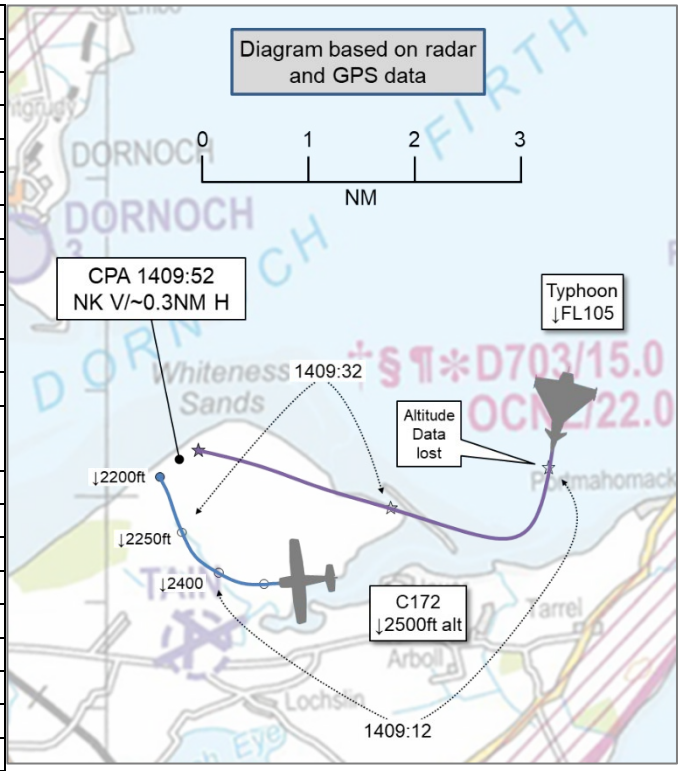
AIRPROX REPORT No 2022001

Date: 07 Jan 2022 Time: 1410Z Position: 5750N 00359W Location: 2.5NM NE Tain

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	C172	Typhoon
Operator	Civ FW	HQ Air (Ops)
Airspace	Scottish FIR	Scottish FIR
Class	G	G
Rules	VFR	VFR
Service	None	Traffic
Provider	Lossie Departures	Lossie Approach
Altitude/FL	NK	NK
Transponder	A, C, S	A, C
Reported		
Colours	White, Maroon	Grey
Lighting	Beacon, Strobe, Landing	Anti-collision, Nav
Conditions	VMC	NR
Visibility	>10km	NR
Altitude/FL	2700ft	2500ft
Altimeter	QNH (1010hPa)	(997hPa)
Heading	~310°	285°
Speed	~100kt	450kt
ACAS/TAS	SkyEcho	Not fitted
Alert	None	N/A
Separation at CPA		
Reported	NK V/400-600m H	Not visual[1]
Recorded	NK V/~0.3NM H	



THE C172 PILOT reports that they were on a local flight from their base airfield, [departure airfield]. They were receiving a Basic Service from Inverness Radar. They were advised about military traffic operating between 8000ft and 2000ft to the north of their position. Since they were about to return to [departure airfield], they requested to stay with Inverness Radar until they were established in the [destination airfield] overhead. They first became visual with the Typhoon as it was climbing away on a northerly heading. They were most surprised to see that it had made a simulated attack profile (SAP) on the strafing target on D703, given that the range was notified as deactivated and the range tower unmanned. They lost sight of the Typhoon when it was south abeam Golspie. They assumed it had departed further north-east to allow them to make their descent into [destination airfield]. They received one more notification from Inverness Radar as to the whereabouts of the Typhoon. They cannot remember whether this was before or after they had lost initial visual contact. They asked Inverness if the Typhoon pilot was working Lossiemouth. This was confirmed and they requested a change of frequency to Lossie Departures. The RAF controller was nonplussed about their transmission, stating the Typhoon pilot knew of their presence but thanked them for their position report and intentions. [Their passenger] (a former PPL holder) then reported the Typhoon initially below them and to their starboard and then level, approximate horizontal range 400-600m in a steep climb. [Their passenger] then lost sight with the Typhoon. They reported their unhappiness to the Lossie controller who then said the Typhoon was at 5000ft. However, they understood that the Typhoon was only receiving a Basic Service from Lossie. They told the controller that they considered the Typhoon to be too close and reported descending into the [destination airfield] overhead and changing frequency to SafetyCom. They fully appreciate that the Typhoon pilot had every much as right to be in the same airspace as themself, but [considered it to be unwise] to be performing SAPs when the range was notified as deactivated and the tower unmanned. It was only thanks to the controller at Inverness Radar that they had any idea that the

[1] Pilot reports that at the time of closest proximity, they were not visual with the light aircraft.

Typhoon was in the vicinity. They are certain SAPs should not have been being performed and the Typhoon pilot put both aircraft at unnecessary risk.

The pilot assessed the risk of collision as 'Medium'.

THE TYPHOON PILOT reports that during a [training sortie], they were conducting strafe profiles [within the confines of] Tain Range. The range was deactivated, but the Squadron had spoken to Tain about conducting off-range strafe within the boundaries of the range utilising the Class G airspace. During a pattern, Lossiemouth Departures informed them of traffic SSE at 5NM. They were not visual with the contact behind them, and continued the pattern, subsequently asking for an update. After receiving the update, they gained visual contact with the aircraft which was in the vicinity of the target and travelling NW. They created a mental model which placed the aircraft as no longer a factor by the time they arrived. They were not visual with the aircraft at the tip and felt that their situational awareness from this mental model was sufficient which, in hindsight, it wasn't. They next gained visual with the aircraft after the profile, as they climbed away. From its position, they felt that the traffic had not been a factor during the profile. Lossie Departures informed them that the light aircraft pilot was concerned about their separation. They were happy to be conducting strafe profiles within the boundaries of Tain whilst it was deactivated, as it was Class G airspace in which off-range strafe would normally be conducted. It was an area with which they were familiar. However, with hindsight, their situational awareness was derived from becoming visual before the tip and building a mental model of where the aircraft would be during the profile. This was insufficient and they should have got further updates on the traffic to become visual with the aircraft at the tip. With the aircraft in the vicinity of the target area they should not have prosecuted the profile.

The pilot assessed the risk of collision as 'Low'.

THE LOSSIE SCREEN CONTROLLER reports that they were screening "Controller A" in Departures. [Typhoon c/s] was a Typhoon operating in Tain (closed) between the surface and 18,000ft. [The Typhoon pilot] was tracking north at approximately 16,000ft and a 7000 squawk was to their south/south-east at approximately 4000ft, range 8NM. They discussed with "Controller A" the criteria for calling traffic. As a training point they advised them that, due to them carrying out high energy manoeuvres, it would be worth calling to give [the Typhoon pilot] better situational awareness, which they did. [The Typhoon pilot] then tracked east and south, then descended before turning west towards the traffic. At approximately the same time [the C172 pilot] called on frequency 119.575MHz requesting information on the Typhoon, which was passed. [The C172 pilot] reported that they were inbound to [destination airfield] and descending to 2000ft. This was relayed to [the Typhoon pilot]. [The Typhoon pilot] requested an update on the traffic which was passed, both were tracking west-northwest at this time with [the Typhoon] approaching [the C172]. Contacts merged but Mode C indicated vertical separation of 5000ft. They don't recall if [the Typhoon pilot] stated if they were visual. [The C172 pilot] expressed concern on frequency and was advised that radar indicated vertical separation of 5000ft. [The Typhoon pilot] was advised that [the C172 pilot] was concerned with their proximity but that radar had indicated no issues. [The Typhoon pilot] responded that they were happy with the traffic, continued their sortie and then descended to low-level en-route.

[They also report that] the Supervisor received the call from [the C172 pilot] later in the day which was the point at which they were made aware that [the C172 pilot] would be filing [an Airprox]. They said they would not raise a DASOR at the time due to no hazard being observed by them (Class G, traffic called, no call for Airprox on frequency, no concerning returns) however they were expecting to have to raise one in response to this, should the pilot submit. They believe the pilot of [the Typhoon] also called later in the day to discuss the situation but have no further information on that.

The controller perceived the severity of the incident as 'Negligible'.

THE LOSSIMOUTH SUPERVISOR reports that they concur with the controller's honest and accurate assessment of the situation which unfolded. [The Typhoon pilot] was informed several times of the conflicting air system that was operating in the vicinity, which the pilot acknowledged. When [the C172 pilot] called because they were visual with the Typhoon operating in their vicinity, further information

was passed to both air systems which painted a more accurate picture of the ongoing situation. At no point did the level of the Typhoon reduce to <5000ft on the radar screen however, the Mode C of the air system did drop off on occasion due to the nature of the manoeuvres being conducted in the area. The pilot of [the Typhoon] was provided situational awareness about the other air system on several occasions and they had no concerns over the proximity of the air systems based on the information available at the time.

THE INVERNESS CONTROLLER reports that [the C172 pilot] was receiving a Basic Service from Inverness Radar while on a flight from [departure airfield] to [destination airfield]. They observed fast-moving traffic operating in the area that is D703 (Tain Range). D703 was not active. They advised [the C172 pilot] of the traffic which appeared to be in a clockwise pattern at around 10,000ft. As that traffic approached the southern extremity of its pattern, the Mode C readout would drop out and then they saw a brief return at A026 before the traffic returned to circa 10,000ft. They advised [the C172 pilot] that the traffic appeared to be making steep descents to the landward area of Tain Range before climbing away. They passed updated Traffic Information when prudent and [the C172 pilot] advised visual with a Typhoon. At that time the Typhoon was not a proximate hazard to [the C172]. [The C172 pilot] asked if the Typhoon was receiving a service from Lossiemouth and they advised that it had a Lossiemouth squawk. [The C172 pilot] elected to transfer to Lossiemouth and before they changed frequency they [the controller] gave updated Traffic Information on the position of the Typhoon. A few minutes later they saw the lateral profiles of both aircraft in close proximity but there was no Mode C information for the Typhoon on the Inverness radar display. Later in the day the pilot of [the C172] phoned Inverness ATC to pass on their thanks for the Traffic Information and mentioned that later in his flight they had had a close encounter with the Typhoon and were filing an Airprox. No details of the Airprox are known as neither aircraft was in receipt of a service from Inverness ATC at the time.

Factual Background

The weather at Kinloss was recorded as follows:

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METAR EGQK 071350Z AUTO 25013KT 9999 FEW080/// 04/M01 Q0999
METAR EGQK 071450Z AUTO 24017KT 9999 FEW090/// 03/M00 Q1000
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Analysis and Investigation

Military ATM

The Lossiemouth Departures controller was under training and was providing a Traffic Service to the Typhoon pilot who was operating in the Tain Range area in a block between surface and 18,000ft. The Screen controller prompted the trainee controller to pass Traffic Information on the C172 which was passed and updated when requested by the Typhoon pilot. The C172 pilot, who had been receiving a Basic Service from Inverness Radar, free-called the Lossiemouth Departures controller to request information on the Typhoon. The C172 pilot was informed that the Typhoon pilot was visual with them and the C172 pilots' intentions were relayed to the Typhoon pilot. The Lossiemouth Departures controller was not controlling any other aircraft at the time of the Airprox and did not perceive there to be an issue as the Typhoon Mode C was not seen to drop below 5000ft.

Figures 1 and 2 show the positions of the C172 and Typhoon at relevant times during the Airprox. The screenshots are taken from a replay using the NATS radars which are not utilised by the Lossiemouth controllers, therefore, may not be entirely representative of the picture available.

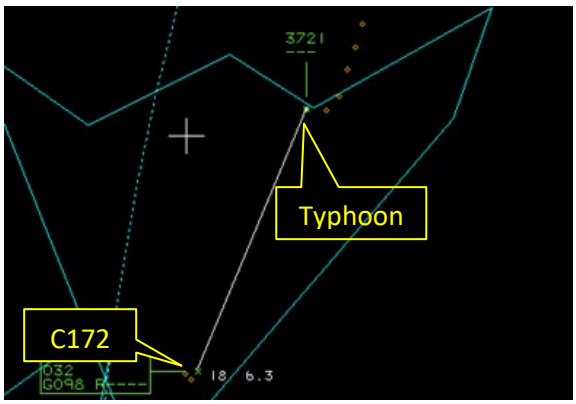

Figure 1 - CPA.

Due to the limited radar coverage in the area, the CPA that could be identified on the radar screen was 1min and 12sec prior to the first set of Traffic Information being passed. Separation was measured at 6.3NM.

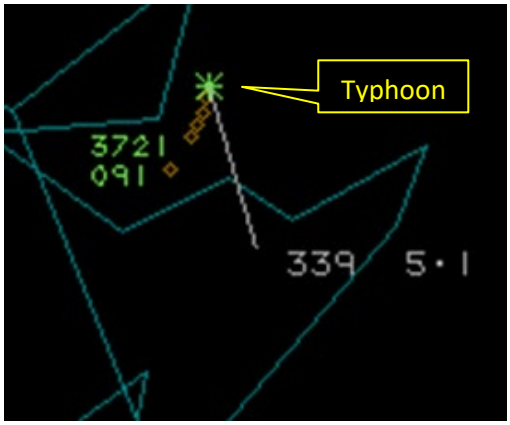

Figure 2 - Typhoon pilot passed Traffic Information.

Figure 2 shows the radar screen when the first set of Traffic Information was passed to the Typhoon pilot. The C172 was not visible on the NATS radar. The C172 was not seen for the remainder of the recording.

The radar picture provided by NATS does not show the C172 due to their level of operation which makes it difficult to ascertain the accuracy of the Traffic Information or whether Traffic Information should have been passed before it was. It was evident from the Lossiemouth Screen controller's report that they were aware of the C172 and utilised the opportunity to teach the trainee the importance of scanning the whole operating block for conflictions and not just the immediate vicinity. Both aircraft were operating in Class G airspace and Traffic Information was passed to aid the situational awareness of the Typhoon pilot. The Lossiemouth Screen controller and the ATC Supervisor did not perceive there to be any cause for concern although there were periods where the Typhoon Mode C did not display, which can indicate rapid climbs or descents. Therefore, the Typhoon could have operated near the C172 without the controller realising.

Typhoon operating organisation and RAF Lossiemouth ATC.

This is a case of two different opinions between the crews as to how close each aircraft were to each other and, with limited evidence to support either case, it is difficult to ascertain the severity of the incident. Furthermore, as highlighted in the Supervisor's comments, ATC had no concerns as to the proximity of the aircraft to each other.

With Tain Range being closed and the airspace released, both aircraft were operating within Class G airspace and both were in receipt of a service from ATC. The Typhoon pilot believed that they had sufficient situational awareness on the civil traffic and that it posed no threat to them during their dynamic manoeuvring. With hindsight, even if [the Typhoon pilot had remained] visual, it would be inadvisable to get too close to an aircraft [operating in the vicinity of] a minor aerodrome and this creates a problem with all pilots complying with rules of the air. This was a salient lesson identified by the pilot involved and has been shared through STANEVAL briefings to educate the wider Typhoon population. STANEVAL has also conducted a review of range booking procedures.

UKAB Secretariat

An analysis of the NATS radar replay was undertaken. The track of the Typhoon could be seen at the time of the Airprox however no vertical data was available. The C172 was not detected on the NATS radar system however the pilot was able to supply a GPS data file. Inverness ATSU was also able to supply screenshots of their recorded radar data from the time of the event and these sources have been combined to produce the diagram and measure lateral separation. The information sources available regarding the altitude of the Typhoon include the pilot reports and the Inverness controller's report which stated that they "saw a brief return at A026" however, this is believed to have occurred on a previous SAP. There is no recorded altitude information for the Typhoon at the time of the Airprox and as such it has not been able to measure the vertical separation.

The C172 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.[2] If the incident geometry is considered as overtaking then the C172 pilot had right of way and the Typhoon pilot was required to keep out of the way of the other aircraft by altering course to the right.[3]

Comments

HQ Air Command

This Airprox was subject to a Local Investigation; although there were no recommendations, the Typhoon Standards and Evaluation unit are conducting a review of the range booking procedures for Lossiemouth. The pilots of both aircraft had awareness of the other via Traffic Information passed by ATC and Inverness should be commended for their passing of military activity to the C172 pilot under a Basic Service. Credit should also be given to the C172 pilot for changing to Lossie Departures to gain better awareness of the Typhoon and its pilot's intentions. As it has already been stated, Tain Range was deactivated, thus leaving the airspace as Class G; that being said, the Typhoon pilot made a valid observation and with hindsight, even if visual, it would be inadvisable to get too close to an aircraft conducting an approach to a minor aerodrome, creating a problem with all pilots complying with rules of the air. This lesson has been shared amongst the Typhoon community. Both pilots had situational awareness of each other's presence - albeit not visual the whole time – the risk of collision was low. Due to the unpredictable nature of the Typhoon's profile, the C172 pilot rightly felt concerned enough to raise an Airprox.

AOPA

It is heartening to see the C172 pilot adopting a sensible approach with proactive selection of ATC, checking NOTAMs before flight and knowing the danger area wasn't active at the intended time of flight. In addition, Inverness ATC have gone above and beyond when providing a Basic Service to general aviation.

It is disappointing that the military pilot used the Tain range outside notified operating hours and, having visually acquired the GA aircraft and then losing sight of it, continued being task orientated

[2] (UK) SERA.3205 Proximity. MAA RA 2307 paragraphs 1 and 2.
[3] (UK) SERA.3210 Right-of-way (c)(3) Overtaking. MAA RA 2307 paragraph 14.

with the target run, rather than gaining extra training benefit from aborting the task, going around for another attempt when the area was clear, ensuring situational awareness is kept.

Summary

An Airprox was reported when a C172 and a Typhoon flew into proximity at 2.5NM NE of Tain at 1410Z on Friday 7th January 2022. Both pilots were operating under VFR in VMC, the Typhoon pilot in receipt of a Traffic Service from Lossie Radar and the C172 pilot was not in receipt of a ATS.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, GPS data files, 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.

The Board first considered the actions of the C172 pilot and were encouraged by their pre-flight planning efforts, having checked the NOATMs and been aware of the status of Tain range as well as them having been equipped with a Mode S transponder and additional EC equipment, although members noted that it had been incompatible with the EC equipment carried on the Typhoon (**CF6**). Members agreed that the pilot had taken a proactive approach to managing their flight and had been in receipt of an appropriate ATS and, when they had needed additional information, they had sought it by contacting Lossie Departures directly. Members discussed that the C172 pilot had assumed that the Typhoon pilot had departed to the north east and that this had proven to be incorrect (**CF4**) as their passenger had then become visual with the Typhoon climbing out from below them. Members agreed that this had been at a point at which it would have been too late for the C172 pilot to manoeuvre to avoid the Typhoon (**CF7**).

Next, members discussed the actions of the Typhoon pilot and the Board agreed that the airspace had been designated as Class G and so there had been no regulation in force to prohibit manoeuvres of the kind which the pilot had been undertaking. The Typhoon pilot had had visual contact with the C172 however this had been lost at the time of the Airprox (**CF7**) and members agreed with the Typhoon pilot's statement that at this point they *"should not have prosecuted the profile"*. The Typhoon pilot had also received Traffic Information regarding the C172 however the Board felt that this information had not been fully assimilated by the pilot (**CF5**). Members agreed that the Typhoon pilot had built an inaccurate mental model regarding the position and flight path of the C172 (**CF4**) and they had not inadequately adapted their plan to account for its presence (**CF3**). A military member commented that high-energy manoeuvres should not be undertaken unless the pilot is certain of the location of any other traffic in the vicinity and has full situational awareness regarding the future flight path of that traffic.

Members then considered the involvement of the ATSUs in the event and commended Inverness Radar for firstly, providing timely and accurate Traffic Information to the C172 pilot when in receipt of a Basic Service and, for their engagement with the UKAB secretariat and the provision of radar data. The Board then discussed the actions of the Lossie controller. Both military and civilian ATC members stated that, when an aircraft is undergoing high energy manoeuvres, there can be occasional loss of transponder Mode C readout. Members agreed that as a result of the occasional loss of Mode C readout the situational awareness of the Lossie controller would have been generic at times (**CF2**) and that, as they had not observed the Mode C readout to be below 5000ft at any time, it had been reasonable for them to assume that the Typhoon had not descended below that altitude (**CF1**). Members also agreed that the controller had been sufficiently concerned by the proximity of the aircraft for then to have passed additional Traffic Information (**CF1**).

Finally, the Board considered the risk involved in this Airprox. Members noted that, although the Typhoon pilot had been visual with the C172 early, they had lost visual contact and had then undertaken a high-energy manoeuvre based on inaccurate situational awareness. The C172 pilot had also had inaccurate situational awareness, believing that the Typhoon pilot had vacated the area. At the point at which the C172 pilot had visually reacquired the Typhoon, it would have been too late for them to be

able to take effective avoiding action. However, the Board considered the recorded horizontal separation to be such that there had been no risk of collision, although safety had been reduced. Accordingly, the Board assigned a Risk Category C to this Airprox.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2022001			
CF	**Factor**	**Description**	**ECCAIRS Amplification**	**UKAB Amplification**
	Ground Elements			
	• Situational Awareness and Action			
1	Human Factors	• Expectation/Assumption	Events involving an individual or a crew/ team acting on the basis of expectation or assumptions of a situation that is different from the reality	Concerned by the proximity of the aircraft
2	Contextual	• Traffic Management Information Action	An event involving traffic management information actions	The ground element had only generic, late, no or inaccurate Situational Awareness
	Flight Elements			
	• Tactical Planning and Execution			
3	Human Factors	• Insufficient Decision/Plan	Events involving flight crew not making a sufficiently detailed decision or plan to meet the needs of the situation	Inadequate plan adaption
	• Situational Awareness of the Conflicting Aircraft and Action			
4	Contextual	• Situational Awareness and Sensory Events	Events involving a flight crew's awareness and perception of situations	Pilot had no, late, inaccurate or only generic, Situational Awareness
5	Human Factors	• Understanding/Comprehension	Events involving flight crew that did not understand or comprehend a situation or instruction	Pilot did not assimilate conflict information
	• Electronic Warning System Operation and Compliance			
6	Technical	• ACAS/TCAS System Failure	An event involving the system which provides information to determine aircraft position and is primarily independent of ground installations	Incompatible CWS equipment
	• See and Avoid			
7	Human Factors	• Monitoring of Other Aircraft	Events involving flight crew not fully monitoring another aircraft	Non-sighting or effectively a non-sighting by one or both pilots

Degree of Risk: C

Safety Barrier Assessment[4]

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

Ground Elements:

Situational Awareness of the Confliction and Action were assessed as **ineffective** because, the Mode C readout from the Typhoon had been unavailable at times giving only generic, two dimensional situational awareness to the controllers whom had been working on the assumption that the aircraft had not descended below 5000ft.

Flight Elements:

[4] The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the UKAB Website.

Tactical Planning and Execution was assessed as **partially effective** because, although the Typhoon pilot had become aware of the presence of the C172, they had not adapted their plan to account for it.

Situational Awareness of the Conflicting Aircraft and Action were assessed as **ineffective** because the Typhoon pilot had not assimilated the conflict information regarding the presence of the C172 and as such, had had an inaccurate mental model regarding it's whereabouts.

Electronic Warning System Operation and Compliance were assessed as **ineffective** because although the C172 had been equipped with EC equipment, it had been unable to detect the Typhoon.

See and Avoid were assessed as **ineffective** because the Typhoon pilot had not been visual with the C172 at CPA and the C172 pilot had only become visual with the Typhoon at a point when it had been too late to manoeuvre to avoid it.