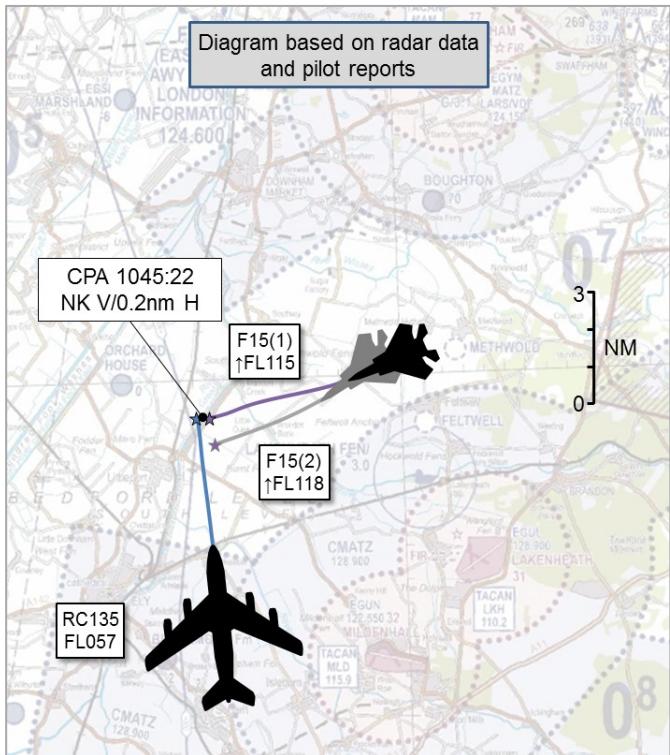


AIRPROX REPORT No 2018031

Date: 07 Feb 2018 Time: 1045Z Position: 5228N 00020E Location: 9nm NW Mildenhall

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	RC135	F15x2
Operator	Foreign Mil	Foreign Mil
Airspace	London FIR	London FIR
Class	G	G
Rules	IFR	IFR
Service	Traffic	Traffic
Provider	Lakenheath	Lakenheath
Altitude/FL	FL057	Not recorded
Transponder	A, C, S	A, C, S
Reported		
Colours	White, Grey	Grey
Lighting	Strobe, Nav	Not reported
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	FL060	>7000ft
Altimeter	QNH (1013hPa)	QNH
Heading	Not reported	Not reported
Speed	Not reported	Not reported
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	500-700ft V/<0.25nm H	2000ft V/>1nm H
Recorded	5800ft V/<0.5nm H	



THE RC135 PILOT reports that he was on a standard departure from RAF Mildenhall (runway heading climbing to FL100, turn direct BANEM and climb to FL110). ATC instructed him to level at FL060 in the turn and passed Traffic Information. He stopped the turn as traffic was identified on TCAS and maintained FL060 as a TCAS RA started; the co-pilot (right seat) initiated a descent as directed by TCAS. The pilot (left seat) obtained visual with the lead F15, at about 1nm, and took control of the aircraft and continued to nose-over. The co-pilot then gained visual with the second F15 and took over control of the aircraft with visual contact of the closest aircraft to them. Both pilots observed the two F15's make an aggressive pitch-up and climb which alleviated the RA.

He assessed the risk of collision as 'Medium'.

THE F15 PILOT reports that he was one of two F15s manoeuvring in a BFM (Basic Fighter Manoeuvres) engagement using a 7000ft fight floor. ATC communicated once that traffic (unknown to be a RC135 at the time) was west of their position just prior to the end of the BFM engagement. Following the BFM engagement, they began climbing to set-up for the next manoeuvre (never descending below 7000ft) and visually acquired the RC135 with altitude deconfliction. As they were passing through approximately 10,000ft, the pilot of the RC135 communicated that they were manoeuvring for an RA.

He assessed the risk of collision as 'Low'.

THE LAKENHEATH CONTROLLER has left the USAF and is no longer contactable.

THE LAKENHEATH SUPERVISOR reports that the RC135 departed RAF Mildenhall on its way to enter controlled airspace via BANEM. The F15s were general handling with Lakenheath approach. Traffic Information was issued to the F15s on the RC135, and to the RC135 on the F15s, when they were 8nm apart. The RC135 was instructed to maintain FL060; the RC135 pilot then reported that he had traffic in sight but was responding to an RA. The F15 pilot then reported traffic in sight as well. Once the RC135 was clear of traffic, he proceeded on course and continued his climb.

Factual Background

The weather at Mildenhall was recorded as follows:

METAR EGUN 070956Z AUTO 33008KT 9999 FEW028 01/01

Analysis and Investigation

UKAB Secretariat

The RC135 and F15 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard¹. If the incident geometry is considered as converging then the RC135 pilot was required to give way to the F15s².

Although the Airprox F15 is clearly seen on radar there is no altitude information until after CPA, possibly due to dynamic vertical manoeuvring, when the radar displays FL129; this was after it had passed 0.2nm behind the RC135.

Occurrence Investigation

The USAFE(UK) Occurrence Investigation noted that the RC135's TCAS determines its calculations based on an algorithm which takes rate of closure, vertical speed, and time to intercept into consideration. The aircraft's technical order states that traffic far ahead could potentially result in an RA if it has a substantial rate of closure. Based on the algorithm, if the system predicts that the closing aircraft will be within 700 feet within 15-35 seconds it could issue an RA.

With this in mind, a fast, highly-maneuverable aircraft could trigger an RA without ever actually encroaching enough to get within 1000 feet. It is understood that the RC135 TCAS may be substantially different from the KC135, but currently this is under investigation to determine the differences and implications.

Figure 1 (1045:17) shows the situation at the time when the RC135 pilot reported responding to the TCAS RA. Although the Airprox F15's altitude is not displayed on the radar, this does not necessarily imply that the aircraft was not transmitting Mode C information but could instead be the result of radar display filtering due to a high rate of change. The second, southerly, F15 could equally have been perceived as a threat by the RC135 TCAS and so it is not possible to determine which F15 caused the TCAS RA in the RC135 system.

Figure 2 (1045:21) shows the closest displayed lateral separation between the RC135 and the northerly F15. Interpolation of the tracks indicates that the F15 came within 0.2nm laterally to the RC135.

¹ SERA.3205 Proximity.

² SERA.3210 Right-of-way (c)(2) Converging.

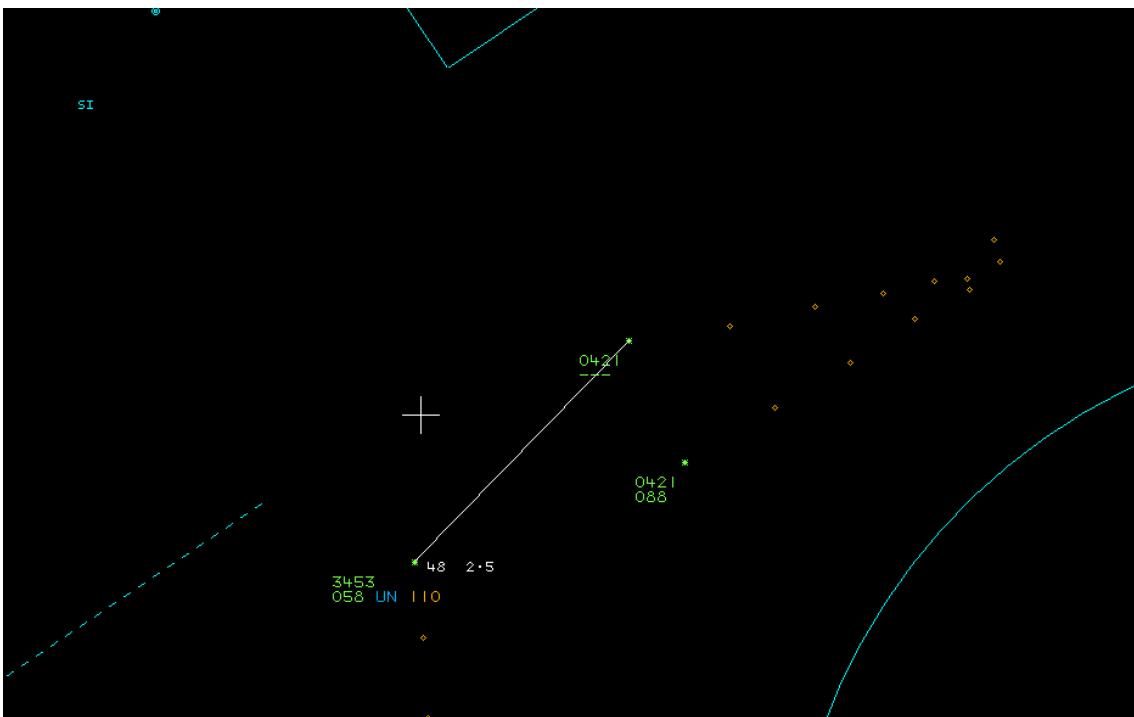


Figure 1: 1045:17



Figure 2:1045:21

Comments

USAFE(UK)

Each aircraft was given Traffic Information on the other and, based upon Mode C and/or pilots' reports, were separated vertically by 1000ft. However, the high energy maneuvers of the F15s, together with the parameters to which the RC135's TCAS operates, made the RA and subsequent avoiding action almost inevitable.

Summary

An Airprox was reported when an RC135 and two F15s flew into proximity at 1045hrs on Wednesday 2nd February 2018. Both pilots reported operating under IFR in VMC, although the F15s were likely operating VFR in VMC. Both pilots were in receipt of a Traffic Service from Lakenheath.

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 by first looking at the actions of the F15 pilot's. They noted that they were conducting high-energy manoeuvres and had sensibly requested a Traffic Service to warn them of any potential conflicts in their operating area. They had received Traffic Information on the RC135 (stated as a KC135) at 8nm range as the RC135 was initially climbing to FL110. Having completed their current manoeuvres, the F15 pilots then climbed as they headed in a westerly direction still presumably under the impression that the RC135 was climbing to FL110 ahead of them. As it happened, the controller stopped the RC135 climb at FL60 just before the aircraft came into proximity, but the F15 pilots did not report being visual with it until after, or just before, CPA. Some members wondered whether the F15 pilots would have been better advised to have turned away earlier from the reported aircraft to their west given that their last information was that it was climbing through their level. However, it became evident from the radio transcript that the controller had reported the RC135 as being in their 2 o'clock when in fact it was in their 10 o'clock; members wondered whether this had resulted in a flawed mental model and that the F15 pilots might have thought that they were better to maintain a SW track to pass behind when in fact by doing so they were routing into conflict.

The Board then looked at the actions of the Lakenheath controller. The RC135 climb had been stopped at FL060 at a late stage in order to maintain separation from the F15s who were operating with the same controller to a base height of 7000ft. From the tape transcript, it could be ascertained that this instruction to the RC135 pilots was made after they had received the TCAS RA on the F15s. Members also noted that the controller had passed Traffic Information to the RC135 on the F15s as being in the 10 o'clock when they were actually in the RC135's 2 o'clock. Similar to the F15s, some members wondered whether this may have resulted in a flawed mental model whereby the RC135 pilots may have initially thought that their right turn might be taking them away from the F15s when it was in fact routing them towards. Finally, members commented that although the controller had attempted to ensure 1000ft standard separation between the two elements, in the highly dynamic circumstances of the F15 flight path, 1000ft was unlikely to be enough to avoid a TCAS interaction. The Board wondered whether the controller was sufficiently aware that a TCAS RA was highly probable when fast-jets were pointing their vectors towards other aircraft with high vertical closure rates. In the circumstances that pertained, if track crossing was likely, stopping the RC135 climb earlier at FL050, to achieve 2000ft separation, might have been more advisable.

The Board then turned to the actions of the RC135 crew. They had initiated a descent based upon the TCAS RA instruction, but the Board noted that the pilot had reported that they had detected the traffic on their TCAS display in enough time to stop their turn. Accepting the manoeuvre limitations of their aircraft type, members commented that, ultimately, they were required to give way to the F15s on their right. The Board felt that the inaccurate Traffic Information had not helped them in this respect, and the RC135 pilots had probably done all that they could given the late warning they had had; reacting to the TCAS RA was the correct priority once it had occurred.

Turning to the cause of the Airprox, the Board agreed that the aircraft were separated by at least 1000ft vertically at all times, and that the TCAS RA had simply been caused by the dynamic manoeuvres of the F15s as they unwittingly pointed towards the RC135. Therefore, the Board agreed that the cause of the incident was that the F15's dynamic manoeuvring in proximity to the climbing RC135 had generated a TCAS RA. Turning to the risk, members quickly agreed that rather than an actual threat to the safety of the aircraft, the TCAS had simply perceived a threat because it could not know that the

F15 pilots were reversing their descent to climb not within 1000ft vertically. As a result, there had been no risk of collision and normal safety standards had pertained; risk Category E.

The Board noted that dynamic manoeuvres of USAFE(UK) F15s in proximity to other aircraft had led to a number of Airprox recently and they therefore recommended that USAFE(UK) re-brief their aircrew and controllers on the need to anticipate the effect of aircraft flight vector on other aircrafts' TCAS.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F15's dynamic manoeuvring in proximity to the climbing RC135 generated a TCAS RA.

Degree of Risk: E.

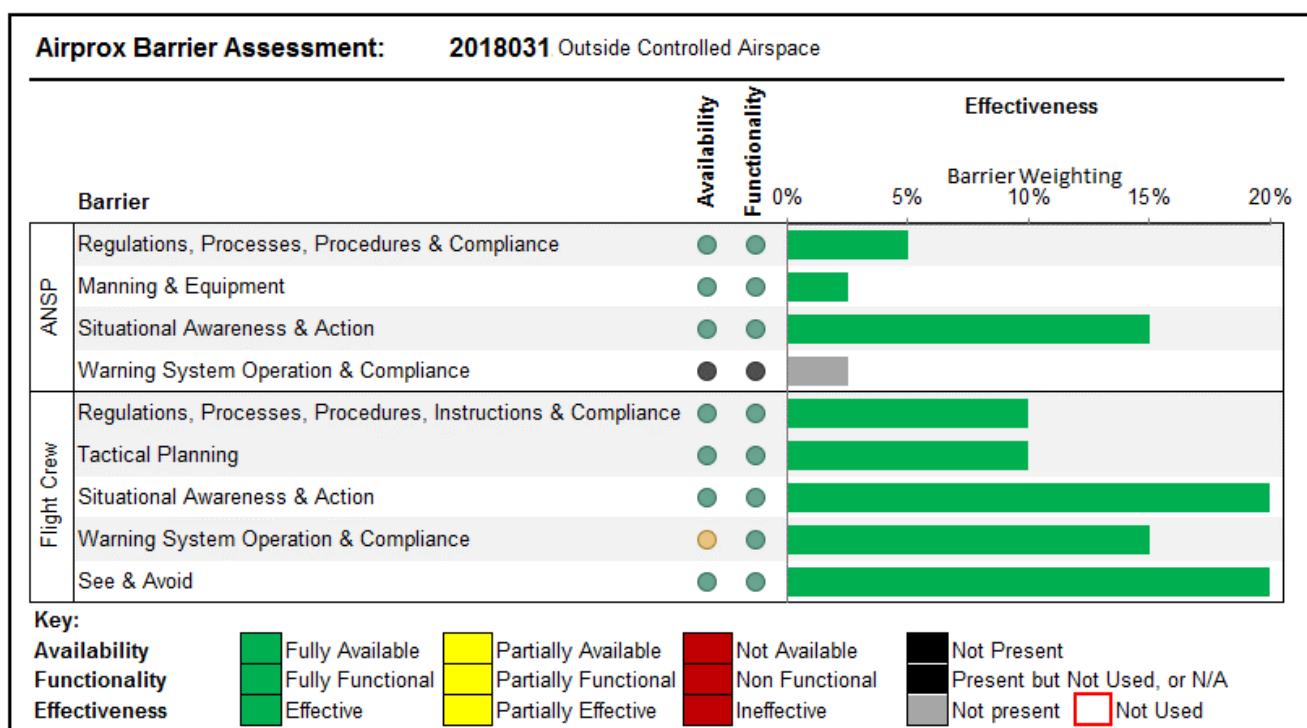
Recommendation(s): USAFE(UK) re-brief their aircrew and controllers on the need to anticipate the effect of aircraft flight vector on other aircrafts' TCAS.

Safety Barrier Assessment³

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

Flight Crew:

Warning System Operation and Compliance were assessed as partially available because the F15s did not have an electronic collision warning system. Nevertheless, the barrier was fully effective in that the RC135 was able to react to the F15s.



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