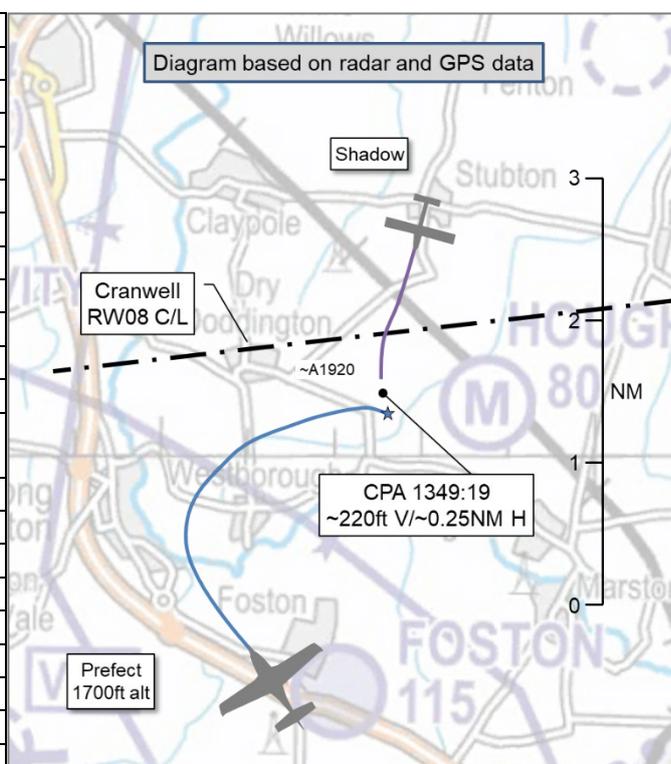


AIRPROX REPORT No 2022250

Date: 18 Oct 2022 Time: 1349Z Position: 5301N 00042W Location: 0.5NM W Hougham airfield

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Prefect	Shadow DD
Operator	HQ Air (Trg)	Civ FW
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	VFR
Service	Traffic	None
Provider	Cranwell	N/A
Altitude/FL	1700ft	~1920ft
Transponder	A, C, S	Not fitted
Reported		
Colours	White, blue	Yellow, burgundy
Lighting	HISL, nav, taxi, landing	Not fitted
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	1500ft	NK
Altimeter	QFE (1025hPa)	QFE (NK hPa)
Heading	080°	NK
Speed	120kt	~60mph
ACAS/TAS	TAS	PilotAware
Alert	None	None
Separation at CPA		
Reported	100ft V/200m H	Not seen
Recorded	~220ft V/~0.25NM (~460m) H	



THE PREFECT INSTRUCTOR reports conducting Staff Continuation Training (SCT) with a pilot student acting as IF safety pilot. They had briefed the student during the sortie brief and outbrief about the importance of their lookout, and specifically their responsibility to take control if necessary to avoid a collision. During the instrument feed-in for a PAR at Cranwell, they were positioned at 1500ft on the extended centreline for RW08, being marshalled by the Cranwell Approach controller. They were concentrating on instrument scan and the student was conducting a sound lookout. Immediately upon being handed over to Talkdown, and before they could change the frequency, the student declared "I have control" and began a shallow descent. They didn't recall the student describing the threat aircraft position but, upon looking up, they saw a single-engine high-wing light-aircraft [on the left] which had been co-altitude and travelling at a speed which they estimated was less than 80kt. They took control back from the student and manoeuvred the aircraft to increase lateral separation. They estimated the nearest point of approach was less than 200m and 100ft. It was difficult to judge the actual collision risk because of the low speed of the threat aircraft, but had the student not taken control they would have been at the same altitude and within that distance. They reported an Airprox to ATC and established a safe height, heading and speed before requesting to break off the approach. ATC reported that they had no primary or secondary radar contacts and the instructor had no TAS contact, indicating that it was unlikely that the threat aircraft was squawking Mode A. As they marshalled for a further feed-in, ATC then reported a faint contact in the vicinity that the threat aircraft was last observed, but the instructor could not correlate this return as they were no longer visual. Upon debrief, it became evident that the student had taken control as soon as they had seen the aircraft, it having 'bloomed' late in their visual scan. Worthy of note is that the threat aircraft was across the cockpit from the student and in a potential blind-spot behind the canopy bow. The instructor also noted that a new radar system had recently been installed at Cranwell, which it was known filtered out low-speed contacts. Along with the lack of SSR return or TAS contact, this may have contributed to their lack of SA on the threat aircraft. Had the inexperienced student not taken control of the aircraft from the QFI, [separation at CPA] would

almost certainly have been closer and the incident possibly more severe. Following debrief, it was possible that their actions were influenced by MAC being highlighted as a top threat, and their right to take control being highlighted as a mitigation, in the pre-flight outbrief.

The instructor assessed the risk of collision as 'High'.

THE SHADOW PILOT reports that they believed the Airprox may have occurred as they entered the visual circuit for Hougham airfield, but that they did not see another aircraft.

THE CRANWELL RADAR CONTROLLER reports they were also banded Director/Departures due to lack of traffic. They had one aircraft on frequency in the [radar training circuit] (RTC) on Approach and one departure prenoted from Barkston and subject to a call-for-release iaw SOPs. The RTC aircraft was from Barkston and was inbound for a radar approach at Cranwell, which was using RW08RH. Once clear of Barkston overhead, they were turned onto a heading of 320° before descending to 1500ft Cranwell QFE for cockpit checks. An aircraft indicating level at 1000ft above was called and seen by the pilot when southwest of the centreline, northbound. There had been a contact north of the centreline which disappeared as the controller saw it. They turned the aircraft right onto 060° and carried out a handover to the PAR controller at Cranwell. They instructed the pilot to contact Cranwell Talkdown and a split second later the pilot reported taking avoiding action on traffic left 10 o'clock, slightly above, converging. As the pilot called the traffic, a contact painted on radar briefly before disappearing again. The pilot informed them that they were calling an Airprox timed at 1349Z and passed a possible aircraft type. Having ascertained the position of the aircraft, they continued to vector for a re-feed in a safe direction, informing the pilot that they would keep them north of the centreline to avoid the last known position of the subject radar return.

THE CRANWELL TALKDOWN CONTROLLER reports they hooked and called contact on the Prefect at 8.5 miles. They identified the aircraft and gave their frequency. They had Stud 5 open to listen for the transfer. They heard the pilot on the frequency state that they had taken avoiding action and would be filing an Airprox. Before calling contact, the Talkdown controller noticed a return in the Glidepath and Azimuth. However, there had been multiple contacts that turned out to be 'chaff' during that session. They were not aware of flying activity occurring at Hougham.

THE CRANWELL SUPERVISOR reports they did not witness the Airprox because they were in the Visual Control Room (VCR) dealing with another situation on the airfield. The ADC informed them that the radar traffic expected inbound had been broken-off due to a possible incident/Airprox. They immediately went downstairs [to the Radar Control Room] and spoke to the PAR controller, who informed them of the incident and that they did not actually take control of the aircraft. The Supervisor spoke to the TATCC [regional] Supervisor and later on they requested that the tapes for [the radar approach frequency] be impounded, together with PAR coverage at the time.

Factual Background

The weather at Cranwell was recorded as follows:

METAR EGYD 181350Z 02003KT 9999 FEW032 FEW250 16/07 Q1028 NOSIG RMK BLU BLU=

Analysis and Investigation

UKAB Secretariat

The Prefect and Shadow pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard.¹ If the incident geometry is considered as converging then the Shadow pilot was required to give way to the Prefect.² An

¹ (UK) SERA.3205 Proximity. MAA RA 2307 paragraphs 1 and 2.

² (UK) SERA.3210 Right-of-way (c)(2) Converging. MAA RA 2307 paragraph 12.

aircraft operated on or in the vicinity of an aerodrome shall conform with or avoid the pattern of traffic formed by other aircraft in operation.³

The RAF Cranwell Flying Order Book⁴ (FOB) states as follows:

Microflight Site at Hougham. This site is marked on low flying maps to the north west of BKH [Barkston Heath]. It can be active at any time during the week in good weather. Pilots are to be vigilant in case microflights do not show on ATC surveillance displays.

The Skyway Code⁵ states as follows:

Aircraft operating near military aerodromes are not confined to the MATZ. This could include aircraft approaching to land or operating in what is known as the 'radar training circuit' (RTC). The RTC is a relatively standard pattern flown by aircraft around the aerodrome for the purpose of practising radar approaches.

The standard RTC sequence is:

- > Take off and climb to a height of between 1500 ft and 2500 ft;
- > Vectoring around the pattern;
- > Alignment and descent with the final approach track and glidepath; and
- > Landing or low approach and go-around.

This could take place either as a left or right hand pattern. It is primarily the downwind and base leg elements of which protrude beyond the extremities of the MATZ, so it is a good idea to contact the relevant MATZ frequency if transiting these areas, even if you are not penetrating the MATZ itself.

After CPA, the Shadow track continued in a shallow descending 270° right turn to pass just north of Hougham airfield and join right-hand downwind for the northerly runway.

RAF Cranwell Occurrence Investigation

The RAF Cranwell Investigation established the following cause, causal factors, mitigations, justifications and recommendations:

Cause: A light civilian aircraft, not in communication with ATC, was painting intermittently on [the radar]. No Traffic Information was passed to [Prefect C/S].

Contributory factors and mitigations:

1. Intermittent [radar] return did not provide sufficient visual cues to controller for them to deem it relevant. Mitigation: [Relevant parties] have scheduled a meeting to discuss potential implications.
2. The [radar] contact was painting for a number of miles/minutes prior to the incident, however not consistently enough to catch the attention of the Radar controller, who had become task focussed on their track in a relatively low arousal controlling session. Justification: Substitution tests conclude that other controllers may have called it before turning the [Prefect] inbound for PAR, though it was stated that this was with the benefit of hindsight. It was also noted that the point that they would have called it would have coincided with the point at which it disappeared from radar.
3. There was a conflicting track painting on [the PAR screen]. The Talkdown controller determined that there was no risk of collision, which was feasible at the time of handover, however no Traffic

³ (UK) SERA.3225 Operation on and in the Vicinity of an Aerodrome. MAA RA 2307 paragraph 17.

⁴ RAF College Cranwell & Barkston Heath Defence Aerodrome Manual, Annex O, Part 2, para 10. Flying Order Book Version 11.2, effective 24 May 23.

⁵ Skyway Code version 3; <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7920>

Information was offered to the Radar controller. However, the Talkdown controller had planned to call traffic to [Prefect C/S] once they called on frequency. Prior to this session there had been significantly more clutter on the PAR screen, which skewed the controller's perception of conflictors present. Recommendation: Review of Current Handover Procedures Between Talkdown and Radar. Conduct Safety Assessment to determine if current handover procedures [between Radar and Talkdown] are sufficient to ensure Duty of Care with regards to passing Traffic Information and taking into account new working layout.

4. The Supervisor was unable to provide SA prior to the incident from [a display depicting EC commonly used by gliders] as they were busy dealing with another [issue]. After [Prefect C/S] had called an Airprox it was noted that traffic believed to be the conflicting aircraft was display[ed] on [this additional SA tool].
5. Talkdown and Radar controllers are still adapting to not being sat next to each other and the change to handover procedures that this presents.
6. There are a number of sites where light civilian aircraft get airborne close to the vicinity where the conflicting track may have originated, as indicated on [the additional SA tool]. These include Glebe Fm, Hougham and Foston for which there are currently no LoAs to improve SA. Recommendation: Liaison with civil site operators. Investigate ways to improve liaison with those operating from civil light aircraft strips, in particular, Glebe Fm, Hougham and Foston. Ensuring they are invited to attend the LAUWG and/or producing an LoA.
7. Prior to this controlling session, the Talkdown controller registered at 'Medium' on the ORM (Fatigue Register), however felt fit to control. The Supervisor was aware. The Talkdown controller considered this to be a rare instance of fatigue.

The Investigation observed that the civil microlight was slightly above the [radar pattern] traffic, and therefore well-established inside the Cranwell [MATZ] Stub⁶. Whilst not a mandatory avoid, good airmanship suggests that civil aircraft operating within the confines of the MATZ should contact ATC to increase SA on military traffic.

Comments

HQ Air Command

This Airprox was subject to a local investigation. The visibility of low radar-cross-section (RCS) and slow-moving aircraft is a known characteristic of this radar system and work is underway to assess potential improvements to optimise the display of all potential aircraft across a broad range of speeds and RCS. A local review of hand-over procedures has been recommended to cater for the discrepancy between systems. A further recommendation has been issued that EC should be reviewed on Prefect vs integration with other civilian systems such as SkyDemon and PilotAware. The owner of Hougham will be invited to all future airspace user working groups and measures have been taken to try and improve de-confliction between them and Cranwell. Hougham will inform Cranwell of any planned activity and an agreement has been put in place to restrict departures from Hougham to not above 1000ft⁷. Any known activity will be broadcast on Cranwell VHF Zone. This will not account for visitors and the departure restriction is non-binding. Finally, the Prefect safety pilot should be commended for intervening; see-and-avoid provided an effective barrier to MAC and the prompt actions increased separation at a critical moment.

BMAA

This report highlights the importance of situational awareness gathered by all available means, both before and during flight. We shall be reinforcing to our membership the importance of appreciating

⁶ The Cranwell MATZ does not have a stub to the west so the Shadow pilot was not operating within the Cranwell MATZ.

⁷ The Hougham airfield manager stated that an informal agreement has been reached to avoid heights above 1000ft to the north of the airfield.

potential nearby aircraft traffic patterns, using all available technologies to both enhance own visibility and detection of others, and the need to remain vigilant to the threat of MAC.

Summary

An Airprox was reported when a Prefect and a Shadow DD flew into proximity near Hougham airfield at 1349Z on Tuesday 18th October 2022. Both pilots were operating in VMC, the Prefect pilot under IFR in receipt of a Traffic Service from Cranwell and the Shadow pilot under VFR, not in receipt of a FIS.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, GPS data, a report 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 discussed the radar's ability to detect slow-moving traffic. Under Project Marshall, defence ATC radars were being replaced with a modern digital product known as STAR-NG.⁸ This radar was capable of detecting very slow moving targets but, as with all Air Traffic Control radars, was set with a filter that prevented display of targets moving at slower than a set speed. This was necessary in order to prevent the display from becoming cluttered with contacts, for example from road traffic, thereby adversely affecting a controller's ability to detect and mitigate risk to airborne traffic. In this case, although the Shadow was flying at a speed that placed it at the lower limit being displayed on the Cranwell area radar, it was tracked and displayed on its southerly track towards Hougham but then faded from display as the Prefect was turned towards the Cranwell centreline. Some controller members expressed the opinion that such a digital radar was designed to be used in the context of controlled airspace and that its suitability for operation with traffic in Class G may be the subject of debate. Older analogue radars were capable of detecting and displaying objects such as flocks of birds which, with experience, controllers were able to interpret and factor into their risk mitigation measures. With the digital radar systems displaying returns based upon a set of parameters, controller interpretation had been removed, however the board agreed that to ensure system suitability, parameter selection should be carefully considered. One controller member summed up their opinion by stating that if a radar can't 'see' a threat then its fitness for purpose may be questioned. In this case the Shadow had been displayed but the Cranwell Radar controller had not assimilated its track towards the Cranwell RTC before the contact faded (**CF3**) and, therefore, could not have issued Traffic Information (**CF2**). Members noted that both the Cranwell Radar controller (operating at Coningsby) and the Cranwell Talkdown controller (operating at Cranwell) had observed the Shadow contact and the military ATC advisor informed the Board that the Cranwell Talkdown controller had 'hooked' the Shadow contact before 'hooking' the Prefect. It was felt that each controller had lacked sufficient stimulus to assess the situation as a potential conflict and that, due to their geographical separation, had not had the opportunity to correlate their observations and perhaps arrive at the conclusion that conflicting traffic had existed (**CF4**). Before the introduction of STAR-NG, both controllers would have been located in physical proximity with the opportunity to communicate directly but it was an unfortunate aspect of the improved system that that opportunity was somewhat reduced. In the event, the controllers had had at best late situational awareness (**CF5**) and in any case the Prefect pilot handover to Talkdown would not have occurred until after the position at which CPA occurred, thereby denying an opportunity for Traffic Information to have been passed in time. The Prefect pilot and student 'IF safety pilot' may have had at best generic situational awareness of the Shadow (**CF6**), given the annotation of Hougham airfield on VFR charts and specific reference in the RAF Cranwell FOB, but it was only as a result of excellent planning and briefing that the student 'IF safety pilot' had been able to take control and take avoiding action when they had seen the Shadow. The Shadow had not been equipped with a transponder so the Prefect TAS could not have detected it (**CF7**) but the Board could not determine why the Shadow TAS had not detected the Prefect (**CF8**) when it might have been expected to do so. The military ATC advisor also noted that had the Shadow been equipped with an ADS-B out device, the Cranwell radar would have detected and displayed it, regardless of its speed. In the event, the

⁸ <https://www.thalesgroup.com/en/worldwide/aerospace/star-ng>

Shadow pilot did not see the Prefect (**CF9**) and the late sighting by the Prefect pilot had resulted in a situation where they were concerned by the proximity of the other aircraft (**CF10**). The Board noted the RAF Cranwell Safety Investigation and observed that the Cranwell MATZ does not have a westerly 'stub' and that the Shadow pilot had therefore not been flying within the MATZ. A minority of members felt that separation at CPA was such that safety had been much reduced but the majority felt that action had been taken to avert the risk of collision, Risk C. The Board also discussed the degree to which activity at Hougham and Cranwell was coordinated and, given the amount of time the airfields had been in existence, expressed some surprise that such coordination did not already exist (**CF1**). The platform altitude for the PAR procedure to RW08 was 1500ft which, given the proximity of the Cranwell RW08 extended centreline to Hougham airfield, could place radar traffic in close proximity to traffic conducting an overhead join at Hougham, with which it was required either to conform or remain clear. The Board noted the HQ Air Command comments and was heartened that sensible measures had been put in place to improve safety in this regard. Finally, members observed that civilian airfields with Instrument Approach Procedures were annotated on CAA VFR charts with 'feathers' but that no such arrangement existed for military airfields. After further discussion, the Board resolved to recommend that 'The CAA includes a means on VFR charts to highlight the military airfields that operate Instrument Approach Procedures outside controlled airspace, and includes a note that pilots are strongly recommended to contact the ATSU before flying within 10NM'.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2022250			
CF	Factor	Description	ECCAIRS Amplification	UKAB Amplification
Ground Elements				
• Regulations, Processes, Procedures and Compliance				
1	Organisational	• Aeronautical Information Services	An event involving the provision of Aeronautical Information	The Ground entity's regulations or procedures were inadequate
• Situational Awareness and Action				
2	Human Factors	• ANS Traffic Information Provision	Provision of ANS traffic information	TI not provided, inaccurate, inadequate, or late
3	Human Factors	• Conflict Detection - Not Detected	An event involving Air Navigation Services conflict not being detected.	
4	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	
5	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				
• Situational Awareness of the Conflicting Aircraft and Action				
6	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
• Electronic Warning System Operation and Compliance				
7	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
8	Human Factors	• Response to Warning System	An event involving the incorrect response of flight crew following the operation of an aircraft warning system	CWS misinterpreted, not optimally actioned or CWS alert expected but none reported
• See and Avoid				
9	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

10	Human Factors	<ul style="list-style-type: none"> • Perception of Visual Information 	Events involving flight crew incorrectly perceiving a situation visually and then taking the wrong course of action or path of movement	Pilot was concerned by the proximity of the other aircraft
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Degree of Risk: C.

Recommendation: The CAA includes a means on VFR charts to highlight the military airfields that operate Instrument Approach Procedures outside controlled airspace, and includes a note that pilots are strongly recommended to contact the ATSU before flying within 10NM.

Safety Barrier Assessment⁹

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

Ground Elements:

Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because there is no formal coordination between traffic at Hougham (7NM west of Cranwell, just south of the extended centreline) and Cranwell radar traffic operating at a level below the overhead join altitude for Hougham.

Situational Awareness of the Confliction and Action were assessed as **ineffective** because although both the Radar and Talkdown controllers (at Coningsby and Cranwell respectively) each saw some track information regarding the Shadow, their geographical separation prevented them sharing that information easily.

Flight Elements:

Situational Awareness of the Conflicting Aircraft and Action were assessed as **partially effective** because the Prefect pilot only had generic situational awareness (based on Hougham airfield being displayed on the VFR chart) and the Shadow pilot had no situational awareness on the Prefect.

Electronic Warning System Operation and Compliance were assessed as **ineffective** because the Prefect TAS could not alert on the Shadow EC equipment and the Shadow TAS did not alert when it might have been expected to do so.

⁹ The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).

Airprox Barrier Assessment: 2022250		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 Conflicition & 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							
Key:			Full	Partial	None	Not Present/Not Assessable	Not Used	
Provision								
Application								
Effectiveness								