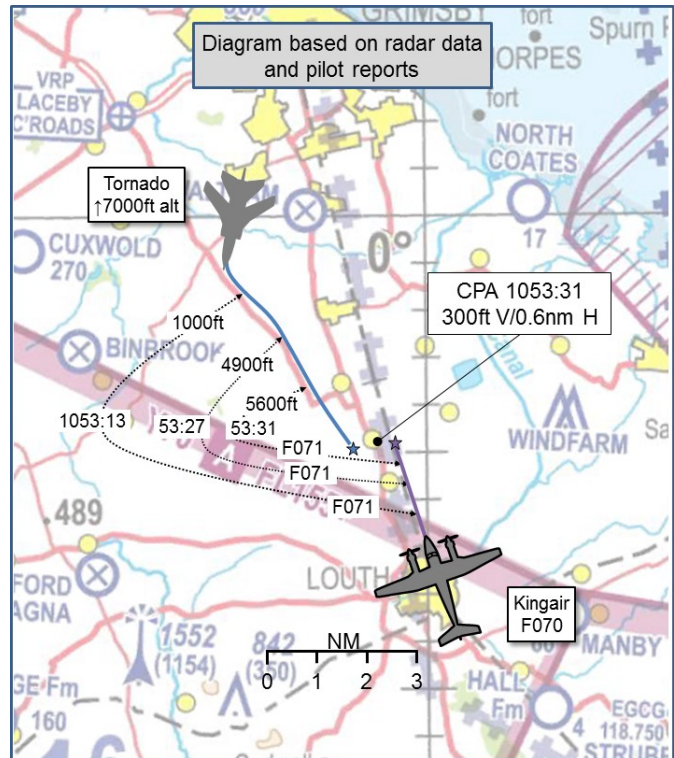


AIRPROX REPORT No 2016006

Date: 20 Jan 2016 Time: 1053Z Position: 5325N 00002W Location: 5nm South of Cleethorpes

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Tornado	King Air
Operator	HQ Air (Ops)	HQ Air (Trg)
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	NK
Service	Traffic	NK
Provider	Swanwick (Mil)	NK
Altitude/FL	FL062	FL071
Transponder	On / Mode C	NK
Reported		
Colours	Grey	NK
Lighting	White HISL, Nav Lights	NK
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	7000ft	Below FL100
Altimeter	RPS (1015hPa)	NK
Heading	140°	NK
Speed	320kt	170kt
ACAS/TAS	TCAS II	TCAS II
Alert	RA	RA
Separation		
Reported	0ft V/0.5nm H	NK
Recorded	300ft V/0.6nm H	



THE TORNADO PILOT reports that he was conducting a recovery from an off-range simulated 30° strafe manoeuvre at approximately 20° nose-up and passing through 5000ft. A TCAS TA was received for an aircraft in approximately the 9 o'clock position; he briefly became visual at this height shortly before a TCAS RA 'Descend' was received. Due to the highly dynamic nature of the manoeuvre 'outside of the normal TCAS environment', and the SA gained from brief visual acquisition of the other aircraft, the pilot did not comply with the RA but instead turned away from its last seen location. Both the Pilot and WSO then became visual again with a twin-engine turboprop passing down the left-hand side of the aircraft at an approximate range of 0.5nm as they climbed through 7000ft. He recalled that a momentary TCAS TA had previously been received during the initial entry to the strafe manoeuvre; however, the descent had been continued because his aircraft was already below the height of the conflicting traffic. At the time of the incident, he was operating under a Traffic Service from Swanwick Military and had requested a height block from surface to 12000ft on the RPS. No notification of the traffic had been received until the Airprox was declared by him on the Swanwick Military frequency. The rest of the sortie was conducted with nothing further to report.

He assessed the risk of collision as 'Low'.

THE KING AIR PILOT reports that he was on an 'asymmetric theory' sortie when the aircraft received a TCAS RA. A student was occupying the LHS, acting as Pilot Flying (PF), and a QFI (aircraft captain) the RHS, acting as Pilot Non Flying (PNF). The aircraft was straight-and-level in 'Play North' near Cleethorpes with the QFI explaining the next element of the planned exercise to the student. The first indication of the conflicting traffic was the TCAS aural 'Climb, Climb' with an associated climb demand on the VSI. The PF pitched the nose up to achieve the required rate of climb whilst applying full power. Before full power could be set the TCAS aural 'Clear of Conflict' sounded; at the same time, the PF became visual with an aircraft, believed to be a Tornado, below in the 10 o'clock,

climbing quickly and turning away. The PF assessed that as the fast-jet was turning away, no further manoeuvre was required; he lost sight of the fast jet high on the left side passing behind. On landing, the RA was reported to the Duty Authoriser and it was decided not to take any further action.

He assessed the risk of collision as 'Low'.

THE SWANWICK MIL CONTROLLER reports that he was the Unit Instructor screening a controller under training (U/T) in North East Tac Right. The U/T had been controlling 2 to 3 aircraft for an hour and was then controlling 1 aircraft in the Linton On Ouse area, at FL150 under a Traffic Service, and a Tornado conducting general handling approximately 10nm south of OTR also under a Traffic Service. Because he had also been pre-noted with another aircraft leaving CAS at OTR, and a second aircraft planning to join CAS at OTR, a Planner was in-situ. The Tornado pilot had requested to manoeuvre between surface and 12000 feet on the Humber RPS (1015hPa) for approximately 15mins, and had been cleared to do so. He observed that the Tornado maintained approximately 12000ft and conducted turns just to the north of airway Y70. As traffic intensity was low, he encouraged the U/T to begin planning to deal with aircraft leaving controlled airspace descending into their destination and what to do with the Tornado when he reported complete. Part of this planning involved displaying the weather on SIS for the Tornado's destination because he anticipated that the Tornado would be routing there once complete. Both his and the U/T's attention at this point was on the SIS display rather than the radar. During their discussion about the weather, the Tornado pilot reported an Airprox. On refocusing their attention to the radar screen, an aircraft track was observed approximately 2nm south of the Tornado at FL070. The Tornado Mode C indicated that he was at a similar level. The Tornado pilot reported that he had become visual with a light twin piston-engine aircraft at approximately 7000ft. The radar return showed that the Tornado was currently turning back towards the track, so the U/T passed Traffic Information to the Tornado pilot, who reported visual, and was observed to climb to 8000ft.

He assessed the risk of collision as 'Medium'.

THE SWANWICK MIL SUPERVISOR reports she was supervising the East sector when multiple transits were taken from East to North East then onto a tanker in ARA5. There was a lot of liaison required with the Tanker, the North Supervisor and the NE Tac in order to organise handovers and determine who was working which airspace, whereas East had minimal traffic and a planner in place and were therefore left to their own devices. She was not aware of the incident until she had completed the liaison of the NE transits and the Airprox had occurred.

Factual Background

The weather at Scampton was recorded as follows:

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METAR EGXP 201050Z 25002KT 0100 FG BKN005 02/02 Q1020 RED
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Analysis and Investigation

Military ATM

An Airprox took place on 20 Jan 16 at 1053, 5nm south of Cleethorpes. The incident took place between a Tornado GR4 under a Traffic Service with RAF (U) Swanwick and a King Air that was not receiving an ATS.

The geometry at 1053:12 (Figure 1) shows the Tornado at 2000 feet and the King Air in transit at FL70.

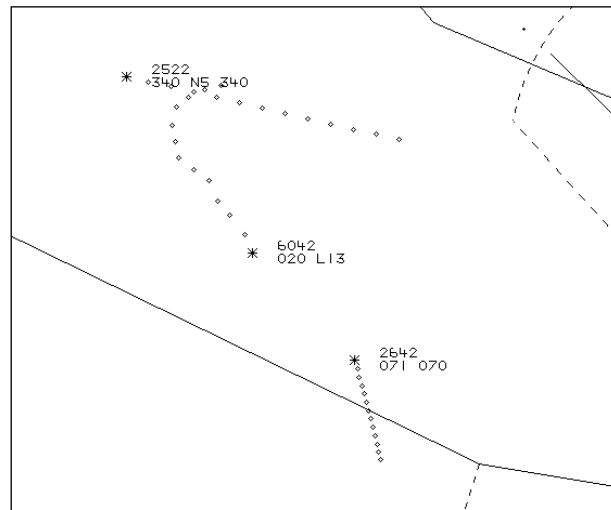


Figure 1: Geometry at 1053:12 (Tornado Squawk 6042; King Air Squawk 2642)

By 1053:23 (Figure 2), the Tornado was in the climb recovering from the strafe manoeuvre.

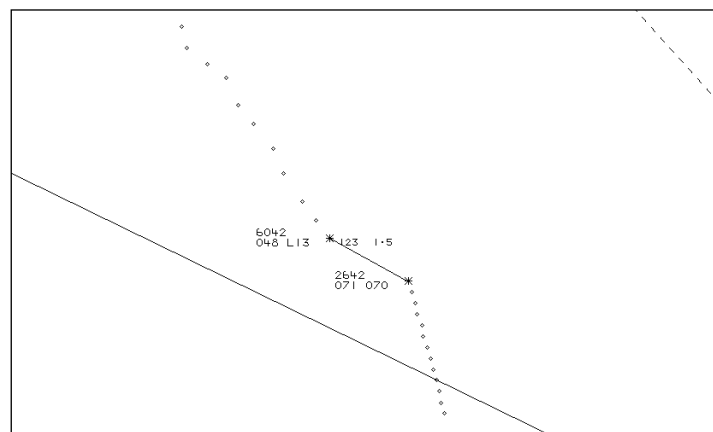


Figure 2: Geometry at 1053:23

The CPA was estimated between radar sweeps at 1053:31 (Figure 3) and 1053:35 (Figure 4).

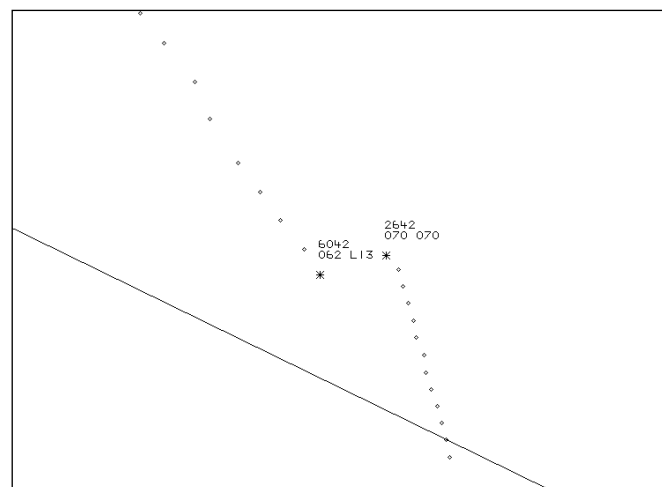


Figure 3: Geometry at 1053:31

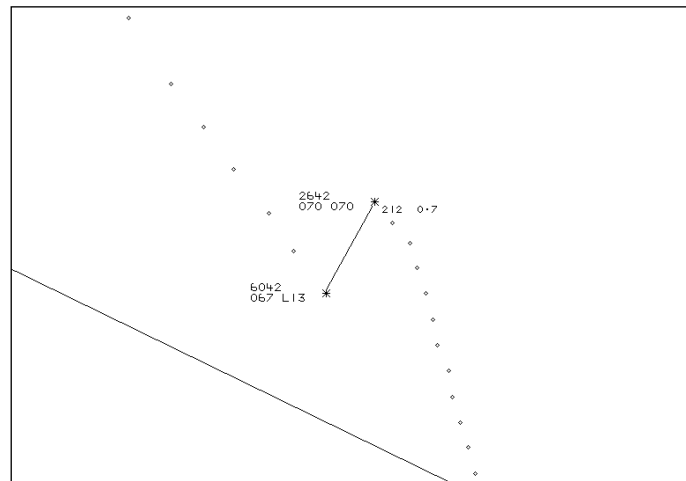


Figure 4: Geometry at CPA at 1053:35

At 1053:35, separation was estimated at 300 feet in height and 0.6nm laterally. At 1054, the Tornado crew contacted Swanwick to inform of an Airprox 10 miles to the west of Donna Nook with a twin-engine aircraft at 7000 feet. At 1055, Swanwick called the traffic, believed to be the King Air, south by 4 miles at FL70. The Tornado crew called visual at 1056.

Portions of the tape transcript between RAF(U)Swanwick and the GR4 crew are below:

From	To	Speech Transcription	Time
GR4	Swan	Swanwick Military, {GR4 c/s}	1054
Swan	GR4	{GR4 c/s} pass message	1054
GR4	Swan	Yeah I believe we've just had an airprox with a er small civilian twin engined er aircraft, this location, 7000 feet	1054
Swan	GR4	{GR4 c/s} er, pass details when ready	1054
GR4	Swan	{GR4 c/s} [???] 10 miles to the er west of Donna Nook range, on the pull up from low level [???] 7000 feet, er, 7000 feet is when we got the TCAS alert, got visual with the aircraft, er, he was heading pretty much in a northerly direction not believed [???] manoeuvre	1054 1055
Swan	GR4	{GR4 c/s} roger copied. {GR4 c/s} traffic now manoeuvring south by 4 miles, flight level 70	1055
GR4	Swan	{GR4 c/s} copies and just er for our information did you have info on that traffic coming into our block	1055
Swan	GR4	{GR4 c/s} er, he seemed to be manoeuvring in that area, he was er, seemed to be below you and miss that traffic	1055

The control team had used a relative lull in traffic levels to plan ahead and prepare the trainee for what was expected next. The role of the instructor is a delicate balance between obtaining the most value out of the session for the trainee whilst not degrading the service provided to the aircrew. The rules of a Traffic Service¹ state that traffic should be called if it constitutes a 'definite hazard' but that information was subject to 'controller workload'. Controllers are expected to prioritise their workload and, on this occasion, the team were distracted by planning ahead; as a result, they did not scan to update the crews. There may have been a perception that the Tornado operating area was clear of other traffic, especially because there were large differences in height readout.

The incident needs to be understood in the context of the events at the time and the lessons that can be shared as a timely reminder of the extra difficulties of instructing and controlling concurrently. The Swanwick SOP is to call traffic in the general handling operating block plus/minus 3000 feet. However, in this instance, for long periods of time there were large

¹ CAP 774, Chapter 3.

differences in Mode C between the Airprox aircraft. It should be noted that controlling aircraft using large pieces of airspace for high energy manoeuvres presents challenges to controllers and, in particular, the Mode C may disappear when aircraft perform rapid climbs or dives. The incident will be highlighted at Swanwick to remind personnel to monitor the full height block of aircraft in high-energy manoeuvres and to provide guidelines on the best techniques to spread an instructor's attention between controlling and instructing.

A local investigation recognised the rapid progression from the Tornado TCAS TA to an RA, and the inability of the crew to take avoiding action. As the Tornado crew were descending past 5000 feet, they did get a TCAS TA on traffic 2000 feet above but they assessed that the other aircraft would not be a threat as they continued with the training. Because the crew were focussed on the task in hand, they may not have fully registered the implications of the first TCAS TA. The local investigation recommended raising awareness on the use of TCAS in high energy manoeuvres in the simulator and the TGRF Handbook was to be amended to include guidance on TCAS settings. It was also recommended that the King Air squadron review their practice of operating without an ATS.

The Tornado Force have recognised strafe training locations and other units are not necessarily aware of these areas; in this instance the King Air crew had operated in an area used by Tornados for high energy manoeuvres and were not aware of this. Organisationally, promulgation of respective platforms' operational areas could allow other airspace users to act on this information to plan and deconflict movements.

UKAB Secretariat

The Tornado and King Air pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard². If the incident geometry is considered as head-on or nearly so then both pilots were required to turn to the right³. CAP 774 (Traffic Information) states:

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

Traffic is normally considered to be relevant when, in the judgement of the controller, the conflicting aircraft's observed flight profile indicates that it will pass within 3 NM and, where level information is available, 3,000 ft of the aircraft in receipt of the Traffic Service or its level-band if manoeuvring within a level block. However, controllers may also use their judgment to decide on occasions when such traffic is not relevant, e.g. passing behind or within the parameters but diverging. Controllers shall aim to pass information on relevant traffic before the conflicting aircraft is within 5 NM, in order to give the pilot sufficient time to meet his collision avoidance responsibilities and to allow for an update in traffic information if considered necessary.'

Comments

HQ Air Command

High-energy manoeuvres are an essential part of military training. However, they test the limitations of procedures and equipment that are designed for more sedate operations. This Airprox has been subject to an internal investigation which identified several factors that contributed to the incident. In hindsight, the decision of the crew to continue the strafe profile having had the initial TA indication on the TCAS was probably the initial event. As the incident unfolded, the limitations of TCAS during high-energy manoeuvres, the distraction of the Swanwick controllers conducting training, and the practice of the King Airs using a quiet frequency were all

² SERA.3205 Proximity.

³ SERA.3210 Right-of-way (c)(1) Approaching head-on.

identified by the investigation as relevant, and appropriate recommendations were made. Ultimately, the barriers of TCAS and lookout both played a part in avoiding a collision. It is also worth adding that a thorough briefing to controllers of the pilot's intentions (such as rapid changes in altitude throughout the allocated height block) may assist them in ascertaining what does and does not constitute a 'threat' to the aircraft such that appropriate and relevant TI can be given.

Summary

An Airprox was reported when a Tornado and a King Air flew into proximity at 1053 on Wednesday 20th January 2016. Both pilots were operating under VFR in VMC, the Tornado pilot in receipt of a Traffic Service from Swanwick Mil and the King Air pilot not in receipt of a Service.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board began their discussion with a briefing from the Military members about the limitations of TCAS during high-energy manoeuvres; in particular, they explained how the on-board equipment communicating with the TCAS had limited utility during high rates of climb. Essentially, when either the altimeter or transponder Mode C are lost, the TCAS will automatically fail; at rates of climb or descent greater than 10,000fpm, Mode C is inhibited and this therefore removes TCAS functionality.

Turning to the ATC aspects, military ATC members went on to explain that the standard procedure for passing Traffic Information to aircraft in an operating block is to warn of any threats that are likely to come within 3000ft of the block's top and bottom levels; they explained that, on this occasion, this had not happened because the controlling ATCO was under training and the Screening ATCO had initially perceived that the King Air was not relevant traffic to the Tornado. Having then become distracted by peripheral duties, ATC members commented that the controllers had not subsequently sufficiently monitored the radar display to update their situational awareness of each aircraft's relative operating altitudes. The Board were heartened to hear from military members that a review had taken place as a result of this Airprox, and that a change in training practices was being introduced to prevent a recurrence of this lapse of radar scan and ensure the pertinent and timely passing of traffic information to aircraft conducting high-energy manoeuvres. In order to reduce the demands on ATC in these circumstances, the Board were further informed that a review was also in progress to ensure aircraft only requested an airspace operating block when they were actually ready to commence their high-energy operational manoeuvres.

The Board then looked at the Tornado crew's actions, particularly regarding the TCAS alerts. They agreed with HQ Air Command that, when they initially received the first TA, there had been an opportunity to consider how to re-plan the recovery manoeuvre to avoid, or gain greater SA, on the conflicting traffic. Notwithstanding, members also recognised that the entry manoeuvre to the strafe attack was undoubtedly a high-workload situation and they wondered whether the crew had fully assimilated the information and relative geometry as a result. Having then continued his climb, as planned, post-attack and received the TCAS RA, the Board noted his decision to ignore the TCAS instructions and instead carry out a turn to avoid the King Air based on a brief visual acquisition of the other aircraft; the Board accepted that, with the high energy manoeuvres and the TCAS limitations, in the circumstances this course of action proved to be timely and sufficient. Clearly there was an imperative to avoid the visually acquired aircraft if it was a threat, but there was also a risk that the visually acquired aircraft was not the aircraft that the TCAS was warning about, and so members opined that pilot's should follow TCAS instructions whenever possible.

The Board then moved on to discuss the King Air crew's part in the incident. A civilian pilot member commented that one of the operational limitations when the King Air was asymmetric was that the aircraft cannot fully manoeuvre to a RA, and so the aircraft standard operating procedure should be to select TA-only in order to avoid generating unachievable TCAS RAs. Other members commented

that the practice of Military King Air's operating in the open FIR without receiving a pertinent service, albeit within a locally published autonomous flying area, was detrimental to the safe conduct of the flight in that it potentially severely limited the situational awareness of the King Air crews who were likely to be conducting head-in academic flying tasks. The Board felt that, in this respect, the King Air operating authority could usefully carry out a risk assessment to determine the suitability of such a practice and, if the distraction of a busy frequency during instructional sorties was a valid reason for the SOP, they wondered whether liaison could be carried out with Swanwick to establish a dedicated discrete quiet frequency on which to receive a suitable service.

The Board then turned their attention to the cause and risk of the Airprox. Noting that all actors could have taken steps to improve their performance, members agreed that the incident was probably best described as a conflict in Class G airspace that had been resolved by the Tornado pilot. Notwithstanding, they also agreed that the Tornado crew, operating under a Traffic Service, rightly had every expectation that they would receive Traffic Information from ATC if other squawking aircraft came towards their declared operating block, and that they may have been relying on this to provide them situational awareness on the initial TCAS TA information if it became a factor to them. The Board understood that there were no guarantees under a Traffic Service, and that high workload might reduce the capacity of ATC to provide Traffic Information but, in this incident, they felt that ATC did not do so when they could have, and that this was a contributory factor. Looking at the risk, the Board noted that the Tornado pilot had achieved a recorded separation of 300ft and 0.6nm, and they therefore determined that timely and effective action had been taken.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A conflict in Class G Airspace resolved by the Tornado pilot.

Contributory Factor(s): Air Traffic Control did not pass Traffic Information.

Degree of Risk: C.