

## AIRPROX REPORT No 2012117

Date/Time: 9 Aug 2012 1143Z

Position: 5236N 00005E (17nm  
WSW of Marham)

Airspace: London FIR (Class: G)

Reporting Ac Reported Ac

Type: Grob Tutor TMk1 Typhoon T Mk3

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

Alt/FL: 7000ft↑ 5000-  
RPS (1023hPa) 28000ft↑↓  
RPS (1023hPa)

Weather: VMC CLAC CLOC

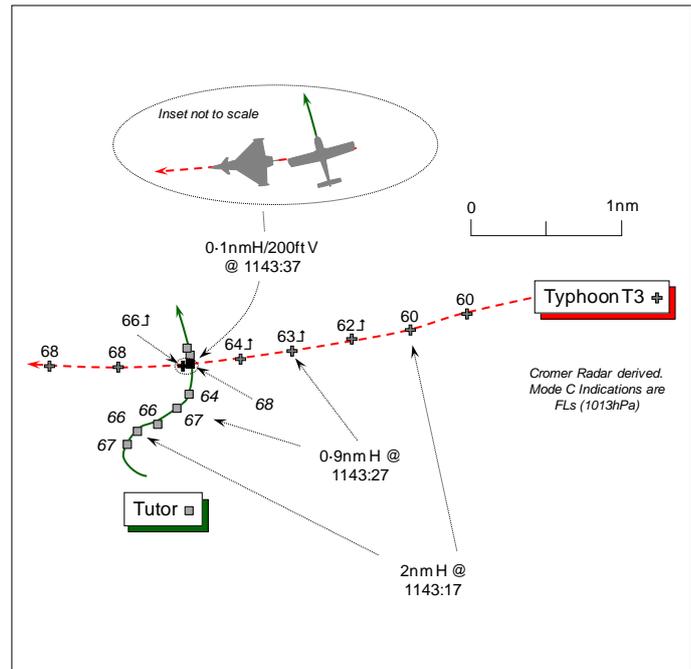
Visibility: 30km 10km+

Reported Separation:

50ft V/250ft H Not seen

Recorded Separation:

~200ft V/0.1nm H



## PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

**THE GROB TUTOR TMk1 PILOT**, a QFI, reports he was instructing an elementary flying training student on a routine IF sortie - Instrument Flying 2. This sortie commences with a SID from Wyton to pick up radar vectors for a PAR at Marham on RW24, overshoot and depart to the SW for IF climbing, turning and descending practice followed by a visual RTB to Wyton.

On completion of the PAR at Marham, the Tutor ac was climbed through cloud under a DS from Marham ZONE on 233.075MHz then, once VMC, they continued under a 'reduced' TS. The student, who was wearing an IF hood, then performed some IF turns. Having successfully completed these he began to teach the student the IF 45° AoB level turn to the R at 100kt. A full lookout scan to the R was completed as well as a scan of the Traffic Alert System display (TAS), which was clear. About 5secs into the R turn a contact appeared on the TAS, along with the automated audio warning, in the 4 to 5 o'clock position at about 1nm, 500ft below, climbing and moving rapidly. As neither he nor his student had visual contact with the other ac he rolled his Tutor level just as Marham ZONE alerted him to the conflict. The contact was still approaching rapidly and now showing on TAS 200ft below within 0.5nm but they still did not have visual contact. To avoid the other ac he attempted to climb and turn his aeroplane; climbing through 7000ft Chatham RPS (1023hPa) [on a N'ly heading] with further automated audio warnings coming from the TAS, he saw a Typhoon in a slight climbing attitude passing under the nose of his Tutor from R – L at high speed, some 50ft below his aeroplane with horizontal separation of about 250ft and a 'high' Risk of collision. He confirmed visual contact on the Typhoon to ZONE and they recovered back to Wyton without further incident.

The ac is coloured white; the HISLs were on. A squawk of A3661 was selected with Modes C and S on.

**THE EUROFIGHTER TYPHOON T Mk3 PILOT** reports he was conducting a passenger flight in Class G airspace during the period of this Airprox, which occurred at 7000ft, he thought, some 10nm W of Marham. He was operating under a TS with London MILITARY in a block from 5000ft to 28000ft amsl (1023hPa). He did not have any recollection of traffic called to him by the controller in the Marham area, nor had he correlated any radar tracks in the location of the Airprox, which was confirmed from a review of the ac's recorded AI radar data. He was not visual with a Tutor at the time of the Airprox and was only made aware of the incident the following day.

UKAB Note (1): The Typhoon pilot initially perceived that he had not descended below 7850ft, which was the lowest indicated height on the HUD recording but apparently for a different time and location. The lowest indicated SSR Mode C for the Typhoon during the incident sequence was FL59 equating to about 6300ft RPS (1023hPa), just before the Airprox occurred.

**THE MARHAM APPROACH CONTROLLER (APP)** reports that because of light traffic levels over the lunch period he was also monitoring the DIRECTOR's frequencies from the same control position but did not receive any calls during the period. In the 15mins leading up to the Airprox his workload comprised only the subject Tutor transiting back to Wyton, a Tornado making a visual recovery to Marham and a pair of Tornado GR4s departing Marham for GH over the Norfolk coast, [plus another Tutor] so he was operating well within his capacity.

On departure from Marham, the Tutor was under a TS that was upgraded to a DS at the request of the pilot for a brief period until he achieved VMC, when once more a TS was requested and provided. At the time of the Airprox, about 1143Z, the pair of GR4s were operating in a block of airspace up to FL190 in the vicinity of Blakeney Point under a TS; Blakeney Point is approx 30nm NE of Marham with CAS a further 8nm to the N, so his attention was divided between the Tutor transit and monitoring the GR4s to ensure they did not infringe CAS. Blakeney Point is routinely used as a radar handover point from London MILITARY, but it is also used as a holding area by F-15 ac prior to working in Holbeach AWR. A recent Airprox involving GR4s and F-15s in that location meant that he was particularly conscious of scanning for conflicting traffic in that area. The Tutor and the GR4s were separated by around 45nm and whilst routinely scanning his radar display between them he spotted a very fast moving contact approximately 2-3nm E of the Tutor, indicating below the Tutor's level but climbing. He immediately called this conflicting traffic to the manoeuvring Tutor crew at a range of 2nm and shortly afterwards the Tutor pilot reported visual with the conflicting ac. The remainder of the period that he was controlling the Tutor was uneventful and the ac recovered to Wyton. The Tutor crew did not report an Airprox to him on frequency at the time of the incident, nor was there any hint in the crew's communications for the remainder of time on frequency – about 14mins - that an Airprox had occurred. It was not until the following morning that the Airprox was brought to his attention, so these details are recalled from memory to the best of his ability.

**THE LATCC (MIL) NE TACTICAL CONTROLLER (NE TAC)** reports he was controlling 4 ac during this period, with a PLANNER on duty; the subject Typhoon conducting GH in the East Anglian MTRA, an ac conducting an air test - non-squawking - also in the East Anglian MTRA and two high level transits to the N in the OTBED area at FL300 and FL400 respectively. Whilst NE PLANNER was on the line to Marham taking a pre-note, he extended the displayed radar range out to about 148nm to scan for any conflicting traffic in the MONTROSE Sector against the two high level transits. Whilst this range was selected the Typhoon turned and descended SW bound, at which point he has been informed that an Airprox occurred. The Typhoon pilot did not mention an Airprox on the RT and he did not remember the incident.

**BM SAFETY MANAGEMENT** reports the Tutor pilot was conducting simulated IF WSW of Marham in receipt of a 'reduced' TS from Marham APP; the Typhoon pilot was operating within the East Anglian MTRA in receipt of a TS from LJAO NE TAC.

The Typhoon pilot reported operating in the block 5000ft to 28000ft RPS (1023hPa) with +10km visibility in nil weather and SCT cloud at 5000ft. The Tutor's pilot reported operating at 7000ft on the RPS (1023hPa) with 30km visibility in clear with cloud at 5500ft.

LJAO NE was manned by both a TAC and PLANNER controllers; however, due to a number of factors outwith the unit's control, it was not until some days after the Airprox that the controllers involved were requested to submit DASORs. Consequently, their ability to recall the event had understandably reduced. In addition to the Typhoon operating within the East Anglian MTRA, NE TAC was providing an ATS to a C130 with an unserviceable transponder conducting an air test within the East Anglian MTRA and 2 further individual ac transiting N at high level. Although NE TAC was unable to recall their perception of their workload and task complexity, BM SM contends that this traffic loading and scenario represented moderate to high workload and task complexity. The ATS

provided to those ac operating within Class G Airspace was not 'reduced' due to high traffic density or controller workload.

Due to low traffic levels at Marham, APP was band-boxed with DIR and ZONE, with a SUPERVISOR present; the unit did not provide a DASOR narrative from the SUPERVISOR. At the time of the Airprox, in addition to the Tutor on UHF, APP was providing an ATS to an un-related pair of GR4s manoeuvring in the vicinity of Blakeney Point on ZONE UHF, and 3 other ac on ZONE VHF; these ac were operating 9.8 and 23.6nm NE and 17.5nm NW of Marham. One of the ac, another Tutor, was in receipt of a BS; however, it has not been possible to determine the types of ATS provided to the other 2 ac. On initial contact with ZONE at 1138:42, the other Tutor pilot [not the reporting Tutor pilot] requested a TS; however the pilot was told that, "*it'll be a Basic Service due to controller workload.*" Notwithstanding the addition of this other Tutor, the workload at 1138:42 reflected that which existed throughout the incident sequence. APP, a highly experienced controller, described their workload and task complexity as 'medium'. SATCO Marham has stated that other controllers were available, albeit on a lunch break, if APP or the Supervisor had deemed the workload excessive and required an additional control position to be opened.

The surveillance based ATSs provided by APP were 'reduced' due to the selection of 'Angels Suppression' to reduce heavy cluttering of the surveillance display. Given the frequency with which the Marham surveillance display is affected by clutter, there is an entry within the FOB to this effect stating that crews will only be told that the ATS is 'reduced'.

The incident sequence commenced at 1140:57, as the Typhoon steadied on a WSW'ly track, indicating FL107; the Tutor was 14.9nm WSW of the Typhoon, tracking SW'ly indicating FL67. At this point, APP's unrelated GR4 pair were 33nm NE of the Tutor and 21 and 23nm NNE of Marham; the Tutor was 15.1nm W of Marham.

NE TAC's unrelated C130 air-test was 4.5nm NE of the Typhoon; the 2 high-level transiting ac were 48.8 and 47.2nm NNW of the Typhoon, tracking NNW'ly, at FL380 and FL300. Shortly before, at 1140:50, NE TAC had extended the surveillance display range to 146nm to facilitate scanning into ScACC Montrose sector's airspace.

Between 1140:50 and 1141:12, APP was involved in an RT exchange with an unrelated GA ac on ZONE VHF; there were no further transmissions on the ZONE UHF or VHF until after the CPA.

Between 1141:00 and 1142:00, NE TAC co-ordinated with Prestwick Centre MONTROSE Sector about the passage of one of the 2 high-level transit ac. Based upon the transcript of the NE PLANNER's landlines, this controller was not involved in any landline liaison at this point. During this period, at 1141:09, the Tutor turned onto a S'ly track and, at 1141:17, the Typhoon commenced a steady descent. At this point, the Tutor was 12.3nm WSW of the Typhoon indicating FL67. APP's unrelated GR4 pair were 34.7nm NE of the Tutor and 22.5 and 23.5nm NNE of Marham; the Tutor was 14.8nm WSW of Marham. NE TAC's unrelated C130 was 7.9nm NE of the Typhoon; the 2 high-level transiting ac were 51.3 and 49.6nm NNW of the Typhoon, tracking NNW'ly, at FL 380 and FL300.

At 1141:18, during the co-ordination with MONTROSE Sector, NE TAC reduced the range on their surveillance display to 116nm. It is reasonable to suggest that this was to enable them to scan the area around the Typhoon and/or the C130. At 1141:30, NE TAC increased the surveillance display range back to 146nm and this range setting was maintained until 1143:44 when the surveillance display range reduced to 93nm. The unit has stated that this range scale was maintained to enable NE TAC to scan for conflicting traffic in MONTROSE Sector's airspace, prior to the NE PLANNER handing the ac over. At this range scale, 1nm was approximately equal to 1.8mm on the surveillance display.

At 1141:40, the Tutor commenced a R turn; the Typhoon was 9.3nm ENE, tracking WSW'ly, descending through FL95. At 1142:09, the Tutor rolled-out of the turn tracking NW'ly; the Typhoon was 6.5nm ENE, tracking WSW'ly, descending through FL83. APP's unrelated GR4 pair was 40 and

38.8nm NE of the Tutor and 26.5 and 24.5nm NE of Marham; the Tutor was 16.6nm WSW of Marham. NE TAC's 2 unrelated high-level transiting ac were 58.4 and 57.2nm NNW of the Typhoon, tracking NNW'ly, at FL 380 and 300.

At 1142:33, the Tutor commenced a L turn onto SW before, at 1143:05, commencing a right-hand turn; at this point, the Typhoon was 3nm NE of the Tutor indicating FL59 - the lowest displayed SSR Mode C for the Typhoon during the incident sequence. Based upon the reporting Tutor pilot's account, it was shortly after 1143:05 that they received a warning from their TAS of the Typhoon's proximity, rolling the Tutor's wings level at 1143:19 as they received accurate TI from APP under the 'reduced' TS provided, "[Tutor C/S] *traffic east, 2 miles, tracking west, indicating slightly below* [radar replay shows 700ft], *climbing*" which was acknowledged immediately at 1143:24. APP did not make or receive any landline calls or RT transmissions between the start of the incident sequence and 1143:19.

Between 1142:00 and 1142:56, NE TAC did not make or receive any landline calls or RT transmissions. From 1142:56 to 1143:30 NE TAC was involved in an exchange of RT with the 2 high-level transit ac, instructing them to squawk their ScATCC (Mil) assigned SSR codes, in preparation for the NE Planner to hand the ac over. The handover commenced at 1143:08 and was completed at 1144:20.

[At 1143:33, the Tutor can be seen on radar (the FL64 Mode C is probably a spurious indication) having steadied on a N'ly track, with the Typhoon 0.5nm NE climbing through FL64. The CPA occurred in between sweeps and at 1143:37, the Typhoon, climbing through FL66, had passed beneath the Tutor that was indicating FL68 and shown at this point 0.1nm E of the Typhoon.]

At the CPA, APP's unrelated GR4 pair was 35.4 and 37.7nm NE of the Tutor and 23.1 and 24.9nm NE of Marham; the Tutor was 17.1nm WSW of Marham. NE TAC's 2 unrelated high-level transit ac were 69nm and 68.1nm NNW of the Typhoon, tracking NNW'ly, at FL 380 and FL300.

## ANALYSIS

Whilst the Tutor crew had received TI about the Typhoon, the earliest point at which they would have begun to assimilate this information was approximately 12secs prior to the CPA, once they knew the area from which the Typhoon was approaching. The timing of this information gave the crew little opportunity to assimilate the TI, visually acquire the Typhoon and act. It is reasonable to argue that the distance between the Tutor and the manoeuvring GR4 pair complicated APP's task by dividing their attention; however, BM SM contends that the 'split' between the Tutor and the GR4 pair was not excessive and would not routinely be expected to represent a significant challenge to an experienced controller. APP confirms this by stating that they were 'operating well within [their] capacity'. Moreover, based upon APP's task load, that no transmissions occurred on their frequencies between 1141:12 and the controller passing TI at 1143:19, it is reasonable to argue that an opportunity existed to pass TI to the Tutor's crew earlier than 1143:19.

Whilst it was disappointing that Marham did not submit a narrative from the ATC SUPERVISOR, given the APP controller's level of experience, it is unlikely that the SUPERVISOR would have been closely monitoring their actions. Whilst in hindsight it appears that the decision to band-box APP, DIR and ZONE together may have contributed to the Airprox, the level of workload associated with this task does not at first appear unreasonable for an experienced controller. That said, it is reasonable to expect that the refusal of a TS to the other Tutor pilot at 1138:42, due to controller workload, should have prompted further action from APP or the SUPERVISOR, to provide additional capacity by separating the ZONE task from APP. It is possible that the provision of that additional capacity may have eased APP's task enabling them to provide earlier TI to the crew of the subject Tutor.

The guidance material contained within CAP774 Chapter 3 Para 5 states that

'Traffic is normally considered to be relevant when, in the judgement of the controller, the conflicting aircraft's observed flight profile indicates that it will pass within 3nm and, where level information is available, 3,000ft of the aircraft in receipt of the Traffic Service'.

However, for ac conducting unpredictable high-energy manoeuvres within an airspace block, the task of assessing this 3nm/3000ft 'bubble' is fraught with difficulty. Agreed best practice in these situations is to pass TI on conflicting ac that will pass within 3nm and through or close to the vertical limits of the manoeuvring ac's block. In this instance, the Tutor passed through the Typhoon's manoeuvring block on a number of occasions prior to the start of the incident sequence but no TI was passed when an opportunity to do so existed. This may be suggestive of low levels of awareness by NE TAC of the manoeuvring capability of Typhoon ac.

In relation to the events that occurred during the incident sequence, NE TAC's ability to detect the confliction was inhibited by the large displayed radar range scale in use - a range scale that they were required to use in order to provide an ATS to the high-level transit ac. Whilst the confliction between the Tutor and Typhoon was evident when NE TAC momentarily reduced the range on their surveillance display at 1141:18, NE TAC did not identify the confliction. This may have been due to the level of the Typhoon at that time allied with the radar range issue such that NE TAC discounted the Tutor as a threat. Alternatively, NE TAC's scan may not have detected the Tutor. However, once NE TAC increased the range scale on the surveillance display at 1141:30, their ability to detect the confliction reduced rapidly as the distance between the 2 radar contacts reduced on the display. As an example, the distance between the contacts at 1141:30 would have been approximately 17mm. Coupled with the difficulty in detecting the conflict, BM SM contends that the complexity of the task load faced by NE TAC affected their ability to divide their attention effectively between all ac that were in receipt of an ATS and thus prevented the provision of TI. The LJAO North SUPERVISOR recalls being cognisant of the increased complexity presented by the C130 undergoing an air-test with an unserviceable transponder and thus opening the NE Planner position; however, the task complexity coupled with the increasing geographic split might have suggested that a second TAC controller was required. Unfortunately, the NE Planner did not submit an occurrence report so their thought processes and awareness of NE TAC's workload and task complexity was unrecorded. Of note was the fact that STCA did not activate during this incident.

Notwithstanding that the Tutor crew and the Typhoon pilot were operating in Class G airspace and had a responsibility to 'see and avoid' other ac', both were in receipt of a TS and had a reasonable expectation that they would be provided with TI, in order to assist them in discharging that responsibility. In this instance the safety barrier provided by LJAO NE TAC did not operate and that provided by Marham APP operated ineffectively, given the timing of the TI relative to the CPA.

#### RECOMMENDATIONS by BM SM

RAF ATM Force Cmd was requested to:

- a. Highlight to ATM personnel that best practice for the provision of TI to ac conducting high-energy manoeuvres is to pass TI on conflicting ac that will pass within 3nm and through or close to the vertical limits of the manoeuvring ac's block.
- b. Monitor DASORs to identify whether the issue identified by this investigation with regard to the provision of TI to manoeuvring traffic is an emerging trend, to determine whether there is a requirement to adapt either controller training or the CAP774 guidance material referred to above.
- c. Consider the requirement for LATCC (Mil) Planner endorsed controllers to be re-briefed on assessing task complexity in addition to task load when determining sector manning.
- d. Maintain a dialogue with the ARCS IPT to continue to investigate the lack of activation of STCA at LATCC (Mil).

RAF ASACS Force Cmd and RN Fleet Capability Aviation ATC were requested to take note of the recommendation to RAF ATM Force Cmd with regard to the provision of TI to manoeuvring traffic, to determine its applicability to their operations.

## OUTCOMES

Following direction from the A/D Operating Authority, SATCO Marham reviewed the unit's manning of control positions. Whilst content with the unit's procedures overall, SATCO has directed that Supervisory staff will maintain enhanced oversight of Ops, specifically where ac are geographically split.

In light of safety concerns generated by several LJAO Sectors operating in the same airspace, a review was conducted into the 'Method of Operations' of the E and NE sectors and recommended a re-sectorisation of the airspace. This re-sectorisation will be implemented shortly and should significantly reduce the likelihood of LJAO controllers facing a N-S split, as experienced by NE TAC during this incident.

Unfortunately, the Tutor pilot did not declare the Airprox on the frequency in use at the time. Consequently, through the availability of staff and the time elapsed following the incident, the recollections of those ATM personnel involved were affected. Particularly those at LATCC (Mil) due to the time required to identify the Typhoon involved and that it was in receipt of an ATS from LJAO NE. All Tutor pilots operating at Wyton have been reminded of the requirement to report an Airprox immediately and RAF Flight Safety continue to promote this across the wider RAF community.

**THE EUROFIGHTER TYPHOON T Mk3 PILOT'S STATION FLIGHT SAFETY OFFICER** comments that following liaison with BM Safety Management and the UKAB, the HUD recording was reviewed in close detail with the Typhoon pilot. The Typhoon HUD video was examined for a period of 4 mins either side of the Airprox timing of 1143:37Z. The weather conditions were better than military visual flight criteria above cloud tops, which were about 2000 ft below the ac. The Typhoon's manoeuvring was benign from straight and level to a 45° AOB turn to the L, which was to allow the rear-seat passenger to recover from feeling airsick. Although the LATCC (Mil) radar recording confirms that the Tutor was in the Typhoon's 11 o'clock, within the visual arc of the HUD, the Tutor is not shown. Furthermore, there are no recorded AI radar tracks.

**HQ AIR (OPS) & (TRG)** combined comment: This incident occurred in Class G airspace, in VMC conditions, and both ac were in receipt of a radar service, yet the paucity of TI from both Marham APP and LATCC (Mil) NE TAC, meant that neither ac was notified of the presence of the other until a late stage in the incident. Fortunately, the Tutor's TAS gave enough warning for the Tutor pilot to change its flightpath, which probably affected the outcome of the Airprox for the better. Of note, this investigation has been hindered by the fact that the timing of the Airprox was initially incorrectly reported by the Tutor pilot; if the Tutor crew had reported the Airprox as it occurred, then an accurate timing of the event would have been available from the start of the investigation. All aircrew should be reminded of the content of RA1410 Para 41, which states that 'as soon as practicable after the event, an Airprox should be reported by the pilot to the ATSU providing the ATS'.

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

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies and radar video recordings, together with reports from the Marham APPROACH controller, LATCC (Mil) LJAO NE TAC controller and the appropriate ATC and operating authorities.

The Board agreed with the BM SM perspective that if the Marham SUPERVISOR and the LATCC (Mil) LJAO NE PLANNER controller had contributed reports, their inputs would have provided a more complete picture of the circumstances surrounding this Airprox.

With APP's traffic about 45nm apart, controller Members recognised the controller had an awkward split, which demanded a wide-ranging scan diverting attention away from where the Tutor was operating. However, it was evident from the BM SM report that APP was manned by an experienced controller who did not consider his workload/task complexity to be high - only 'medium' he reports. Both the BM SM Advisor and another familiar with Marham's operations considered that the traffic under service should have been well within the controller's capabilities. Nevertheless, controller Members noted that APP had refused to provide a TS to another Tutor pilot during the period of this Airprox, only offering a BS, ostensibly due to his workload whilst DIR and ZONE were bandboxed onto the APP position. As additional controllers were apparently available, controller Members suggested that opening another control position to work the GR4s, might have enabled ATC to provide a better service overall and facilitated earlier recognition of the conflict by the controller here, leading to earlier TI for the Tutor crew. As the Typhoon had been operating in the vicinity of the Tutor beforehand, where potentially TI might have been warranted it was suggested, APP should have been keeping a watchful eye for it. Indeed, some controller Members suggested that as it would have been evident from the Typhoon's squawk that the ac was under an ATS from LJAO NE, APP might usefully have effected co-ordination and, by being more pro-active, could potentially have averted the close quarters situation. Notwithstanding any 'reduced' TS deemed to be provided by Marham, which would be unknown to Wyton pilots unless stated on the RT, it was pointed out that at these levels Marham with better lower level coverage, could probably detect the confliction more readily. As it was, APP had not spotted the fast moving Typhoon until it was about 2-3nm E of the Tutor, climbing from just below the Tutor's level the controller reports. The Military terminal controller Member opined that TI should be called as soon as practicably possible, but the Board noted that TI had not been passed to the Tutor pilot until the Typhoon had closed to a range of 2nm. Members agreed with the MAA Advisor's view that this was unsatisfactory and the TI was passed too late to be of practical use. Controllers should be aiming to provide comprehensive TI not later than 5nm range the Advisor opined; however, if the traffic was fast moving, as here, it might need to be provided at greater range if pilots of relatively slow, low performance aeroplanes such as a Tutor were to make effective use of the information in the time available. This demanded a thorough comprehensive scan of the radar display. The Board agreed the late TI provided by APP to the Tutor crew was a contributory factor within this Airprox. The Tutor pilot reported that his ac's TAS had alerted him to the Typhoon when it was about 1nm away and just before the TI was transmitted by APP; as the TI was given at 2nm his recollection was therefore slightly awry. However, in the short timespan from first alert to CPA, as the Tutor QFI manoeuvred his aeroplane and both he and his student searched for the other ac, the geometry of the situation and the airframe had probably obscured the Typhoon until it was seen passing under the nose of his Tutor about 250ft away from R - L at high speed, some 50ft below his aeroplane in a slight climbing attitude. This coupled with the high-speed of the conflicting ac, left the Tutor pilot very poorly placed to affect the outcome.

The Tutor had been manoeuvring on a relatively steady bearing to the Typhoon, just L of the nose, as the Typhoon pilot maintained his westbound course in a gentle climb, possibly distracted by his airsick passenger. Nevertheless, the Typhoon pilot had not seen the Tutor despite obtaining a TS from LJAO NE TAC to supplement his lookout and assist him with his responsibility to 'see and avoid' other traffic within Class G airspace. It was evident from the Typhoon pilot's report, as confirmed by the BM SM investigation, that NE TAC had not spotted the conflict with the Tutor nor passed TI to the Typhoon pilot at any stage. The Typhoon pilot would be aware of the limitations of radar in detecting gliders and light ac with a composite structure; however, the Airprox did not occur in an area of poor radar coverage, nor was the TS 'reduced' in any way. Consequently, the Typhoon pilot could reasonably expect a 'full' TS to be provided by NE TAC unless he had been advised to the contrary. Whilst the Board was cognisant that the recorded radar data available to the Board did not replicate exactly the picture displayed to NE TAC, the recording shows that the Tutor was detected by the radar sources available to LATCC (Mil). A confliction between the Tutor and Typhoon was evident, BM SM reports, when NE TAC momentarily reduced the range on their surveillance display over two minutes before the Airprox occurred. There was no reason to doubt, therefore, that NE TAC could have passed TI to the Typhoon pilot if he had spotted the developing conflict, but it was evident to the Board that NE TAC was working an even more difficult split of traffic over a wide area displayed on a very large radar range scale, whilst also completing some of the actions normally expected of the PLANNER when closed up. Cognisant that NE TAC was also coping with a large vertical split

with the Typhoon down in the lower airspace and other traffic in the upper air, with the added complication of a non-squawking C130 air test, Members questioned the wisdom of this traffic allocation; it was unfortunate that the NE PLANNER had not provided any insight into this aspect. Here the LJAO controllers had focused on the high level traffic in receipt of a RCS as the priority at the time, but to the detriment of the Typhoon pilot operating in Class G airspace who received no help at all to alert him to the Tutor under the TS that had been agreed. The MAA Advisor commented that although the Typhoon pilot had requested to operate over a large vertical block of airspace, if the traffic situation dictated that the controller could not provide a satisfactory service from 5000ft - 28000ft and fulfil his responsibilities to report traffic in the vicinity throughout these levels to the Typhoon pilot, then perhaps the controller might have offered the pilot a higher base level for his sortie - well above the level where light ac might normally be encountered, say above 10000ft, which might have been acceptable if the aims of the sortie could still be achieved. Members suggested that the LJAO controllers might not have been entirely alert to the great manoeuvrability of this agile jet fighter, but it was evident that the Typhoon pilot had been in the lower levels of his notified operating block for several minutes beforehand and the BM SM report mentioned that NE TAC had omitted to call TI on the Tutor on other occasions when it would have been appropriate. The Board concluded that the LJAO NE Sector controllers had not provided a satisfactory TS to the Typhoon pilot and the absence of TI was a contributory factor to this Airprox. However, the Board was encouraged to learn that the investigation of this Airprox had led to a review by the Unit and the planned resectorisation of LJAO NE and E Sectors.

The Board was aware that it is not uncommon for some aspects of Airprox initial reports to be incorrect; nevertheless, Members encouraged pilots to report Airprox promptly on the RT at the time they occurred. Even a brief 'heads-up' on the RT followed up by a landline call would facilitate more accurate reporting by pilots, which would also alert controllers and ATSU's to the incident at an early stage. If, having declared an Airprox over the RT, pilots or controllers subsequently elect not to file a formal report or withdraw the Airprox, as is their prerogative with the agreement of all involved, then nothing important will be lost in the intervening period. In this occurrence the Tutor pilot initially reported an erroneous time and location and the Typhoon pilot was mistaken when he initially reported he had not descended to the level reported by the Tutor pilot. However, the accurate timing and location of the Airprox were evident from the recorded LATCC (Mil) radar data which shows the Typhoon climbing through FL66 Mode C as it passed beneath the Tutor indicating FL68. Since the Typhoon pilot did not see the Tutor at any stage, the Board agreed unanimously, that this Airprox had resulted from a non-sighting by the Typhoon pilot.

There was unanimous agreement amongst the Members that this was a risk-bearing Airprox, but the degree of Risk engendered considerable debate. Alerted by their TAS and the belated TI, only the Tutor crew was aware of the impending conflict but plainly at a late stage and unaware that the conflicting aircraft was a fast jet. The Tutor pilot had endeavoured to resolve the conflict by turning and trying to climb above the Typhoon, which itself was in a shallow climb, but had inadvertently turned towards the Typhoon thereby prolonging the conflict. The low performance of the Tutor compared to the Typhoon militated against the Tutor pilot's avoiding action having a great impact; the Board noted HQ Air's view that it was of benefit in increasing the separation, nevertheless it was difficult to assess if the Tutor pilot's actions had had a significant affect on the outcome. With the Typhoon pilot completely unaware of the presence of the Tutor above him as he underflew it, this suggested to some Members that an actual Risk of collision had existed at these close quarters. However, other Members perceived that the 200ft of vertical separation that did exist was sufficient to prevent the two ac colliding. Furthermore, when appraised of the correct time and location of the Airprox, the Typhoon unit reviewed the HUD recording and confirmed that at no stage was the Tutor visible in the HUD's field of view. The Board remained fairly evenly divided over the level of Risk and a vote was required to finalise the assessment. By a majority of the Members, it was concluded that the safety of the ac involved had been compromised.

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

Cause: A non-sighting by the Typhoon pilot.

Degree of Risk: B.

Contributory Factors: The absence of TI to the Typhoon pilot and late TI to the Tutor crew.