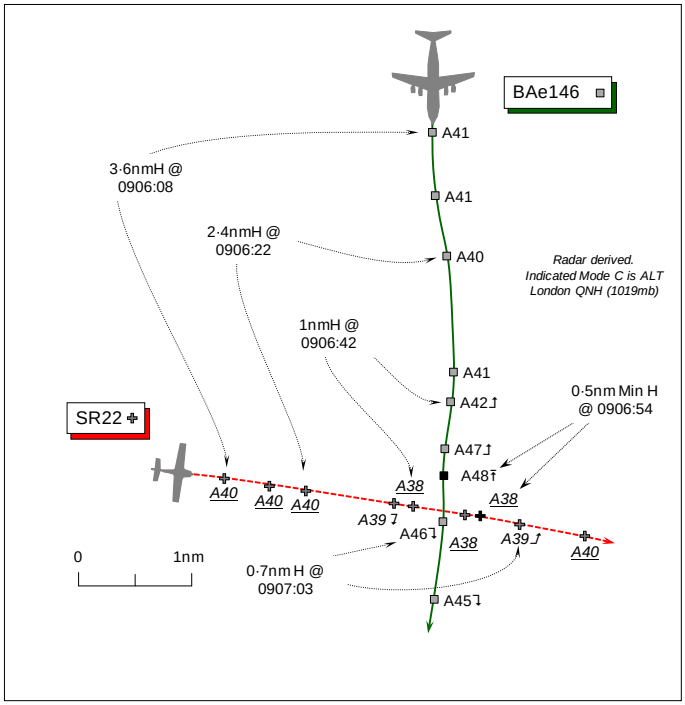
AIRPROX REPORT No 2011045

Date/Time:	19 May 2011 0906Z	
Position:	5208N 00003E (5½nm SW of Cambridge)	
Airspace:	London FIR	(*Class:* G)
	Reporting Ac	*Reported Ac*
Type:	BAe146	Cirrus SR22
Operator:	HQ Air (Ops)	Civ Pte
Alt/FL:	4000ft QNH (1018mb)	4000ft QNH (1018mb)
Weather:	IMC CLBL	VMC NK
Visibility:	30km	>10km
Reported Separation:	400ft V/<1nm	NK
Recorded Separation:	Nil V @ 2·4nm H 0·5nm Min H @ 1000ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BAe146 PILOT reports he was in transit to Northolt on an IFR flight, routeing SIVDA to BARKWAY (BKY), and had descended wings level at 230kt from FL100 to 4000ft London QNH (1018mb) into cloud with London MILITARY [LJAO E-TACTICAL] under a TS. A squawk of A4671 was selected following a handover to Luton RADAR, but before two-way RT was established with the Luton controller, heading 200° 10nm N of BARKWAY (BKY), TCAS showed traffic at the same altitude of 4000ft moving R to L. Flying in between cloud layers with FEW at 5000ft, TCAS enunciated a CLIMB RA and the guidance was followed, ascending to an altitude of about 4600ft, before returning to their previously 'cleared' level. The other ac – a white civilian low-wing single-engine propeller driven aeroplane - passed less than 1nm in front and 400ft below their ac with a 'high' Risk of collision. No TI had been given by London MIL. Once they had established RT comms, Luton RADAR asked whether details of the other ac had been passed to them on handover. Luton stated they would complete a report on the incident. The recovery to Northolt was completed without further incident.

THE CIRRUS SR22 PILOT reports he was had departed from Gloucestershire Airport under VFR and was in receipt of a BS from Cambridge. A squawk of A7000 was selected with Mode C. TCAS is not fitted; elementary Mode S is fitted.

Flying an E'ly heading at 150kt, established in a level cruise at 4000ft QNH, below cloud in VMC, ATC had advised of other traffic but it was not seen.

His ac has a white colour-scheme; the HISLs and nav lights were on.

THE LATCC (MIL) LJAO EAST TACTICAL CONTROLLER (E-TAC) reports screening a UT whilst controlling the BAe146 inbound to Northolt under a TS, with a PLANNER in situ. As far as could be recalled everything was normal, with timely calls of TI. As the event took place over 24hr ago he could not recall any other detail.

THE LATCC (MIL) LJAO EAST PLANNER CONTROLLER (E-PLAN) could not recall the event.

THE LUTON INTERMEDIATE RADAR CONTROLLER (RADAR) reports that a radar hand-over was given by London MIL who were providing a TS to the BAe146 inbound to Northolt; it was agreed that it would be accepted at 4000ft London QNH. London MIL was asked if TI had been passed on 2 contacts ahead and he was told that it had. One of those contacts was tracking eastbound indicating 4000ft QNH. The BAe146 pilot called and declared that he had responded to a TCAS RA against the unknown ac and was now returning to 4000ft from 4600ft. There was traffic inbound to Luton tracking W to go through the Luton 'gate', but this traffic was still descending through 6500ft QNH and so unaffected.

The BAe146 pilot was later asked if London MIL had passed TI, he said that they had not but as they were IMC he had reacted to the RA. He also said that they got a late visual sighting of the ac through a gap in the cloud.

He opined that as TI had not been passed when providing a TS, coupled with the instruction to change frequency so close to an unknown ac, this seemed very dangerous. Especially as this could have led to a loss of separation with other Luton traffic. The pilot advised that he would be filing a report.

ATSI endorsed the report provided by NATS Ltd relating to the involvement of Luton RADAR in this Airprox, an abridged version of which is included below.

NATS LTD reports that the BAe146, had been operating outside CAS under the control of London MILITARY (LJAO E-TAC) and at 0858 was pre-noted to Luton RADAR for a 'Charlie' arrival inbound to Northolt. Luton RADAR was being operated by a trainee monitored by an instructor. At this time the BAe146 was outside the range at which Luton RADAR was operating so the controller asked for the ac to be handed over later, when it was within 30nm of Luton.

At 0904:21, the BAe146 was seen on radar to change from the LJAO East squawk to A4671 - the Luton RADAR squawk. Shortly afterwards, Luton RADAR answered a telephone call from LJAO but was interrupted by the RT. The telephone call continued at 0905:03 with LJAO E-PLAN offering a handover of the BAe146:

Luton RADAR: *"Roger, I've got the details..."*.

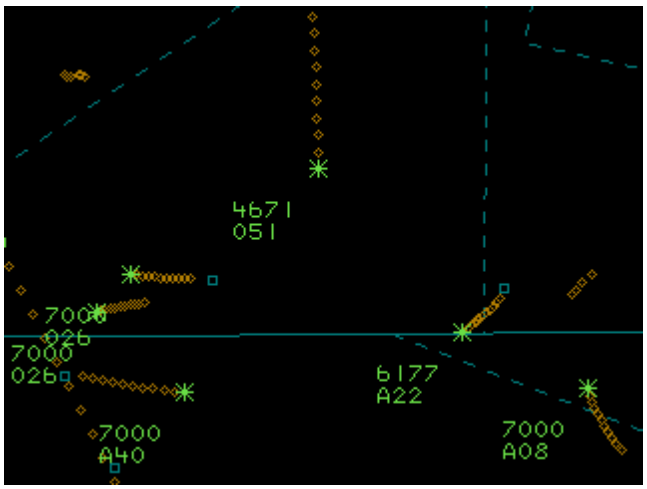
LJAO E-PLAN: *"He's* [the BAe146] *currently Cambridge, North West, 7 miles, tracking south, squawking 4-6-7-1".*

Luton RADAR: *"Identified".*

LJAO E-PLAN: *"Descending Flight Level 4-0, traffic service".*

Luton RADAR: *"..OK have you called the traffic in his 1 o'clock and 10 o'clock?"*

The traffic visible to Luton RADAR at this time is shown on the radar snapshot below:



LJAO E-PLAN: *"Affirm all traffic around that area called".*

Luton RADAR: *"Roger OK traffic service, 1-2-9 decimal 5-5-0 Q-N-H 1-0-1-8".*

LJAO E-PLAN: "*1-2-9 decimal 5-5-0 and QNH was what sorry*"

Luton RADAR: *"1-0-1-8 millibars".*

LJAO E-PLAN: *"1-0-1-8 do you want him on that now?"*

Luton RADAR: *"yes please 4 thousand feet".*

LJAO E-PLAN: *"Roger 4 thousand feet 1-0-1-8."*

Luton RADAR: "*Thank you, co-ordinated".*

At 0906:08 while the Luton RADAR controller was speaking to Luton TOWER a high severity STCA warning was generated. This downgraded to a low severity warning at 0906:12 before almost immediately upgrading again to a high severity alert at 0906:18

The pilot of the BAe146 made his initial report on the frequency at 0907:04:

> BAe146 pilot: "Luton [BAe146 C/S] *with you...just had a T..traffic R-A..4 thousand 5 hundred feet at this moment in time recovering to 4 thousand feet 1-0-1-8".*
>
> Luton RADAR: *"From radar you appear to be clear of that traffic now and Q-N-H 1-0-1-8 millibars it's a traffic service."*

This was acknowledged by the pilot of the BAe146 before instructions for a 'Charlie' arrival for Northolt were passed and acknowledged.

At 0914:25, the Luton RADAR Instructor enquired, "[BAe146 C/S] *just out of interest, on your handover when you got transferred from the military, had they passed the traffic that you had the TCAS with?"* The pilot of the BAe146 replied, *"Negative…we'll file a report… (unintelligible),they offered 4 thousand feet and we were I-M-C although we did see the traffic in a gap in the cloud. It passed below us and we got within 600ft over the top."* The Luton RADAR Instructor acknowledged *"..roger I'll do the same because they said they were going to pass the traffic so I'll file as well."* The BAe146 pilot was then instructed to contact Northolt APPROACH.

From both the radar recording and the Airprox report from the BAe146 pilot, it is clear that having been handed over from London MILITARY, but before establishing contact with Luton RADAR, the BAe146 pilot had received and responded to a TCAS RA. Radar shows the maximum level reached by the BAe146 was 4800ft.

The decision of the BAe146 pilot to accept a TS whilst flying in IMC outside Controlled Airspace rather than a DS may have had an effect. CAP774 Chapter 3 para 3 states:

> 'Pilots should be aware that a Traffic Service might not be appropriate for flight in IMC when other services are available.'

HQ 1GP BM SM reports that this Airprox occurred approximately 10nm N of BKY between a BAe146 flying IFR in IMC and an SR22 operating VFR in VMC, in receipt of a BS from Cambridge. Although at the time of the Airprox the BAe146 was switching to Luton RADAR, the incident sequence starts whilst the ac was in receipt of a TS from LJAO E-TAC, 51 sec prior to the CPA.

On completion of an air test, the BAe146 began to route towards BKY via SIVDA descending to 4000ft London QNH and, at 0859:00, was pre-noted by E-TAC to Luton RADAR. E-TAC was under training with two other ac pre-noted to them but only the BAe146 was on frequency at the time of the occurrence.

At 0904:40, E-TAC passed TI to the BAe146 crew on an unrelated ac squawking A7000, calling, "*multiple contacts..right 1 o'clock..range of 5* [7.3nm] *and 6 miles* [8.7nm]*, indicating 3 thousand feet and below*." The BAe146 crew replied that they were, "*looking..those contacts on TCAS*." At this point the SR22 is 2nm S of the 2 unrelated ac.

At 0905:03, E-PLAN commenced a handover on the BAe146 to Luton APP during which, at 0905:10, E-TAC passed TI to the BAe146 on unrelated traffic descending into Luton.

All ac in receipt of an ATS from LJAO, LAC, TC or PC are depicted as "foreground tracks" with full data blocks, whilst other ac are displayed as "background tracks" with limited data blocks showing only the SSR Mode C. There is no colour or brightness change between foreground or background tracks on the LJAO surveillance displays. The Unit investigation states that the SR22's data block was obstructed from E-TAC's view by the data block of high-level GAT. Analysis of the radar replay demonstrates that 0905:10 is the latest point at which the data block from the high-level GAT ac could have obscured this view, taking into account the possible variations of label orientation on the E-TAC surveillance display.

As the handover between E-PLAN and Luton RADAR drew to a conclusion at 0905:18, Luton asked, "*have you… called the traffic in his 1 o'clock and 10 o'clock*?" E-PLAN replied, "*affirm, all traffic around that area has been called*." At that point the unrelated ac squawking A7000 on which TI had been passed were approximately in a 2 o'clock position. The SR22 is in the BAe146's 1 o'clock at 7.7 nm with 1300ft of vertical separation existing; a second ac inbound to Luton is in the BAe146's 10 o'clock position. At this point, TI had not been passed on either the SR22 or the second Luton inbound.

At 0905:30, E-TAC passed TI to the BAe146 on the second Luton inbound, with the handover of the BAe146 between the E-PLAN and Luton terminated at 0905:39. At this point, 6·7nm lateral and 1000ft of vertical separation exist between the SR22 and BAe146. At 0906:07, the BAe146 crew acknowledged E-TAC's instruction to contact Luton RADAR, at which point 3·6nm lateral and 100ft vertical separation exist.

At 0906:42, with lateral separation reducing to 1nm but vertical separation increasing from 400ft as the BAe146 climbed through 4200ft London QNH, the BAe146 pilot's response to the TCAS RA CLIMB can be seen. Minimum horizontal separation occurred at 0906:54 with 0·5nm lateral and 1000ft vertical separation established after the tracks had crossed.

[UKAB Note: The BAe146 contacted Luton RADAR at 0907:04; however, this occurred after the SR22 had crossed ahead of the BAe146 and after the CPA.]

There are two causal/contributory aspects to this Airprox: those of the provision of an ATS and the BAe146 pilot's decision to fly in IMC in receipt of a TS, through airspace that the Unit acknowledges as being "congested." This report will assess the former.

LATCC (Mil)'s investigation identified that E-TAC's view of the SR22's SSR data block was obstructed by the data block of an overflying GAT ac. Furthermore, the range scale used on the surveillance display will have reduced the "on-screen" angular difference between the SR22 and the unrelated SSR 3A 7000 traffic, on which the BAe146 was passed TI, to the point that the ability of E-TAC to differentiate the traffic was compromised. However, analysis of the radar replay suggests that E-TAC would have had an un-obstructed view of the SR22's data label from 0905:10, some 54 sec before E-TAC transferred control of the BAe146 to Luton. Given the proximity of the SR22 at 0904:40 to the un-related ac squawking A7000 on which E-TAC passed TI, it is possible that E-TAC sub-consciously later discounted the SR22 as a conflict, believing that they had passed TI on it. This perception may have been reinforced by the statement from the BAe146 crew that they could see those contacts on TCAS. This hypothesis is given weight by the absence of TI on the SR22 to the BAe146 from 0904:40, despite the fact that the confliction is evident. Although only 24-hours had elapsed between the incident and completion of their DFSOR, E-TAC was unable to recall any detail

of the occurrence. Consequently, whilst we can draw the conclusion that from E-TAC's perspective nothing untoward occurred, we are unable to prove conclusively that E-TAC believed that they had passed TI on the SR22. However, as E-TAC was manned by a trainee and instructor, the fact that the cognitive error was not picked up by the instructor suggests either that the instructor also suffered the same error or that their ability to monitor the trainee was impaired - no information was available to determine which of these hypotheses is correct.

Another aspect that requires assessment is the radar handover conducted between the E-PLAN and Luton RADAR. The phraseology used by Luton at 0905:18 when asking whether TI had been passed is ambiguous, in that it does not specifically identify to which traffic he is referring. However, it is reasonable to argue that it did contain enough information for E-PLAN to have been able to deduce which ac Luton were referring to. Based upon the available evidence, it seems reasonable to argue that the E-PLAN, having heard E-TAC pass TI to the BAe146 crew, assumed that all the relevant traffic had been called.

Given the absence of TI from E-TAC on the SR22, the remaining ATM related safety barrier was penetrated when the E-PLAN assumed that E-TAC had passed all relevant TI. Following this, the remaining safety barriers were 'see and avoid' - that had been prejudiced by flight in IMC – and TCAS, which subsequently enabled the BAe146 pilot to resolve the confliction.

This Airprox represents a confliction in Class G airspace that was resolved by the pilot of the BAe146 [responding to the TCAS RA]. The lack of TI from E-TAC to the BAe146 crew about the SR22, compounded by the assumption by the E-PLAN that all relevant TI had been passed, should be considered as contributory factors.

HQ AIR (OPS) comments that whilst the SR22 contact was not specifically called, the TI passed advised of multiple traffic within a few miles of it. The TI contained no information regarding the direction of travel or speed of the contacts so it is unclear why further detail or updates were not requested. This would have been required for the crew to reliably discharge their responsibility to avoid a collision. In the event, reliance was placed on following TCAS warnings to prevent a collision rather than:

a) gaining visual contact and self-separating (not possible IMC).

b) taking positive separation in azimuth or altitude based on a mental air picture formed from TI (not possible without detailed TI and continued updates).

c) requesting a Deconfliction Service to allow ATC to provide separation based on their air picture.

By being in receipt of a radar service, the crew had complied with guidance in MRP RA 2307, para 26, although this is worded as a directive. The advice in CAP 774 is valid but it is not clear whether the BAe146 crew considered the use of a DS. Such advice, and greater guidance on actions required to safely operate in IMC under a TS could usefully be included in the MRP.

HQ Air will use this and other Airprox examples to highlight the reasoning behind the CAP774 advice to adopt a DS in IMC where possible, to highlight the difficulties of collision avoidance based solely on TI, and particularly to highlight the limited responsibilities of ATC when providing TI.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the LATCC (Mil) and Luton RADAR RT frequencies, radar video recordings, reports from the three air traffic controllers involved and reports from the appropriate ATC and operating authorities.

It seemed to the Members that the cloud base in the vicinity of this Airprox was somewhat patchy, but evidently close to 4000ft, as the reporting BAe146 pilot flying IFR reports being in cloud at this altitude, whereas he subsequently saw the SR22, whose pilot was operating below cloud under VFR. Although the BAe146 was not seen by the SR22 pilot, the radar recording illustrated a slight descent by the SR22 as the tracks crossed, which suggested to some that the pilot might have descended slightly to maintain VMC. Whilst coincidentally this had increased the vertical separation at a critical point, a GA pilot Member observed that it was always preferable to maintain good clearance below the cloud base so that traffic descending through cloud might be detected in good time, especially when flying relatively fast aeroplanes such as the SR22.

It was explained that the BAe146 pilot's Unit invariably attempts to route via CAS whenever possible and the Command had highlighted the advantages of a DS to assist crews in discharging their responsibilities to avoid other ac when flying IMC in Class G airspace. However, controller Members who regularly control traffic in this environment explained that, given the intensity of traffic operating in the 'Open FIR' beneath the London TMA, it can be difficult to achieve the specified deconfliction minima when threading ac through areas of high density traffic. Nevertheless, crews should still ask for a DS where appropriate. The HQ 1 Gp BM SM Advisor added that reductions of service specifically cater for situations where a controller, in endeavouring to provide the best radar service possible in a high intensity situation, is unable to achieve the desired minima against every observed contact. The CAA Standards and Policy Advisor stressed that avoiding action instructions issued under a DS by controllers are provided as 'advice', aimed at achieving specified deconfliction minima; this 'advice' can be accepted or not as the case may be.

Whilst the general consensus was that a DS might have been more appropriate here for an airliner operating in Class G airspace, the BAe146 crew had requested and was in receipt of a TS with LJAO E-TAC with the reasonable expectation of having conflicting traffic in the vicinity pointed out to them. Although the BAe146 crew had not been appraised specifically about the presence of the SR22 within the TI provided earlier, they had been told about, "*multiple contacts..indicating 3 thousand feet and below*". Notwithstanding the Command's view that the BAe146 crew could have asked for further detail or updates, given E-TAC's descent instruction to 4000ft QNH, thereby providing 1000ft above the traffic reported at 3000ft and below, the BAe146 crew might well have been content to track the ac reported by E-TAC on TCAS, unaware of the SR22 themselves at that stage. Evidently E-TAC had not specifically identified the threat of the SR22 that was plainly indicating level flight at 4000ft QNH before the BAe146 was switched to Luton RADAR. Controller Members focused on the prompt given by Luton RADAR to E-PLAN during the handover; the military Area controller Member perceived there was an unfounded assumption on the part of E-PLAN that the SR22 had been called within the TI about the multiple contacts. Members accepted that the terminology used by Luton RADAR, who had done their best to point out the conflicting traffic, should have readily identified the SR22 at the same altitude as the BAe146 to E-PLAN, who should have taken stock of what had and had not been called, so it was unfortunate that the latter did not react more positively or ask E-TAC to simply call it in, which did not occur. Consequently, specific TI had not been given to the BAe146 crew about the SR22 before E-TAC switched the flight to Luton RADAR. The Board agreed that the absence of specific TI from E-TAC about the SR22 was part of the Cause of this conflict in Class G airspace.

The BAe146 crew switched frequency at the critical moment, just as STCA activated, thus they were denied any further input from ATC until TCAS alerted them to the presence of the SR22 and prompted them to take their own avoiding action by responding to the CLIMB RA. This enabled them to resolve the conflict and achieve 900ft of vertical separation above the SR22 during the manoeuvre as the latter crossed ahead and drew to port which, assisted by the slight descent of the SR22, increased to 1000ft at the closest point. Moreover, it was clear from the Luton RADAR RT transcript that the BAe146 crew had managed to spot the SR22 through a gap in the cloud during the occurrence. After weighing all these factors carefully the Cause of this Airprox was unanimously agreed by the Members to be, in the absence of specific TI, a conflict in Class G airspace resolved by the BAe 146 crew using TCAS; the crew's prompt response to the TCAS RA, coupled with the visual sighting, effectively removed any Risk of a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: In the absence of specific TI, a conflict in Class G airspace resolved by the BAe 146 crew using TCAS.

Degree of Risk: C.