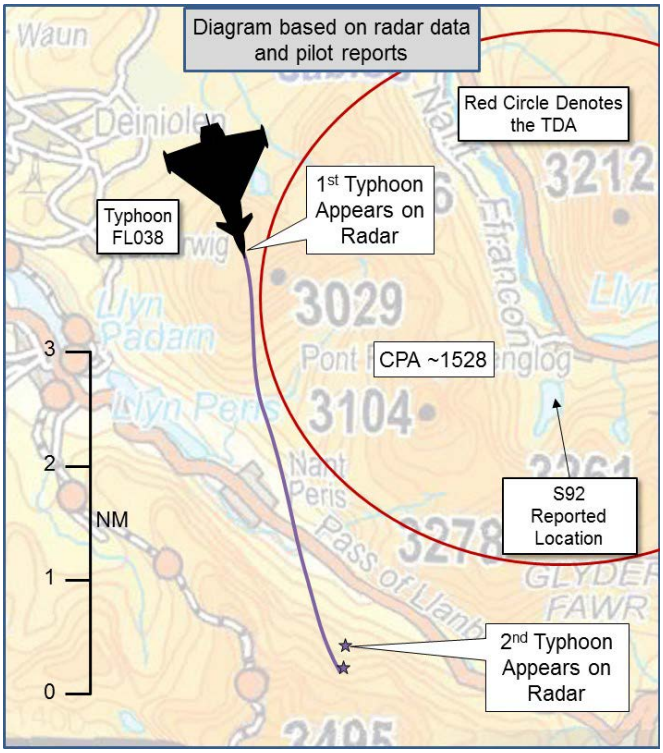
AIRPROX REPORT No 2017259

Date: 30 Oct 2017 Time: 1528Z Position: 5307N 00401W Location: Ogwen Valley

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	S92	Typhoon
Operator	SAR	HQ Air (Ops)
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	VFR
Service	[Basic][1]	None
Provider	Valley	N/A
Altitude/FL	NK	FL038[2]
Transponder	A, C, S	A, C
Reported		
Colours	White, Red, Blue	Grey
Lighting	Nav, HISL	Not reported
Conditions	VMC	VMC
Visibility	>10km	10km
Altitude/FL	120ft	350ft
Altimeter	QNH (1029hPa)	NK
Heading	100°	Not reported
Speed	Hover	420kt
ACAS/TAS	TCAS II	Not fitted
Alert	None	N/A
Separation		
Reported	0ft V/500m H	Not Seen
Recorded	NK	



THE S92 PILOT reports that they were positioning to a precision hover in a SAR TDA when 2 fast-jets were seen to pass abeam the aircraft within 500m and at a similar height as they transited the Ogwen Valley. They opined that, had this occurred a few minutes earlier, a mid-air collision would have been highly possible as the helicopter had just flown through the area to access the casualty. No TCAS indications were seen until after the event. The TDA was requested by UKRCC at 1502 and RAF Valley confirmed the TDA was active. UKRCC generated a CADS snapshot. The TCAS indications only appeared as the Jets climbed out of low-level and passed approximately 1200ft above the S92 [UKAB note: The 1200ft vertical separation is based on when the Typhoons appeared on the S92 pilot's TCAS II display, not the reported vertical separation].

He assessed the risk of collision as 'High'.

THE TYPHOON PILOT reports that he was unaware that an Airprox had occurred until informed by the UKAB. He did not see the helicopter.

He assessed the risk of collision as 'Low'.

THE VALLEY CONTROLLER reports that she was the Radar Controller at RAF Valley when the S92 climbed away from a rescue scene, a TDA had been established. When she had taken control of the console, the S92 had been on the ground, after letting down with the previous Radar Controller. When the S92 pilot contacted her on climb-out, the pilot informed her that they would be filing an Airprox

[1] The S92 had descended to land and the Valley controller had ceased the service due to the reduction in radio reception from the surrounding terrain.
[2] The height displayed when one of the Typhoons appeared on the radar replay, the second Typhoon is not visible until after they are clear of the Airprox reported location.

report on 2 fast-jet aircraft who had flown through the TDA at low-level. She asked the pilot if they had recognised the aircraft types. They responded that they believed them to be Eurofighter Typhoons.

She assessed the risk of collision as 'None'.

THE VALLEY SUPERVISOR reports that he did not witness the incident.

Factual Background

The weather at Valley was recorded as follows:

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METAR EGOV 301450Z 19016KT 9999 FEW023 SCT130 BKN200 11/07 Q1029 BLU TEMPO SCT023 WHT
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Analysis and Investigation

Military ATM

Radar replays from NATS radars could identify the S92 but not the conflicting Typhoons. The Valley Approach Controller was not able to see the S92 or the Typhoons on radar at the time of the Airprox and was not providing either with an ATS.

Records from the Distress and Diversion Cell at RAF(U) Swanwick show that a broadcast was made on 243.0MHz at 15:12:19 to inform airspace users that a TDA had been established. A withdrawal message followed at 15:42:26.

UKAB Secretariat

The S92 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[3].

The TDA was established with a 2nm radius from 5307N 00401W, up to 5500ft.

In respect of the S92 TCAS indications, the Eurocontrol 'ACAS Guide' states that:

> The CAS logic may inhibit a Climb or Increase Climb RA in some cases due to aircraft climb performance limitations at high altitudes, or when the aircraft is in the landing configuration. These limitations are known by the logic, which will then choose a viable alternative RA. The limitations are set beforehand by the certification authorities according to the type of aircraft.
>
> For all aircraft, pre-defined limitations apply at lower altitudes to prevent RAs in proximity to the ground. RAs are inhibited based on radar (radio) altimeter reported heights. Hysteresis values of +100 feet (for climbing aircraft) and –100 feet (for descending aircraft) ensure that the inhibition state does not oscillate rapidly should the aircraft be flying close to the nominal altitude boundary but periodically passing above and below that boundary (e.g. when flying over hilly terrain).

Table 7: TCAS alert generation inhibitions.

Alert type	Alert inhibited below
Increase Descent RA	1550 ft (±100 ft) AGL
Descend RA	1100 ft (±100 ft) AGL
All RAs	1000 ft (±100 ft) AGL
All TCAS aural alerts	500 ft (±100 ft) AGL

Note: +100 ft values are used for climbing aircraft, –100 ft for descending aircraft.

[3] SERA.3205 Proximity.

Moreover, when a GPWS (Ground Proximity Warning System), TAWS (Terrain Avoidance and Warning System) or wind shear detection warning have been activated, TCAS will automatically be placed into TA-only mode and TA aural annunciation is suppressed. TCAS will remain in TA-only mode for 10 seconds after the GPWS/TAWS or wind shear warning is removed. During this 10 second suppression period, the TA aural annunciation is not suppressed.

If there is no valid radar (radio) altimeter input, TCAS will set the ground level as –100,000 feet. Consequently, none of the inhibits that are activated by proximity to the ground will be set.

Occurrence Investigation

An RAF investigation into the incident highlighted the following two contributory factors:

1. The Typhoon pilots were unaware of the establishment of the TDA. The only method of communicating TDA information was via R/T; the Typhoon pilots did not receive the UHF Guard transmission from D&D and had left Swanwick frequency prior to establishment of the TDA. D&D report that the broadcast on 243.0 was made at 15:12:19Z (10 mins after the Typhoon formation established Low-Level) and the withdrawal message was made at 15:42:26Z. Swanwick SME reports that 243.0 coverage in Wales is poor, with the nearest transmitters to Wales located at Clee Hill and Kelsall.

2. MAC Barrier Failures:

    a. Lookout: the rotary was stationary in the hover at approximately 120ft therefore visual pick-up was difficult.
    b. Radar: Post-flight data analysis shows no radar contact.
    c. ATS: No direct 2-way communication within the UKMLFS.

Comments

HQ Air Command

For encounters in the low-level environment it is often the case that electronic barriers to MAC are adversely affected by the topography. This appears to be the case here; whilst the Typhoon aircraft is not yet fitted with a CWS, it is transponder equipped and so could have interacted with the TCAS II on the S92. That the helicopter pilot does not report any TCAS indications prior to the Typhoon's climb out probably reflects the effect of terrain screening by the hills between the Typhoon's routing and the helicopter's operating area. Equally, the Typhoon's radar would not have been able to detect the helicopter on the other side of the hills and lookout would have been similarly compromised. It is testament to the lookout of the pilot of the helicopter that, during his hover, he sighted the pair of Typhoons 500m away and shows that a continued visual vigilance is essential, particularly at low-level where other sensors are either unavailable or their full capability is compromised.

Regarding the inadvertent penetration of the TDA, the Typhoon pilots were already established at low-level and out of radio contact with any agency that could have provided information to them when the TDA was activated. Furthermore, the transmissions on UHF Guard frequency were not received by the Typhoons due to poor radio coverage in Wales so the pilots had no way of knowing that they were infringing a TDA.

Summary

An Airprox was reported when a S92 and a Typhoon flew into proximity at approximately 1528hrs on Monday 30th October 2017. Both pilots were operating under VFR in VMC, the S92 pilot in receipt of a Basic Service from Valley[4] and the Typhoon pilots not receipt of a Service.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board began by looking at the actions of the Typhoon pilots. The military member commented that the Typhoons were transiting over high ground in the vicinity of a flow arrow that routed aircraft in the opposite direction down the Nant Ffrancon valley (A5 pass) – see Figure 1. The A5 pass was well-known to all fast-jet pilots as a one-way flow arrow, and it seemed unlikely that either of the Typhoons would be at low-level heading in the other direction. Typhoon 1 was indicating at 1500-2000ft above the peaks in that area and, although there was no radar recording of the No2 Typhoon until well after CPA, he opined that it was likely that it would be at a similar level or slightly lower in radar shadow. He went on to comment that although it could not be ruled out that one or both of the Typhoons had inadvertently entered the TDA, the A5-pass flow arrow would also have meant that they would have been unlikely to have been much inside its boundary edge. In respect of the establishment of the TDA, the military member commented that any blind broadcast of the TDA on Guard could easily be missed by aircraft at low-level in mountainous terrain, and that this was what had happened in this case. As a result, although not desirable, those operating within TDAs promulgated at short notice should be aware that aircraft that may have been airborne and at low-level before the TDA was established might not be aware of its existence. He went on to comment that it was the nature of low-flying in such topography that some of the normal safety barriers to collision avoidance were either reduced in effectiveness or not present. In this respect, see-and-avoid in particular was sometimes compromised by terrain, as was electronic conspicuity.

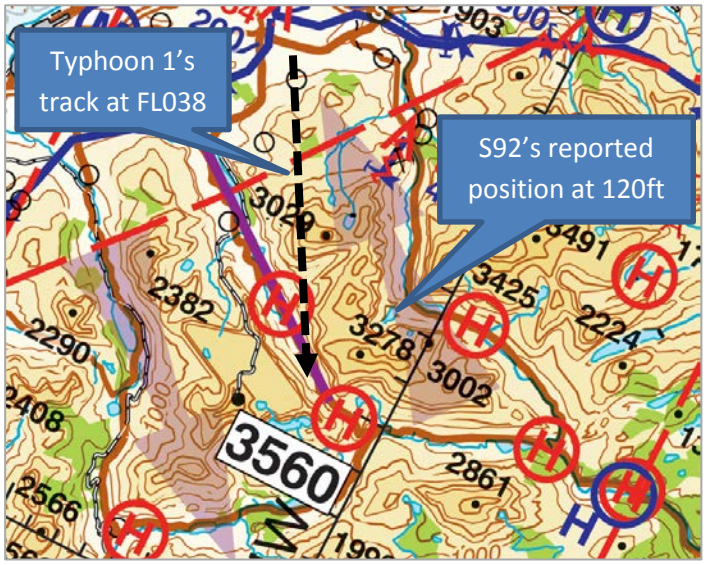


Figure 1: Mil Low Flying Chart

The Board then looked at the actions of the S92 pilot and commended them for their good lookout in spotting the two fast-moving Typhoon aircraft in an area of mountainous terrain. Some members wondered whether the S92 pilot had been taken by surprise by seeing the Typhoons, especially because they might justifiably assume that, all things being equal, the TDA offered a degree of protection against other aircraft impinging on their task. Although it could not be established with any certainty what height the No2 Typhoon was actually flying, but noting the military member's comments about the unlikelihood of it being at low-level in the opposite direction to the A5-pass flow-arrow, members wondered whether the surprise, and no doubt consternation, regarding possible TDA penetration by the No2 Typhoon had startled the S92 pilot into perceiving it as being closer than it actually was. Finally, controller members noted that the S92 pilot had reported that they had thought they were under a Basic Service. Although not germane to the incident, they commented that because they had landed and taken off again, they were not actually under a service until they had re-established communications with Valley and agreed a new service.

[4] This may have been inhibited due to the altitude of the S92 and the masking effect of the local terrain in the operating area.

Turning to the cause of the Airprox, the Board noted that the radar replay showed Typhoon No1 as being outside the confines of the TDA throughout, but they could not assess whether the No2 Typhoon had entered the TDA or not. However, when it did subsequently appear on radar it was in a position commensurate with tactical formation parameters that indicated it was not far separated from Typhoon No1. After much discussion, the Board concluded that it was improbable that the No2 Typhoon had flown within 500m of the S92's reported operating position at the same height. They therefore concluded that the S92 pilot had probably been startled by the sudden high-speed appearance of the Typhoons in the vicinity of the TDA, and had likely perceived them to be closer and lower than they were. As a result, the Board felt that the incident was probably best described as a sighting report. Turning to the risk, there was much discussion about the significance of the TDA and whether the Typhoon's possible penetration should be considered within the risk assessment. However, the prevailing view was that the Typhoon pilots could not have known about the TDA and so no comment could be attributed as to its penetration by them, even if they had indeed done so. Therefore, the Board agreed that the incident was benign and consequently determined it as a Category E event.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A sighting report.

Degree of Risk: E.

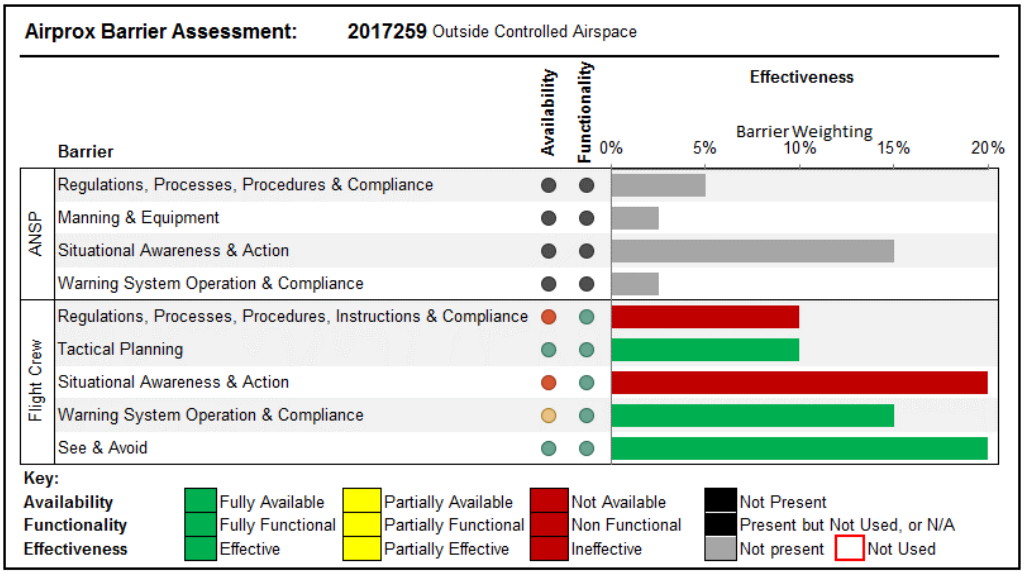
Safety Barrier Assessment[5]

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

Flight Crew:

Regulations, Processes, Procedures, Instructions and Compliance were assessed as **ineffective** because the Typhoon pilots were already airborne at low-level and didn't receive the establishment of the TDA when it was promulgated and transmitted on the Guard frequency.

Situational Awareness and Action were assessed as **ineffective** because neither pilot had effective situational awareness of the other due to the local terrain restricting effective radar and transponder coverage.



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