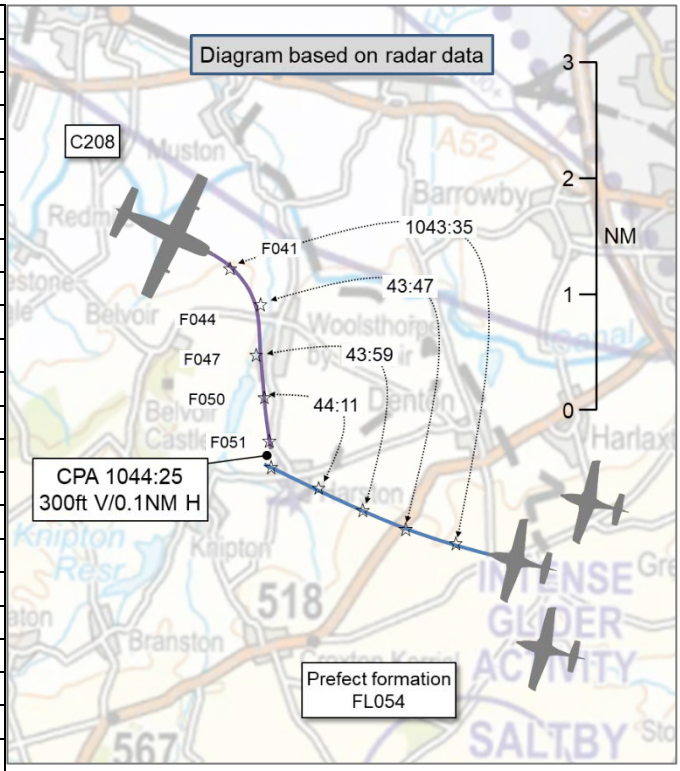
AIRPROX REPORT No 2021121

Date: 19 Jul 2021 Time: 1044Z Position: 5253N 00045W Location: ivo Belvoir Castle

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Prefect formation	C208
Operator	HQ Air (Trg)	Civ Comm
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	VFR
Service	Traffic	Listening Out
Provider	Cranwell	East Mids/Langar
Altitude/FL	FL054	FL051
Transponder	A, C, S	A, C, S
Reported		
Colours	White, blue	White, red
Lighting	Strobes, landing	Nav, beacon, taxi
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	5500ft	4650ft
Altimeter	QFE (1014hPa)	QFE (NK hPa)
Heading	290°	170°
Speed	140kt	120kt
ACAS/TAS	TAS	TCAS II
Alert	Alert	TA
Separation		
Reported	'just below' V/100-200m H	700ft V/0.5NM H
Recorded	300ft V/0.1NM H	



THE PREFECT INSTRUCTOR reports that they were leading a 3-ship formation recovery to RW08RH at Cranwell. As they were about to leave 5500ft, they received a traffic call from Cranwell ATC reporting an aircraft just right of the 12 o'clock position, that was likely to be the paradropping aircraft from Langar. Shortly afterwards, the Traffic Alerting System alerted on an aircraft at the same level in the 2 o'clock at close range. As ATC were updating the other aircraft's position, the Prefect Instructor saw the other aircraft much closer than expected, at about 500m in the 2 o'clock, and just below their level. Due to the other aircraft's proximity, they had no time to do anything except estimate that it would not collide with the formation. They noted the time and asked ATC what squawk the other aircraft was wearing (0033). The formation then proceeded to Cranwell. After landing, the (non-handling) QFI in the No.2 aircraft estimated that the other aircraft had passed just below and within 100-200m.

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

THE C208 PILOT reports conducting para-dropping operations from Langar airfield with 15 POB. When over Woolsthorpe, they noticed traffic on the TCAS display. They looked out but couldn't see them initially. When they realised that there could be a potential conflict they levelled off and waited for the traffic to be in sight. They then saw 3 single-engine aircraft in formation, crossing from left to right, 300-800ft above. The other aircraft did not take avoiding action but remained on heading and altitude. The C208 pilot noted that they had had to take avoiding action. The C208 pilot commented that their understanding was that Prefect instructors are advised to be aware of Langar's operations, that they were most likely on a Traffic Service and therefore that they should have been given plenty of notice in order to give way.

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

THE CRANWELL DEPARTURES CONTROLLER reports they were controlling a 3-ship formation of Prefect aircraft. As the formation tracked west the controller noticed an aircraft squawking 0033 which was climbing and tracking east initially, before tracking south. The traffic was called initially to the formation leader as right 2 o'clock, 5 miles, roughly 1800ft below and climbing and was also notified as paradropping. The formation leader acknowledged the traffic call but did not call visual. As the tracks continued into confliction, the controller called the traffic again, this time at 3 miles northwest, 400ft below and climbing, and reiterated the paradropping squawk. The formation leader again acknowledged but did not call visual. The controller called the traffic again at 1 mile northwest with 200 ft separation and this time the formation leader reported visual with the traffic.

THE CRANWELL SUPERVISOR reports that they did not witness the incident as they were discussing the developing tailwind with the Duty Pilot. On landing, the Prefect Instructor phoned to report that they were submitting a DASOR, informed the Supervisor of the estimated distance between the formation and the para-dropper aircraft and that the other aircraft had seemed steady on course, seemingly unaware of their presence. The Supervisor confirmed the transponder code (0033) and they briefly discussed the large looping climbs routinely exercised from Langar. Having listened to the tapes it was clear that the Departures controller had called the conflicting traffic on a number of occasions.

Factual Background

The weather at Barkston Heath was recorded as follows:

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METAR EGYE 191050Z 32005KT 9999 FEW038 ///// Q1022 RMK BLU=
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Analysis and Investigation

Military ATM

An Airprox occurred on 19 Jul 21 at approximately 1045 UTC, 4NM southeast of Langar Para-Dropping Site between a Prefect formation and a C208. The Prefect formation was in receipt of a Traffic Service from Cranwell Departures and the C208 pilot was listening out on East Midlands Radar and the Langar Drop Zone frequencies but was not in receipt of a service.

The Prefect pilot was the lead in a 3-ship formation sortie that was conducted to the south and east of Cranwell and was on recovery at the time of the Airprox in receipt of a Traffic Service from Cranwell Departures. Whilst conducting recovery admin in the cockpit, they were passed Traffic Information regarding the conflicting C208, however, they did not become visual, though the contact was on TAS, although the pilot was unconcerned due to the distance of the C208. They received updated Traffic Information whilst they were under a medium cockpit workload and although they considered manoeuvring options, they were discounted due to the relatively un-manoeuvrable formation and not having exact SA on the C208. Further Traffic Information was passed by ATC which coincided with a TAS alert which focused their activity on visually acquiring the C208 which was achieved a few seconds later. The Prefect pilot assessed that the C208 would pass behind and below the formation and elected to climb to increase separation, which was assessed as 100-200m.

The Cranwell Departures controller was working with a self-assessed medium to low workload with 4 aircraft on frequency which included the Prefect formation, in receipt of a Traffic Service. Traffic Information was passed on three separate occasions until the Prefect pilot reported visual. The Supervisor did not witness the occurrence as they were discussing the developing tailwind with the Duty Pilot but were made aware of the Airprox by the Prefect pilot after landing.

The C208 pilot was conducting para-dropping operations from Langar airfield and became aware of the Prefect after noticing traffic on their TCAS display. They opted to level off as they were not visual and waited for the Prefect to be in sight. They reported that they became visual with the 3-ship of Prefects crossing their windscreen 300-800ft above and 0.5-1.5NM away. They reported that they levelled off as their avoiding action and noted that the Prefect pilots did not take avoiding action. The C208 pilot was not in receipt of a service but was listening out on East Midlands Radar and Langar DZ frequencies.

Figures 1 – 4 show the positions of the Prefect and the C208 at relevant times during the Airprox. The screen shots are taken from a replay using the NATS Radars, which are not utilised by Cranwell, therefore, the pictures may not be entirely representative of the Cranwell controllers' radar display.

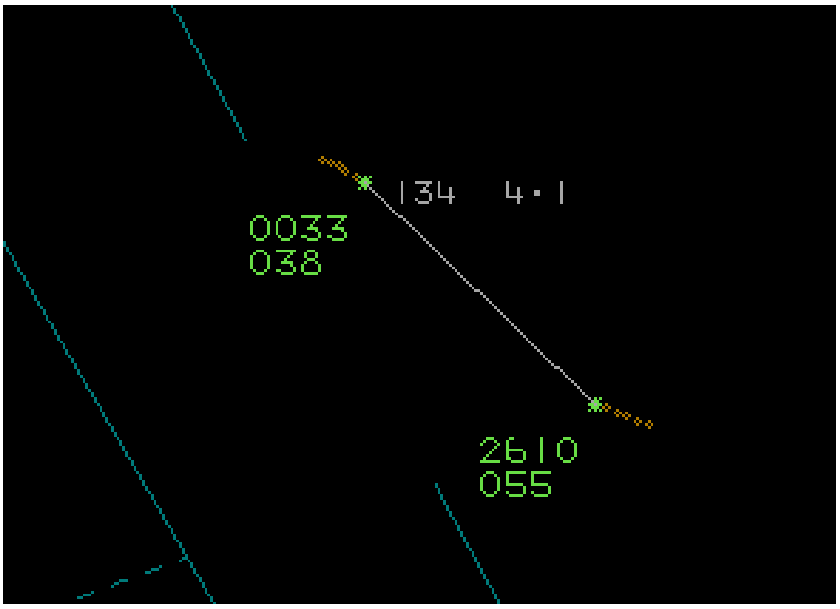

Figure 1: Traffic Information is first passed to the Prefect pilot (2610)

In response to advising two minutes to recovery the Cranwell Departures controller passed Traffic Information to the Prefect pilot regarding the position of the C208. Separation was 4.1NM and 1700ft.

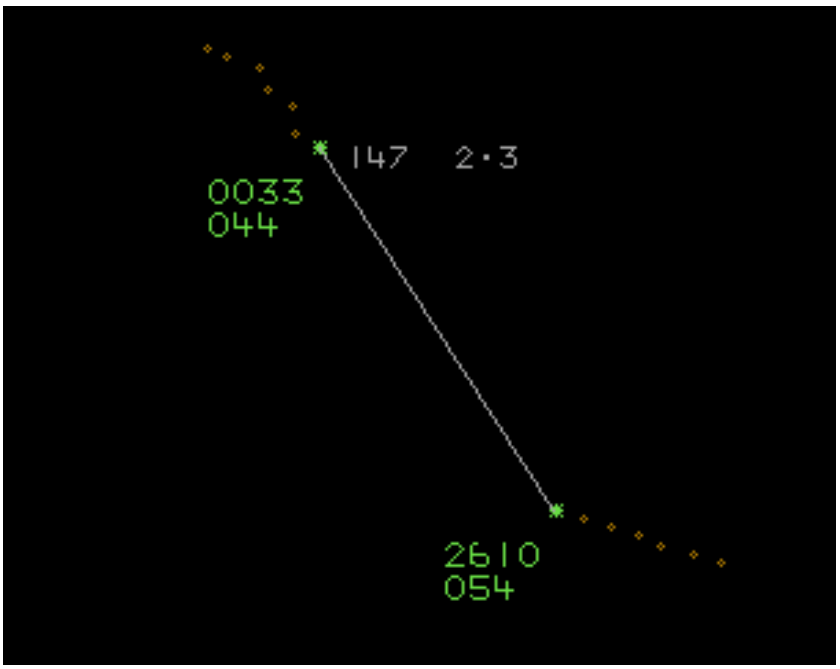

Figure 2: Traffic Information is updated.

Twenty seven seconds later the the Cranwell Departures controller provided updated Traffic Information to the Prefect pilot. Separation decreased to 2.3NM and 1000ft.

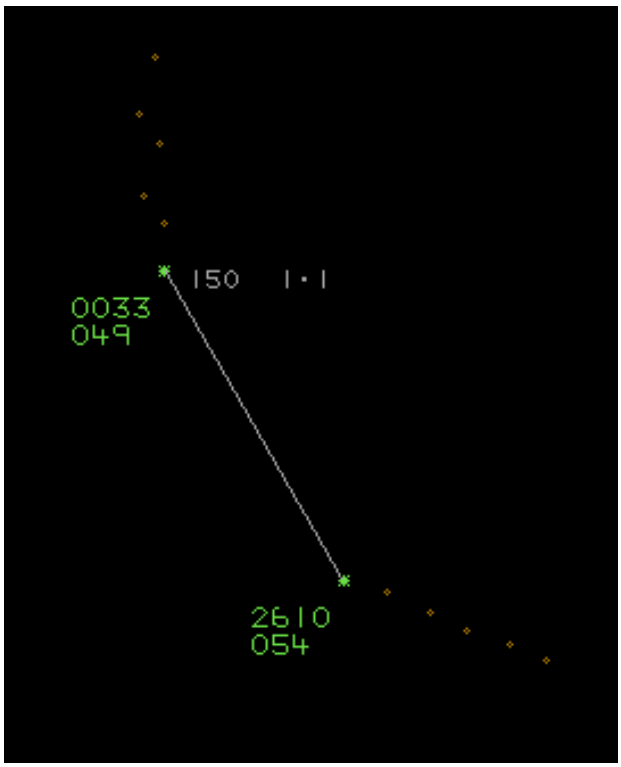

Figure 3: Traffic Information is updated again.

Twenty three seconds later the Traffic Information was provided for the third time. Six seconds after being passed the Traffic Information the Prefect pilot reported that they were visual with the C208. Separation decreased to 1.1NM and 500ft.

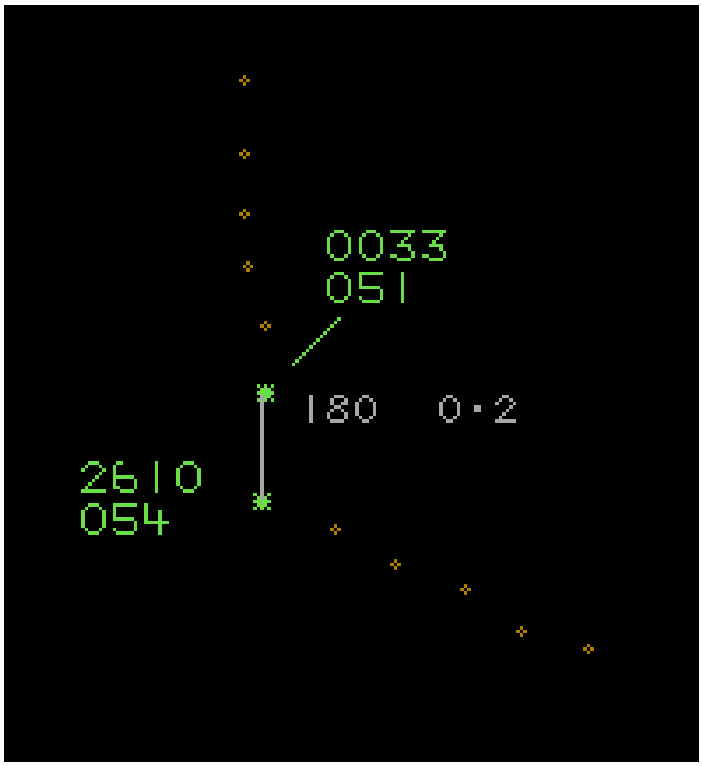

Figure 4: CPA.

Fourteen seconds later CPA occurred which was measured at 0.2NM and 300ft.

The unit conducted an Occurrence Safety Investigation (OSI) into the incident which provided a thorough analysis of the Airprox and raised recommendations including to improve the liaison and

understanding between Cranwell and Langar. The Traffic Information at times could have been more accurate, however, the controller provided timely updates on two separate occasions to allow the Prefect pilot to become visual with the C208. The OSI highlighted that the Controller could have offered deconfliction advice as it was evident they were concerned by the proximity of the two aircraft. However, it was noted that the Prefect pilot felt their manoeuvring actions were limited as their wingmen were formating, therefore, horizontal deconfliction advice would be difficult to follow. With the given Traffic Information and lack of sighting, the Prefect pilot could have requested a climb to increase the separation had they felt that it was required. As the C208 pilot was not in receipt of a service they were not provided with Traffic Information and assumed that it was likely the Prefect pilots would be in receipt of a service, would have been passed Traffic Information and would avoid them. Although the Prefect pilots had received Traffic Information, the C208 pilot should not have assumed that the Prefects would avoid them especially as they were flying in formation which can be less manoeuvrable in comparison to a singleton.

UKAB Secretariat

The Prefect and C208 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 Prefect formation lead pilot was required to give way to the C208[2]. An aircraft that is aware that the manoeuvrability of another aircraft is impaired shall give way to that aircraft[3]. Military regulations state that 'Formations of aircraft are normally less manoeuvrable than single aircraft and are unable to take sudden avoiding action. The handling Pilots of single aircraft should therefore give way to, and keep clear of, Formations of aircraft'[4]. Note that no such explicit provision for collision avoidance between formations and singleton aircraft exists in UK civilian regulation.

CAP413 (Radiotelephony Manual)[5], Chapter 5: Radar Phraseology, Traffic Information and Avoiding Action Phraseology, paragraph 5.21 states as follows:

> Relative movement should be described by using one of the following terms as applicable:
>
> 1. 'crossing', including the relative direction of movement either 'left to right' or 'right to left', where there is relative movement; i.e. a change in the relative bearing between the conflicting traffic's flight path and that of the aircraft under service. Controllers should include the words 'ahead' or 'behind' where appropriate to assist the pilot in assessing the conflicting traffic's flight path.
>
> 2. 'converging', where there appears to be no change in relative bearing between the conflicting traffic's flight path and that of the aircraft under service and/or the controller perceives there to be a significant risk of mid-air collision.
>
> 3. 'same direction' …
>
> 4. 'opposite direction' where the conflicting traffic's flight path is approximately 180° opposed to that of the aircraft under service but the flight paths are not converging.

The Board previously commented[6] on the requirement for a civilian singleton aircraft to avoid a civilian formation on the basis of impaired aircraft manoeuvrability, as follows:

> This [*a discussion on right of way*] led the Board to discuss the T67 pilot's comments about the 'laws of the air', they thought the pilot was probably referring to SERA 3210 Right of Way in which it states that if a pilot is aware that another aircraft's manoeuvrability is impaired they shall give way to that aircraft. However, members agreed that although a close formation as a whole may be considered to be less

[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.
[3] (UK) SERA.3210 Right-of-way (b). MAA RA 2307 paragraph 7.
[4] MAA RA 2307 paragraph 9.
[5] Edition 22 dated 26th May 2016.
[6] Airprox 2021058.

manoeuvrable than individual aircraft, this was by the choice of those taking part in the formation and that each aircraft's manoeuvrability was in fact unaffected. Members agreed that this rule was written with a single aircraft in mind and that it could not be used as a means to obtain carte blanche right of way for a formation.

Prefect Occurrence Investigation

The Prefect Occurrence investigation found that the event outcome was that,

'The Langar paradrop aircraft flew into confliction with the Prefect [C/S] 3-ship formation.'

The narrative description of the cause was that,

'The Langar paradrop aircraft appeared to hold some situational awareness with respect to the formation of 3 aircraft, however, they chose to continue with their climb and turn to the south in preparation for paradropping. The lead Prefect aircraft held limited situational awareness and as a result was reluctant to manoeuvre. That said climbing may have been an option.'

The investigation found 4 causal factors, as follows:

1. On the day of this incident the wind was easterly. This meant that the Langar paradrop aircraft was climbing to the east before turning south and then west before positioning for the paradrop run into wind. Similarly, with an easterly wind CWL runway 08RH was in use meaning that the [C/S] formation needed to position to the west of CWL for recovery. Thus the paradrop aircraft and the formation aircraft were all operating in the same congested/constrained airspace. This is a scenario that is likely to occur with easterly winds.

Recommendation: When easterly winds are prevailing and CWL RW08 is in use, consideration should be given to contact ATC 2 minutes before the recovery call, to gain situational awareness of any paradrop aircraft airborne in order that early deconfliction can occur.

2. It is understood that Langar paradrop aircraft do not take a traffic service but currently maintain a 'listening watch' which may hinder situational awareness.

Recommendation: Liaison with Langar Airfield to encourage Langar paradrop aircraft to consider taking a traffic service in order to increase situational awareness.

3. The lead Prefect aircraft struggled to obtain the Langar aircraft visually until it was within 1NM. This is most likely due to the geometry of the Langar aircraft as it approached (steady bearing, no crossing aspect). However the lead aircraft comprised a solo pilot that at the time had a moderate workload in preparation for recovery including the challenging set up required for moving between internal and external communications.

Recommendation: Consideration to be given to the use of lookout safety pilots for lead formation aircraft.

4. The Prefect was operating in formation and therefore was less manoeuvrable than a singleton.

Justification: This is required as part of the formation sorties. RA2307 notes that other traffic should give way to formations as they are less manoeuvrable. SERA also infers [sic] that pilots should give way to less manoeuvrable aircraft.

The investigation also observed that,

The lead Prefect aircraft was in receipt of a traffic service (with the other 2 aircraft listening) however deconfliction advice was not requested, however due to the compressed timeframe (23 seconds between the 3NM and 1NM call) it would have had limited benefit.

The investigation Chairperson commented as follows:

This airprox took place in class G airspace, where both aircraft were entitled to be flying in the manner they were. This is the 2nd reported airprox between a 3 FTS and Langar aircraft and emphasises the threat that exists when aircraft are using the same piece of airspace whilst using different ATC frequencies. The investigation found that the Langar aircraft created the confliction by turning and climbing towards the formation and failing to carry out sufficient deconfliction action once the formation was in sight. From the paradrop pilot's narrative, it was clear to the ORG that he made an assumption that the Prefect formation would take action to avoid him, but may not have appreciated the restrictions of doing so whilst operating in formation. RA2307 notes that other traffic should give way to formations as they are less manoeuvrable, and SERA also infers [sic] that pilots should give way to less manoeuvrable aircraft. It was noted in this occurrence that the formation was not visual with the paradrop aircraft until very late in the sequence, and given their configuration at the point of confliction, the initiation of significant avoiding action was not an option.

The ORG opined that while the controller gave sufficient and repeated information to the formation, fulfilling their responsibilities whilst providing a TS, suggested deconfliction advice may have been useful, given that the controller was evidently concerned about the confliction course of the aircraft and the formation were struggling to become [sic] visual contact with the paradrop aircraft. That said, the lead pilot felt his manoeuvring options were limited whilst his wingmen were formatting [sic] on him and any lateral deconfliction advice may have been difficult to enact.

The ORG endorsed all recommendations made by the investigators – of particular importance is the liaison and relationship building between 3 FTS and Langar airfield. A mutual understanding of operations and an agreed process for deconfliction will aid in preventing recurrence and inform all parties of the airspace constraints, particularly when there is a northerly or easterly wind. Ideally, Langar aircraft will obtain a service rather than a 'listening watch' – which is in effect no service at all, as there is no path for Cranwell ATC to establish an agreed deconfliction.

The early situational awareness call by 3 FTS aircraft recovering to the Easterly runway is a vital mitigation to establish an effective deconfliction with any aircraft operating in that area, which may necessitate an early northerly turn by aircraft returning to Cranwell. The ORG felt this had been thoroughly investigated and suitable recommendations made to prevent recurrence.

Comments

HQ Air Command

This occurrence was subject to an Occurrence Safety Investigation and the majority of its recommendations have already been implemented. It was the second of two airproxes (the first was a month earlier) that happened in similar circumstances: an easterly wind forces Cranwell recovery aircraft and Langar paradropping aircraft into the same piece of airspace; this airspace is relatively congested; and both crews are relatively busy in-cockpit with Cranwell crews preparing for recovery and the C208 in the climb for the drop. On this occasion it was a formation of 3 Prefects recovering that were notified of the C208 under the Traffic Service they were receiving from Cranwell.

A mutual understanding of operations between Langar and Cranwell and an agreed process for deconfliction was identified as key to preventing reoccurrence. The 3 Flying Training School (FTS) Air Safety Team has been extremely proactive in engaging face to face with Langar, not only visiting them but also inviting them to local and Cranwell Airspace User Working Groups. This interaction has paid dividends. Langar has elected to bring in new procedures to standardise their routes, making use of pre-determined entry and exit points to maintain low level when military aircraft are recovering. Additionally they are trying to move more towards East Midlands airspace where possible and are planning to discuss the uplift of ATC service requests to get a Traffic Service from East Midlands more often. On the military side, the incidents have been briefed to the squadrons and the Flying Order Book updated to mandate a 2 minute recovery call to ATC. This will give ATC a chance to scan for the para-dropper and thus provide early vectors when needed to maintain separation.

This is another example of an exemplary investigation by 3 FTS. This demonstrates the effect that engagement can have and has resulted in mutual recommendations implemented to ensure that reoccurrence does not occur. They should be commended for their thorough and engaging approach.

Summary

An Airprox was reported when a Prefect formation and a C208 flew into proximity near Belvoir Castle at 1044Z on Monday 19th July 2021. Both pilots were operating under VFR in VMC, the Prefect pilot in receipt of a Traffic Service from Cranwell and the C208 pilot listening out on the East Midlands and Langar DZ frequencies.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members first discussed the controller's actions and agreed that they had been busy at the time. Whilst provision of deconfliction advice would have been of assistance, it was felt that this was only obvious with the benefit of hindsight and that the controller had reasonably expected the Prefect pilot to take action, if required, themselves. However, it was felt that the provision of Traffic Information had been inaccurate (**CF1**) in that the traffic was described as '… crossing right left ahead …' when it had been converging and was not described as converging on the subsequent Traffic Information call. That the controller made 3 Traffic Information calls was of itself reason to suspect the traffic was converging and members felt that use of the descriptive 'converging' may have galvanised the Prefect pilot into action.

Turning to the Prefect pilot, members thought that they were probably operating on the assumption that the singleton traffic would 'give way to and keep clear of' them, in accordance with MAA RA2307 paragraph 9. However, the civilian para-dropping aircraft was flown by a civilian pilot who would not have been presented with any of the MAA rule-set during their training and who was consequently operating on the basis of regulations that they had been required to learn and demonstrate as having learnt, in this case that traffic converging on the left is required to give way. It said much for the airmanship of the C208 pilot that despite their reasonable assumption that the 'other traffic' would give way, they nevertheless undertook to break the confliction by levelling below the Prefect whilst maintaining heading and speed, in accordance with (UK) SERA.3210(a). The Board commended them for taking such action. Members discussed the regulations pertaining to the Prefect formation and the C208 and agreed that they were not compatible, in that there was no requirement in (UK) SERA for a singleton aircraft to give way to a formation.

Whilst the Board agreed that it was sensible for a singleton aircraft to give way to a formation, they did not agree in 2 regards with the Prefect occurrence investigation assertion that 'SERA also infers [sic] that pilots should give way to less manoeuvrable aircraft.'. Firstly, there was no inference; the requirement to give way was explicit, and secondly, in the Board's opinion, the provision of (UK) SERA.3210(b) that 'An aircraft that is aware that the manoeuvrability of another aircraft is impaired shall give way to that aircraft.' did not apply to a formation. Whilst the manoeuvrability of a formation as a whole is less than that of a single aircraft, each formation aircraft's manoeuvrability is not impaired; its manoeuvrability is restricted purely by choice of the pilot taking part and whilst in close formation. Additionally, in this instance, the C208 pilot was not aware that the TCAS alert (**CF4**) for which they had levelled was a formation (until after they had levelled and saw the Prefects just before CPA), could not know to 'give way and keep clear' even if they had been operating under RA2307 paragraph 9 and, even under military regulation, had a reasonable expectation that the traffic on the left would give way.

The Board also disagreed with the Prefect occurrence investigation event outcome, that the C208 pilot flew into conflict with the Prefect formation. Members agreed that the C208 pilot discharged their responsibility under (UK) SERA.3210 in full and that in fact the outcome was that incompatible regulation had resulted in the C208 and Prefect pilots flying into conflict (**CF2**). After further discussion, the Board resolved to recommend that,

'*The MAA and CAA review conflicting Rules of the Air regulations with respect to formations of aircraft; specifically, Avoidance of Collisions within MAA RA2307 paragraph 9 and (UK) SERA.3210 Right-of-way*'.

Members further discussed the Prefect pilot's lack of action and debated as to the degree of their task focus, to what extent the aircraft had joined in formation and, with an instructor in each aircraft, whether a turn would have been feasible and appropriate. The Board agreed with the Prefect occurrence investigation in their assessment that climbing was an option. Regarding risk of collision, members agreed that incompatible regulation, lack of action and late sightings (**CF5**) had contributed to a situation where the aircraft had flown close enough to each other to cause concern, despite situational awareness (**CF3**). However, there was no risk of collision because the C208 pilot had used their TCAS to generate vertical separation and each pilot had seen the other aircraft, albeit at a late stage.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2021121			
CF	**Factor**	**Description**	**ECCAIRS Amplification**	**UKAB Amplification**
	Ground Elements			
	• Situational Awareness and Action			
1	Human Factors	• ANS Traffic Information Provision	Provision of ANS traffic information	TI not provided, inaccurate, inadequate, or late
	Flight Elements			
	• Regulations, Processes, Procedures and Compliance			
2	Organisational	• Flight Operations Documentation and Publications	Flight Operations Documentation and Publications	Inadequate regulations or procedures
	• Situational Awareness of the Conflicting Aircraft and Action			
3	Human Factors	• Lack of Action	Events involving flight crew not taking any action at all when they should have done so	Pilot flew close enough to cause concern despite Situational Awareness
	• Electronic Warning System Operation and Compliance			
4	Contextual	• ACAS/TCAS TA	An event involving a genuine airborne collision avoidance system/traffic alert and collision avoidance system traffic advisory warning triggered	
	• See and Avoid			
5	Human Factors	• Identification/Recognition	Events involving flight crew not fully identifying or recognising the reality of a situation	Late sighting by one or both pilots

Degree of Risk: C.

Recommendation: The MAA and CAA review conflicting Rules of the Air regulations with respect to formations of aircraft; specifically, Avoidance of Collisions within MAA RA2307 paragraph 9 and (UK) SERA.3210 Right-of-way.

Safety Barrier Assessment[7]

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

Ground Elements:

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

Situational Awareness of the Confliction and Action were assessed as **partially effective** because the controller informed the Prefect pilot that the C208 was crossing ahead and did not inform them that it was converging.

Flight Elements:

Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because the military regulation in RA2307, concerning singleton aircraft giving way to formations, does not exist in civilian regulation and civilian regulation (UK) SERA.3210(a), requires a pilot to give way to an aircraft converging on the right.

Situational Awareness of the Conflicting Aircraft and Action were assessed as **partially effective** because both pilots continued to close proximity and the Prefect pilot did not alter their flight path.