Information was not being passed and the Tornado was not ACAS equipped. The FA20 crew had taken an avoiding descent and a left hand turn of 30 degrees to deconflict. The Tornado pilot’s report demonstrates the limitations of ‘see-and-avoid’ for two converging jets at night, particularly in respect of range information. Traffic Information was not effective as a barrier because of the amount of activity on the radio frequency; Traffic Information was provided at 0.5nm, but the FA20 crew’s avoiding action had resolved the incident by that point. The recovery plan from Swanwick would not have been thought likely to overload the RT or controller in normal circumstances. The constant RT absorbed the controller’s attention and did not allow enough capacity to pass Traffic Information to the Tornado crew or provide a service to the FA20 crew.

## UKAB Secretariat

Both pilots had equal responsibility for avoiding collisions and for ensuring that did not fly in such proximity to other aircraft as to create a danger of collision.<sup>5</sup> The aircraft were converging, and the Tornado was on the right of the FA20, so the FA20 pilot was required to give way, which he did.<sup>6</sup>

## Comments

### HQ Air Command

This Airprox highlights a number of issues that combined to allow two aircraft to fly into conflict with each other. Firstly, the Falcon pilot was instructed by 1ACC, at a distance of approximately 15nm from the boundary, to remain within the confines of D613C until two-way radio contact had been established with Swanwick (Mil). However, given the delay in achieving radio contact due to his continued inability to transmit an initial call to Swanwick(Mil), the pilot elected to continue into Class G airspace. Secondly, the exchanges between the Typhoon formation and the Swanwick (Mil) controller became protracted and essentially blocked the frequency to others. That said, the majority of exchanges were between the formation and the Swanwick(Mil) controller, and opportunities therefore existed for the controller to pass Traffic Information on the Falcon to the Tornado crew. Thirdly, an internal domestic call, from the Typhoon formation to the single Typhoon, was made on the ATC frequency without the controller's permission and at an inopportune time. Lessons to be emphasised include:

1. If a controller requests an action, such as remaining within a defined area, it is likely that it is because it forms part of that controller's deconfliction plan. Non-adherence to the request, whilst perfectly permissible in this instance, may induce unintended consequences.
2. Give consideration to others and allow them to use the frequency. When multiple call signs are recovering from an MDA<sup>7</sup> it is likely that they will all want to speak to the controller.
3. The controller 'owns' the frequency. Do not transmit domestic messages unless you have the controller's permission to do so.

Although the Tornado crew became visual with the Falcon's lights, at night this becomes a weakened barrier as relative aspect is extremely difficult to judge. Thankfully the Falcon was TCAS equipped and its crew took avoiding action on the Tornado; the other aircraft in and around this Airprox were not similarly endowed, and so that barrier to mid-air collision was missing in most cases.

## Summary

An Airprox was reported between an FA20 (whose crew were not under any ATS because they had left the 1ACC frequency and had not yet been able to establish 2-way communication with Swanwick (Mil)), and a Tornado, (whose crew were in receipt of a Traffic Service from Swanwick (Mil)). The Swanwick (Mil) frequency was congested and neither crew received Traffic Information; the Tornado crew saw the FA20's lights but could not assess its track effectively enough to take avoiding action, the FA20 crew received a TCAS TA and subsequent RA and took avoiding action.

<sup>5</sup> Rules of the Air 2007, Rule 8, Avoiding Aerial Collisions and reflected in RA2307, Rules of the Air

<sup>6</sup> Rules of the Air 2007, Rule 9, Converging

<sup>7</sup> Managed Danger Area

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

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

Looking first at the actions of the FA20 crew, the Board noted that they had been given instructions by the 1ACC controller to remain within D613 until they had established two-way communication with Swanwick (Mil); some members thought that this may have been a mandatory instruction. There was some academic debate about whether the civilian crew, operating as part of a military activity, would have been considered subject to military or civilian regulations but the Board noted that, practically, in this case the requirements would have been the same for military or civilian crews because throughout the encounter the airspace was Class G where the military regulations (described in MAA RA2307) mirror those underpinned by the Air Navigation Order. Whilst it was, therefore, not mandatory for the FA20 crew to follow the 1ACC controller's instructions, members unanimously agreed that, as part of the controller's deconfliction plan, it would have been best practice to follow them unless the crew had a flight safety-related reason not to. Recognising that the Swanwick (Mil) frequency was busy, the Board noted that the FA20 crew had elected to leave D613 airspace contrary to their last instructions whilst they waited for an opportunity to contact the Swanwick (Mil) controller. Whether this was because they had not assimilated the instruction, or whether they had expected earlier contact with Swanwick(Mil) was not clear. Whichever, using their TCAS to enhance their lookout, the crew had then spotted the conflict with the Tornado and had turned left and descended to ensure that the aircraft remained separated. The Board was informed by airline members that civilian pilots are warned that TCAS can suffer from 'angle of arrival' errors, and that they should not use TCAS to manoeuvre laterally because this can be unsafe. Notwithstanding, the Board noted that in this case both the lateral and vertical manoeuvres had been effective.

Turning to the Tornado crew, the Board noted that they had seen the FA20's lights but had found it difficult at night to judge its position and closure accurately; without the benefit of TCAS or Traffic Information, the Board considered that they had been unable to take any effective avoiding action.

As for the actions of the controllers, the Board discussed whether the 1ACC or Swanwick (Mil) controllers should have passed Traffic Information. Although the 1ACC controller had free-call transferred the FA20 crew to Swanwick (Mil), the aircraft had been fully pre-noted in accordance with the agreed procedures, and had been transferred early enough such that, in normal circumstances, the Swanwick (Mil) controller would ordinarily have been able to pass Traffic Information in plenty of time. The Board considered that the 1ACC controller had therefore discharged his duties correctly in his expectation that the FA20 would not exit D613 before achieving two-way contact with Swanwick (Mil). However, in actuality, the Swanwick (Mil) frequency had been busy and the FA20 crew did not immediately achieve two-way contact as a result. In this respect, Psycho and Turbo formations had made matters worse by passing intra-formation messages without the controller's permission, but the Board agreed that much of the RT had been broadcast by the Swanwick(Mil) controller himself, who could at several points, have made a 'break' or 'stand-by' call and passed Traffic Information to the Tornado crew.

The Board concluded that the FA20 crew's decision to exit D613 before achieving RT contact with Swanwick(Mil) was the cause of the incident because the Swanwick(Mil) controller was relying on that RT contact for his deconfliction plan. They also agreed that the busy frequency and the low priority that the Swanwick(Mil) controller afforded to Traffic Information for the Tornado crew were contributory factors. When discussing the Degree of Risk, the Board agreed that the FA20 crew had taken timely and effective action to prevent the aircraft colliding, and they agreed that the risk was therefore Category C.



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

Cause: The FA20 crew did not assimilate the instruction to remain within D613 until in RT contact with Swanwick(Mil).

Contributory Factors:

1. The Swanwick(Mil) frequency was busy.
2. The Swanwick(Mil) Controller did not prioritise Traffic Information to the Tornado.

Degree of Risk: C.

ERC Score<sup>8</sup>: 2.

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<sup>8</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.