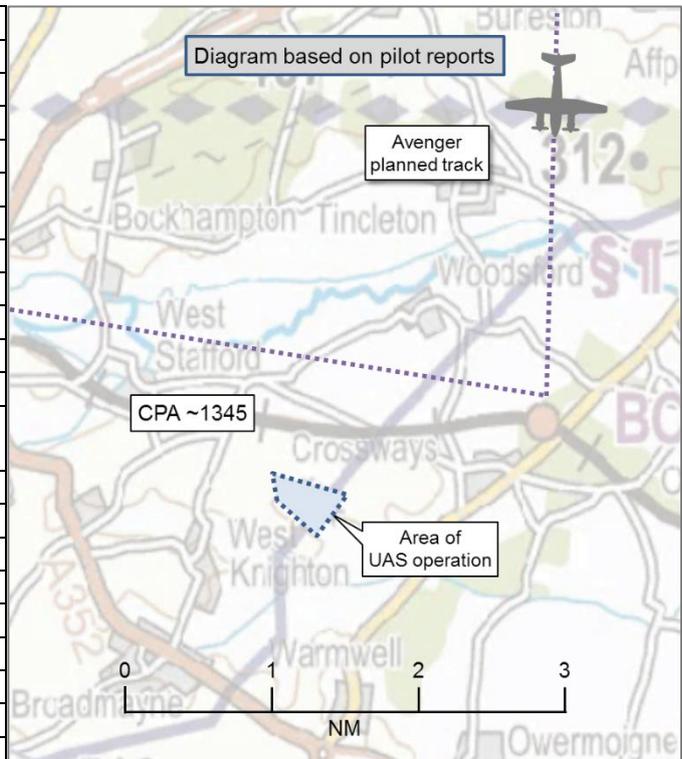


**AIRPROX REPORT No 2019215**

Date: 01 Aug 2019 Time: 1345Z Position: 5042N 00221W Location: 3.5NM ESE Dorchester

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

Recorded	Aircraft 1	Aircraft 2
Aircraft	DJI Phantom 4	Avenger T Mk1 <sup>1</sup>
Operator	Civ UAS	RN
Airspace	London FIR	London FIR
Class	G	G
Rules	VLOS	VFR
Service	None	Basic
Provider	N/A	Yeovilton
Altitude/FL	NK	NK
Transponder	Not fitted	A, C, S
<b>Reported</b>		
Colours	White	White, blue
Lighting	Red strobe	Anti-col, nav, beacon
Conditions	VMC	VMC
Visibility	NK	NK
Altitude/FL	120m (~400ft)	800-1000ft
Altimeter	agl	agl
Heading	090°	NK
Speed	NK	NK
ACAS/TAS	Not fitted	TCAS II
Alert	N/A	None
<b>Separation</b>		
Reported	0ft V/350m H	Not seen
Recorded	NK	



**THE PHANTOM 4 PILOT** reports conducting a survey flight when an aircraft was heard approaching from the East. The SUAS pilot tried to locate the approaching plane and observed it below/near 400ft he thought and heading west, flying to the left of the SUAS from the pilot’s ground perspective. His initial thought was to ditch the SUAS but this was not carried out due to minimum vertical separation and that, once initiated, the SUAS would not have any power and would be uncontrollable. The SUAS pilot realised that the aircraft was going to pass to the left and that the best course of action was to leave the SUAS on current heading away from the aircraft. The aircraft appeared to pass over the National Grid pylons at a similar height to the SUAS and then banked to the North. The pilot noted that from seeing the aircraft to it disappearing from sight was about 20sec.

The pilot assessed the risk of collision as ‘High’.

**THE AVENGER PILOT** reports that none of the crew saw a SUAS in the reported area.

**Factual Background**

The weather at Bournemouth was recorded as follows:

METAR EGHM 011350Z VRB02KT 9999 SCT030 22/15 Q1018=

<sup>1</sup> RN designation for a modified King Air 350ER.

## Analysis and Investigation

### UKAB Secretariat

The Phantom 4 and Avenger 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>2</sup>. Neither aircraft appeared on area radar replay.

### Summary of Yeovilton Local Investigation

A King Air Avenger was flying a low-level training sortie from RNAS Culdrose around RNAS Yeovilton and back to RNAS Culdrose. The crew are very experienced operators with in excess of 13,000 hours between them. They were authorised appropriately for low-level down to 700ft MSD [Minimum Separation Distance]. The Avenger is flown under MAA regulations and generally sits between 700ft and 1200ft agl in the low-level environment. The height is measured with reference to a RADALT in conjunction with a RADALT warning system set to 700ft [agl] to alert the crew to any deviations. In the area was a drone operator who, from the operator's position on the ground, visually judged there to have been an Airprox between the drone and Avenger. The Avenger crew did not see the small drone at any point and were entirely unaware of the Airprox until advised by the UKAB. The drone operator stated that the aircraft appeared to be at the same level, or below that of the drone. From the report the drone was operating at approx 120m [394ft] and the Avenger was seen to be approx 350m horizontally to the left of the drone, visually judged from the ground position of the drone operator, approximately 2nm from the planned track and turning point of [the] Avenger. It is worthy of note that the Avenger is a modified variant of the Beech King Air 350ER specifically adapted for training Royal Navy Observers. The Avenger aircraft is not able to be operated below 700ft agl/MSD due to the distractions created by the fitted terrain awareness equipment (TAWS+). If the airframe was to be operated below 700ft agl, there would be a series of continuous, repetitive and distracting aural and visual warnings to the crew. The Avenger crew stated that there were no such aural or visual warnings at the time of the Airprox; therefore the aircraft must have been at least 700ft rad alt/agl and probably higher because at 699ft, indications start to appear informing the pilot that his height is lower than the set 700ft rad alt warning system. Provided that the drone was being operated accurately within the parameters stated in the Airprox report, there would have been an absolute minimum separation at the closest point of approach of 300ft vertically and 350m laterally between the two air systems. The crew therefore believe that there was no risk of collision and that the Airprox risk and risk of MAC was negligible.

It was observed that there was no NOTAM for drone activity in the area where the Airprox was reported. A small drone is extremely difficult to see even when its position is known in advance; avoiding something that cannot be seen is an impossible task.

### Summary

An Airprox was reported when a Phantom 4 UAS and an Avenger T1 flew into proximity near Dorchester at about 1345Z on Thursday 1<sup>st</sup> August 2019. Both pilots were operating in VMC, the UAS pilot under VLOS and the Avenger pilot under VFR in receipt of a Basic Service from Yeovilton.

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

Information available consisted of reports from both pilots and radar photographs/video recordings. 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 agreed that, based on the description of the aircraft's TAWS+ given in the Yeovilton investigation it appeared highly likely that the Avenger had been operating not below 700ft agl and to the north of the drone operating area. The Avenger pilot was in receipt of a Basic Service, which did

---

<sup>2</sup> SERA.3205 Proximity. MAA RA 2307 paragraphs 1 and 2.

not require monitoring for other traffic by ATC (CF1), and in any case the drone was not radar significant. The Avenger pilot was not aware of the drone operating area and the drone operator had only late SA on the Avenger due to the sound of its approach (CF2). Similarly, the drone was not fitted with EC and could not activate the Avenger TCAS (CF3) to provide early SA to the Avenger crew. The Board noted that the Avenger, in essence a King Air 350, is a moderately large aircraft, in this case operating somewhat unusually in the low level environment; members wondered whether the drone operator may therefore have mis-perceived its proximity to his operations due to its size. Whatever the reason, the Board commended him for his proactive avoiding action to the threat he perceived at the time (CF5) but, on this occasion, despite the fact that the Avenger crew did not see the drone (CF4), it appeared that normal safety standards and procedures had pertained.

The Board then discussed the issue of a NOTAM to cover drone activity. It was acknowledged that a NOTAM would not be issued for 'normal' activity (i.e. with a drone being operated under VLOS and below 400ft agl), but members wondered what mitigations may exist for low-flying aircraft. The military low-flying advisor reminded the Board that although drone operators could not be given access to the military 'plan-to-avoid' tool (CADS), they could ring the RAF Low-Flying Ops Flight with details of their planned operation on 01489 443 133. This information would then be entered on CADS to warn military low-flying crews and, in return, general information on military low-flying operations in the area could be passed to the drone operator on request.

## **PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK**

### Contributory Factors:

	2019215		
CF	Factor	Description	Amplification
	<b>Ground Elements</b>		
	• Situational Awareness and Action		
1	Contextual	• Situational Awareness and Sensory Events	Not required to monitor the aircraft under the agreed service
	<b>Flight Elements</b>		
	• Situational Awareness of the Conflicting Aircraft and Action		
2	Contextual	• Situational Awareness and Sensory Events	Generic, late, no or incorrect Situational Awareness
	• Electronic Warning System Operation and Compliance		
3	Technical	• ACAS/TCAS System Failure	Incompatible CWS equipment
	• See and Avoid		
4	Human Factors	• Monitoring of Other Aircraft	Non-sighting or effectively a non-sighting by one or both pilots
5	Human Factors	• Perception of Visual Information	Pilot was concerned by the proximity of the other aircraft

Degree of Risk: E.

Recommendation: Nil.

### Safety Barrier Assessment<sup>3</sup>

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

<sup>3</sup> The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).

**Ground Elements:**

**Situational Awareness of the Confliction and Action** were assessed as **not used** because the Avenger pilot was not in receipt of a service that provides for routine conflict awareness and controller action, and the UAS was not detectable to ATC radars anyway.

**Flight Elements:**

**Situational Awareness of the Conflicting Aircraft and Action** were assessed as **partially effective** because although the Avenger crew were unaware of the UAS, the UAS pilot heard the approaching Avenger and was able to cue his visual acquisition.

**Electronic Warning System Operation and Compliance** were assessed as **ineffective** because the UAS was not compatible with the Avenger TCAS.

Airprox Barrier Assessment: 2019215		Outside Controlled Airspace						
Barrier	Provision	Application	Effectiveness					
			Barrier Weighting					
			0%	5%	10%	15%	20%	
Ground Element	Regulations, Processes, Procedures and Compliance	✓	✓					
	Manning & Equipment	✓	✓					
	Situational Awareness of the Confliction & Action	✗	○					
	Electronic Warning System Operation and Compliance	●	●					
Flight Element	Regulations, Processes, Procedures and Compliance	✓	✓					
	Tactical Planning and Execution	✓	✓					
	Situational Awareness of the Conflicting Aircraft & Action	!	✓					
	Electronic Warning System Operation and Compliance	✗	✗					
	See & Avoid	✓	✓					
<b>Key:</b>								
	Full	Partial	None	Not Present/Not Assessable	Not Used			
Provision	✓	!	✗	●				
Application	✓	!	✗	●	○			
Effectiveness								