

## AIRPROX REPORT No 2014017

Date/Time: 24 Feb 2014 1205Z

Position: 5243N 00341W  
(20nm WNW of NITON)

Airspace: North Wales MTA      (Class: G)

Aircraft 1      Aircraft 2

Type: BAe146      Hawk

Operator: HQ Air (Ops)      HQ Air (Ops)

Alt/FL: FL130      13,000ft  
NK

Conditions: VMC      NK

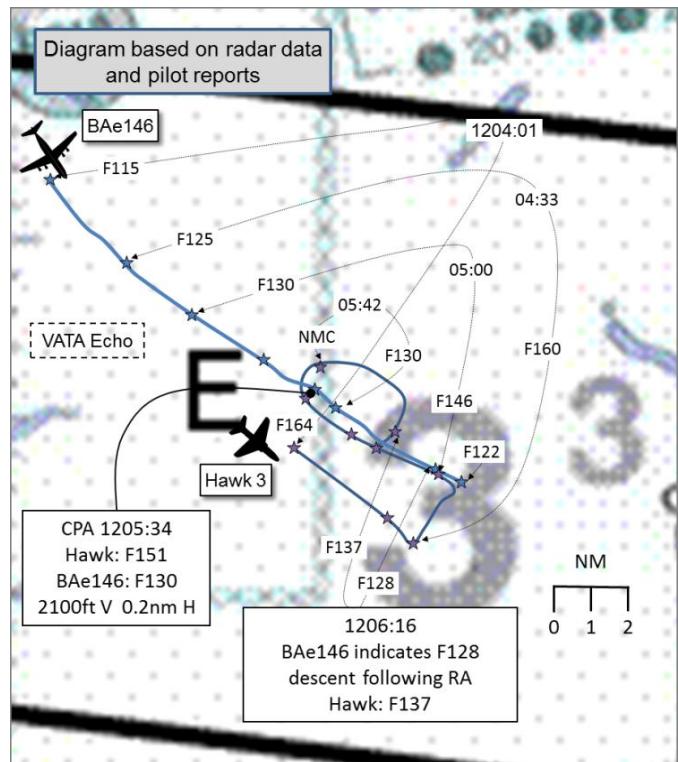
Visibility: 40km      60km

Reported Separation:

200ft V/NK H      2000ft V/1nm H

Recorded Separation:

2100ft V/0.2nm H



## PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

**THE BAe146 PILOT** reports flying a predominantly white aircraft, VMC, clear above cloud, with 'navigation, beacon and strobe' lights turned on, squawking transponder Modes 3/A,C and S, and with TCAS fitted. They had successfully completed a practice diversion and training approaches at RAF Valley, and were routing via NITON. Climbing to FL130 on departure from Valley, passing FL89, the crew were told to stop climb at FL90, which they 'inevitably overshot'; the aircraft was recovered to FL90. Having established radio contact with London Mil and having agreed a Traffic Service routing direct to NITON at FL90, the crew became aware of London Mil attempting to establish a deconfliction plan with a Hawk formation by limiting them to operate at FL110 and above. The BAe146 pilot recalls that the Hawks could not comply with the co-ordination due to their training needs, and so London Mil gave the BAe146 crew a new radar heading and then cleared them to climb to FL130; subsequently, they were re-cleared direct to NITON. At 'approximately 1205', around 15nm to the northwest of NITON, whilst heading 130°, the BAe146 pilot received Traffic Information on traffic in their 1130 position; the crew acquired it visually and identified it as a Hawk, which was manoeuvring approximately 1000ft above them and moving closer laterally; the crew informed London Mil that they were visual with the reported traffic. They subsequently received a TCAS 'Traffic Advisory' which correlated with the Hawk's position as it passed them, on a reciprocal heading, down their right-hand side, maintaining approximately 1000ft above them; once the Hawk had passed behind them the Traffic Advisory ceased. Approximately 60sec later, around 11nm northwest of NITON, and with no further warning from London Mil or TCAS, the crew received a 'Descend' RA<sup>1</sup>, which they followed in accordance with standard operating procedures. None of the BAe146 crew could see the Hawk, 'or any other contact' during the RA, but the PNF<sup>2</sup> noted from the TCAS display that the RA contact was indicating 200ft above their altitude when the RA manoeuvre was commenced. Simultaneously with the RA manoeuvre, the crew were aware of communication between a Hawk callsign and London Mil, which included information about the BAe146, and was immediately followed by updated Traffic Information, to them on the Hawk, to which the BAe146 pilot replied 'TCAS RA descending'. On passing through FL123, the TCAS announced 'Clear of Conflict' and the crew re-commenced their climb to FL130 and informed London Mil of their actions.

He perceived the severity of the incident as 'Low'.

<sup>1</sup> Resolution Advisory – a TCAS instruction which is calculated to de-conflict the aircraft

<sup>2</sup> Pilot Not Flying

**THE PILOT OF HAWK 3** reports flying as the third aircraft of a formation carrying out air-combat training. He was flying VMC, clear above cloud, squawking transponder Modes 3/A, C and S with a TAS<sup>3</sup> fitted; the aircraft's lighting state was not reported. The Hawk formation were operating in the eastern portion of the North Wales MTA<sup>4</sup>. The intercept profile required a 50nm split between the 'fighter pair' (Hawks 1 and 2) and the 'hostile' Hawk (Hawk 3). The formation leader agreed a Traffic Service with London Mil, in accordance with their SOPs. The pilot reports that, having contacted London Mil at 1110:52, the formation was cleared to operate in the height block from 9000ft to 28000ft on the RPS; he recalls that this instruction was acknowledged by all of the formation pilots and the London Mil controller. At 1124:19, when the BA146 was inbound to Valley for its Practice Diversion, the BA146 crew was vectored directly beneath a visual merge between the Hawks. At 1200:25, the Hawks received Traffic Information on the BAe146 as it left Valley routing direct to NITON, which would take it directly below the 'merge area' that the Hawks had been using for the 'previous 35 minutes'. London Mil contacted the Hawk formation pilots requesting that they should manoeuvre not below 11000' for Co-ordination; at the time Hawks 1 and 2 were conducting the radar-to-visual element of an intercept, which is a period of high cockpit work-load, so the pilot of Hawk 3 responded on behalf of Hawk 1's pilot and stated that they would be unable to coordinate and would be working down to 9000': London Mil acknowledged. At 1201:42 the BAe146 pilot was passed Traffic Information about Hawks 1 and 2, which were 5nm east of his aircraft, west-bound, descending from FL130. At 1201:50 the pilots of Hawks 1 and 2 turned their aircraft to track southeast on the final phase of a radar-to-visual transition. At 1201:54 London Mil passed Traffic Information, to the pilot of Hawk 2, on the BAe146. At this point in the intercept, given the high in-cockpit workload, 'exacerbated by the high comm chatter' from London Mil, the pilot of Hawk 2 made the decision to terminate the intercept and the formation reset to their intercept start points. The pilot of Hawk 3 reports that, due to the fuel states of the formation aircraft and the pressure to complete the sortie, he suggested that they should fly an abridged profile with the formation start points only 20nm apart. At 1202:27 the BAe146 pilot was instructed to climb to FL130. At 1204:48 the BAe146 pilot was passed Traffic Information about Hawk 3, 7nm southeast of him, southeast bound at FL150. At the same time the pilot of Hawk 3 manoeuvred from the southeasterly heading to a northwesterly heading and descended to 13,000ft, which was the hostile start height for their task profile. At 1205:07 London Mil tried to call the pilot of Hawk 3 at the same time as he received a TCAS Traffic Alert on a contact in his 12 o'clock, approximately 2nm away and 1100ft below him. He manoeuvred Hawk 3 to 25° nose-up, using 4.2G to avoid the BAe146, which he saw passing underneath his aircraft. During this manoeuvre, the pilot of Hawk 3 assessed that the aircraft were separated by no less than 2000ft vertically and 1nm laterally. The pilot of Hawk 3 manoeuvred to maintain visual contact with the BAe146, positioning on a parallel track 2nm north of it; subsequently Hawk 3 was manoeuvred up and to the right to expedite separation from Hawks 1 and 2 prior to their final radar-to-visual air-combat merge. Having maintained visual contact with the BAe146 from the point of receiving a Traffic Alert to their eventual separation, the pilot of Hawk 3 did not consider this occurrence to be an Airprox. Hawk 3's pilot expressed surprise that the London Mil controller had attempted to 'thread the needle' between two elements of the formation which had, for the previous 35 minutes, been conducting high-energy air-combat manoeuvres, and had been unable to accept a reduced deconfliction block.

He assessed the risk of collision as 'Low'.

**THE LONDON MIL CONTROLLER** reports acting as OJTI<sup>5</sup> supervising another controller who had four aircraft on two cross-coupled<sup>6</sup> frequencies; Hawks 1, 2 and 3, who were in receipt of a Traffic Service, operating between 9,000ft and 27,500ft (Holyhead QNH 993hPa) on one frequency, and the BAe146, also in receipt of a Traffic Service, transiting from RAF Valley towards NITON on the other frequency. The BAe146 pilot had requested FL130 but was flying at FL090 initially, to deconflict it against the general handling Hawks, which were conducting practice intercepts running the length of the North Wales MTA. The London Mil controller asked the Hawk pilots if they could accept an increase to the base of their operating block for deconfliction, but they were unable to do so for

<sup>3</sup> Traffic Alerting System

<sup>4</sup> Military Training Area, which is sub-divided at RAF Valley in to VATAs D,E and F

<sup>5</sup> On the Job Training Instructor

<sup>6</sup> Cross-coupling allows pilots on different frequencies to hear all transmissions made on other coupled frequencies

'tactical reasons'. The BAe146 pilot was instructed to turn on to a heading of 160° to take the aircraft away from the Hawks and enable a climb. Hawk 3 was operating in the northeast corner of the North Wales MTA with Hawks 1 and 2, and then proceeded to turn south, still indicating 'well above' the BAe146. The BAe146 pilot was given 'own navigation' to route towards NITON and a climb to FL130. Hawk 3 was approximately 12nm northeast of the BAe146 with a Mode C indication of FL153 when Traffic Information was passed to the pilots of both aircraft. The London Mil controller observed that Hawk 3 had commenced a descent and passed updated Traffic Information to the pilots of both aircraft; the pilot of Hawk 3 reported visual, requested the BAe146's callsign and level. The controller recalls that Hawk 3 then turned towards the BAe146, 'went into tight turns right on top of its position' and appeared to descend, displaying a Mode C indication of FL132, despite further Traffic Information being provided. The controller then saw the BAe146 indicate a descent to FL120. After this, the pilot of Hawk 3 reported that he had been "visual throughout", and the pilot of the BAe146 reported that he had taken a 'TCAS descent' against the Hawk.

He perceived the severity of the incident as 'Low'.

**THE LONDON MIL SUPERVISOR** reports the controller's and the Unit's workloads as medium to low.

## Factual Background

The weather at RAF Valley at 1150 was recorded as:

METAR EGOV 241150Z 19018KT 9999 FEW018 SCT250 09/06 Q0999 BLU NOSIG

## Analysis and Investigation

### Military ATM

All heights/altitudes quoted are based upon SSR Mode C from the radar replay unless otherwise stated.

The BAe146 pilot was provided with a Traffic Service; the controller informed him of the Hawk 3-ship and offered the options of maintaining FL90 for the next 20nm or taking a turn to be able to climb to his requested cruise level of FL130. The BAe146 maintained at FL90 to 'fit in' with the Hawks. The Hawks pilots were asked if they could operate 'not below 11000ft' but they could not accept because 9000ft was required for the visual contact. At 1201:30 the controller requested, "[BAe146 C/S] positioning against that general handling traffic, turn right heading 160 degrees."

At 1201:43, the controller passed Traffic Information, to the BAe146 on Hawks 1 and 2 operating to the north of Hawk 3. Further Traffic Information was then passed to the Hawks on the BAe146, and, at 1202:25, the BAe146 was instructed to climb to FL130 and given own navigation to NITON. At 1204:45, as per Figure 1, the southeasterly route of the BAe146 can be seen in conjunction with the Hawk tactical manoeuvrings and Traffic Information was called, "[BAe146 C/S] traffic southeast 7 miles eastbound indicating flight level 154 descending Hawk."

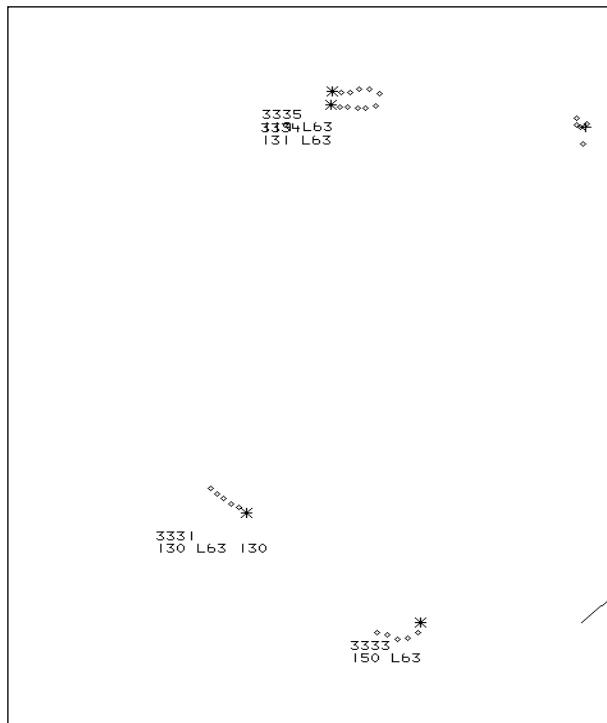


Figure 1: Aircraft geometry at 1204:45  
(BAe146 = 3331, Hawk 3 = 3333 Hawks 1 & 2 = 3334/5).

The Traffic Information was updated at 1204:56, “[BAe146 C/S] previously called traffic east 6 miles turned to the north indicating flight level 147 descending.” Traffic Information was passed to Hawk 3 at 1205:04, “[Hawk 3 C/S] traffic northwest 5 miles opposite direction at flight level 130, RJ100<sup>7</sup>. Figure 2, at 1205:04 shows the closing distance of the aircraft; the BAe146 is at FL130 and the Hawk is at 14,500 feet, 993 HPa. Hawk 3 copied the traffic and requested a confirmation of the height.

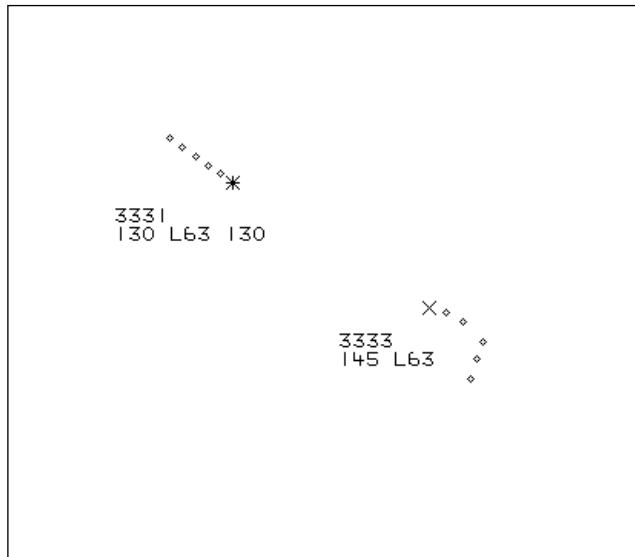


Figure 2: Aircraft geometry at 1205:04.

At 1205:19, Traffic Information was updated to the pilot of Hawk 3, “[Hawk 3 C/S] previously called traffic northwest 2 miles opposite direction at flight level 130.” As per Figure 3, the aircraft have 2.6nm separation and 1100ft on Mode C. The pilot of Hawk 3 reported visual at 1205:25.

<sup>7</sup> RJ100 = BAe146

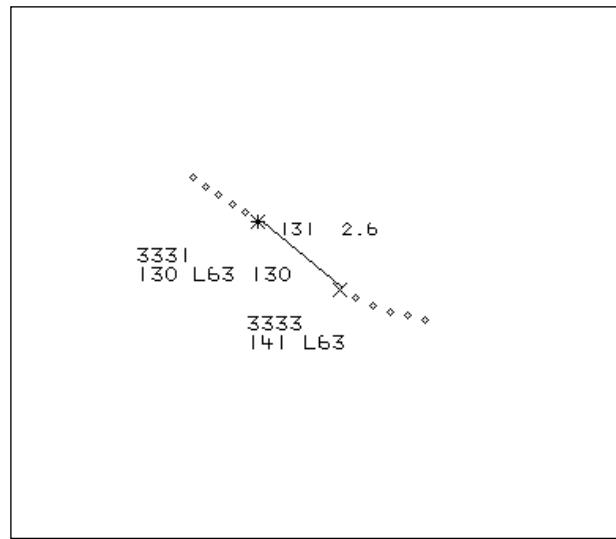


Figure 3: Aircraft geometry at 1205:19.

At 1205:30, the controller transmitted, “[BAe146 C/S] traffic passing down your right hand side, Hawk at flight level 140.” The BAe146 pilot reported visual. The radar replay shows a lateral separation at 1205:34 of 0.2nm and 2100ft vertical separation, as per Figure 4.

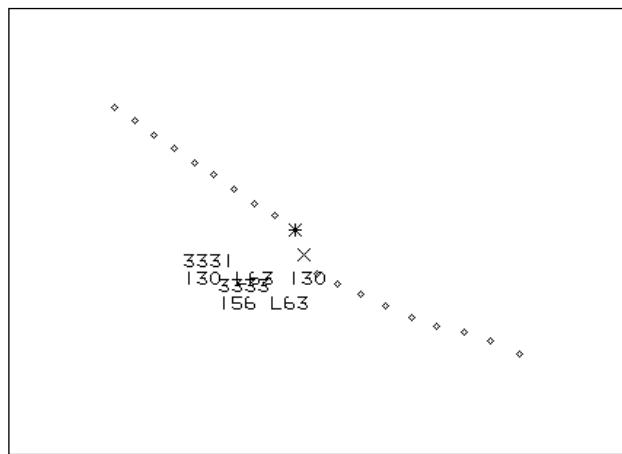


Figure 4: Aircraft geometry at 1205:34.

At 1205:58, height separation was 200ft with a lateral separation of 1.6nm, as per Figure 5.

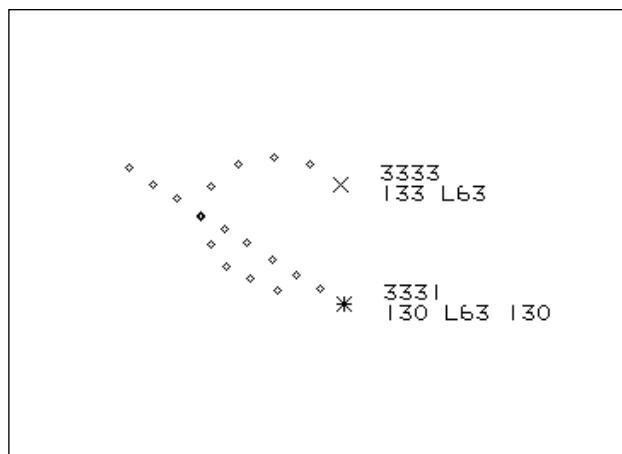


Figure 5: Aircraft geometry at 1205:58.

Traffic Information is passed again at 1206:11 as per Figure 6, “[BAe146 C/S] previously called traffic north half a mile turning south flight level 135 climbing.” The controller passed an update to

the Hawk pilot, “[Hawk 3 C/S], previously called traffic southeast half a mile tracking southeast flight level 126 descending.” The Hawk replied that he was visual throughout and, at 1207:18, the BAe146 crew confirmed that they had had a TCAS descent and were level at FL130 again.

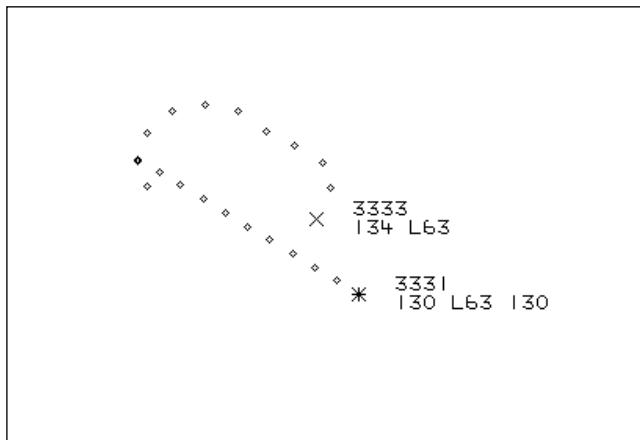


Figure 6: Traffic Information as at 1206:11.

The LATCC(Mil) controller attempted to build in lateral and vertical separation and, when this was not available, he passed Traffic Information and cross-coupled the frequencies so that all elements had awareness of the other traffic. The Traffic Information was accurate and persistent. The crews were operating in Class G airspace in VMC conditions and reported visual as they were on converging headings. The pilot of Hawk 3 manoeuvred his aircraft in a way that triggered a TCAS RA descent for the BAe146 crew. Although the Hawk pilot could see the BAe146 throughout the encounter, as he turned to the right the Hawk was above and behind the BAe146 and out of sight of its crew.

There were several barriers which were pertinent to this occurrence. The controller provided Traffic Information, the crews maintained a lookout, and TCAS provided updates and a Resolution Advisory, which was followed. The Hawk 3 pilot did not consider the incident to be an Airprox and all parties considered the risk of collision as ‘low’. Although the Hawk pilot was visual and all parties had TCAS and Traffic Information to provide situational awareness, the manoeuvrings of the Hawk resulted in a TCAS RA that had to be followed by the BAe146 crew.

### **UKAB Secretariat**

When the aircraft were approaching head-on both pilots were required to alter course to the right.<sup>8</sup> After the initial merge, Hawk 3 turned right and was overtaking, so the BAe146 had right of way and the Hawk pilot was required to keep out of its way.<sup>9</sup>

### **Comments**

#### **HQ Air Command**

It is disappointing that this incident resulted in an Airprox at all – both pilots had received persistent and accurate Traffic Information and were visual with each other’s ac at sufficient range to have generated enough separation to have not triggered the BAe146’s TCAS. Different perceptions of what constitutes ‘safe separation’ depend on whether it is a mandated separation to be achieved by a controller or whether it is the opinion of a pilot of a particular ac type flying in VMC – in this case the Hawk pilot considered that the separation he gave to the BAe146 was sufficient, but probably did not appreciate that his manoeuvring would trigger the RA on the BAe146’s TCAS, which the BAe146 pilot was obliged to follow.

<sup>8</sup> Rules of the Air 2007, Rule 10, Approaching Head-on as reflected in RA2307

<sup>9</sup> Rules of the Air, 2007, Rule 11, Overtaking

## **Summary**

An Airprox was reported between a Hawk and a BAe146, 20nm west-northwest of NITON. The Hawk was number 3 in a formation of 3 Hawks conducting high energy manoeuvres for a training sortie, receiving a Traffic Service from a London Mil controller. The BAe146 departed RAF Valley heading towards NITON and was also under a Traffic Service from the same London(Mil) controller.

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

Information available included 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 noted that there were many factors influencing this Airprox, not least of which being perceived operational pressure on the Hawk pilot to complete his sortie and his perception of suitable separation regarding TCAS-equipped large aircraft.

Members quickly agreed that the initial encounter between the aircraft had been normal, with both pilots able to see each other's aircraft and maintain acceptable separation. The subsequent right turn from the Hawk 3 pilot was also sensible from a tactical and a safety point-of-view. Notwithstanding, members were disappointed that he did not then give the BAe146 a wider berth as he positioned himself; particularly as he had elected to adopt a fairly high rate of descent as he continued to turn right in relatively close proximity around the BAe146. Members wondered whether this decision could indicate that the Hawk pilot did not fully appreciate how TCAS works and that the predicted vector of his aircraft would trigger an RA onboard the BAe146 if he pointed at it at those ranges. In this respect, at representative speeds and altitudes, TCAS is likely to generate an RA when within 3-4nm on the beam and 5-6nm in the head sector of the BAe146.

Members wondered if ATC could have done more to avert the confliction, perhaps by giving the BAe146 crew an orbit until the Hawks had completed their intercepts. ATC members pointed out that this would not have been expeditious, and that the BAe146 crew had the same right to operate in the Class G airspace as the Hawk pilots did. With all of the aircrew operating under Traffic Services and being made aware of each other's aircraft to the extent that they were visual with each other, the Board agreed that the London Mil Controller had satisfied his responsibilities as evidenced in the normal initial encounter between the 2 aircraft: it had been the actions of the Hawk 3 pilot after this that had caused the TCAS RA and hence the Airprox.

There was some discussion as to whether the degree of risk was a C (because effective and timely actions had been taken), or an E (because normal safety parameters had been maintained). The Hawk's predicted trajectory had momentarily triggered a TCAS RA, and the Board agreed that the Hawk 3 pilot could have done more to avoid this. However, he had kept the BAe146 in sight throughout, and there had been no real risk of collision; the Board agreed that the risk was Cat E.

## **PART C: ASSESSMENT OF CAUSE AND RISK**

Cause: The Hawk pilot flew close enough to trigger a TCAS RA.

Degree of Risk: E

ERC Score<sup>10</sup>: 2

Recommendation(s): HQ Air Command raises awareness of flight vector on generation of other aircraft TCAS RA.

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<sup>10</sup> Although the Event Risk Classification (ERC) trial had been formally terminated for future development at the time of the Board, for data continuity and consistency purposes, Director UKAB and the UKAB Secretariat provided a shadow assessment of ERC.