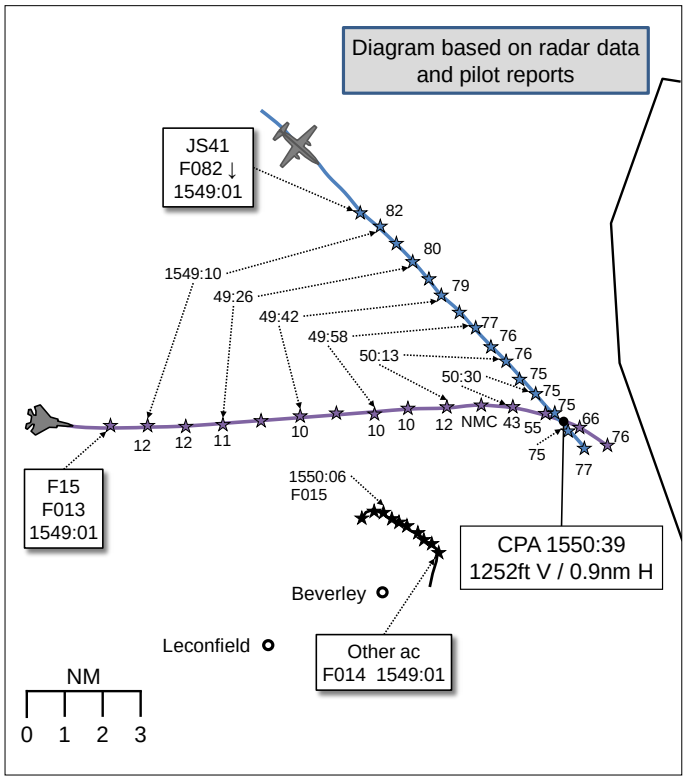
AIRPROX REPORT No 2013037

Date/Time:	16 May 2013 1550Z	
Position:	5358N 00014W (9nm NE of Leconfield)	
Airspace:	London FIR	LFA11
	(*Class*: G)	(*Class*: G)
	Reporting Ac	*Reported Ac*
Type:	Jetstream JS41	F15E
Operator:	CAT	Foreign Mil
Alt/FL:	FL80	FL80
Weather:	IMC	VMC
Visibility:	NR	20km
Reported Separation:		
	NR V/1nm H	NR V/NR H
Recorded Separation:		
	1200ft V/>0.1nm H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JETSTREAM (JS41) PILOT reports descending to FL75 in intermittent IMC at 245kt under a DS from LATCC(Mil) NE. The crew received TI on LL traffic that they correlated with a return indicating 6000ft below on the aircraft's TCAS display; LATCC(Mil) NE advised them to turn on to 140° to remain clear of the other ac, and then handed them over to Humberside Radar [UKAB Note 1: the heading of 140° was to achieve the gap between radar returns required by DS minima against an ac squawking 3/A 7010 which was not physically involved in this Airprox]. During their initial call to the Humberside APR controller, and before 2-way communication had been established, the crew received a TA, on the previously correlated traffic, they thought. The return which they could see on their TCAS display was climbing and was indicating 3000ft below them [UKAB Note 2: this was in fact the F15 and not the ac squawking 3/A 7010. The JS41 pilot subsequently reported that he did not notice that the two events were related to different TCAS returns because the crew were scanning between the TCAS, the instruments and the sky]. The crew reports that 'within a second' of receiving the TA they received an RA instruction to climb and the Pilot Flying (PF) disengaged the autopilot and followed the instruction. A few seconds later the TCAS indicated that the conflict had been resolved. However, when they subsequently established 2-way communication with Humberside Radar, the controller issued an avoiding action turn on to 190°. The crew informed APR that they were clear of conflict, hdg 190° and descending to FL75; normal communications were established and the ac continued to its destination. The crew did not see the F15 other than on the TCAS display.

He assessed the risk of collision as 'Medium'.

THE F15 PILOT reports free-calling LATCC(Mil) E on the Initial Contact Frequency (ICF) for an ATS. They had been LL, hdg 142°, VMC, and had commenced a climb using their radar to search for traffic; they contacted LATCC(Mil) E on passing 4000ft, who instructed them to Squawk 3/A 6064. As the ac levelled at FL100, LATCC(Mil) E passed TI on traffic '12 o'clock, 1nm, at FL80' and asked if the crew could see it. The crew answered that they could not see the other ac, and that they had levelled at FL100. LATCC(Mil) E acknowledged, agreed a TS and instructed the crew to take up their own navigation to their base.

He assessed the risk of collision as 'Low'.

THE HUMBERSIDE RADAR CONTROLLER reports operating as the OJTI mentor for a trainee. LATCC(Mil) NE called to handover the JS41 8-10nm NW Hornsea, descending to FL70, he thought, under a DS. LATCC(Mil) NE had put the ac on a radar hdg of 140° to achieve a gap against a conflicting ac squawking mode 3/A 7010 but offered to turn the JS41 back towards OTR. Humberside Radar observed the F15 tracking E at 'low-level', around 5nm SW of the handover point and assessed that the suggested turn would place the JS41 'directly over' the F15. Consequently, Humberside Radar refused the turn, identified the JS41 and passed their contact frequency to LATCC(Mil) NE. Humberside Radar assessed that the relative speeds of the ac meant that the F15 would pass in front of the JS41, achieving a gap. At the same time as the JS41 crew contacted Humberside Radar, the controller observed the F15 squawk change to 6064 and the ac climbed rapidly 'in close proximity' to the JS41. Humberside Radar issued an avoiding action turn on to 170° and at the same time the JS41 crew responded to a TCAS RA. The Controller reports seeing the F15's return pass less than 1nm to the E of the JS41's return, indicate a climb to FL100 and then turn to track S along the coast.

THE LATCC(Mil) NE CONTROLLER reports that he was not made aware of the Airprox at the time of the event and does not recall the event. He reports that, although he would have carried out the handover to Humberside Radar, it is likely that he had handed over the control position before the actual Airprox took place.

THE LATCC(Mil) E CONTROLLER reports that his workload was 'high to medium' with 3 other ac on frequency when the F15 crew free-called; the task difficulty was described as low and it had been 25 minutes since his last break. The F15 crew free-called climbing to FL100; the controller instructed them to select mode 3/A 6064 and scanned the screen to identify the ac. The LATCC(Mil) NE controller pointed out the F15 and asked if the ac was receiving a service from the LATCC(Mil) E controller. The LATC(Mil) E controller moved his radar screen coverage and saw a return, with the squawk he had allocated to the F15, at FL80, tracking SE, in confliction with another ac which was tracking SW at the same level. The controller passed TI to the F15 crew and asked if they were visual with the ac now in their '6 o'clock, about 1 to 2 miles'; the crew replied that they were not. Noting that the F15 was now at FL100 and the other ac was at FL80, the controller instructed them to maintain their hdg in order to increase the separation as quickly as possible. Shortly afterwards the F15 crew continued en-route to work in the area of the Donna Nook AWR.

He perceived the severity of the occurrence as 'High'.

Factual Background

The Humberside OBS at 1520Z was:

080/07 8km -SHRA SCT1800 BKN3800 +11/+8 QNH 1001

Humberside Radar was manned by an experienced controller acting as OJTI to a trainee.

The Jetstream crew were flying from Aberdeen to Humberside under IFR and in receipt of a DS initially from LATCC(Mil) NE and subsequently from Humberside Radar. They had selected strobe, conspicuity and navigation lights on and had SSR modes 3/A, C and S selected on.

The F15 crew were flying a VFR sortie, in VMC, at 379kt, in LFA11, around 25nm N of Donna Nook AWR, with position lights and beacons turned on. The crew had also selected SSR modes 3/A, S and C.

An InCAS simulation was performed by NATS and indicated the following separation which correlates closely with the separation observed on the radar recording:

CPA:	1252ft V/0.09nm H
Minimum Lateral Separation:	1520ft V/0.01nm H
Minimum Vertical Separation:	13ft V/0.59nm H

Investigation Analysis

CAA ATSI had access to Humberside RTF and the area radar recording, the Humberside radar controller's and ATSU written reports, together with the written reports from both pilots.

The JS41 was in the process of establishing two way communication with Humberside Radar following a radar handover from LATCC(Mil) NE.

The F15 was operating on mode 3/A squawk of 0401 in Low Flying Area (LFA) 11 (Class G airspace) and was in receipt of a service from Newcastle Radar on a squawk of 3761 and then on a Leeming conspicuity squawk of 0401. The F15 passed NE of Leeming and continued SE at low level towards the Donna Nook AWR. The Humberside Manual of Air Traffic Services (MATS) Part 2, paragraph 4.9.4.3 states:

> 'An observed conspicuity code is to be regarded, effectively, as an unknown aircraft, whereas an aircraft transponding on a discrete unit code may be assumed to be receiving a service from the assigned unit, where a discrete code is assigned for the purpose of identification.'

The JS41 had been pre-noted by LATCC(Mil) NE (in accordance with the joint Letter of Agreement between the units and was allocated an acceptance level of FL75, with a squawk of 4277 and frequency 119.125MHz. This would normally be on a freecall basis, provided that the ac was clear of confliction.

The Humberside Radar controller's workload was considered to be medium. Humberside Radar operate a 10cm Watchman primary surveillance radar (4 second update rate) with an SSR feed from the Claxby area surveillance radar (8 second update rate).

FACTUAL HISTORY

The JS41 was in receipt of a DS from LATCC(Mil) NE and at 1549:43, the controller, having placed the JS41 on a radar heading, contacted Humberside Radar with a radar handover. Radar showed the JS41 squawking 4277 at FL79 (Figure 1) as well as two other ac, one squawking 7010, indicating FL014, and the second, the F15, squawking 0401 indicating FL010 (an altitude of 676ft using the Humberside QNH 1001 hPa, with 1hPa equivalent to 27ft). The F15 was 4.6nm SW of the JS41.

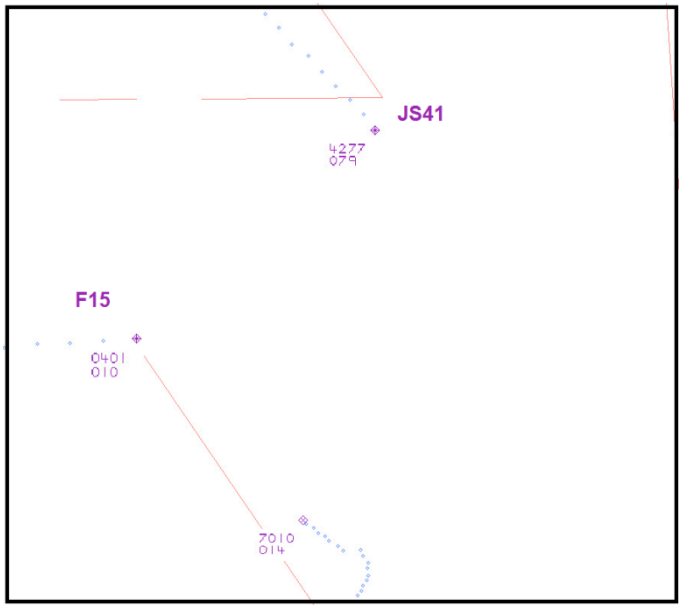


Figure 1 – Claxby & Manchester MRT at 1549:43

The F15 had been low-level for the previous 15nm and was displayed on the area MRT radar, which was likely available to the LATCC(Mil) E controller. During the radar handover the LATCC(Mil) NE

controller reported that the JS41 was bearing 350° from OTR at 15nm heading 140° and squawking 4277. The Humberside Radar controller responded, *"Contact"* and the LATCC(Mil) NE controller continued, *"Descending flight level seven zero deconfliction service just turned him ri- er left ten degrees to get a gap on the seven zero one zero squawk erm but we're happy to come to Otringham now if you are."* Humberside Radar replied, *"Er no (JS41)c/s is identified continue that heading contact Humberside radar one one nine decimal one two five."* The Humberside Radar controller's written report indicated that, from the relative speeds of the ac, he judged the 0401 squawk would pass in front of the JS41 and considered that a turn towards OTR would place the JS41 overhead the 0401 squawk. There was no discussion during the handover regarding the unknown 0401 squawk. The call was terminated at 1550:14 and at this point radar showed the two ac (JS41 and F15) converging at a range of 1.7nm. At 1550:20 the range had reduced to 1.3nm and the Mode C of the F15 was no longer shown on the Claxby radar (FL012 on MRT). The groundspeed of the F15 was 424kt (Figure 2).

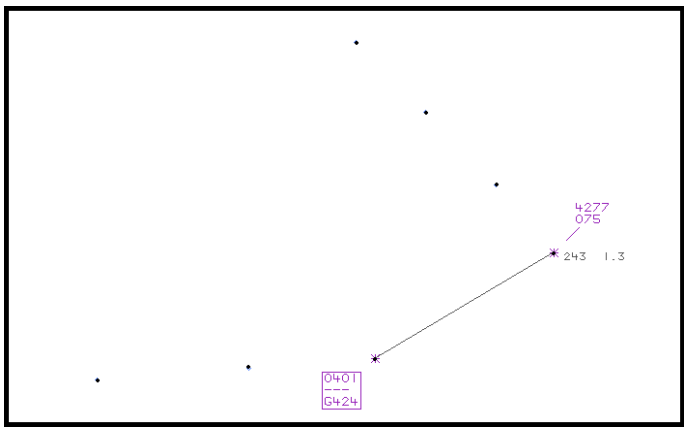


Figure 2 – Claxby single source at 1550:20

The next two successive sweeps of the Claxby radar, at 1550:28 and 1550:36, showed the F15 Mode C indicating FL043 and then FL055. (Figure 3 and Figure 4).

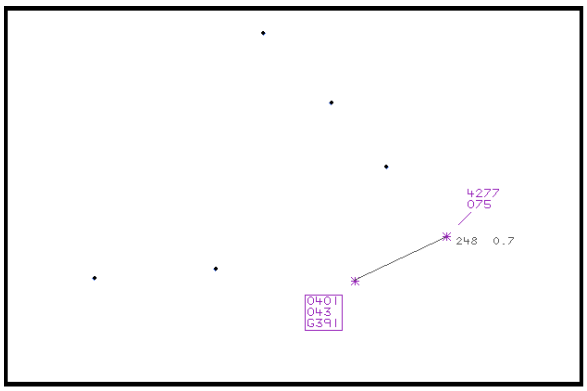


Figure 3 – Claxby single source at 1550:28

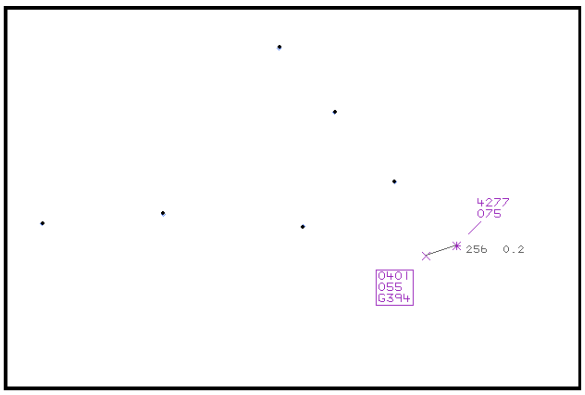


Figure 4 – Claxby single source at 1550:36

The F15 pilot's report indicated that, after passing 4000ft in the climb, he contacted LATCC(Mil) E. The ATSU investigation report indicated that the Humberside Radar controller manipulated the ac labels to avoid them overlapping, noticing the Mode C of the 0401 squawk had jumped to FL042 and then FL055 in one sweep; he thought that this might be an error due to garbling but after the second sweep recognised that avoiding action was required. At 1550:42, the JS41 contacted Humberside Radar, *"Humberside Radar good afternoon (JS41) just level flight just level flight level seven five we're on a radar heading of er one four zero degrees request deconfliction service"*.

The Humberside Radar controller replied, *"(JS41)c/s Humberside Radar identified reduced deconfliction service due to displayed clutter - and avoiding action turn er right heading one nine zero degrees traffic was ????? in your location eastbound last indicating flight level five five - now believed to be climbing."* It is likely that during this transmission the JS41 received a TCAS RA and radar

showed the JS41 climb to FL81. The JS41 pilot responded, *"????? we're now turning onto a heading of one nine zero degrees just passing flight level eight one and we'll be levelling shortly."* The Humberside Radar controller then gave further avoiding action, *"Roger that's avoiding action immediate right turn further right heading two zero zero degrees traffic now east of you turning onto a southerly heading indicating slightly above your level believed to have pulled out of low level."* This was acknowledged by the JS41 pilot.

At 1550:32, the F15 pilot was instructed to squawk 6064 by LATCC(Mil) E and the new SSR code was displayed on the next sweep of the radar at 1550:44. The Claxby radar showed that the tracks had crossed with the JS41 at FL075 and the F15 at FL066 (Figure 5).

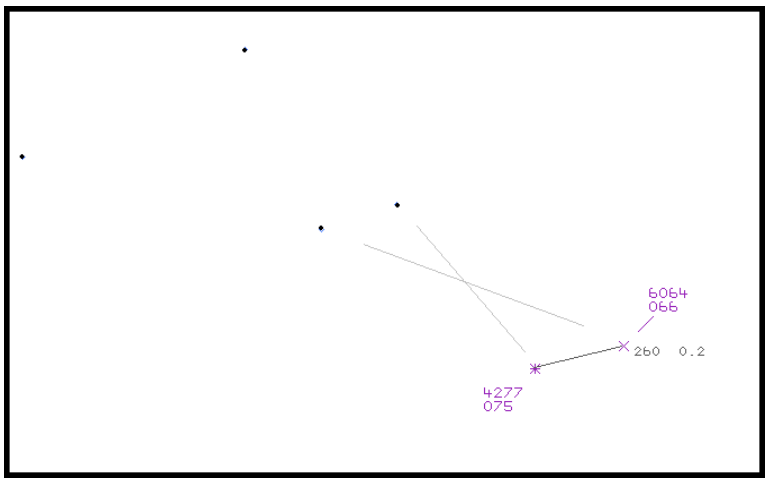


Figure 5 – Claxby single source 1550:44

The JS41 pilot's report indicated intermittent IMC at FL75 and the F15 pilot's report indicated VMC with flight visibility 20km. At no time was the F15 pilot visual with the other ac. The two ac continued to diverge and at 1551:06, the F15 was 1000ft above the JS41 (Figure 6).

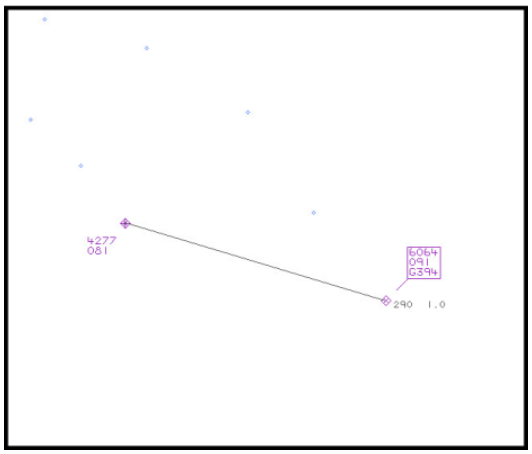


Figure 6 – Claxby & Manchester MRT at 1551:06

At 1551:41, the JS41 pilot reported, *"(JS41)c/s is now clear of conflict and descending back to flight level seven five."* This was acknowledged by the Humberside Radar controller and the JS41 was instructed to descend to an altitude of 3000ft on QNH 1001hPa.

The JS41 pilot's report indicated that he had received a TCAS TA from climbing traffic which was 3000ft below followed, during his initial transmission to Humberside Radar and before two way communication had been established, by a TCAS RA. He reported that Humberside Radar then gave an avoiding action turn which the crew accepted as they were by then 'clear of conflict'.

The JS41 was then given vectors for the ILS Runway 20 and landed without further incident.

ANALYSIS

The Humberside Radar controller reported observing the F15 flying low-level for the previous 15nm. The F15 crew had not changed SSR code after leaving the Leeming frequency and they did not select the military climb out squawk of 7001 or high energy manoeuvre squawk of 7005. During the handover neither controller referred to the presence of the 0401 squawk. As the two ac converged at a range of 1.3nm the vertical distance was 6300ft. It is likely that the Humberside controller had an expectation that the unknown 0401 squawk would remain low level. CAP 774 UK Flight Information Services, Chapter 4, page 1, paragraph 6: states:

'…The deconfliction minima against unco-ordinated traffic are:
• 5nm laterally (subject to surveillance capability and regulatory approval); or
• 3,000ft vertically and, unless the SSR code indicates that the Mode C data has been verified, the surveillance returns, however presented, should not merge…'

'…Furthermore, unknown aircraft may make unpredictable or high-energy manoeuvres. Consequently, it is recognised that controllers cannot guarantee to achieve these deconfliction minima…'

The JS41 was between frequencies when the F15 commenced a rapid climb, such that the F15's Mode C was not initially shown on the Claxby radar. When the rapid climb of the F15 was detected, the two ac were in close lateral proximity and the Humberside Radar controller's options would have been limited with very little time to react to the situation. As soon as the JS41 came on frequency the Humberside Radar controller recognised the conflict and gave avoiding action with TI. However the tracks of the ac had already crossed and the JS41 crew had already responded to the TCAS RA. From MRT data the vertical distance at the point of crossing was calculated to be 1400ft and the deconfliction minima re-established when the F15 passed FL091.

CONCLUSIONS

The Airprox occurred when the F15 crew commenced a rapid climb from low level and into proximity with the JS41 at FL75 which, following the radar handover, was in between frequencies and not at the time in receipt of an ATS.

Unknown to the Humberside controller, the JS41 had responded to a TCAS RA and on the JS41's initial call to Humberside the controller gave avoiding action.

BM SAFETY POLICY AND ASSURANCE reports that the F15 was in the process of freecalling LATCC(Mil) E Tac. The JS41 was in the process of transitioning to Humberside Radar's frequency from LATCC(Mil) NE Tac, in receipt of a DS.

LATCC(Mil) E Tac reported 'high to medium' workload and low task complexity, providing ATS to 3 ac in addition to the freecalling F15. They also noted that the F15 crew reported VMC with 20km visibility whilst the JS41 pilot reported intermittent IMC. Of concern to BM Safety Policy and Assurance was that the JS41's TCAS was unable to respond quickly enough to the rapidly developing conflict.

The incident sequence commenced at 1549:46 as the LATCC(Mil) NE Planner initiated the handover of the JS41 to Humberside Radar.

The handover between Humberside Radar and LATCC(Mil) NE Planner was completed at 1550:05; the Humberside controller reported that he was conscious of the 'ac squawking 0401' but, 'given the relative speeds, it was hoped [F15 c/s] would pass in front of the [JS41 c/s], producing the required gap'.

AIP ENR 1.6.2 Para 2.2 states that the SSR mode 3/A 7010 is for use by ac operating in an Aerodrome Traffic Pattern, when instructed to do so by an ATS unit or local operating instructions, and must be considered un-validated and un-verified.

CAP 774 Chapter 4 Para 6 states that the deconfliction minima against un-coordinated ac are '5nm laterally or 3000ft vertically and, unless the SSR code indicates that the Mode C data has been verified, the surveillance returns, however presented, should not merge. (Note: Mode C can be assumed to have been verified if it is associated with a deemed validated mode 3/A code)'. MMATM Ch 35 Para 11 Para 5c states that 'where a controller can ascertain from the Code Allocation Plan that a discrete Mode 3/A code has been assigned by a unit capable of validating the code, and has not been notified that the code is corrupt, then that code can be deemed validated'. CAP 493 Section 1 Chapter 5 Para 4.4 states similar. Of note, none of these documents place a geographical limitation on this deeming rule, such that the observed mode 3/A code must be within the area of responsibility (AoR) of the unit to whom it is assigned within the Code Allocation Plan.

At 1550:22, as the JS41 pilot read back the frequency for Humberside to the LATCC(Mil) NE Tac, the F15's SSR Mode C 'dropped out', suggesting that it had initiated a rapid vertical manoeuvre. At this point, the F15 was 1.2nm WSW of the JS41, tracking E'ly and, on the previous sweep of the radar, was indicating 1200ft; the JS41 was level at FL75.

At 1550:23, the F15 crew free-called LATCC(Mil) E Tac, passing their callsign and were instructed by LATCC(Mil) E Tac to, "*squawk 6-0-6-4, pass message*." The F15 crew read back the squawk at 1550:30 and stated that they were, "*requesting to route Flight Level one hundred, traffic service…* [garbled but believed to be en-route to a point of destination]." As the F15 crew read back the SSR mode 3/A code, the Mode C data became visible on the radar replay, indicating a climb through 3800ft, 0.5nm WSW of the JS41; Figure 7 depicts the incident geometry at this point.

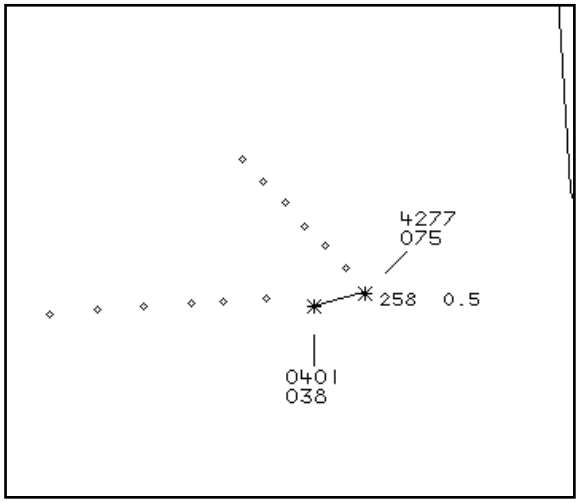


Figure 7: Incident Geometry at 1550:30

CAP 413 Chapter 3 Para 1.51 states that the initial call of an en-route VFR flt to an ATS unit should 'only include the minimum information needed to establish the service that an en-route flight requires' and that the ATS unit will 'respond with their callsign and "Pass Your Message" (optional)'. CAP 413 Chapter 3 Para 1.6.3 goes on to state that 'when instructed by the ATS unit to pass your message details, the reply [from the ac] should contain the following information, whenever possible in the order specified: the ac's c/s and type, departure point and destination, present position, level and additional details or intentions'.

The F15 crew called LATCC(Mil) E Tac on the East ICF approximately 10nm N of the boundary between LATCC(Mil) E and NE airspace; consequently, the LATCC(Mil) E Tac's surveillance display was centred on the E AoR, which delayed their subsequent identification of the F15. However, due to the timing of the F15 crew's initial call in relation to the CPA, this delay had no bearing on the incident.

The CPA occurred between sweeps of the radar at 1550:40 with no recordable lateral separation. The sweep before the CPA (:38) depicts the F15 climbing through FL58 and the sweep after (:42) depicts it climbing through FL64; the JS41 indicated FL75 throughout the incident. Figure 8 depicts the incident geometry at 1550:42. The SSR mode 3/A code assigned by E Tac to the F15 was not visible on the radar replay until 1550:50.

Given the non-standard response by the F15 crew to LATCC(Mil) E Tac at 1550:30, LATCC(Mil) E Tac had no way of determining the location and thus the identity of the F15 until the assigned SSR 3A code was displayed on their surveillance display. That said, given the timing of the F15 crew's initial call in relation to the CPA, even had the F15 crew included all of the relevant information, there would have been no time for LATCC(Mil) E Tac to have reacted and provided a warning to the F15 crew on the proximity of the JS41. Thus, whilst this Airprox has highlighted a number of additional ATM work streams, RAF ATM activity was neither causal nor contributory to this Airprox. Of concern was that the JS41's TCAS was unable to respond quickly enough to the rapidly developing conflict.

Although the F15 crew reported that they were VMC and utilising their radar to search for conflicting ac, they did not acquire the JS41 visually or electronically. Although the JS41 crew were alerted to the presence of the F15 by TCAS, they did not visually acquire the F15.

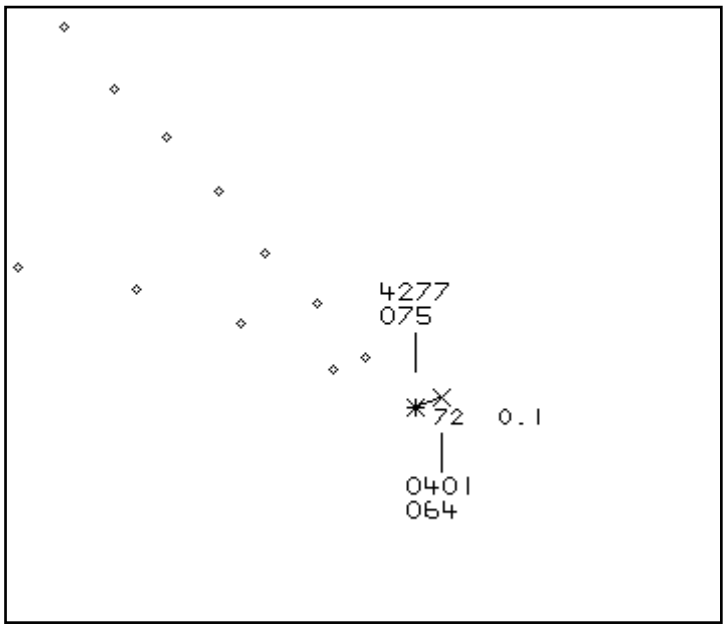


Figure 8: Incident Geometry at 1550:42

OBSERVATIONS & ACTIONS

It is noteworthy that the non-standard response by the F15 crew to LATCC(Mil) E Tac at 1550:30 was similar to that seen in Airprox 104/12 on 19 Jul 12, where the lack of detail in that F15 Formation's initial R/T call to ScATCC(Mil) was cited as a contributory factor to the Airprox. Following this incident, LATCC(Mil) have sought to engage with USAFE staffs at RAF Lakenheath but BM SPA have also highlighted this issue to the MAA, requesting that they monitor the situation to determine whether further Regulatory action is required.

Whilst the assumption by the LATCC(Mil) NE Tac and Planner that the F15s SSR mode 3/A code was validated and verified was neither causal nor contributory to this incident, this Airprox has identified a potential area for additional work. In this instance, the F15 was operating approx 50nm ESE of RAF Leeming, 106nm NNE of Birmingham and 98nm NNW of RAF Lakenheath and the SSR mode 3/A code could reasonably have been assigned to the F15 by any of those units. What is clear is that the F15 had gone en-route from Leeming and had not selected the appropriate low-level conspicuity mode 3/A code. Although it could be argued that deeming SSR data to be valid and verified outside the AoR of the unit to whom it is assigned is not a 'good practice', there is no reason

to make this assumption based on extant Regulation. Moreover, whilst some form of safety promotional activity to highlight to aircrews the importance of appropriate SSR mode 3/A code selection whilst flying autonomously would be appropriate, there may be an opportunity to highlight this issue through Regulation. BM SPA has requested that the MAA and CAA examine the current Policy and Regulation to determine a suitable course of action to address this issue.

LATCC(Mil) and BM SPA will include conspicuity code awareness in forthcoming safety promotional activity.

USAFE comments that a number of factors coincided to negate any preventative action: the JS41 was outside of the F-15E's radar cover; the JS41's TCAS was unable to respond quickly enough; the JS41 was between frequencies; and the timing of the F-15E's free call to LATCC(Mil) E Tac. The F-15E pilot said subsequently that he detected a slight hesitation or inflection in the controller's voice and immediately switched the radar from its 'search' mode to 'guns' mode, a move which still failed to reveal the JS41, probably because it was already behind him. Although not affecting the outcome, BM SP&A's comments are noted.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the Board consisted of the reports from the pilots of both ac, the air traffic controllers involved, and radar recordings and RT transcripts.

The Board first discussed the matter of the incorrect squawk being displayed by the F15 and its effect on the ATC service. Although it was agreed that it would have been more appropriate for the ac to have squawked Mode 3/A 7001 to indicate a low flying ac, and that this may have made the Humberside Radar controller more wary of the track, nonetheless, the ATC members agreed that it was unlikely to have changed the course of events because Humberside Radar would have been unlikely to have delayed the hand-over even if 7001 was being squawked given that they were indicating more than 6000ft apart at that point. Unfortunately, the Airprox sequence commenced whilst the JS41 crew were changing frequency, and the F15's Mode C display disappeared at the same time, so the Controllers could not have reacted any more quickly than they did.

The discussion then turned to the actions of the ac crews. It was noted that the JS41 was reporting IMC whilst the F15 was reporting VMC at the time; the JS41 crew had established a DS for their descent, and their actions were appropriate. The USAFE Advisor had discussed the meteorological conditions with the F15 crew, who confirmed that the weather was clear in their area, with perhaps some 'wispy' cloud around. They also confirmed that they were carrying out a controlled climb from low-level using their radar to search ahead. A pilot member noted the F15's significant rate of climb for a short period, and that its Mode C display had been lost at around this time; Mode C output is lost when rate of climb exceeds 8000fpm, and the member opined that this may have been the reason. The effect of the loss of Mode C was that the JS41's TCAS could not respond until it returned.

Pilot Members advised that a more appropriate climb-out profile for the F15 would have been to climb to the cloud-base (Humberside METAR indicating BKN at 3800ft), establish 2-way communication and an ATS with LATCC(Mil), and then commence further climb. It was also noted that, if the F15 crew had made a standard initial call they may have facilitated a faster identification, but it was felt that given the high rate of climb, it would not have changed the sequence of events on this occasion.

The Board agreed that, although the JS41 crew had responded to the TCAS RA, the loss of Mode C data had reduced the warning time given by TCAS; the Members agreed that the InCAS simulation CPA of 1252ft V and 0.09nm H indicated that there had been a risk of collision, and that safety margins had been reduced, thereby resulting in a Risk Grading of B.

The Board agreed that the safety barriers pertinent to this Airprox were: 'ATC rules and procedures', 'controller action', 'aircrew rules and procedures', 'visual sighting', 'aircrew action', 'situational awareness gained from RT', 'situational awareness gained from on-board systems', 'situational awareness gained from ACAS' and 'compliance with a TCAS RA'. The Board concluded that 'aircrew

rules and procedures', 'visual sighting', 'aircrew action', 'situational awareness gained from RT' and 'situational awareness gained from on-board systems' had not been effective; the remaining barriers had provided a minimal effect so the Airprox was allocated an Event Risk Classification score of 502.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F15E pilot climbed into conflict with the JS41, which he did not see.

Degree of Risk: B.

ERC Score: 502.