CIVIL AVIATION AUTHORITY

UK AIRPROX BOARD

Analysis of Airprox in UK Airspace

Report Number 7
July 2001 to December 2001

A joint Civil Aviation Authority / Ministry of Defence service

Report by the UK Airprox Board,

‘Analysis of Airprox in UK Airspace’

(July 2001 to December 2001)

produced jointly for

The Chairman,
Civil Aviation Authority

and the

Chief of the Air Staff,
Royal Air Force

FOREWORD

This report covers full annual statistics for 2001 together with the UK Airprox Board's findings on all Airprox in UK airspace that were filed during the second half of that year. Like the six reports that have preceded this one, this book is aimed squarely at UK pilots and air traffic control officers, both civil and military. Its purpose remains unchanged - to promote air safety awareness and understanding, by sharing widely the lessons to be learned from unexpected encounters. For the process to work effectively, this document must be made freely available to pilots and controllers in their work place - not locked away in a manager's office.

These latest statistics show that trends on total Airprox numbers in UK airspace continue to decline by small but important margins. During 2001 a total of 195 Airprox were filed for assessment. This figure is the lowest annual total since combined pilot/controller records began in 1990 and it displaces the previous 'low' of 198 incidents recorded in 2000.

Incidents involving Commercial Air Transport (CAT) aircraft last year fell sharply to 82, having been stable in the range 96 - 99 for the preceding four years. Moreover, there were no Risk A cases at all. A breakdown of the 82 incidents shows that 14 were Risk B (safety compromised), 64 were Risk C (no collision risk) and 4 were Risk D (insufficient information available on which to assess the risk). The Risk D tally is unusually high despite thorough investigations and compares with one or two maximums in recent years.

Poor weather early in 2001 and then the foot and mouth epidemic had a telling influence on the pattern of GA flying hours and this reflected the subsequent pattern of GA risk results month by month. Total GA involvement for the year ended up slightly higher at 112 Airprox and the breakdown was Risk A = 24, Risk B = 27, Risk C = 60 and Risk D = 1.

Military totals for 2001 were down slightly at 94 Airprox. Of these, Risk A = 27, Risk B = 19, Risk C = 47 and there was a single Risk D.

An update on UKAB Recommendations is set out after the Statistics section for those cases not published previously and for those where resulting action has been determined since UKAB Report Number 6. Finally, findings on the 94 incidents that happened between July and December last year are set out for all to see, forming the bulk of this report.

Gordon McRobbie

Gordon McRobbie
Director, UKAB

CONTENTS

INTRODUCTION

UKAB COMPOSITION

The UKAB is an independent organisation sponsored jointly by the Civil Aviation Authority (CAA) and the Ministry of Defence (MOD) to deal with all Airprox reported within UK airspace. There are 8 civilian and 6 military members on the Board, which is Chaired by the Director UKAB, who reports directly to the Chairman CAA and Chief of the Air Staff, Royal Air Force. Each UKAB member is a volunteer - either a pilot or an air traffic controller - and together they form a team of hands-on practitioners with first hand civil and military 'know how' on:

- Air Traffic Terminal Control, Area Control and Airfield Control
- Commercial Air Transport flying (CAT)
- General Aviation (GA) flying, both fixed wing and rotary
- Military flying by the RN, Army and the RAF, plus UK-based USAF aircraft

UKAB's ROLE

The UKAB has the following roles in promoting improved safety standards in the air:

- The start point for an investigation process into each incident, carried out by the Safety Regulation Group (SRG) of the CAA and/or Military HQs.
- Determining what happened and analysis of the main causal factors.
- Assessment of risk levels involved.
- Making recommendations where appropriate to prevent incident recurrence.
- Publishing and distributing full reports twice a year so that lessons can be learned.

STATUS OF UKAB REPORTS

The sole objective of the United Kingdom Airprox Board shall be to assess reported Airprox in the interests of enhancing flight safety. It is not the purpose of the Board to apportion blame or liability. To encourage an open and honest reporting environment names of companies and individuals are not published in reports.

RISK CATEGORIES

Risk level assessments are made on the basis of what actually took place and not on what may or may not have happened. There are four agreed categories as follows:

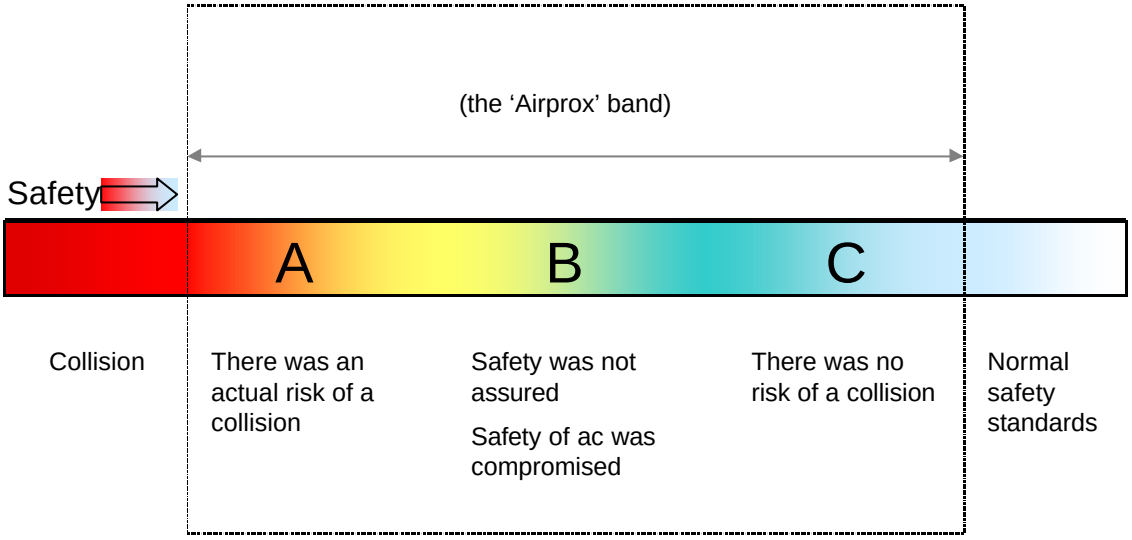
A **Risk of collision** An actual risk of collision existed

B **Safety not assured** The safety of the aircraft was compromised

C **No risk of collision** No risk of collision existed

D **Risk not determined** Insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination

A pictorial representation of the main Airprox risk bands is shown below.



An AIRPROX is described as: "A situation in which, in the opinion of a pilot or a controller, the distance between ac as well as their relative positions and speed was such that the safety of the ac involved was or may have been compromised

STATISTICS

THE UKAB DATA SET

Unless otherwise stated, all of the Airprox statistical information presented in this report has been taken from the UKAB database and is presented at two levels for ease of reference. The first level gives a broad overview on general trends. Second level detail then follows, where more specific results are shown for each of the three airspace user groups set out below.

CAT
- Scheduled/Non-Scheduled passenger flights in Airliners and Helicopters
- Cargo flights

GA
- Executive and Company aircraft (hired for specific reward)
- Private and Flying Club aircraft
- Gliders, sport aviation and airships
- Aerial work

Military
- Aircraft flown by the RN, Army and RAF plus foreign military aircraft (UK airspace)
- Defence Procurement Agency aircraft - formerly MOD (PE)

Notes:

(1) CAT flying hour totals are supplied by the Safety Regulation Group (SRG) of the CAA. They include figures from Eurocontrol on hours flown by commercial aircraft in transit through UK airspace as well as departures and arrivals to UK destinations.

(2) GA flying hours are based on aircraft with less than 5700 kg maximum take-off weight authorised; they include Microlights and Gliders, but exclude Gyroplanes and balloons. The British Gliding Association and the Registration Department of the CAA supply GA data. The latter organisation has recently updated their figures and changes have been incorporated in this report.

(3) Military flying hours include elements flown outside UK airspace.

AIRPROX RESULTS FOR 2001

Monthly Distribution

Fig 1 and Table 1 show the distribution of Airprox during 2001. Deviations from the 5-year average are evident in the first five months. Thereafter monthly numbers conformed more closely to expectations. By December the total was well under par at 195.

These results reveal little more than broad trends. See each user group section later in the report for more meaningful information.

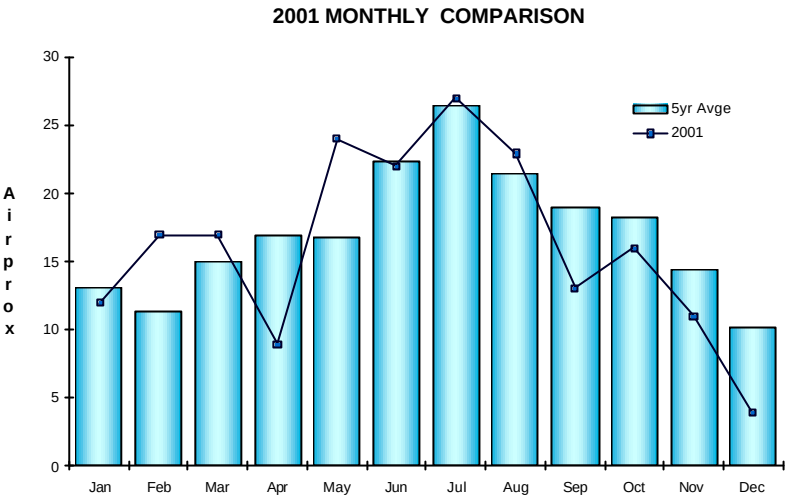


Figure 1

Table 1: Airprox distribution in 2001 against the 5-year average

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
5yr Avge	13.0	11.4	15.0	17.0	16.8	22.4	26.4	21.4	19.0	18.2	14.4	10.2	205.2
2001	12	17	17	9	24	22	27	23	13	16	11	4	195

Trends by User Groups

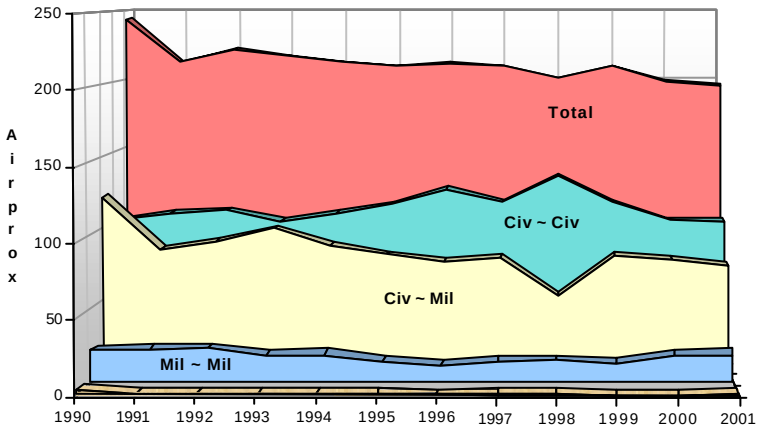


Figure 2: Airprox totals by user groups

Fig 2 depicts the involvement of civil and military aircraft in Airprox since 1990; these encounters make up the total picture.

Mil~Mil incidents continue to be the least in number, without much change. Likewise, the number of Civ~Civ incidents last year was virtually the same as that for 2000. There was a slight reduction in the number of joint Civ~Mil Airprox.

The cumulative effect of these results shows that the slow but steady trend over the years, of declining total numbers, was maintained once more. Details are set out in Table 2.

Table 2: Airprox totals by user groups

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Unknown	2							1	1			1
Mil ~ Mil	21	22	23	18	19	15	12	14	16	13	19	20
Civ ~ Mil	121	85	91	100	88	81	76	79	52	81	78	74
Civ ~ Civ	100	105	107	99	105	112	123	114	132	114	101	100
Total	244	212	221	217	212	208	211	208	201	208	198	195

Who Met Whom During 2001?

Airprox: 2001	CAT: Cargo	CAT: Helicopter	CAT: Passenger	GA: Hire&Reward	GA: Company ac	GA: Glider	GA: Helicopter	GA: Private or Club	GA: Training	GA: Untraced	Military: Fixed Wing	Military: Helicopter	Military: Untraced	Powered ac: Untraced	Unpowered ac: Untraced	Weather Balloon	Unknown	
CAT: Cargo											1							**1**
CAT: Helicopter		1									2							**3**
CAT: Passenger	2	2	26	5	1		4	9	1		19	1	1			1	2	**74**
GA: Hire&Reward							1	2	1		7	1			1			**13**
GA: Company ac				1							2							**3**
GA: Glider				3	1		1	2	1		2							**10**
GA: Helicopter											2							**2**
GA: Private or Club			1	5	1	1		14	2	1	6	1						**32**
GA: Training								5	3		3							**11**
Military: Fixed Wing			3	2			4	8	2	2	16			1				**38**
Military: Glider								3			1							**4**
Military: Helicopter									1		3							**4**
Totals:	**2**	**3**	**30**	**16**	**3**	**1**	**10**	**43**	**11**	**3**	**64**	**3**	**1**	**1**	**1**	**1**	**2**	**195**

Figure 3: A breakdown of Airprox participants in 2001

The grid shown above provides detailed information on parties involved in the 195 encounters during 2001. Pilots of aircraft depicted in the left (vertical) column are generally the ones who filed Airprox, whereas the (top) horizontal row represents those aircraft that formed the other party to any perceived confliction. It is important to realise, however, that relative position on the grid is not an indication of fault or responsibility and neither does it imply any association with 'Risk'. The matrix as presented is simply a factual breakdown of who met whom and how frequently these unplanned encounters took place.

To extract information simply locate the box which is the intersect point between the two axes, e.g. there was one case where CAT:Cargo and Military Fixed Wing aircraft met.

Types of Airspace Involved

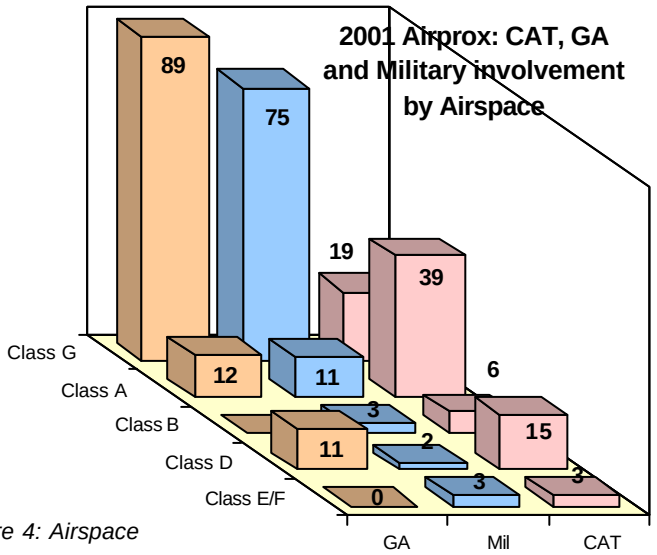


Figure 4: Airspace

Fig 4 (left) shows the type of airspace involved in incidents, where at least one of the aircraft was either GA, Military or CAT.

Unsurprisingly, in the majority of cases where at least one GA or one Military aircraft was involved, these encounters were outside regulated airspace. When either group had incidents inside controlled areas, these were mainly in class A and class D.

Most of the 82 cases involving CAT aircraft were inside controlled airspace - in class A or in class D - but 19 of these meetings (23%) were not.

CAT Risk Results

Fig 5 (below) shows the long-term trends on risk results for CAT aircraft, set against the background 'total Airprox' situation. Note the steady increase in CAT flying hours over the period and the slight levelling-off last year; this reduction can be attributed to 11th September. All of the profiles shown derive from the detailed information set out in Table 3 (below).

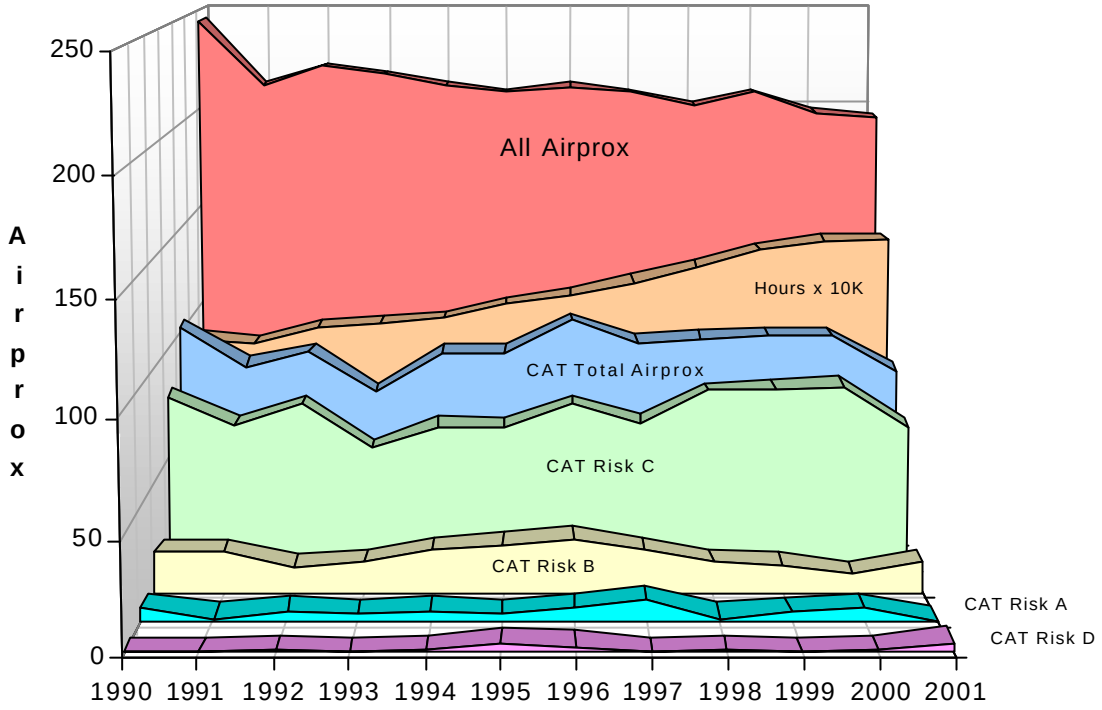


Figure 5: CAT Risk distribution 1990 - 2001

Although flying hours have been going up each year, the involvement of CAT aircraft in Airprox has not followed the same trend. On the contrary, CAT numbers were remarkably stable in the three years 1998, 1999 and 2000, while last year there was a significant downturn by some 17% to 82 incidents.

For the first time there were no Risk A encounters (where an actual risk of collision existed). A Risk B assessment is made for those incidents where the risk of actual collision may have been unlikely, but the safety of one or either of the aircraft involved was, nonetheless, compromised in some way. Last year there were 14 Risk B examples for CAT aircraft. This total, coincidentally, equals the Risk (A+B) count for 2000.

The vast majority (78%) of CAT incidents turned out to be Risk C cases, involving no risk of collision at all. Finally, there were 4 incidents where - despite thorough investigation - there was simply not enough information available to make any sensible assessment on risk.

Table 3: CAT risk data 1990 - 2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
CAT Risk A	6	1	5	3	5	3	6	9	1	4	6	0
CAT Risk B	18	18	11	14	20	21	24	20	14	12	8	14
CAT Risk C	79	66	75	55	65	64	75	67	82	83	84	64
CAT Risk D	0	0	1	0	1	3	2	0	1	0	1	4
CAT Total Airprox	103	85	92	72	91	91	107	96	98	99	99	82
Hours x 10K	89.3	87.4	94.6	96.8	100.4	106.1	111.8	117.9	125.9	133.2	138.9	139.5
All Airprox	244	212	221	217	212	208	211	208	201	208	198	195

CAT Airprox Rates

Fig 6 (right) shows annual rate figures (per 100,000 flying hours) for Airprox involving CAT aircraft. The chart provides a visual indication on trends for total results and for the combined count of Risk (A+B) cases. Encouraging results emerge from the data.

A detailed numerical breakdown is contained in Table 4 (below).

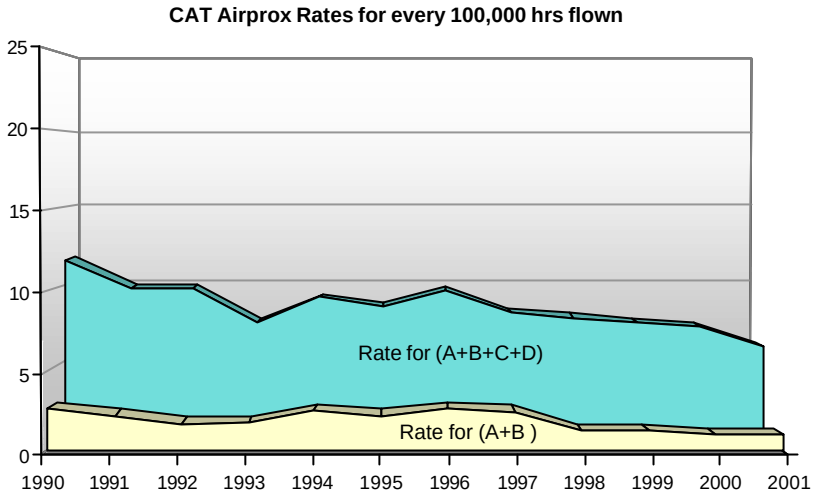


Figure 6: CAT Risk rates

While the total rate has virtually halved since 1990, the rate for Risk (A+B) has levelled at 1 incident in 100,000 flying hours. These figures point to improvements in air safety that show welcome signs of consolidation but at a level where the 'laws of diminishing returns' start to take effect.

Credit for safer trends can be attributed to several areas, but none more so than the widespread carriage of TCAS in aircraft. This has been the single most potent factor in achieving better safety results. Other elements have also played important roles, such as STCA equipment (not fitted at all ATC units) which has proved to be a strong *safety net.*

Table 4: CAT Airprox rates per 100,000 flying hours

CAT Data	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
CAT Rate (A+B)	2.69	2.17	1.69	1.76	2.49	2.26	2.68	2.46	1.19	1.20	1.01	1.00
CAT Rate (A+B+C+D)	11.53	9.73	9.73	7.44	9.06	8.58	9.57	8.14	7.78	7.43	7.13	5.88
Hours flown in K	893	874	946	968	1004	1061	1118	1179	1259	1332	1389	1395

CAT: Pilot & Controller Causal Factors

Fig 4 (right) shows the top 9 reasons for CAT involvement in Airprox last year. Compared with the number of aircraft movements that were dealt with, mistakes were relatively few and only the top three factors were in double figures. 'Level busts' moved down from second place in 2000 to fifth position last year.

Entering controlled airspace without clearance, however, has moved up three places into third position and comprised:

- 6 x GA pilot entries
- 3 x Military ones and
- 1 x suspect foreign Military in an airway that has no radar cover

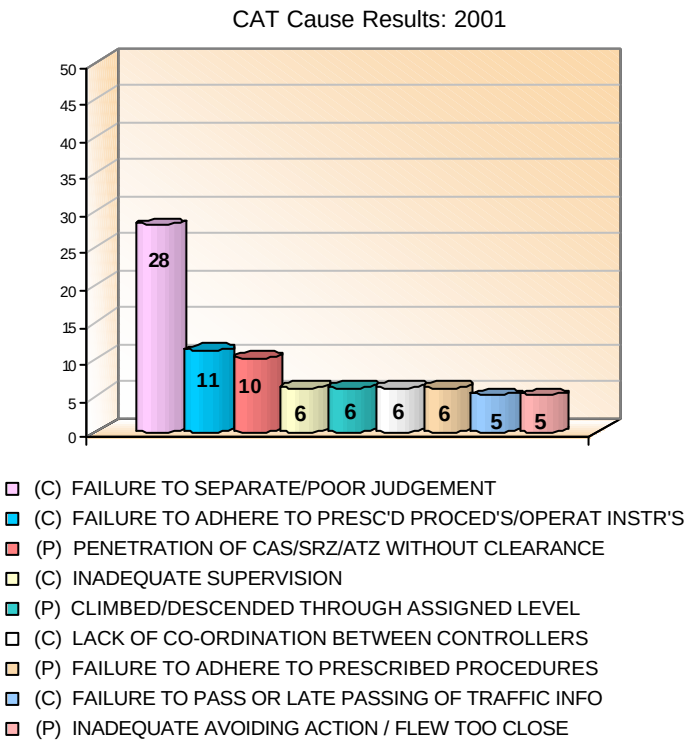


Figure 7: CAT causal factors

GA Risk Results

The GA airspace user group is the most diverse of the three and includes everything from microlights at one end of the scale to high performance business jets at the other. As illustrated in the Grid at Fig 3 earlier in this book, GA pilots show up in no fewer than six different categories as opposed to just three for the other two user groups. Add to that the large turnover in GA pilot numbers each year, with the associated resulting fluctuations in experience levels, and it becomes easier to realise the wider general scope that exists for GA pilots to meet other aircraft unexpectedly. Little wonder then that they were involved in 112 of the 195 cases filed last year. This amounts to a little over 57% and up 3% on the previous year. How these totals compare with earlier years can be seen from the profiles in Fig 8, while the figures set out in Table 5 (below) allows more precise detail to be calculated for comparison. Using either the chart or the table for reference, clear indications emerge of a downward trend overall, which is good.

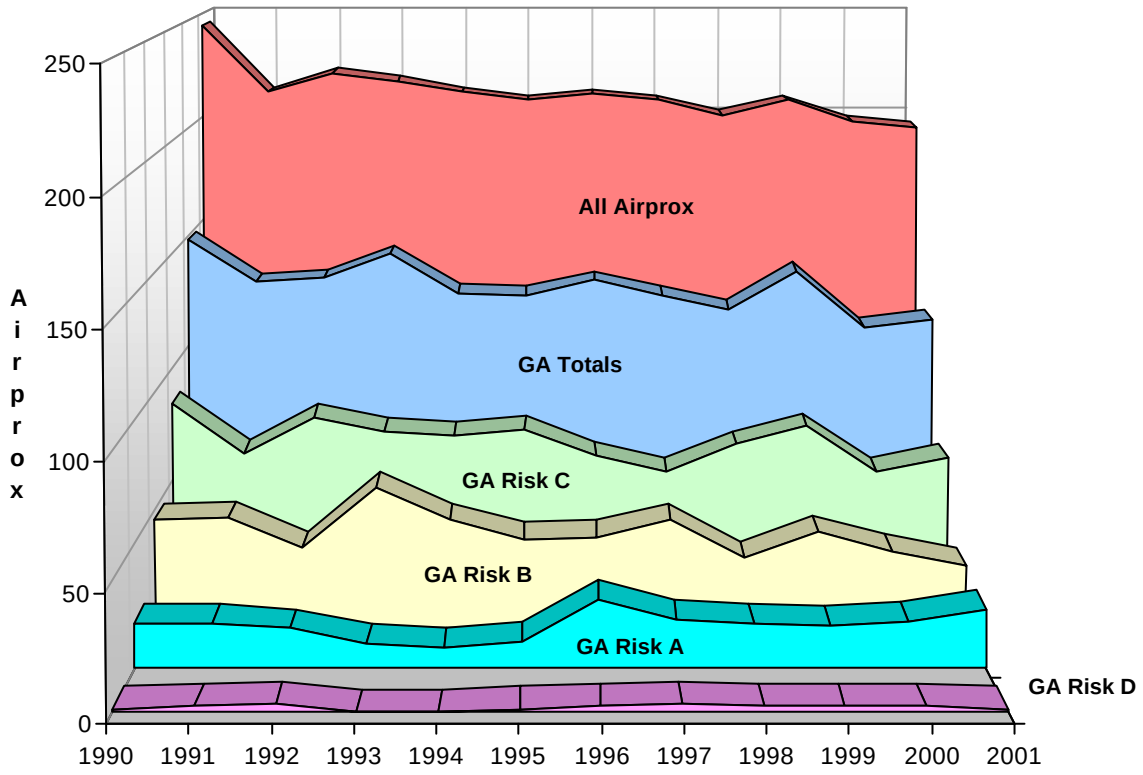


Figure 8: GA Risk distribution

While total numbers may give the big picture, other factors are less evident. For example, lulls in flying caused by very poor weather early on last year, followed by limitations imposed by the foot and mouth epidemic later, had marked effects on the monthly risk returns. Broadly speaking, the final percentage of Risk (A+B) returns were down slightly compared with year 2000, while the percentage of 'no collision' results also moved in the right direction i.e. upwards by about 3 points. Closer inspection, however, shows that while the number of safety compromised cases fell (Risk B), these were counterbalanced by an upturn in the number of actual collision risk encounters (Risk A). The latter correlates with the lulls mentioned earlier.

Table 5: GA risk data 1990 - 2001

GA Data	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GA Risk A	18	18	16	10	8	11	28	20	18	17	19	24
GA Risk B	46	47	34	60	46	38	39	46	30	41	33	27
GA Risk C	84	62	78	72	70	73	61	54	66	74	54	60
GA Risk D	1	2	3	0	0	1	2	3	2	2	2	1
GA Totals	149	129	131	142	124	123	130	123	116	134	108	112
All Airprox	244	212	221	217	212	208	211	208	201	208	198	195

GA Airprox Rates

Fig 9 gives a pictorial view of the rate per 100,000 flying hours at which GA aircraft have been involved in incidents. Two rates are provided; one is for all GA incidents and the other shows the rate for Risk(A+B) results over the years. Profiles derive from the figures set out in Table 6.

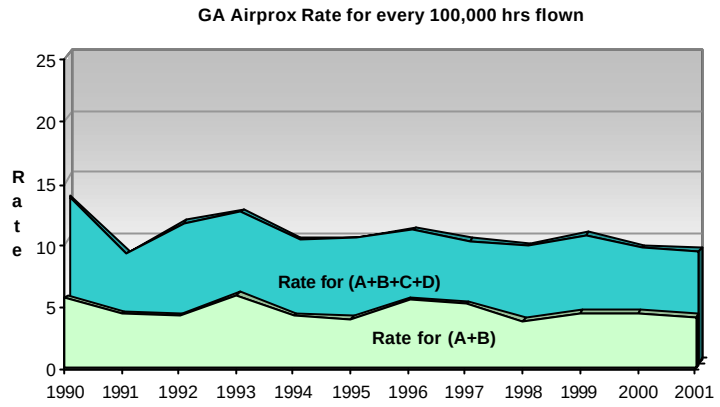


Figure 9: GA Rates

The CAA has recently revised (downwards) the total number of flying hours attributed to GA aircraft. The outcome has been to return a higher Airprox rate than previously recorded. Even so, with due allowance for scale, trends look stable.

Table 6: GA Airprox rates per 100,000 flying hours

GA Data	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Rate for (A+B)	5.71	4.39	4.27	5.98	4.30	3.97	5.48	5.23	3.89	4.47	4.46	4.09
Rate for (A+B+C+D)	13.29	8.71	11.18	12.13	9.87	9.97	10.64	9.75	9.40	10.33	9.27	8.98
Hours flown in K	1121	1481	1172	1170	1256	1234	1222	1262	1234	1297	1165	1247

GA Causal Factors

The Chart at Fig 10 (below) shows the leading causes for 'GA Airprox' during 2001, with attribution split to show which pilot featured in the final outcome. Not seeing the other aircraft, or seeing it late, remain the most common reasons for GA encounters. Similar results show up in the Military causal factor chart.

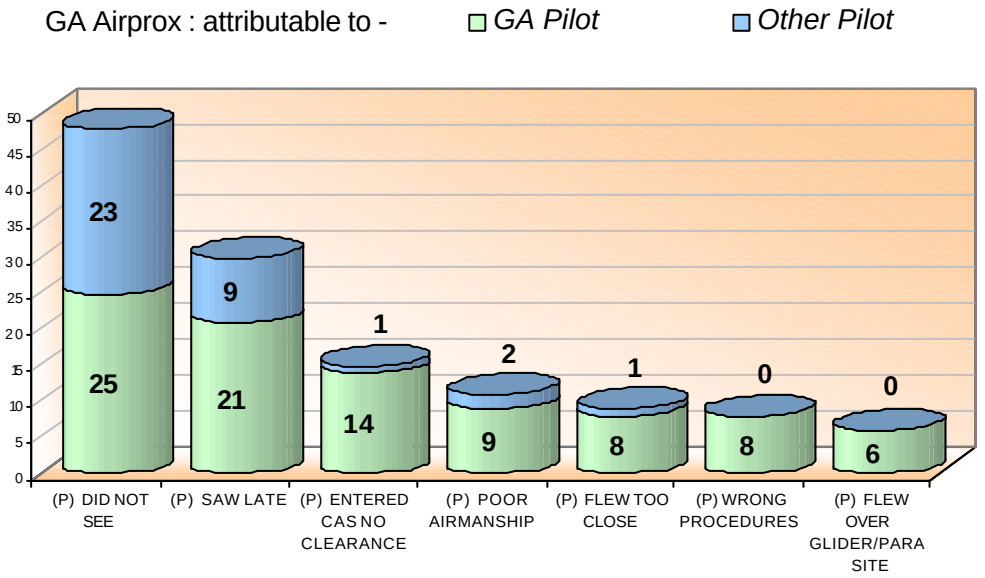


Figure 10: Top GA Causal factors in 2001

Military Risk Results

In recent times the annual involvement of Military aircraft in Airprox first fell below the 100 mark in 1995 and that position has held ever since. Last year's tally of 94 represents 48% of the 'All Airprox' count and compares favourably with like results for 2000; the longer term picture can be judged from Fig 11. Ignoring the statistical blip in 1998, the Military totals profile has been reasonably stable over the last 7 years.

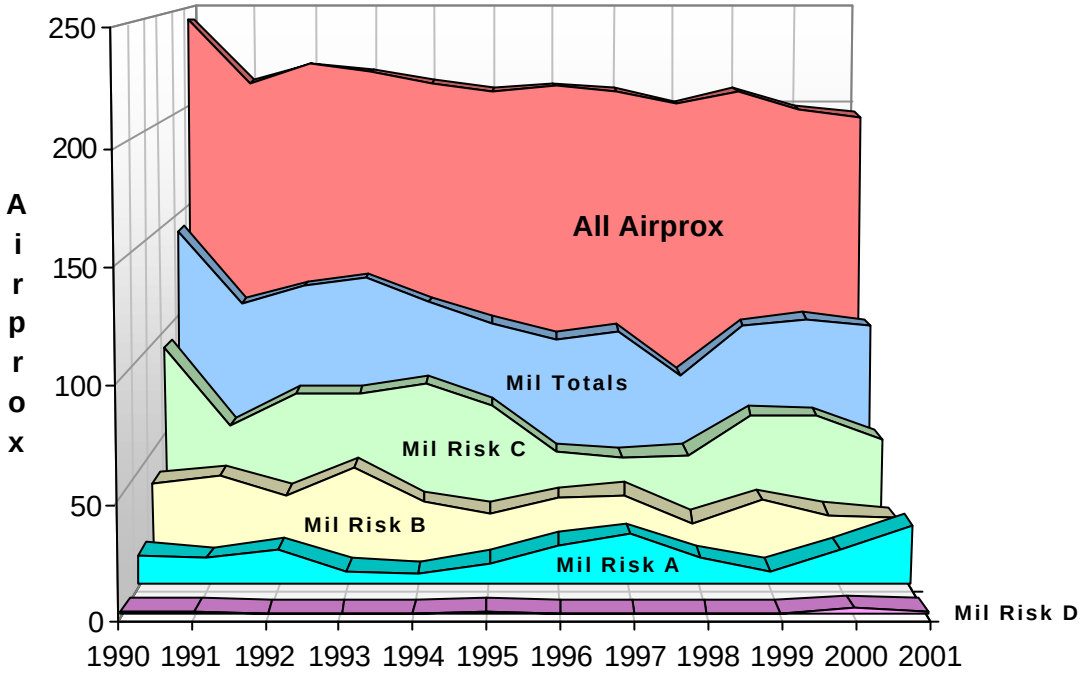


Figure 11: Military risk distribution

An examination of Military Risk results set out in Table 7 reveals that for last year, one half (47) of all Military encounters were assessed in the end as having no collision risk attached. A further one fifth of cases (19) were judged to be Risk B situations - safety was compromised - and there was one instance where insufficient information was available to make any sensible assessment on risk.

In contrast to these results for Risk B and Risk C, both of which reveal a downward trend, there was a sharp rise in Risk A situations - ones in which an actual risk of collision existed. During 1998 and 1999 the number of collision risk examples were in decline, but the trend reversed in 2000 and in 2001 numbers rose to their highest recorded level since 1990. Reasons for this unwelcome movement can be found on the next page, under Causal Factors; pilots had difficulty either in seeing the other aircraft, or seeing it in time to take effective avoidance measures sufficient to remove the risk of actual collision.

Table 7: Military risk data 1990 - 2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Mil Risk A	14	12	16	7	5	10	19	23	13	7	16	27
Mil Risk B	36	39	30	43	27	22	29	31	17	28	21	19
Mil Risk C	91	53	68	68	74	63	40	38	39	59	58	47
Mil Risk D	1	1	0	0	0	1	0	0	0	0	2	1
Mil Totals	142	105	114	118	106	96	88	92	69	94	97	94
All Airprox	244	212	221	217	212	208	211	208	201	208	198	195

Military Airprox Rates

The number of times military aircraft were involved in an Airprox per 100,000 flying hours, is depicted at Fig 12. Two rates are shown; one profile gives the rate for all Military involvement, while the other profile shows the rate for a combined count of Risk A and Risk B meetings.

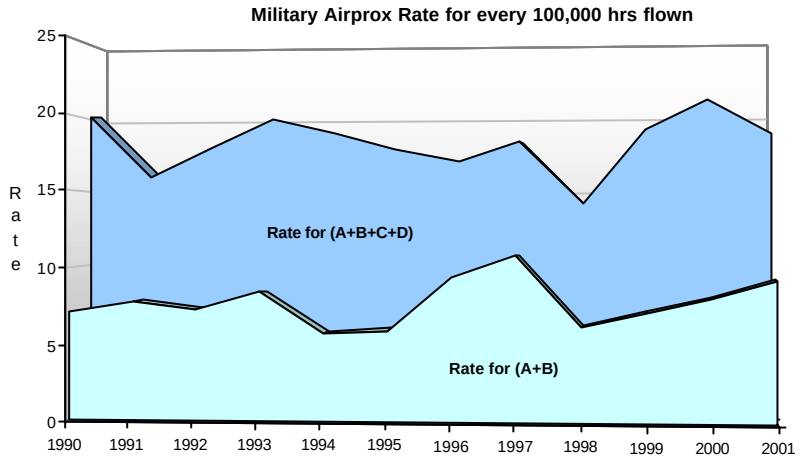


Figure 12: Military Risk Rates

Trends have moved in both directions over the years, but the Rate for (A+B) has shown a persistent inclination to ascend since 1998. Fig 12 was compiled from the data set out in Table 8.

Table 8: Military Airprox rates per 100,000 flying hours

Military Data	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Rate for (A+B)	7.10	7.77	7.28	8.40	5.69	5.94	9.27	10.78	6.17	7.13	8.07	9.16
Rate for (A+B+C+D)	20.17	16.01	18.04	19.83	18.86	17.81	16.99	18.36	14.20	19.14	21.16	18.73
Hours flown in K	704	656	632	595	562	539	518	501	486	491	458	502

Military Causal Factors

The Chart at Fig 13 (below) provides the leading causes for Military involvement in Airprox during 2001, with attribution split to show which pilot featured in the final outcome. The correlation with GA causal factors is very close; not seeing the other aircraft or seeing it late continue to head the list.

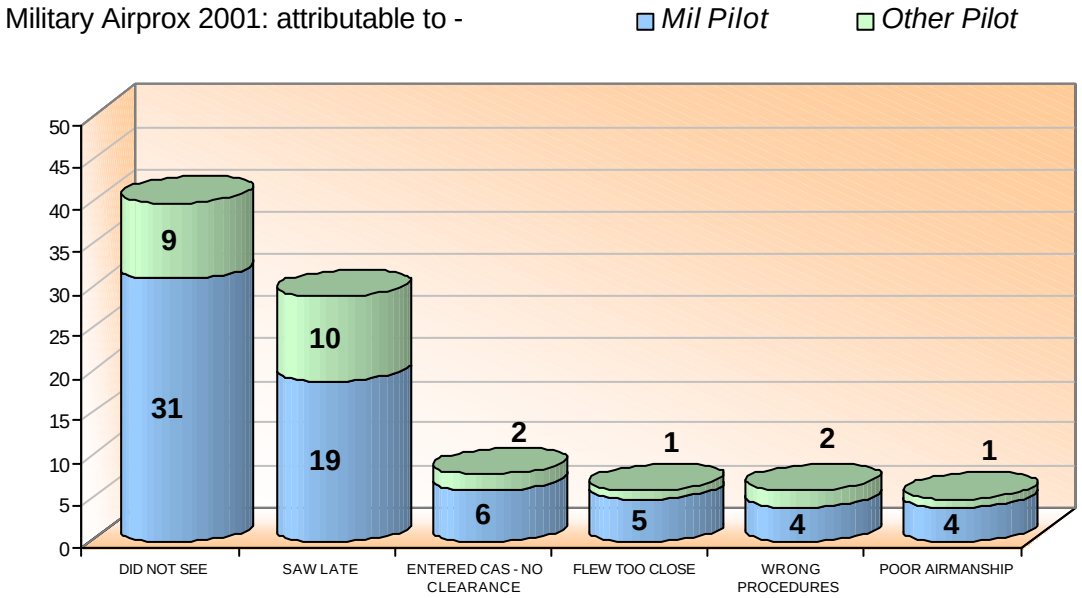


Figure 13: Military Causal factors in 2001

Some Further Correlations Between GA and Military Results

Causal factors are not the only common ground between GA and Military Airprox results. Other correlations also exist. For example, Fig 14 compares the 'time of day' at which incidents occurred - clear matches show up around 10 am and again at 2 pm.

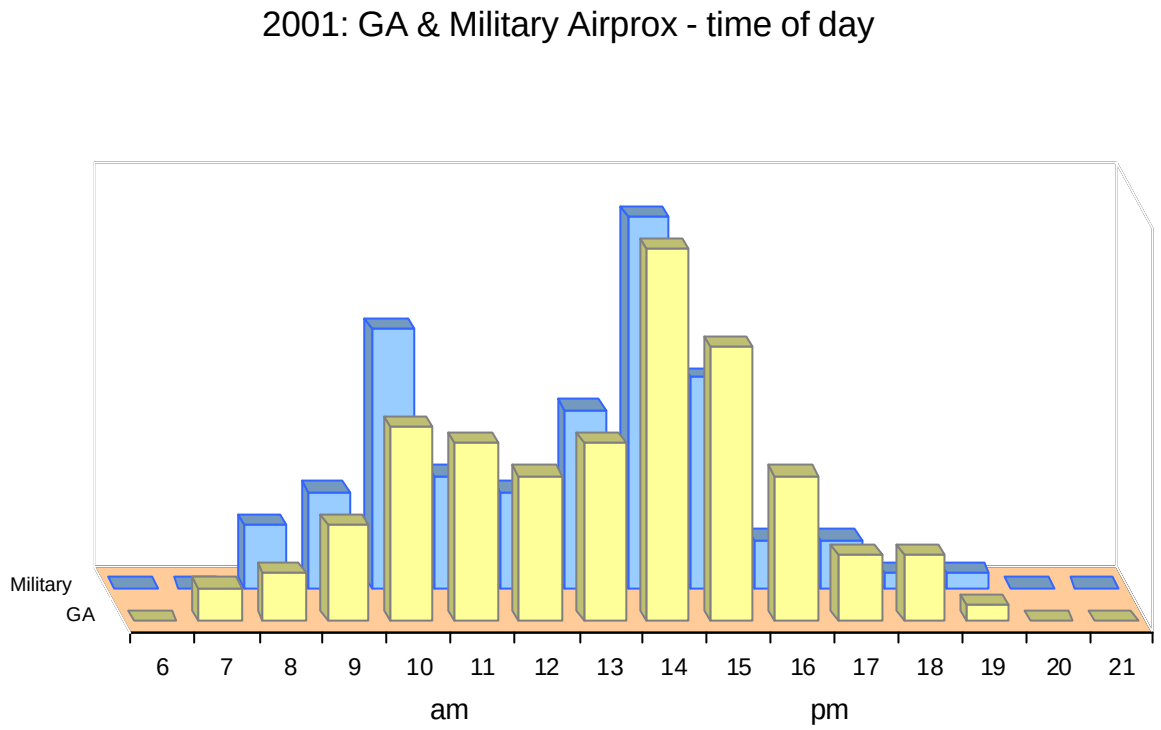


Figure 14: GA and Military incidents compared - by time of day

Altitudes are compared at Fig 15 for results from both groups. Here the match below 3,000 ft stands out; the most prolific single layer appears to lie between the surface and 1,000 ft, while the next two 1,000 ft steps up show nearly twice as much GA involvement compared to Military returns. On these statistics, flying above 3,000 ft seems to offer 'safer' freedom.

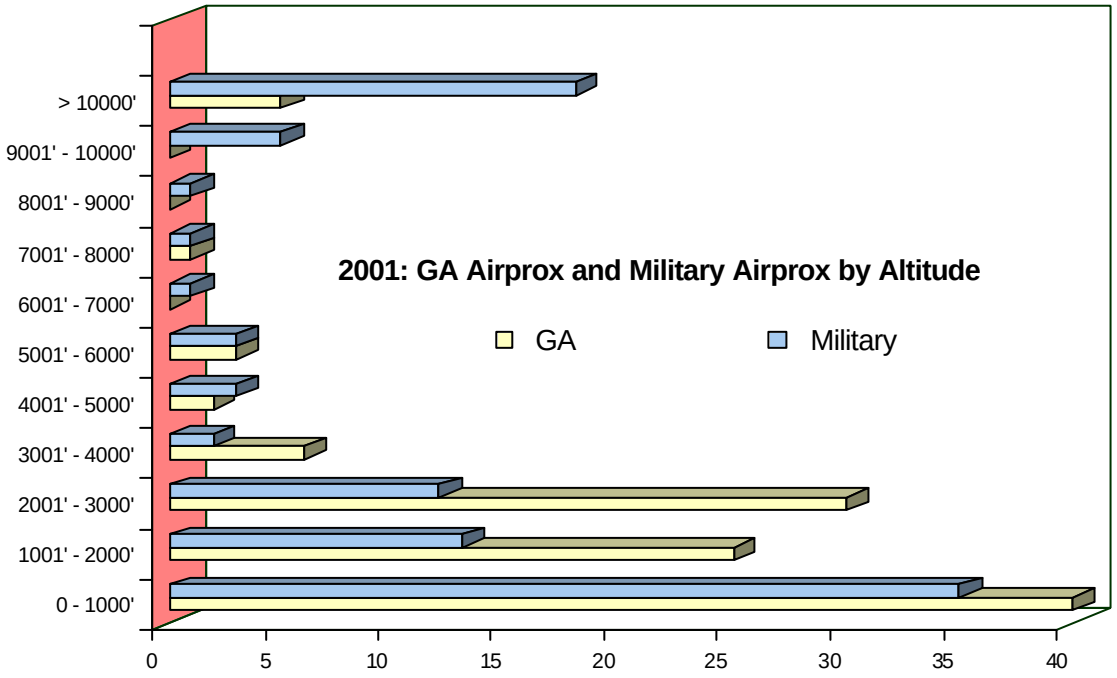


Figure 15: GA and Military incidents compared - by altitude

UKAB RECOMMENDATIONS

Recommendations are made when the Board believes that attention needs to be drawn to particular safety matters, e.g. where risk bearing incidents are repeated or where improved practices may prove beneficial. Subsequent 'acceptance' or 'non acceptance' is a matter for the organisation concerned to decide, based on its own professional judgement. The information that follows updates Recommendations published in Report Number 6 and lists new ones.

32/01 Sea King and a BAe 146 12 Feb 01 Risk Category: C

RECOMMENDATION: That the MOD considers conducting a risk analysis assessment at units where fixed and rotary wing aircraft engage in simultaneous operations from more than one take-off or landing area.

Status - Accepted - Closed

MOD Action: The MOD directed military Operating Authorities to review operating procedures at RAF Cosford, RAF Shawbury and RAF Valley, to ensure that the conduct of any simultaneous operations of fixed and rotary wing aircraft is considered to be acceptably safe. Results showed that controls are in place to prevent any repetition of events such as those experienced in Airprox 32/01.

100/01 Sea Fury and a JetRanger 23 Jun 01 Risk Category: C

RECOMMENDATION: That the CAA and MOD consider reviewing policy regarding the co-ordination of civilian events, where military ac have been invited to participate in flying displays, to ensure a consensus between all three services and the civilian regulatory authority.

Status –– Accepted - Closed

CAA Action: The CAA has reviewed its policy regarding the co-ordination of civilian events where military aircraft have been invited to participate in flying displays. Co-ordination of military flying at civil displays where a Permission under Article 70 of the ANO has been issued and civil aircraft are displaying together with military aircraft is already satisfactorily covered. Every such display has a nominated Flying Display Director whose responsibilities include co-ordination of flying. However, Article 70 specifically does not apply to military displays over military-owned property or at any venue where only military aircraft are displaying. Such events are therefore outside CAA jurisdiction and are totally a military responsibility. Nevertheless, the CAA has held discussions with the Headquarters Strike Command RAF (HQ STC) to clarify the situation. The latter has agreed to regulate more closely those civil events in which it participates where there is no CAA-issued Permission. Joint Service Publication 318 details the level of supervision required for military flying displays. HQ STC has also agreed to liase with the appropriate Naval and Military authorities to ensure they are aware of their responsibilities.

CAA Action: The CAA has reviewed its policy regarding the co-ordination of civilian events where military aircraft have been invited to participate in flying displays. Co-ordination of military flying at civil displays where a Permission under Article 70 of the ANO has been issued and civil

116/01 JetRanger and a Harrier 11 Jul 01 Risk Category: C

RECOMMENDATION: That MOD/HQ STC reviews the height regulations attaching to the 'flow arrow' in the Marham - Kings Lynn gap with a view to deconflicting military low flying ac and civilian helicopters engaged on Pipeline Inspection Sorties.

Status - Accepted - Closed

MOD Action: The MoD has made a change to the UK Low Flying System regulations (MIL AIP Vol 3, Pt 1). The 'northward flow' to the west of RAF Marham is to be flown at or below 500 feet agl; aircraft are to call RAF Marham Approach, as before, for transit through the gap.

119/01 Cessna 152 and a Bell 222 14 Jul 01 Risk Category: C

RECOMMENDATION: That MOD/HQ PTC review arrangements for providing an Air/Ground Service at government aerodromes where an ATZ is established, but where no formal ATC is provided.

Status - Open

MOD Action: The MoD is currently processing this Recommendation.

147/01 B737 and F16 x 2 21 Aug 01 Risk Category: C

RECOMMENDATION: That the MoD considers a review of supervisory arrangements attaching to mission planning by foreign military aircrews taking part in Exercises in UK airspace.

Status - Open

MOD Action: The MoD is currently processing this Recommendation.

196/01 B747 and an A330 10 Nov 01 Risk Category: B

RECOMMENDATION: That the CAA considers:

a. A review of ATC and aircrew procedures and arrangements to eradicate errors in OCA entry estimates.

b. Including a check of the entry clearance time as part of the OCA entry clearance message.

c. A review of procedures and equipment used to transmit emergency messages immediately to aircraft in oceanic airspace.

Status - Open

CAA Action: The CAA is currently processing this Recommendation.

GLOSSARY OF ABBREVIATIONS

AAA	Airfield Avoidance Area
AAI	Angle of Approach Indicator
ac	Aircraft
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
ACN	Airspace Co-ordination Notice
A/D	Aerodrome
ADA	Advisory Area
ADC	Aerodrome Control(ler)
ADCC	Air Defence Control Centre
ADF	Automatic Direction Finding Equipment
ADNC	Air Defence Notification Centre
ADR	Advisory Route
ADRU	Air Defence Radar Unit
AEF	Air Experience Flight
AEW	Airborne Early Warning
AFIS(O)	Airfield Flight Information Service (Officer)
A/G	Air / Ground Operators
agl	Above Ground Level
AGI	Air Ground Incident
AIAA	Area of Intense Aerial Activity
AIC	Aeronautical Information Circular
AIS	Aeronautical Information Services
a(m)sl	Above (mean) sea level
ALFENS	Automated Low Flying Enquiry & Notification System
AOB	Angle of Bank
APC	Approach Control(ler)
APR	Approach Control Radar
ARA	Airspace Restricted Area
ARP	Aerodrome Reference Point
ASR	Airfield Surveillance Radar
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATCO	Air Traffic Control Officer
ATCRU	Air Traffic Control Radar Unit
ATIS	Automatic Terminal Information Service
ATM	Aerodrome Traffic Monitor
ATS (U)	Air Traffic Service (Unit)
ATSA	Air Traffic Service Assistant
ATSOCAS	ATSs Outside Controlled Airspace
ATSI	Air Traffic Services Investigations
ATZ	Aerodrome Traffic Zone
AWAC	Airborne Warning and Control
AWR	Air Weapons Range
Awy	Airway
BGA	British Gliding Association
BHAB	British Helicopter Advisory Board
BHPA	British Hang Gliding and Paragliding Association
BINA ERS	British Isles/N America En Route Supplement
BMAA	British Microlight Aircraft Association
CAA	Civil Aviation Authority
CALF	Chart Amendment - Low Flying
CANP	Civil Air Notification Procedure
CAS	Controlled Airspace
CAT	Clear Air Turbulence, Commercial Air Transport
CAVOK	Visibility, cloud and present weather better than prescribed values or conditions
CMATZ	Combined MATZ
C/S	Callsign
CSC	Chief Sector Controller
CTA	Control Area
CTR/CTZ	Control Zone
DAAvn	Director Army Aviation
DAT	Defence Air Traffic
D & D	Distress & Diversion Cell
DF	Direction Finding (Finder)
DFTI	Distance from Touchdown Indicator
DH	Decision Height
DI	Direction Indicator
DME	Distance Measuring Equipment
DUA	Dedicated User Area
EAT	Expected Approach Time
ERS	En Route Supplement
FIC	Flight Information Centre
FIR	Flight Information Region
FIS	Flight Information Service
FISO	Flight Information Service Officer
FMS	Flight Management System
FONA	Flag Officer Naval Aviation
FPS	Flight Progress Strip
GAT	General Air Traffic
GCA	Ground Controlled Approach
GCI	Ground Controlled Interception
GMC	Ground Movement Controller
HISL	High Intensity Strobe Light
HLS	Helicopter Landing Site
HMR	Helicopter Main Route
HPZ	Helicopter Protected Zone
HTZ	Helicopter Traffic Zone
ICF	Initial Contact Frequency
IFF	Identification Friend or Foe
IFR	Instrument Flight Rules
IFTA	Instrument Flying Training Area
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
JOI	Joint Operating Instruction
KHz	Kilohertz
LARS	Lower Airspace Radar Service
LAS	Lower Airspace Service
LATCC	London Area & Terminal Control Centre
LFA	Low Flying Area
LFC	Low flying Chart
LFS	Low Flying System
LHS	Left Hand Seat
LJAO	London Joint Area Organisation
LOA	Letter of Agreement Line of Attack
LTMA	London TMA
MATO	Military Air Traffic Operations
MATS	Manual of Air Traffic Services
MATZ	Military Air Traffic Zone
mb	Millibar/s
MCTA	Military Control Area
MCTZ	Military Control Zone
MEDA	Military Emergency Diversion

MHz	Megahertz
MRSA	Mandatory Radar Service Area (Military Area)
MSA	Minimum Safe Altitude
MSD	Minimum Separation Distance
MTA	Military Training Area
MTRA	Military Temporary Reserved Airspace
NATS	National Air Traffic Services
NDB	Non - Directional Beacon
NM	Nautical Mile(s)
NOTAM	Notice to Airmen
NVG	Night Vision Goggles
OAC	Oceanic Area Control
OACC	Oceanic Area Control Centre
OAT	Operational Air Traffic
ODL	Opposite Direction Level
OJTI	On-the-Job Training Instructor
PAR	Precision Approach Radar
PFL	Practice Forced Landing
PI	Practice Interception
PIC	Pilot in Command
PINS	Pipeline Inspection Notification System
PTC	Personnel & Training Command
QDM	Magnetic heading (zero wind)
QFE	Altimeter setting to give height above aerodrome, or runway threshold
QGH	Controlled descent through cloud
QNH	Height above sea level (altitude)
QSY	Frequency change
QTE	True bearing
RA	Resolution Advisory (TCAS)
RAS	Radar Advisory Service
RHS	Right Hand Seat
RIS	Radar Information Service
RNAS	Royal Naval Air Station
RPS	Regional Pressure Setting
RSO	Range Safety Officer
RTF	Radio Telephony
RVSM	Reduced Vertical Separation Minimum
RWY, Rwy	Runway
RVR	Runway Visual Range
SAP	Simulated Attack Profile
SC	Sector Controller
SCH	Set Clearance Height
ScOACC	Scottish and Oceanic Area Control Centre
SID	Standard Instrument Departure
SIF	Selective Identification Feature
SMF	Separation Monitoring Function
SRA	Surveillance Radar Approach
SSR	Secondary Surveillance Radar
STAR	Standard Instrument Arrival Route
STC	Strike Command
STCA	Short Term Conflict Alert
SVFR	Special VFR
TA	Traffic Alert (TCAS)
TANS	Tactical Air Navigation System
TBC	Tactical Booking Cell
TC	Terminal Control
TCAS	Traffic Alert & Collision Avoidance System
TDA/TRA	Temporary Danger or Restricted Area
TFR	Terrain Following Radar
TMA	Terminal Manoeuvring Area
TTA	Tactical Training Area
UAR	Upper Air Route
UAS	Upper Airspace Service
UASRA	Upper Airspace Special Rules Area
UDA	Upper Advisory Area
UDF	Ultra High Frequency Direction Finder
UDR	Upper Advisory Route
UKAB	UK Airprox Board
UIR	Upper Flight Information Region
UKLFHB	UK Military Low Flying Handbook
USL	Under-slung Load
UTC	Co-ordinated Universal Time
VCR	Visual Control Room
VDF	Very High Frequency Direction Finder
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omni Range
VRP	Visual Reporting Point
WIP	Work in Progress
WRDA	Weapons Range Danger Area

AIRPROX REPORT No 105/01

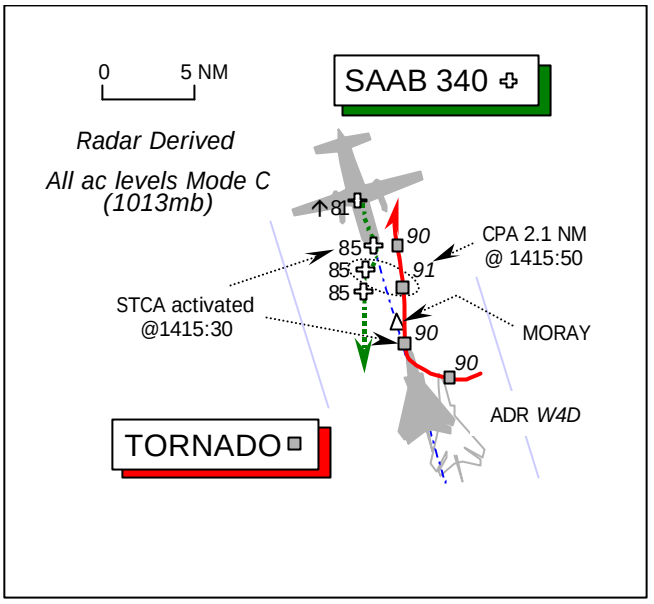
Date/Time: 2 Jul 1415

Position: 5807 N 0251 W (2 NM NNW MORAY)

Airspace: ADR W4D (*Class:* F)

	Reporting Aircraft	*Reported Aircraft*
Type:	SAAB 340	Tornado GR1 pair
Operator:	CAT	HQ STC
Alt/FL:	FL 80↑	FL 90
Weather	VMC CLOC	VMC SKY CLEAR
Visibility:	>10 km	>20 km
Reported Separation:	400 ft V, 1 NM H	1.5 NM H

Recorded Separation: 600 ft V @ 2·1 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SAAB 340 PILOT reports heading 165° at 200 kt climbing out from Wick on ADR W4D to their cleared level of FL 160 under a RAS from ScACC. A squawk of A5066 was assigned and Mode C selected; TCAS is fitted. At about 22 NM DME from the WIK, ATC advised them of military traffic ahead, but as they were being *"covered by a RAS continued as cleared whilst keeping a good lookout"*. The conflicting traffic appeared on TCAS at FL 90, as they were climbing through FL 80, whereupon ATC passed traffic information and stated that they would *"keep them advised"*. The two jets were at about 11'30 – on a constant bearing heading straight toward his ac and now within 2 NM and 400 ft above their level so an avoiding action R turn was initiated. Simultaneously, TCAS enunciated *"Traffic"*, followed by *"descend"* and then *"adjust vertical speed"*. During the avoiding action turn ATC gave them a heading of 220° he thought, and two military jets passed 1 NM to port (he stated 2 NM on RT) about 400 ft above his ac; when clear of the traffic ATC instructed them to fly direct to the ADN VOR. He assessed that there was a *"medium"* risk of a collision and suggested that to prevent a recurrence ADRs should be reclassified as airways.

THE TORNADO GR1 PILOT reports leading a pair of camouflage grey Tornados level, he thought at FL 80, whilst conducting a close formation training sortie in a clear sky. They were not in receipt of an ATS, but were monitoring the squadron private frequency, and only the lead ac was squawking 3/A 7001 with Mode C. HISLs were on. A climbing R turn was initiated to reposition for the next part of the sortie, when flying out of the sun passing 270° in a slow R turn, (the radar recording reveals at FL 90) a low wing twin-engine ac was spotted 1·5 NM away and 1500 ft below, heading about 160°. At this point the student No 2 pilot was in echelon to starboard, flying at 300 kt. The R turn was continued and he pulled the maximum 'G' allowable with the No 2 on the inside of the turn; the civilian ac passed 1·5 NM to port and 1500 ft below his ac. He did not consider avoiding action necessary for the formation and there was "*no risk of a collision at any time".*

UKAB Note (1): Subsequent enquiries revealed that the crew composition in the lead Tornado was a staff pilot/student navigator, with a student pilot/staff navigator flying in the No2. ADR W4D is depicted on the Tornado Moving Map Display.

THE ScACC MORAY SECTOR CONTROLLER (SC) reports that the SAAB 340 was climbing to FL 160 after departure from Wick, routeing W4D to Aberdeen. The ATS was a RAS - limited to squawking ac only, because the Allans Hill primary was unserviceable. Traffic information was given initially about two other ac – a low level contact tracking NW on a Lossiemouth squawk and a 7001 squawk manoeuvring between MORAY and SMOKI indicating FL 80-100 Mode C. He updated the traffic information when the 7001 squawk was at about 12 NM indicating FL 90 and which then turned towards the SAAB that was still climbing through FL 80. Avoiding action was issued to the SAAB crew to turn R onto 220° and descend to FL 80 with a further update on the traffic, which passed down the SAAB's port side. Once clear of the 7001, the SAAB crew was instructed to resume their own navigation to Aberdeen, whereupon the pilot indicated that he had been visual with two military jets which passed 2 NM away and 400 ft above his ac. The pilot indicated that he had begun his own avoiding action just before avoiding action was issued by ATC and declared he would be filing an Airprox.

HQ STC comments that regardless of the actual separation between these ac, this was an unnecessary incident that occurred when a formation unintentionally drifted into the ADR whilst repositioning for the next 'event' on a student pilot training sortie. Crews at RAF Lossiemouth should, by now, be very well aware of the need to avoid ADRs where possible, or to obtain a RIS when compelled to operate close to, or, within them. In light of this incident, the Station has once again reinforced its directive to crews and stressed the importance of sound airmanship at all times.

UKAB Note (2): A review of the ScACC TAY sector RTF transcript reveals that the SC passed traffic information to the SAAB crew relating to another ac at 3000 ft and the Tornado pair (3/A 7001) for the first time at 1412:10, *"...traffic in ... your twelve o'clock at a range of 18 miles...appears to be military aircraft or fast jet aircraft...manoeuvring at the moment...last seen climbing through flight level 100 I will keep you updated"*; the crew responded *"roger that's copied* (C/S) *looking".* Exactly 3 min later at 1415:10, the SC updated the traffic information on the previously observed contacts at 3000 ft and the subject ac - *"...previous traffic...the higher one appears to be maintaining flight level 90".* Followed within the same uninterrupted transmission at 1415:30, with "*...avoiding action turn right head..230 traffic in your 12 o'clock at a range of 4 miles unverified at flight level 90"*. The SAAB crew responded immediately at 1415:40, *" taking avoiding action..."*, whereupon the SC asked for their flight conditions, which were VMC. At 1416:00, the SC instructed the SAAB crew to *"..descend flight level eight zero that's avoiding action traffic in your ten o'clock now at a range of 2 miles unverified indicating flight level 90".* Whereupon the SAAB crew replied *"traffic in sight..."*. Thirty sec later the Tornado pair was reported by the SC to be *"..now behind you in your 7 o'clock at a range of 4 miles you can resume your own navigation again for Aberdeen".* The SC later ascertained that the SAAB crew was filing an Airprox and requested the crew's estimation of the minimum separation, to which they replied *"..conflicting aircraft was in our 12 o'clock initially…slowly coming round to our nine o'clock...approximately 400 feet above us...and we were actually in process of taking avoiding action before you actually...passed it to us".* Adding that the horizontal separation was *"...approximately 2..nautical miles"*.

UKAB Note (3): Analysis of the ScATCC (Mil) Aberdeen Radar recording reveals that the Airprox occurred broadly as described. At 1414:50, the SAAB was about 6·5 NM NNW of MORAY following the ADR centreline climbing through FL 81. Simultaneously, the lead Tornado is shown at 11'30 – about 10·5 NM, turning through W indicating FL 90 Mode C; the No 2 Tornado is not shown clearly. STCA is triggered just after 1415:20, and ten sec later the SAAB is shown at FL 85 with the lead Tornado still indicating FL 90. The ac pass port – port with a CPA of about 2·1 NM at 1415:50, the Tornado indicating FL 91 northbound and 600 ft above the SAAB which has stopped its climb and is shown at FL 85 and steadying SW'ly.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and the appropriate operating authority.

This was a very unfortunate incident, after all the sterling work done by the Station in the interests of flight safety for all members of the aviation community in Scotland. The HQ STC pilot member said that the lead Tornado pilot was mortified when he discovered his error after the event and the Station was very concerned indeed. Exhaustive work had been done to promulgate lessons learned from previous occurrences in Class F airspace and this had resulted in a unit directive to avoid ADRs where possible, or to obtain a RIS when compelled to operate close to them.

The Board was briefed that whilst pre-occupied by 'pattering' to his student navigator during the exercise, the lead pilot had not realised they had strayed into the ADR, which - as had been made clear by HQ STC – was contrary to the local Unit directives. It was apparent to members that the Staff navigator in the No 2 Tornado had also been similarly distracted, otherwise he would have mentioned the navigation lapse to the lead pilot - a useful CRM teaching point - which all four crew-members had apparently missed. In mitigation it was explained that the staff navigator was also under a very high workload monitoring his student pilot's formation station keeping against the lead ac. Nevertheless, the Board's view was that the instructional task should not have prevented them from paying attention to this basic point of airmanship; situational awareness was always a priority. Once again this incident highlighted the advantages of obtaining a radar service from an ATSU to help in this important task. Nevertheless, the lead Tornado pilot reported that the SAAB was acquired 1·5 NM away when they were in the turn and no further avoiding action was necessary.

Whereas the SAAB pilot had suggested that the ADR should be reclassified as an airway, this was a matter for the Directorate of Airspace Policy whose role is to judge whether the traffic density on this or other routes warrants Class A airspace.

The SAAB pilot had been provided with traffic information at range and was aware of the developing situation, but it was not until TCAS enunciated a TA and he then spotted the jets 2 NM away that he decided to take prompt avoiding action. This was a wise move, taken just before TCAS enunciated an RA to descend. Moments later this was further reinforced by the avoiding action issued by the MORAY SC to descend to FL 80 that had been prompted by the STCA. This resolved the situation and led members to conclude that the Airprox resulted from a conflict in Class F airspace, resolved by the SAAB pilot. These combined actions afforded a horizontal separation – fairly accurately judged by the SAAB pilot at the time – of 2·1 NM at the CPA against the Tornado pair. Therefore all the safety nets had each played their part – TCAS, the STCA and the SC, which coupled with the visual sighting, led the members to conclude unanimously that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in Class F airspace resolved by the SAAB pilot.

Degree of Risk: C

AIRPROX REPART No 106/01

Date/Time: 2 Jul 1036

Position: 5330 N 0110 W (GOLES)

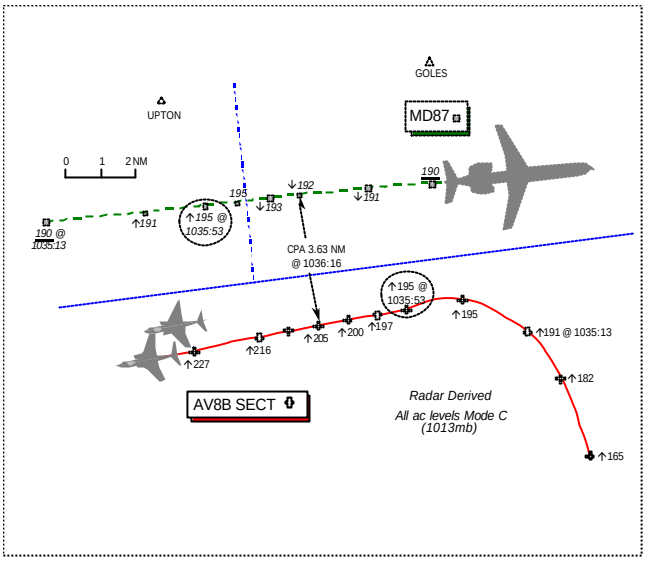
Airspace: Airway/FIR (*Class:* A)

Reporter: LATCC N SEA SECTOR

	First Aircraft	*Second Aircraft*
Type:	MD87	AV8B x2
Operator:	CAT	Foreign Mil
Alt/FL:	FL 196↑	↑ FL 250
Weather Visibility:	VMC CLAC Unlimited	Not reported Not reported
Reported Separation:	Not seen	Not reported

Recorded Separation:

3·63 NM H, 1300 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LATCC N SEA SECTOR 10 CONTROLLER reports that he was acting as mentor to a trainee controller on S10. The MD87 had levelled at FL 190 outbound from Manchester and in accordance with the LATCC/MACC standing agreement, was eastbound to the S of the L975 centreline. Just as his trainee instructed the MD87 to climb to FL 230, he noticed another ac S of GOLES indicating about FL 194. Realising that this unknown ac was northbound, he issued avoiding action to the MD87 crew first to turn hard L onto 055° and next, seeing the unknown ac was climbing, he gave further avoiding action by stopping the MD87's climb immediately. The MD87 crew did not appear to take the turn, but they did stop the climb and descended back to FL 190. Traffic information was given and the MD87 crew did detect the traffic on TCAS. However, no RA was declared.

THE LATCC N SEA CSC reports that the MACC S29 controller called to advise they were turning the AV8B section (the unknown ac) hard L. He looked down to the radar display and heard the S10 controller also issuing avoiding action to the MD87. As both flights were being turned L he assessed that standard separation would be maintained or, if lost, only by about 0·5 NM. The AV8B leader had been instructed by S29 to remain outside CAS and call for joining clearance on the MACC frequency.

THE MD87 PILOT reports he was outbound from Manchester at FL 190 under a RCS from LATCC. About 2 NM E of GOLES, he thought, LATCC cleared them to climb, which was commenced. Shortly thereafter, they were instructed to maintain FL 190 and to turn L for avoiding action. TCAS enunciated a TA twice, but the other ac was not seen at all.

THE AV8B (HARRIER) PILOT provided a most comprehensive report in Spanish and thoughtfully provided an English translation, which has been summarised here. He reports that he was leading a section of two AV8Bs departing Waddington after participating in their Air Show. The day before their departure, Waddington OPERATIONS had confirmed their flight plan (FPL) routeing and departure time for their return flight to Rota - Spain via Mont de Marsan - France.

Engines were started at their planned time, but Waddington GROUND advised them of a short delay. Engines were restarted according to the new slot time, and immediately afterwards their

CAS joining clearance was requested. GROUND advised that their clearance was 'on request' and a few minutes later asked him to confirm the level they could reach by GOLES. Both pilots agreed they could reach FL 250 and the leader believed he advised GROUND accordingly, who responded "FL 250 on request". From this the pilots concluded that GROUND was co-ordinating with the controlling agency their 'clearance' to fly the flight-planned route. After a few minutes GROUND called and after ensuring they were ready to copy their 'clearance' advised them "...you have been cleared to proceed to GOLES, after departure R turn direct to GOLES, climb and maintain FL 250, contact Waddington DIRECTOR" and included a frequency and squawk. The leader read-back their 'clearance' and GROUND replied "your read-back is correct, advise when ready to taxy". The AV8B pilots followed ATC instructions and once cleared by TOWER, executed a formation take off. UKAB Note (1): The 'clearance' referred to here, was possibly local departure instructions and not the CAS joining clearance.

After departure the section executed a R turn onto a heading for GOLES and commenced a climb to, he thought, their cleared level of FL 250 and switched to Waddington DIRECTOR (DIR - who was providing a DEPARTURES service). After checking in with DIR, he thought the controller advised, "negative radar contact, you'll have to get your clearance with Manchester CONTROL (MACC) on frequency....you are cleared to switch". As no reference was given to any intermediate level before FL 250, the leader assumed that this referred to a clearance for the routeing beyond GOLES. Therefore, the leader thought that their clearance limit was GOLES.

The section continued their climb at 300 kt, heading 330°, in echelon starboard with no more than 0·1 NM spacing between ac and attempted to free-call MACC several times, but without success. While trying to establish communications the AV8B section maintained VMC; passing FL 120 the leader observed traffic on his AI radar 40° L, crossing L – R, at FL 190 above them that was safely avoided by reducing the RoC and turning L. RT contact was then established with Manchester who advised the leader that they were not cleared to enter CAS. This call really surprised both pilots and a heading and a level to remain clear of CAS was immediately requested from MACC; MACC subsequently cleared them for the rest of the route as flight-planned, which was flown all the way to Mont de Marsans, without further problems.

Both pilots reviewed the occurrence and believed that they had been given a 'clearance' after engine start to an assigned level of FL 250, but no mention at all at that stage that they would have to obtain their own CAS joining clearance. It appeared to them (erroneously) that they had been permitted to launch without prior co-ordination to reach the level they were given in their clearance from GROUND. They commented that if ac are to be launched in this situation, pilots must be informed when still on the ground, with an intermediate level, clear of CAS, from which they can safely co-ordinate their entrance into the airway. He thought that none of this had been given to the pilots, only FL 250 (incorrectly). Even when the pilots contacted DIR, the information given led them to believe that this was to obtain a clearance for the rest of the route beyond GOLES as DIR didn't give an intermediate level to remain clear of CAS. Furthermore, Waddington ATC should have expected that if the pilots had RT problems whilst following standard procedures, they would conform to their clearance and climb to FL 250, which is exactly what they thought they had done. During the debrief back at base both pilots were surprised that other participants at the airshow who departed 2 hours later were instructed to level at 5000 ft after takeoff, and safely obtained their clearance without any problems on departure. For future airshows, they recommended that pilots are given a clearer picture of the situation they are launching into, together with an intermediate level from which they can safely co-ordinate the CAS join.

MIL ATC OPS reports that this Airprox occurred on the day after the Waddington airshow when ATC was reasonably busy with a steady stream of departing ac. At 1023:29, the Waddington SUPERVISOR (SUP) telephoned MACC to request an airways joining clearance for the AV8B section. After a delay of about 1 min, SUP passed the estimate for GOLES - 1031 - and the requested joining level - FL 240. The level was questioned by the MACC Air Traffic Services Assistant (ATSA), and at 1024:51, the SUP was asked to standby. At 1025:45, the ATSA advised SUP *"...we're just talking to North Sea because technically it's their bit of airspace, it's delegated to them..."*. SUP then asked *"OK, can we put them on for departure..."* which

the ATSA accepted, *"Yeah, there'll be no problem getting them going but just err..."* and SUP added that Waddington would get the ac airborne so that they would be able to make their estimate. The ATSA acknowledged this at 1026:05, but asked SUP to *"..hang on."* Over the next 45 sec the ATSA and SUP continued their discussion, with the ATSA stating that *"…we'll ring you back with the clearance...",* both agreeing that the flight could get airborne and SUP then suggesting *"Do you want them to freecall?"* Finally, at 1026:53, ATSA stated *"Yes, remain clear of controlled airspace, then freecall Manchester on one one eight decimal seven seven"* and SUP read back *"One one eight decimal seven seven, remaining clear of controlled airspace, roger...."* after which the landline was closed.

At 1030:27, after departure from RW21, the AV8B leader checked in with DIR, who was fulfilling a 'DEPARTURES' function; the flight was identified, placed under a RIS and released *"...own navigation GOLES, climb Flight Level two four zero."* The leader acknowledged *"Copied, leaving one thousand for Flight Level one one zero"*. The incorrect readback was not questioned by DIR. At 1030:55, when the section was 7–8 NM W of Waddington, DIR advised the AV8B leader *"...unable to arrange a joining clearance at GOLES at the moment. However, Manchester would like you to freecall them on one one eight decimal seven seven, remaining clear of controlled airspace and obtain your clearance there. Can you do that on your other box and report back to me when you have got your clearance?"* The lead pilot replied *"Copied, stand by."* About 30 sec later, DIR requested the leader to recycle his transponder setting and received the reply *"Copied, resetting 3631."* Soon afterwards, at 1032:22, DIR passed traffic information on conflicting traffic in the Gamston area but received no reply. DIR attempted to call the AV8B section a further 3 times over the following 2 min, with a fourth call while he rang MACC. Whilst waiting for a reply, DIR saw the lead AV8B's squawk change and then 'ident', saying out loud (& heard on the tape)*"Ahhh they've just changed it"*, before the line was answered at 1034:59. DIR enquired *"...have you got* (the AV8Bs C/S)*?"* to which the person at Manchester replied *"I have but we have lots of problems with him. I'm gonna have to call you back because he's about to enter controlled airspace and..,where he's not supposed to at the moment."* Manchester then confirmed *"he is speaking"* and DIR replied *"good, that's all I wanted to know".* As the landline was closed, DIR saw the AV8Bs turn L onto a westerly heading and track S of the L975 boundary at FL 195 Mode C, whilst also observing another ac, tracking E close to the southern edge of L975 indicating FL 190. The tracks appeared to pass with about 5 NM horizontal separation.

With hindsight, planning a flight to France with a CAS entry point to the N of Waddington seems to have been an odd decision. Waddington is a regular host for military detachments and, if discovered, ATC will attempt to rectify an obvious poor choice of route on filed FPLs. This however, is dependent on the workload and experience of the team on watch and when it is discovered; it is sometimes simpler to leave an accepted FPL as it is rather than to risk complicating matters with a late change of routeing. Here the AV8B pilots had filed their FPL for the return leg from their home base abroad, at the same time as they filed the FPL inbound to Waddington; when the return routeing was spotted, it was too late to attempt a change. As a result of experience with several detachments, Waddington now provide a list of suggested routeings as part of an introductory briefing package, which is sent to foreign aircrew prior to their arrival for ACMI detachments or airshows.

The choice of GOLES as a CAS joining point at FL 240, was an unfortunate one as it resulted in a 3½ min telephone call whilst attempting to negotiate the join. This airspace just falls within the LATCC N SEA Sector, but the reason why SUP rang MACC for the clearance could not be determined (information regarding airway sectorisation currently displayed within Waddington ATC is shown correctly). Nevertheless, both SUP and the MACC ATSA had tried their best to facilitate the AV8B pair's CAS join, but the long telephone delay added additional pressure to the situation. With hindsight a join at FL 190 or below, directly with MACC, would probably have simplified and expedited the whole process. Getting the ac airborne, to freecall MACC and hold clear of CAS until cleared to join appeared to be entirely workable; it appeared the clearance would be forthcoming, the flight would not be unnecessarily delayed (which may have caused problems further 'down route') and it would 'free up' the runway for subsequent departures. However, this was reliant upon the pilots of two single seat fast jets from a foreign country being able to keep themselves clear of CAS. DIR was aware of this, hence his attempt to get the pilots

to contact MACC *"..on your other box..."* at an early stage, the intention being to continue to provide a radar service (and CAS avoidance if required) until two-way communications had been established with MACC. The lead pilot appeared to understand DIR's transmission, possibly reinforced by the fact that DIR could still communicate with the ac about 30 sec later when he asked the pilot to recycle the squawk. However, DIR assumed that the AV8Bs were fitted with two radios capable of simultaneous operation, which may not have been the case here and could explain why there was no response to his subsequent RT calls.

After losing RT contact with the AV8B leader for such a long period, DIR did have the option of attempting a call on 243·0 MHz (GUARD), even whilst telephoning MACC. In this situation however, a simultaneous call on GUARD with instructions to avoid CAS, might have actually countermanded a joining clearance issued on VHF.

ATSI reports that Class A CAS within L975/UL975 from FL 195 to FL 275, E of of a position 8 NM E of DENBY is delegated to LATCC N SEA S10. Accordingly, ac joining L975 at GOLES westbound enter LATCC N SEA Sector's airspace. When MACC received a request from Waddington for the AV8B pair to join CAS at GOLES at FL 240, MACC telephoned N SEA Sector for co-ordination.

MACC advised LATCC N SEA *"…we've got…2 Harriers that are looking to join on track GOLES at flight level two five zero estimate for GOLES is one zero three one. I can't actually see them at the moment have you got anything to affect if we join them at GOLES and then they're gonna go to DENBY?"*. The CSC advised that she could not find the fps and MACC offered to route the AV8Bs on track to DENBY, which would mean the jets would only clip the edge of LATCC's airspace. No positive reply was received to this suggestion, so MACC proposed phoning back when the ac were visible on radar, which was agreed by the LATCC CSC. Consequently, MACC instructed Waddington to get the ac airborne to *"...remain clear of controlled airspace then freecall Manchester on 118·77".*

The ATSA answered Waddington's call to MACC and the request to LATCC was made by the SC S29. This might explain a couple of discrepancies i.e. the requested joining level passed to LATCC was FL 250, whereas Waddington said it was FL 240. There appeared to be some confusion from the MACC controller's perspective as to whether or not the Harriers were already airborne, whereas Waddington specifically stated the ac were on the ground.

There is no guidance in the MACC MATS Part 2 about procedures for joining clearances for military ac. However, under the heading of "Joining Clearances for Military Aircraft" appears the following at LATCC-AC MATS Part 2, Page NOR 3-27: *"For aircraft departing from military airfields which are due to join CAS/UAR at a point within the North Sea airspace less than 10 minutes flying time from the departure point, e.g. Coltishall, ATC at the airfield will request the joining clearance prior to the aircraft's departure. The NSEA CSC shall issue a joining clearance, subject to the traffic situation, based on the estimate for the joining position. It is the airfield's responsibility to advise the NSEA CSC if the aircraft's departure is delayed and therefore the estimate for the joining position has changed. If the time on which the clearance issued is critical, a Clearance Expiry (CE) time should also be added to the joining clearance. The Clearance Expiry time will not be less than 5 minutes after the estimate for the joining position"*. Had Waddington telephoned LATCC, rather than MACC, this procedure could have been followed and any resultant confusion would probably have been eliminated.

The AV8B leader contacted MACC S29 at 1032:20. However, satisfactory two-way RT communication was not established with the flight until 1034:30, when the Harriers were passing FL 160, climbing to FL 240, on course to GOLES. Initially, the AV8B leader was instructed to take up an orbit to remain outside CAS (UKAB Note (3): From the transcript, the lead pilot did not appear to understand this instruction as at 1035:10 the leader queried *"sorry OK we will stay you know at what is outside...controlled airspace give me one heading to remain outside"*.) Subsequently, MACC instructed the leader to *"...fly a radar heading of 260"*. The resultant turn kept the Harriers outside CAS and MACC warned LATCC N Sea of the situation.

The MD87 was eastbound on L975 under the control of the LATCC N SEA climbing to FL 230. As soon as the SC realised the situation with the AV8Bs, he instructed the MD87 crew to *"turn hard left heading zero five five"*. This was followed by *"stop*

your climb immediately avoiding action heading zero six zero". Traffic information was passed on traffic 2 o'clock – 5 NM at FL 195. The pilot reported descending to FL 190. Radar recordings reveal that the MD87 crew did not take the avoiding action turn. A radar photograph, timed at 1036:16, shows the AV8Bs at the CPA, 1·46 NM S of the L975 boundary climbing through FL 205 and passing 3·63 NM S of the MD87, which is descending through FL 192, after ascending to FL 195.

MACC believed that the best solution was to get the AV8Bs airborne, clear of CAS, and then issue a CAS joining clearance. If two-way communication had been established straight away between the AV8Bs and MACC, the situation could have been resolved at an early stage. However, the action taken did ensure the AV8B section did not enter CAS at that point.

It is suggested that as this event is held annually, perhaps some prior planning should take place to ensure that ac wishing to join CAS are given a better ATS, either by involving LATCC (Mil), or ensuring that Waddington is aware of the correct controlling authority for a particular GAT routeing.

UKAB Note (4): JSP318A Article 1003, para 1 states that *"...ATS staff at the departure aerodrome is responsible for obtaining the (CAS joining) clearance..."*. Para 2a specifies *"When the point of entry is within 10 min flying time from the aerodrome of departure, pre-flight clearance is to be requested"*. The southern boundary of L975 is about 6 min flying time - at 300 kt - after take-off from Waddington.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

The Board recognised that in this unusual occurrence, by chance, several contributory factors that independently would have had little impact, had combined together to degrade safety significantly. It was readily apparent that the ATC staff – at all three ATSUs involved – had been doing their level best to help the AV8B pilots on their way home, but several things went wrong and there were a number of good lessons to be learned from this encounter.

Some members believed that the catalyst to this Airprox occurred many days beforehand, with the filing of the return leg FPL at the AV8B pilots' home base. Their intention for their IFR flight seemed to be to seek the sanctuary of CAS as soon as possible after take-off and members reasoned this was why GOLES was chosen as an entry to CAS. The comprehensive Mil ATC Ops report explained this was not a particularly good choice and the Board was pleased to see that more advice was now provided by Waddington in the form of briefing packages for air display participants and foreign visitors. This was an important point, incumbent on ATSUs and Ops staff at any host airfield. In this instance the Board thought it was unfortunate that Waddington OPERATIONS had not spotted the awkward routeing on the FPL when it was received, but was advised that the inexperience of Flt Ops staff might have played a part in this respect. Some members did not agree with the Mil ATC Ops comment that it is sometimes better to leave awkward but 'accepted' routeings alone; others were surprised that the FPL processing 'system' had not rejected the route. Notwithstanding the busy traffic scenario generated by the airshow departures for all concerned at Waddington, most felt it was better to correct an obvious poor choice and that OPS/ATC at Waddington should have done so at an earlier stage. The unwelcome complications that ensued subsequently in this case made the point. Members sympathised with the foreign AV8B pilots who had checked the day before that everything was in order for their departure, for here was another lost opportunity to simplify their route and in turn reduce ATC's workload. Once the AV8B pilots had started their engines things were set. The next unfortunate turn of events was the call to MACC instead of LATCC. This promoted delay and resulted in an interim plan to get the AV8Bs airborne while an airways entry clearance for them was being addressed. Pressure and workload was thereby increased on Waddington ATC, yet could have been mitigated by joining the pair (at a slightly lower level) further W in MACC's airspace, followed by a 'request-level-change-enroute'.

Another unfortunate aspect was that no transcript was available of the Waddington GROUND frequency, which had only been in use temporarily

for the period of the air show and had not been recorded. The AV8B leader believed he had received an entry clearance into CAS on GROUND, but members thought this was improbable. Whilst the pilots might have been asked for their desired joining levels, GROUND could not issue a clearance as none had been relayed by the SUP. There was a broad consensus that the AV8B pilots might have mistaken their aerodrome departure instructions from Waddington as a perceived 'clearance' to join L975 at GOLES – especially as this is what they might have been expecting. Whilst there was no firm evidence to support this view it seemed the most plausible explanation for what followed. A military controller member reaffirmed that the pilots' choice of routeing could have been better (he thought S to join at BARKWAY was another option), but was more concerned that Waddington SUP had erroneously called MACC instead of LATCC for the CAS join. If LATCC had been asked initially, the response time might have been hastened and the 10-min rule – catered for in the LATCC MATS Pt II - would have been complied with. Some military controller members opined that it was quite normal for military ac, flying as GAT and joining CAS within 10 min from departure, to be launched to hold clear and await their CAS joining clearance. Whilst not ideal this was a fact of life in the busy airspace surrounding the LTMA, but common usage did not however condone the practice; rightly or wrongly the rules were written for situations such as these. If these rules were outmoded then consideration should be given to changing them. However here, if the CAS joining clearance had been obtained whilst the AV8Bs were on the ground there would have been less room for error – especially with visiting foreign pilots, who through no fault of their own might be more easily confused than those whose native tongue was English. It was this 'bending' of the rules which one experienced civil controller thought was fundamental to this Airprox, but this was not a widespread view as to cause, more a contributory factor. Some pilot members were sympathetic to the AV8B pilots' predicament. They thought ATC may have underestimated the workload imposed on the leader of these single-seat jets i.e. to fly his own ac, lookout in 'see and avoid' airspace, navigate, talk on the RT, change height/frequency/ squawk and at the same time keep an eye out for his wingman. Lengthy RT exchanges from Waddington ATC had made none of these tasks easier.

Whilst it was evident that DIR had told the leader he was not cleared to join at GOLES, which was acknowledged, the leader had patently not understood what he had been told. Some members wondered if it was realistic to expect the AV8Bs to remain clear of CAS so soon after take-off without ATC assistance. This was supported by the lead pilot's confused transmission at 1035:10, when he eventually established RT contact with MACC. Moreover, DIR had assumed the lead pilot could talk simultaneously on UHF to him and on VHF to MACC, a point that was never cleared up. Pilots agreed that operating under the 'control' of two ATSUs at the same time was best avoided wherever possible. It may have been better for ATC to have proffered set headings and levels for the AV8Bs to fly – or even a point on which to hold – (they were flying an IFR FPL) and accept the higher workload that this would have entailed – in other words take charge of the ac in a more positive manner. DIR probably could have done this if asked, which he was not under the extant RIS. A counter view argued that the AV8B pilots should have been entirely capable of complying with the instruction given and there was no positive indication from them that they did not understand the situation. Military pilot members thought that DIR's call of *"...own navigation GOLES, climb Flight Level two four zero"* was the key instruction that misled the leader into believing that he was cleared to GOLES - for that is plainly what the latter's intention was. However, the leader's acknowledgement of *"Copied, leaving one thousand for Flight Level one one zero"* was completely wrong and should have been questioned by DIR. With hindsight here was another clue (to DIR) that things were not all that they should be. DIR's later call at 1030:55, when the pair were 7-8 NM W of Waddington, was clear and unambiguous that no CAS join had been issued, but it was buried in a long transmission that was evidently not understood by the AV8B lead pilot; for one thing it was not what they would have expected to hear. His reply of *"copied standby"* was more indicative of a pre-occupation with another cockpit activity which had momentary priority, rather than an acknowledgement of understanding the instruction to remain clear of CAS. All of this was a prelude to the Airprox.

With the pair rapidly approaching the boundary of CAS toward GOLES (which they had every intention of reaching) it was not entirely evident that the ac

the AV8B pilot reported detecting on AI radar and subsequently avoiding, was in fact the MD87. Surprise was expressed that the MD87 crew had not turned their ac in compliance with the avoiding action proffered by the LATCC N SEA SC. It might have been that they simply did not hear the instruction, but if there was another reason they should have advised the N SEA SC accordingly. It was therefore fortunate that the MACC S29 SC managed to obtain two-way RT when he did and steer the AV8Bs away from the airway and the MD87 within it. His prompt action resolved the developing confliction with the airliner. Putting all of this together, the Board concluded that this Airprox had resulted from a potential unauthorised penetration of Class A CAS (L975) by the AV8Bs, prevented by the MACC S29 SC. Separation was 'deemed' to exist between the airliner (over 2 NM inside L975) and the AV8B pair (1·46 NM outside CAS), such that the Board concluded that no risk of a collision existed in the circumstances.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A potential unauthorised penetration of Class A CAS (L975) by the AV8Bs, prevented by the MACC S29 SC.

Degree of Risk: C.

Contributory factors:

Poor choice by the AV8B pilots of CAS joining point/ level and routeing, which was not detected beforehand and corrected.

No CAS joining clearance obtained before departure.

Waddington SUP requested the airways joining clearance from the wrong controlling agency - MACC vice LATCC.

Misunderstanding by the AV8B lead pilot of key ATC instructions that were included as one part of a lengthy transmission.

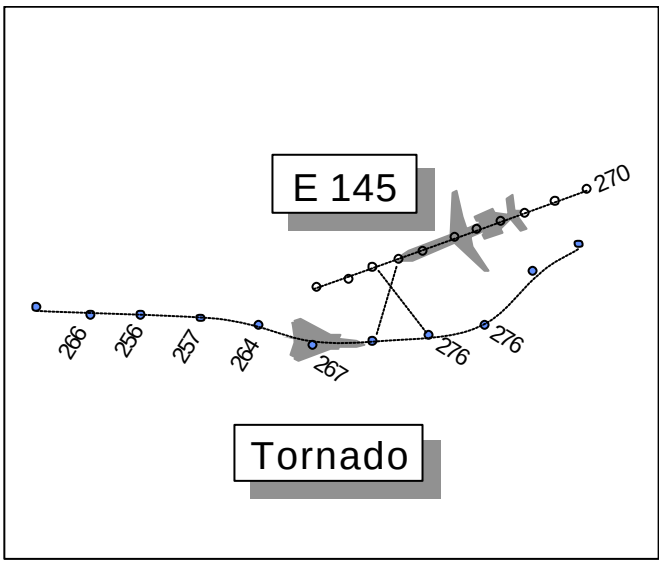
AIRPROX REPORT No 107/01

Date/Time: 3 Jul 1003

Position: 5522 N 0010 W (53 NM ENE of Newcastle)

Airspace: UIR (*Class:* B)

	Reporting Aircraft	*Reported Aircraft*
Type:	Embraer 145	Tornado F3
Operator:	CAT	HQ STC
Alt/FL:	↓ FL 270	FL 270 ↑
Weather Visibility:	VMC CLNC 100 km	VMC CLNC Unltd
Reported Separation:	1.8 NM, 500 ft V /NK	
Recorded Separation:	1.9 NM	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EMBRAER 145 PILOT reports heading 250° at 300 kt under radar control having been cleared by ScACC to descend from FL 350 to FL 270. Passing FL 273 the controller instructed him to level immediately at FL 270. Moments later military fast jet traffic passed in the opposite direction to port by 1.8 NM and 500 ft above. TCAS gave a 'Descend Now' RA and he complied, but the RA cleared almost immediately, after only 100 ft of descent. After landing he was told that the fast jet had climbed well through its cleared level.

THE TORNADO F3 PILOT was detached shortly after the incident and did not provide a report until a month after the incident. He reports flying a PI on a target at FL 420; he was the lead ac of a pair and the target was his No 2. He had dived from FL 310 to FL 250 to expedite his acceleration to M1.4; he was heading 080° at 850 kt and when passing FL 260 had begun a rapid climb, as instructed by the fighter controller. Ac inertia took it to FL 255; when 20° nose up, the Buchan controller told him to maintain FL 255. Having already responded to the instruction to expedite the climb, this was not achievable. He did not see the Emb145 but was subsequently informed it had passed 1·5 NM abeam at the same level.

UKAB Note: ScACC radar recordings show the Emb145 maintaining FL 270 throughout the event. The Tornado's descent is abruptly stopped at FL 256 and it climbs through FL 264 as it crosses the Emb145's 12 o'clock 7 NM ahead at a crossing angle of 25°. The next return shows FL 267 and after one return without Mode C it then shows level for three returns at FL 276 by which time it has passed the Emb145. The CPA (1·9 NM) occurs between radar returns, as the Tornado passes at about twice the Emb145's speed.

ATSI reports that the Emb145 was en route to Newcastle. The pilot contacted Scottish Control at 0942:05 maintaining FL 350 inbound to FILET and was identified by the Montrose SC at 0944:30.

The controller informed the pilot that, due to military activity, there would be a delay in descent and the crew could expect to be cleared not below FL 270 until around 40 NM from Newcastle; the pilot accepted this. At 0957:40, Buchan telephoned to co-ordinate traffic and enquired as to the Emb145's intentions; the SC advised that it was at FL 350, shortly to descend to FL 270 on top of the military activity. The military controller stated that his traffic, squawking 1522, would be climbing to FL 300 and would not turn west until above the Emb145 and would then turn behind it. This was agreed.

The Emb145 requested descent and was cleared to FL 270. At 1001:30 the Montrose SC contacted the military and asked the intentions of their ac squawking 1521. The SC was told that he was talking to Neatishead; the 1521 squawk was working Buchan. Neatishead advised that they would ask Buchan to ring the Montrose Controller direct, as there was no direct line between the Montrose Sector and Buchan.

The Emb145 was instructed to maintain FL 270 on reaching and to expect further descent 35 - 40 NM from Newcastle, due to military traffic below. This was duly acknowledged at 1002:30. Almost immediately afterwards, the Montrose SC passed traffic information on military traffic "*1 o'clock 14 miles showing FL 275 descending*", and instructed the Emb145 to stop at his present level. The controller then tried to co-ordinate with the military but the controller who answered the phone was talking to an ac. The Montrose Controller then updated the traffic information to the Emb145 as "*1 o'clock range 6 miles indicating FL 255 descending*". The military controller, who was still on the line, advised that his traffic was maintaining FL 255.

Shortly afterwards, at 1003:30, the Emb145 pilot advised that he had received a TCAS warning against traffic 500 ft above his left hand side, range 3 NM. The Montrose SC advised that the traffic was supposed to be descending from FL 255, but then did an immediate climb. The Emb145 reported visual with the traffic.

Some 10 minutes later, Controller 2 at Buchan telephoned to apologise regarding the ac squawking 1521. He advised the Montrose SC that the ac had decided to descend without informing him in advance. The SC replied that such action was

unacceptable, especially as he had descended through the Emb145's level and then climbed back above it. He finished by requesting Buchan to talk to the supervisor as he was too busy to discuss the matter whilst in an operational position.

ASACS SSU comments that the Buchan weapons controller (WC) was controlling a high-level supersonic sortie involving the pair of F3s. Before turning the ac inbound, the WC detected the Montrose Sector traffic squawking 5147 at FL 350; believing the traffic was inbound to Newcastle he initiated co-ordination. Co-ordination was agreed at 0958:23, with the civil ac descending to FL 270 and the No 2 Tornado to 'go behind'. The co-ordination did not specifically mention the Leader. The Buchan WC asked the Leader if he was happy to expedite a climb to FL 310 in order to pass above the stranger (whose position he passed) - as he was to be supersonic, this would provide the required 2000 ft separation. Some 23 sec later he updated the airliner's position and track and the Tornado pilot replied that he was "*in the climb*".

However, the Tornado descended initially, presumably in order to accelerate as required for the supersonic sortie profile against a high-flying target. The WC could reasonably be expected to have anticipated this action. As the conflicting tracks approached each other, the Buchan controller instructed the Tornado to expedite his climb and was asked to reiterate the FL 310 climb height. The pilot said he was expediting but when asked if he was still descending, replied *"Affirm, is this a terminate?"* The WC did not reply but when the Tornado pilot advised he was coming left, the Buchan WC instructed (18 sec after ordering the Tornado to expedite climb) "*not above 255"* and added *"C/s if you wish to maintain, you'll be able to to climb shortly"*. The pilot replied, "*Yeah, Roger, call when we're clear to climb please"*. At no stage did the WC use the term 'avoiding action' in connection with either the climb or the later levelling off instructions. As the Tornado was supersonic at the time of the confliction, the WC's action also did not provide the required 2000 ft vertical separation. During this period the Montrose Sector controller initiated a call to the Buchan WC, presumably as he was concerned at the F3's proximity to the civil traffic.

In conclusion, the Buchan WC's plan to achieve the required vertical separation was unsound as it took insufficient account of the F3's need to carry out a diving acceleration to reach supersonic speed for the intercept profile being flown. Although he may have been misled by the F3's *"in the climb"* call, the WC did not adequately monitor the F3's Mode C as the ac flightpaths closed and subsequently he did not give the required positive radar control orders to ensure that safe separation was achieved. Had the supervising Fighter Allocator been monitoring the situation more closely he would have been aware that the WC's action to resolve the confliction was inadequate and could have alerted the WC to the need for more positive action. The situation was exacerbated by the F3 pilot not promptly adhering to the instruction to climb despite the 2 stranger warnings. Finally, although both military and civil controllers were clearly content with the co-ordination they had agreed, the telephone transcript does not make comfortable reading. The inter-controller dialogue (on both sides) would have benefited from greater discipline and precision, thereby saving valuable time.

As a result of this regrettable incident the Buchan WC underwent a period of local remedial training. This HQ is issuing instructions to all ASACS units stressing the need to include greater exposure to the control of high level supersonic sorties during continuation training programmes. The lack of a direct line from Montrose Sector to Buchan, which caused additional delay on this occasion, is also being addressed within this HQ. This unfortunate incident and the lessons learnt will be the subject of a detailed ASSU Roadshow presentation to ASACS units.

HQ STC comments that the procedure for intercepting a high-flying target is defined in the Tornado F3 SOPs and the acceleration manoeuvre should be familiar to controllers. An understanding of the limitations on ac manoeuvrability is therefore essential. A Tornado F3 with a mass of around 24 tonnes travelling at M1·4 requires considerable anticipation by aircrew and controllers alike and, even with the swiftest of reactions to an external instruction, the pilot will be unable to effect a rapid change in nose position and, hence, flightpath. However, this does not excuse the crew in this instance for acknowledging (implying compliance) with the call of "not above 255" if they were unable to comply. From the radar trace there is no sign of the RoC associated with being 20° nose up at M 1·4. After momentarily descending to FL 255, the

ac begins to climb at an average of only around 3100 ft/min before levelling at FL 267 which the pilot was cleared to maintain by the WC.

It seems highly likely that the attention of the Tornado crew was focused primarily on the target and, consequently, they were unable to assimilate fully the traffic information on the Emb145. Had they done the latter, they would have been that much more aware of the need to monitor its progress, comply with the WC's instructions and, if necessary, terminate the intercept if they did not like the scenario that was developing.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC and operating authorities.

Members agreed that part of the cause of this Airprox was the F3 crew's apparent lack of situational awareness regarding the Emb145, on which they were twice given traffic information. The Board also agreed that part of the cause was that the Buchan WC did not ensure that the required 2000 ft separation between the ac was maintained. Members felt that he had exercised insufficiently positive control over the F3, particularly when it stopped performing according to his expectations. In assessing the risk level, members accepted that although the ac passed almost 2 NM apart, this appeared to be more by luck than anything else as the situation appeared to have been largely uncontrolled. The Board assessed that the safety of the ac had not been assured.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Buchan WC did not maintain the required 2000 ft vertical separation, and the F3 crew did not take sufficient account of the TI provided on the Emb145.

Degree of Risk: B

AIRPROX REPORT No 109/01

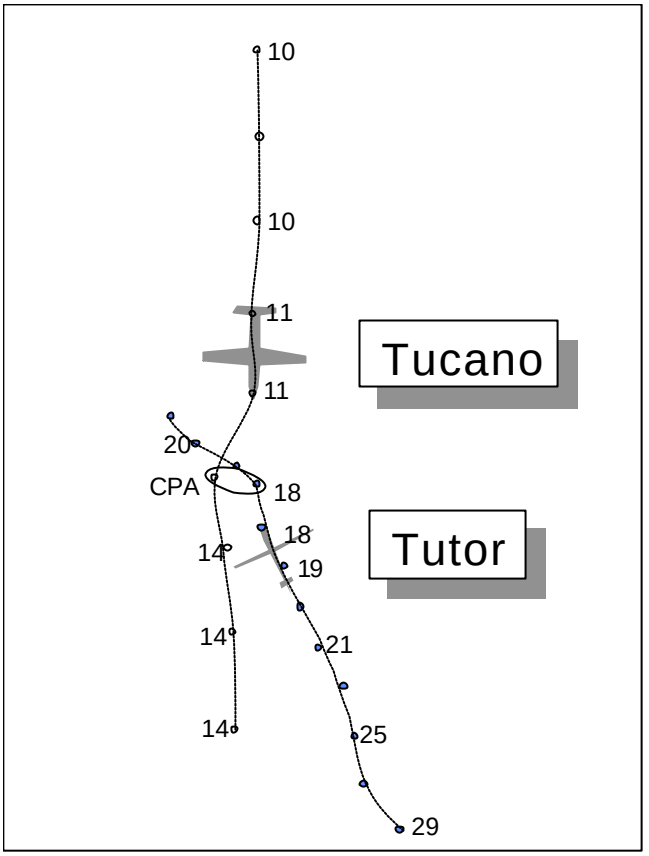
Date/Time: 5 Jul 1458

Position: 5427 N 0220 W (9 NM SE of Appleby)

Airspace: LFS (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tutor	Tucano
Operator:	HQ PTC	HQ PTC
Alt/FL:	500 ft (agl)	250 ft (agl)
Weather Visibility:	VMC HAZE 10 km+	VMC CLOC good
Reported Separation:	200-250 ft V	/200 ft, 150 m H

Recorded Separation: 600 ft V, 0.5 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TUTOR PILOT reports heading 328° at 120 kt on a dual LL exercise at 500 ft agl. While his student (RHS) was referring to a chart to confirm a fix, he saw a Tucano less than 100 m away, closing from 2 o'clock low. He immediately took control and broke high and right, reversing the turn to see the Tucano pass directly below by 200-250 ft. He commented that the student had been distracted by the map reading and his cross cockpit vision was limited and he believed the Tucano had emerged from behind high ground. There had been a moderate risk of collision.

THE TUCANO PILOT reports heading 175° at 250 kt when the student in the front seat saw a light ac above and about 2 NM ahead; on calling it, the student altered heading to avoid flying directly underneath it. It passed about 150 m away and some 200 ft above. There was no risk of collision.

UKAB Note: The LATCC Gt Dun Fell radar recording shows the ac closing as depicted in the diagram. The Tutor is descending gently, following a shallow angle off the Pennines, and the Tucano is level at 1000-1100 ft Mode C in the valley ahead. The latter's Mode C does not show at the closest point but is level at 1400 ft thereafter. The Tutor is at 1800 ft at the CPA, where the lateral separation is about 0·56 NM, and by interpolation, the Mode C vertical separation would have been 5-600 ft. Both ac alter track somewhat to the right immediately before they pass.

HQ PTC comments that with the benefit of hindsight (and the advantage of the radar plot), it seems that this was a routine encounter in the LFS. The late pickup by the Tutor crew probably coloured their assessment of the degree of height separation. The Tucano had the advantage of being lower and was therefore able to see the Tutor rather earlier and ensure safe separation without the need for a radical manoeuvre.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings and reports from the appropriate operating authorities.

The radar recording indicated that the vertical separation between the 2 ac was somewhat more than both crews' estimates, and the avoiding turns indicated that the sightings were made at a greater distance than reported. Members agreed that both crews had seen the other ac in time to take effective avoiding action and that the encounter was a confliction of flightpaths in the LFS which was resolved by both crews in a manner which removed any possible risk of collision. It was observed that a Tutor, head-on, is not easily seen at distance, and the Tutor instructor did well to spot the Tucano against a terrain background.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths in the LFS which was resolved by both crews.

Degree of Risk: C

AIRPROX REPORT No 110/01

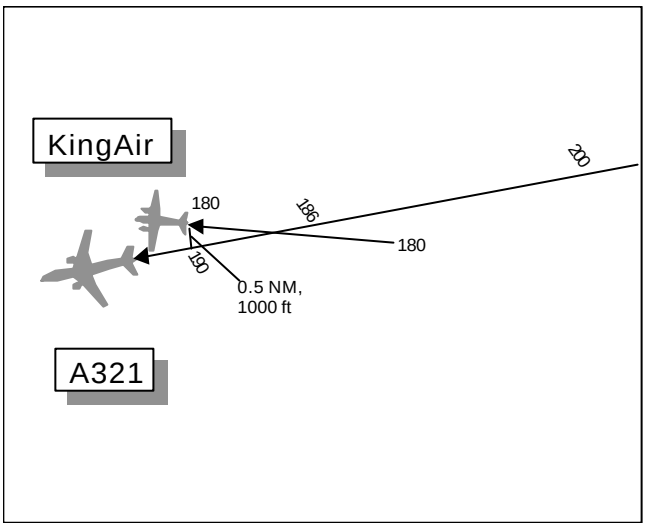
Date/Time: 7 Jul 0703 (Saturday)

Position: 5133 N 0118 E (11 NM N of Margate)

Airspace: Airway Y4 (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	A321	Beech King Air
Operator:	CAT	Civ Comm
Alt/FL:	↓ FL 140	FL 180
Weather Visibility:	IMC 4500 m	IMC
Reported Separation:	2·7 NM, 600 ft V	/NK

Recorded Separation: 1.6 NM, 600 ft



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A321 PILOT reports heading W at 330 kt inbound to Gatwick in IMC under the control of LATCC, cleared to descend to FL 140. During the descent he received a TCAS RA at about FL 185 and followed the instruction to climb, passing an indicated 600 ft vertical and about 2·7 NM from the other traffic. He did not assess the risk of collision. He did not see the conflicting traffic. On TCAS it was from left to right about 3 NM ahead and there was no immediate or real risk of collision.

THE BEECH KING AIR PILOT reports cruising at FL 180, squawking 6130, in communication with LATCC en route to Shoreham, in IMC. He was informed about the Airprox after landing.

ATSI reports that the LATCC TC SABER SC had been recalled from a break, earlier than he had expected, to carry out a split of the TC East Group (Saber/Dagga) by opening the Saber Sector. He had been in position about three minutes prior to the incident and described the RT loading as high

at the time. Additionally, there was no Co-ordinator on the sector, resulting in an increase in his workload. Prior to the split, the combined sector had been operating with a mentor and a trainee and it was the former who had given him the handover. He agreed that he had received a full handover of the traffic situation on the sector. He did comment, however, that, in his opinion, an earlier split would have been preferable, as the traffic situation was becoming complex, partly because of arriving ac having to hold at LAM and TIMBA and partly because of the presence of two 'non-standard' flights inbound to Shoreham, which, not being subject to Standing Agreements, required individual co-ordination. The first of these was the King Air, which was flight planned Airway R1 to MID. The other ac involved in the incident was the A321, inbound to Gatwick on a TIMBA 2E STAR, from UAR UY76.

The King Air had established communication with the combined Dagga/Saber (TC East) Sector at 0657, prior to the split. The ac had been instructed to continue on a radar heading of 275° at FL 180. The oncoming controller confirmed that he had been informed about this flight during the handover and its FPS was displayed, correctly annotated. He commented that, if he had been in position earlier, he would have 'boxed' this flight on his radar display to assist in remembering its presence. He said that, initially, he concentrated his attention on the traffic situation to the west of the sector, where there was a possibility of traffic entering another sector's airspace without co-ordination. Shortly after he took over, the A321 pilot made his initial call on the frequency, at 0701:50, reporting at FL 200, the agreed level for Gatwick inbounds from the CLN Sector. The Saber SC instructed the flight to descend to FL 140, a non-standard individually co-ordinated level, to be level by TANET (Standing Agreement FL 130). The SC admitted that he did not take the King Air into account when issuing this descent clearance. He believed that he probably did not look at his radar screen before passing the instruction, relying solely on his FPS display. However, because the FPS for the subject ac were not displayed under the same designator, the confliction was not readily apparent. (A FPS for the King Air was produced for the SABER designator, whereas the A321's was for TANET). The radar photograph, timed at 0701:50, i.e. just before the A321 was cleared to descend, shows the A321 passing FL 203, with the King Air, maintaining FL 180, in its twelve o'clock at a range of 8·2 NM.

Having issued descent clearance to the A321, the SC said that he focused his attention on the traffic situation elsewhere in the sector. He did not realise the potential confliction, between the subject ac, until alerted by the activation of the STCA. He recollected that it went straight to a high severity red alert, although radar recordings indicate that a low severity white alert was produced at 0703:08, changing to red at 0703:23 before ceasing at 0703:40. He immediately realised the situation and instructed the A321 to "*turn left now head one eight zero degrees*". The term 'avoiding action' was not used. The pilot reported a TCAS climb passing FL 186 and was passed information on traffic on his right side. The pilot queried his cleared level and was instructed to *"continue descent when clear flight level one four zero".* The instruction to descend when clear of the traffic was then reiterated, together with a clearance to route direct to Detling. The radar photograph, timed at 0703:44, when the A321 was first instructed to *"continue descent when clear*", shows it at FL 188, with the King Air 0·9 NM ahead. The SC agreed that it was not standard operating practice to allow a pilot the discretion of 'descending when clear'. He had reasoned that, as the pilot was fully aware of the situation and was quickly overtaking the other ac, he was in a better position to take the appropriate action. No traffic information was passed to the pilot of the King Air.

Radar recordings of the event, reveal that the A321 did not take the left turn issued by ATC. The minimum separation occurred at 0703:32, when the subject ac were 1·6 NM apart, with the A321 level at FL 186. The A321 then climbs to FL 190, which it reaches at 0704:02, having just overtaken the King Air, 0·5 NM S of it. The A321 pilot then initiates his own descent at 0704:28, when the A321 is 1·9 NM SW of the King Air, passing through the latter's level, at a range of 3 NM, nineteen seconds later.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC authorities.

Members agreed that the cause of the Airprox was that the SABER SC did not take the King Air into account when he issued the descent clearance to the A321. In assessing the risk, the Board noted that once again TCAS had provided timely warning and safe resolution guidance, removing any risk of the ac actually colliding.

The Board discussed the human factors involved in the SC's error, and what could be done to make such omissions (which could never be eliminated entirely) less likely, or more detectable. It was observed that an FPS for each ac was displayed under separate designators which made detection of the confliction less likely. Had the SC had more time to take over, he would probably have placed FPSs for the 'off route' King Air in more relevant positions. The SC was clearly mindful of the possibility of forgetting such traffic and had evolved a practice of 'boxing' such flights as a reminder. The fact that he had not had time to do this or see to his FPSs, following a later than ideal split of the Saber/Dagga sectors, was considered to be a factor in the incident. It was pointed out that the controller the SABER SC was 'taking over' from was not 'off-going' but was still manning the increasingly busy DAGGA sector, and that the SABER SC would neither have had any extra help from that quarter while settling in, nor did he have a co-ordinator to assist. The Board had made earlier recommendations on the topics of providing co-ordinators, and of watching traffic levels at supervisory levels so that sector manning could be arranged in a more timely manner. Members were advised that NATS has recently (since this Airprox) reviewed procedures for sector splitting and for the introduction of co-ordinators in Terminal Control. Two instructions have subsequently been issued: LATCC (TC) SI 119/01 details general guidance on the placement and removal of a co-ordinator on TC sectors. The guidance includes issues such as complexity, amount of traffic as well as weather. LATCC (TC) SI 115/01 details general guidance and instructions on when a TC sector should be split or band boxed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The SABER SC did not take the King Air into account when he issued descent clearance to the A321.

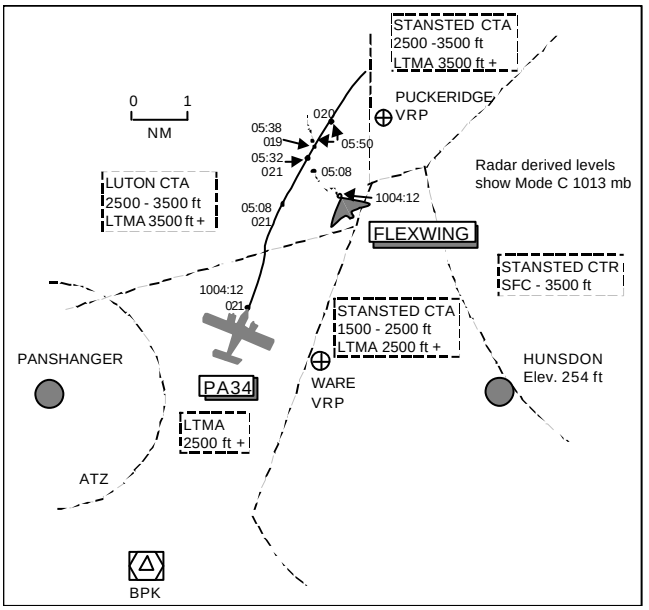
Degree of Risk: C

AIRPROX REPORT No 111/01

Date/Time: 1 Jul 1006 (Sunday)
Position: 5152 N 0002 W (1·5 NM WSW Puckeridge VRP)
Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Mainair Blade Flexwing M/L	PA34
Operator:	Civ Trg	Civ Trg
Alt/FL:	2400 ft (QNH NK mb)	2400 ft (QNH 1027 mb)
Weather	VMC CAVOK	VMC CLOC
Visibility:	NK	>10 km
Reported Separation:	<100 ft V/H	200 ft V

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MAINAIR BLADE (FLEXWING) MICROLIGHT PILOT reports heading 360° at 2400 ft QNH and 55 kt on a VFR instructional training sortie (first lesson) from Hunsdon. The ac was coloured white/green/yellow with strobe lights on, no radio was fitted and the weather was CAVOK. When about 4 NM SW of Puckeridge VRP, he was explaining to his student the difference between the smooth flying conditions they were encountering under the prevailing cloud as opposed to what may be expected under the cumulus cloud in his 7 o'clock position. He was keeping a good lookout and was aware that the view in this rearward direction was difficult to cover. He pointed in that direction and fortuitously, whilst he turned his head, he noticed something out of the corner of his eye. All he could see were two propellers and a cockpit aiming straight at him at the same level, about 80 yd or less away. He instinctively pushed out the control bar (which gives an instantaneous 100 ft climb) and waited for the impact. The twin engined ac, coloured light cream and possibly a Seneca, must have noticed him at the last second as it appeared to dive away underneath him and to his RHS, heading towards Stansted. He estimated the conflicting ac passed within 100 ft, vertically and horizontally, and thought the risk of collision as grave. He wondered why the PA34 pilot had not seen him earlier as he must have been flying VFR in the CAVOK conditions and the strobe lights on his flexwing were working well. If not, he surmised that the PA34 may well have been IFR training and reliant on an ATC flight or radar service.

THE PA34 PILOT reports flying a dual IR training sortie from Stapleford aerodrome at 2400 ft QNH (1027 mb he thought) at 135 kt. The visibility was >10 km in VMC and he was receiving a FIS from Essex Radar on 120.62 MHz squawking 7000 with Mode C. Owing to the busy nature of the airspace, he had erected only 2 IF screens ahead of the student on the LHS; the remaining 3 screens were not used. The ac was coloured white/red stripes with anti-collision and strobe lights on. When approx. 2 NM SW of Puckeridge VRP heading 030°, he saw a high wing 2 seat microlight, just R of his 12 o'clock, 0·25 NM ahead in level flight, 50-100 ft above. He thought this was strange as the other ac must have been flying very close to the base of, if not within, the LTMA (2500 ft); this was not where he would have expected FIR conflicting traffic to have been. He initiated a descent to avoid the traffic and passed 200 ft beneath the microlight which appeared to take no avoiding action. He assessed the risk of collision as low. He opined that microlights were notoriously difficult to see, which would account for his late sighting, but said that his descent to pass underneath it, by a safe margin, was not by any stretch of the imagination an emergency manoeuvre.

UKAB Note (1): Met Office archive data shows the Stansted METAR 0950 UTC 26006KT 230V300 CAVOK 19/12 Q1026.

ATSI comments that only a FIS was being provided to the PA34 by the Essex Radar controller who recalls neither an incident taking place nor one being reported to him. While regrettable that the relevant Essex Radar RTF recording is not available, it is considered unlikely to have contained anything significant to the Airprox.

UKAB Note (2): Analysis of the Debden radar recording at 1004:12 shows the PA34 squawking 7000 at FL 021 (2460 ft QNH 1026 mb) 4 NM NNE of BPK VOR tracking 020° with a pop-up primary only return, believed to be the Flexwing, in his 1 o'clock range 2·6 NM tracking NNW. The Flexwing manoeuvres for about 20 sec before steadying on a N track before fading from radar at 1005:08 when the PA34 is 0·8 NM in his 7 o'clock now tracking 030°. The PA34 continues on a steady track and at 1005:38 the Mode C indicates FL 019 (2260 ft QNH). The Flexwing reappears on radar at 1005:50 still tracking N with the PA34 now in his 2 o'clock range 0·45 NM indicating FL 021 again (2460 ft QNH). The Airprox is not observed on recorded radar only the 200 ft height loss during one radar sweep by the PA34 which accords with the reported pilot's avoiding action descent.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings and reports from the appropriate ATC authorities.

Members agreed that this had been a very late sighting by the PA34 pilot. It was acknowledged that effective CRM was more complicated on instructional sorties involving IR training; the instructor had recognised his transit would involve passage through a busy piece of airspace and had only erected 2 IF screens, (for his student) on the LHS of the cockpit, to allow a better view between his 11 and 3 o'clock positions. However, the Flexwing appeared just R of his 12 o'clock, within his clear view area, slightly above him close to the base of CAS. This was not where he had expected conflicting traffic to appear. Members acknowledged the inherent difficulties of seeing a Flexwing at the best of times, but realised that this sighting at 0·25 NM range with a closing speed of approx 90 kt (1·5 NM/min) would have given him only about 10 seconds to react before passing it. The Flexwing pilot did well to see the approaching Seneca from his rear quarter. Although the Flexwing had right of way, the pilot was able to effect a limited avoiding action manoeuvre in the vertical plane, probably his only option available at the time owing to the geometry of the incident. The PA34 pilot's options were also limited, owing to his late sighting, and he had elected to descend to pass beneath the conflicting microlight. Little more could have been done by either pilot in these circumstances. Although their successful avoiding actions had removed an actual risk of collision, members were in no doubt that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the PA34 pilot.

Degree of Risk: B

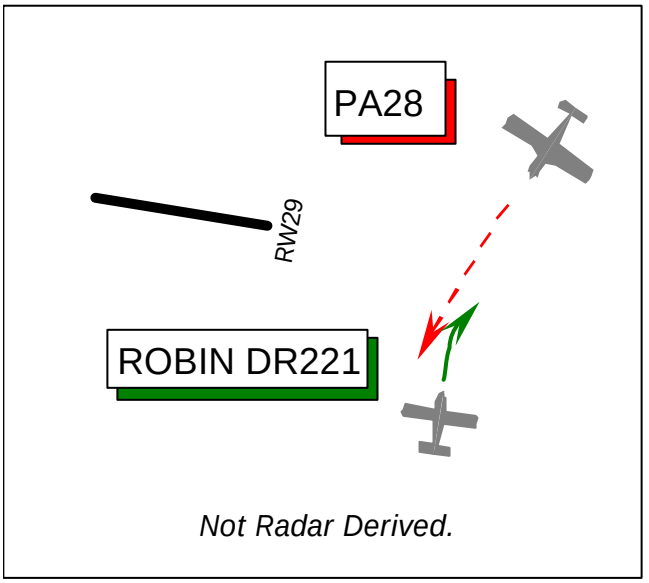
AIRPROX REPORT No 112/01

Date/Time: 8 Jul 1125 (Sunday)

Position: 5300N 0111 W (Hucknall aerodrome Cct - elev 281 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Robin DR221B	Piper PA28
Operator:	Civ Club	Civ Pte
Alt/FL:	1000 ft (QFE 998 mb)	1500 ft (QNH 1008 mb)
Weather Visibility:	VMC below cloud 3 NM	VMC below cloud 10 km
Reported Separation:	30 ft H, 200 ft V	Not seen
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ROBIN DR221B PILOT reports his ac has a red/white colour scheme; neither SSR nor HISLs are fitted. He was flying a dual circuit training detail at 85 kt, 1000 ft Hucknall QFE (998 mb) and in communication with Hucknall RADIO A/G Station. Following the turn from the downwind leg onto a L base for RW29, another ac was spotted 200 m away directly ahead crossing at a very shallow angle almost on a reciprocal heading from R – L and apparently descending wings level. He took control of the ac and initiated a shallow descending R turn to avoid the other ac, which passed 30 ft to port and 200 ft clear above his ac with a "high" risk of a collision. He turned to track the other ac, which he identified as a PA28 and changed frequency to East Midlands APPROACH on 119·65, whereupon the PA28 pilot called abeam TROWELL VRP. East Midlands APPROACH was advised of his intention to file an Airprox and he requested the other pilot be so informed. Upon turning back to Hucknall he climbed to check the cloud base which was 1300 ft QFE.

He postulated that the PA28 pilot was attempting to regain VMC, below cloud, before entering the East Midlands CTR, but could only assume the PA28 pilot was not aware of his position relative to Hucknall as he had entered the ATZ and descended into the Cct. He added that there have been an increasing number of ac entering the Hucknall ATZ when the weather was "minimal", either flying around the outskirts of Nottingham or following the M1 motorway, to and from East Midlands.

UKAB Note (1): The UK AIP at AD 2-EGNA –1-2.17, promulgates Hucknall ATZ as a circle radius 2 NM, centred on RW11/29, from the surface to 2000 ft above the aerodrome elevation of 281 ft and active on Sundays in Summer from 0900 – 1700. The A/G Station Hucknall RADIO operates on 130·8 MHz during the same period.

THE PIPER PA28 PILOT reports his ac has a white/blue colour scheme; HISLs are not fitted and he was squawking A7000 with Mode C whilst returning to E Midlands from the vicinity of Gamston. The local weather was generally broken at around 2000 ft with local areas of scattered cloud down to about 1700 ft, which was more prevalent to the W of Hucknall in the direction of the TRENT VOR. Flying at 100 kt, he maintained VMC and was established on the R210 GAM, heading 215°, which he assessed would keep him to the E of Hucknall but close enough to establish his proximity to it visually. Hucknall was sighted about 5 miles to the NE of the aerodrome, at 1700 ft E Midlands QNH (1008 mb). He had obtained the E Midlands ATIS 'Information Hotel', which gave the cloud base as broken at 2100 ft and confirmed the QNH as 1008 mb. Whilst NE of Hucknall, radio contact was established with East Midlands APPROACH, but he was asked to standby initially, he thought that this delay lasted 2-3 minutes. During this period he passed to the E of Hucknall, but had been forced to descend to 1500 ft QNH because of a local area of scattered cloud with a base of around 1700 ft amsl. When he was SE of Hucknall, APPROACH requested his flight details and he reported his position to the SE of Hucknall at 1500 ft QNH, whereupon he turned R direct to the TROWELL VRP that was to the R of the ac's heading. He estimated that he passed about 3 NM E of Hucknall not below 1500 ft QNH. Whilst en route to TROWELL he heard an Airprox being reported by the pilot of another ac on the E Midlands APPROACH frequency, but at no stage did he obtain visual contact with the other ac. When the Robin was on L base for RW29 at Hucknall, it would have been below his PA28 and he could only conclude that his PA28's engine cowling obscured the other ac.

He is currently training towards an ATPL licence and has taken this report very seriously. Whilst he does not believe that he flew through the Hucknall ATZ, he accepts that given the weather conditions in the area at the time, greater lateral separation from the ATZ would have given more protection to both ac.

UKAB Note (2): An ac flying at 1500 ft (1008 mb) would be about 200 ft above another ac flying at 1000 ft (998 mb).

UKAB Note (3): A review of the E Midlands APPROACH frequency - 119·65 MHz, reveals that the PA28 pilot free-called APPROACH at 1123:00 and was immediately requested to *"..standby please"*. Just after 1123:40, APPROACH apologised for the short delay due to *"...co-ordination..."* and asked the pilot to pass his message whereupon he reported *"..inbound to E Midlands presently just to the southeast of Hucknall routeing to TROWELL for rejoin altitude 1500 ft 1008"*. APPROACH

confirmed the QNH as 1008 mb and landings on RW27. At 1126 the PA28 pilot reported *"..east abeam TROWELL"* and was cleared for a LIMA ECHO arrival and to report at the CTR boundary. At 1127:30, the Robin pilot called and reported *"..we're in the circuit at Hucknall I'd just like you to advise (PA28 C/S) that there will be a report...just had to take avoiding action on base leg"*. This transmission was acknowledged by APPROACH and copied by the PA28 pilot.

UKAB Note (4): The incident was not recorded on radar.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and transcripts of the relevant RT frequencies.

The Board noted the Robin pilot's comments regarding other ac entering the Hucknall ATZ. Whilst not a factor here, a GA member familiar with this aerodrome and its environs confirmed that the presence of the M1 motorway passing through the lateral confines of the ATZ could cause problems when pilots followed this line feature down to E Midlands Airport without calling on RT. Clearly the Robin pilot considered that he was inside the ATZ when on a base leg to RW29 at Hucknall, whereas the PA28 pilot thought he had remained outside the boundary. GA members thought it extremely unlikely that the Robin would have been more than 1-1·5 NM from the RW threshold when on left base and hence inside the ATZ. Flying 2 NM or more from this grass runway and thus outside the ATZ would have been extremely wide, defeating the purpose of the ATZ. Conversely, the PA28 pilot estimated he passed about 3 NM E of Hucknall following the R210° from Gamston and had remained outside the ATZ. There was no way to resolve this reported discrepancy, but it was evident that when flying the R210° ac would pass barely 0·5 NM clear of the Hucknall ATZ boundary, leaving little room for error; members agreed entirely with the PA28 pilot's own view that he should have afforded the ATZ a wider berth. Indeed one member also noted that following this radial took ac directly over the built-up area of Nottingham, which should also be avoided at these altitudes whenever possible. Unfortunately, the absence of recorded radar information did not enable the position of the Airprox to be determined with certainty. The only pilot who saw anything at the time – the Robin pilot - saw the PA28 pass to port between the Robin and Hucknall aerodrome. Whether the Airprox occurred inside or outside of the ATZ was largely irrelevant to the outcome, but it was certainly in the close vicinity of the ATZ boundary. Relying on instruments and following the VOR radial did not absolve the PA28 pilot from his duty of care to see and avoid other ac, and from the reported geometry he should have been able to spot the Robin. Conversely, the Robin pilot saw the PA28 in time to take control of his ac from the student and effect avoiding action. This led the Board to conclude that the cause was a conflict close to the boundary of the Hucknall ATZ, resolved by the Robin DR221B pilot.

Turning to risk, traffic flying in opposition to Cct traffic in the vicinity of an aerodrome/ATZ will inevitably cause problems, but the Robin pilot had seen the PA28 in time to turn and descend beneath it, which removed the risk of actual collision. However, the PA28 pilot had not seen the Robin at all, which led the Board to conclude that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict close to the boundary of the Hucknall ATZ, resolved by the Robin DR221B pilot.

Degree of Risk: B.

AIRPROX REPORT No 114/01

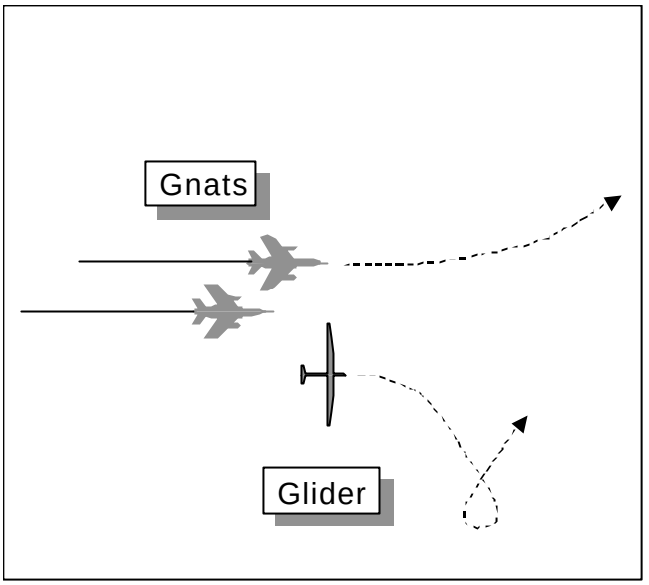
Date/Time: 9 Jul 1150

Position: 5216 N 0031 W (2 NM SE of Rushden)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Gnat	Glider
Operator:	Civ Pte	Civ Pte
Alt/FL:	2500 ft (QNH 1014 mb)	(QNH)
Weather Visibility:	VMC CLBC	VMC
Reported Separation:	200 ft H,100 ft V	

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE GNAT PILOT reports heading 090° at 260 kt, leading a pair of ac at 2500 ft with his No 2 in loose echelon to the R. His No 2 saw a glider tail on at a similar level, but he, the leader, did not see the glider at all. He was looking ahead into the impending left turn, scanning for gliders near the glider site N of that position. He turned left; his No 2 passed about 100 ft below and 200 ft left of the glider. There was a moderate to high risk of collision; the glider had been very difficult to see against the grey cloud. His No 2 said he caught a glimpse of it as it passed about 100 ft away and 100 ft above; it was a modern high performance glider with a large wingspan.

UKAB Note: LATCC radar recordings show a 7000 NMC return, identified from its routeing as one of the Gnats, closing on a primary-only return which is manoeuvring until about 20 seconds before the 7000 return crosses it directly, at which point both returns are tracking E. The returns cross at 1159:10 and the 7000 return turns to the NE about 20 seconds later. When next seen the primary is tracking SE and then turns onto NE as the Gnats leave the area. The primary return disappeared in the area of Gransden Lodge; enquiries there elicited a reply, 6 weeks after the Airprox, from the pilot of a Discus glider.

THE DISCUS PILOT reports that he remembered seeing a red jet on the day; he believed he was heading about 290°, watched its approach and was satisfied that its change of course meant that he needed to take no action. He did not hear any ac close to him. When asked later how close it had come, and whether there were 2 jets in formation, he was unable to remember. (UKAB Note: The Discus has a span of 15 m.)

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the Gnat pilots and a glider pilot, and radar video recordings.

Members observed that the Gnats were flying at 260 kt and wondered if they had dispensation to fly faster than 250 kt below FL 100. The operator does have the requisite dispensation, and military members added that this must be about the minimum sensible speed to fly such an ac, particularly in formation. The Board discussed whether or not the glider pilot contacted was the one concerned in the Airprox since the incident occurred close to Sackville Farm glider site and the

return seen on radar was not visible continuously. While the Discus pilot was in the area, and reasonable interpolation of the radar display contacts indicated a high probability of this, the pilot had not heard the Gnats passing close by. The Board reached no conclusion on this point. However it was clear that if the glider seen by the Gnat pilots was tail on, it was entirely their responsibility (the leader's specifically) to see and avoid the glider. While acknowledging that such a glider, tail on against grey cloud, was always going to be difficult to spot early, the Board concluded that the reason they got so close was that the Gnat leader did not see the glider. Members pointed out that they were not finding fault in this; it was simply a matter of fact. The No 2 saw it but too late to do anything about it since he was in close formation. As to the risk of collision, the leader had said that the glider was closer than they would have liked or felt comfortable with; its proximity was such that while they did not need to manoeuvre to avoid serious risk of collision, the margins for coping with any sudden manoeuvres by the glider were reduced. The Board concluded that the safety of the ac had not been assured.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non sighting by the Gnat leader and a late sighting of the glider by the No 2 Gnat pilot.

Degree of Risk: B

AIRPROX REPORT No 116/01

Date/Time: 11 Jul 0846

Position: 5243 N 0025 E (6.5 NM NW of Marham)

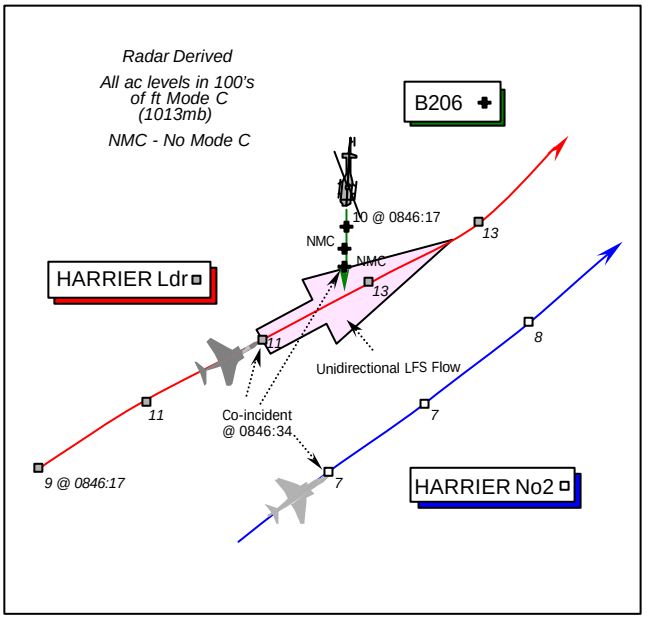
Airspace: London FIR/UKDLFS (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	B206 JetRanger	Harrier GR7
Operator:	Civ Comm	HQ STC
Alt/FL:	600 ft (RPS 997 mb)	↑ 840 ft (RadAlt)
Weather Visibility:	VMC CLBC >10 km	VMC CLBC 25 km

Reported Separation:

300 m H, 100ft V 0·5 NM H, 200 ft V

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BELL 206 JETRANGER PILOT provided a very comprehensive report stating that his helicopter has silver upperworks and a black underside; upper and lower HISLs, navigation lights, red anti-collision beacon and the landing light were all on. He had notified his flight to Low Flying Booking Cell (LFBC) under PINS and was flying single pilot with an observer on a gas pipeline patrol, whilst in receipt of a FIS from Marham ZONE on 124·15 MHz. He had selected A0036 with Mode C and his ac was TCAS fitted, but not a Rad Alt.

After turning at the Kings Lynn bypass, southbound at 100 kt along the railway line on a heading of 190°, he was following the pipeline at an altitude of 600 ft CHATHAM RPS, when Marham advised him of two fast jets approaching on a reciprocal heading and at a similar height. He asked Marham if they wanted him to climb or descend to accommodate them, but the controller told him to maintain 600 ft and that the jets would climb to 1000 ft to avoid his helicopter. At that moment, he received a TCAS Traffic Alert, showing two overlapping contacts at 2 o'clock - 5 NM away, both climbing, 200 and 300 ft below him respectively. The two TCAS contacts immediately turned to white "conflict" symbols and an audio "traffic" warning enunciated. A few sec later, they spotted a single Harrier passing 300 m in front from R – L climbing through their height but the second ac was not seen. No avoiding action was taken as the jet had already passed when seen. (He reported 100 ft clearance on RT).

He called Marham and said that he had not been happy with the separation and the controller asked if he wanted to file an Airprox, which he confirmed. He added that no avoiding action was taken at the time because he felt that any deviation was, potentially, more dangerous than remaining straight and level, especially as they could not see the second jet at the time. Because they were flying low he was not able to obtain a RIS, which he would have liked in preference. Consequently, they were operating under a FIS and would not normally have expected any "conflict advisories". However, as the Marham controller's VHF workload appeared minimal, he felt the controller could have taken a more active role in suggesting avoiding action to the Harrier pilot or himself. He believed that the Harrier pilots' actions, whether instructed by Marham or taken on their own initiative, were inappropriate. If they had maintained their height, they would have passed safely beneath him. As it was, they increased the risk of collision, by heading straight for his helicopter and climbing through its level.

THE HARRIER PILOT reports he was leading a pair of camouflage grey Harriers on a low level sortie; HISLs were on and they were squawking 7001 with Mode C whilst under a FIS from Marham APPROACH (APP) on 268·875 MHz. Heading 070°(T) through the Kings Lynn/Marham gap, 2000 ft below cloud at 420 kt, APP informed him of the helicopter's presence so, as a precaution, he elected to climb to 1000 ft RadAlt. Passing 800 ft RadAlt he spotted the helicopter, below his ac, at the 11:30 position, he assessed that he would pass well clear of it, so he levelled off and in an attempt to reassure the helicopter pilot he waggled his wings. As the faster and more manoeuvrable ac, he assessed there was no risk of a collision. At the closest point he estimated that they passed 0·5 NM horizontally ahead of, and 200 ft vertically above, the helicopter and had assured adequate separation to avoid any adverse effect of downwash on the helicopter's rotor disc.

UKAB Note (1): The PINS notification was promulgated by NOTAM UKLB 1650, which activated the applicable Gas Areas from 07-1100 UTC (F1,2,4; G2 & H1-5). The Harrier pilot's unit reports that its pilots were cognisant of the general warning provided by the PINS NOTAM.

UKAB Note (2): The UK MIL Aeronautical Planning Document at Vol. 3 Part 1 Pg. 1-2-5-1 (LFA 5) promulgates a unidirectional easterly flow for the Kings Lynn/PMP216/Marham MATZ gap. Crews are not permitted to fly below 500 ft msd within a stipulated area, which encompasses the location of this Airprox. Crews flying through this gap are required to make mandatory RT contact with Marham APP 10 NM before the gap; APP will, unless otherwise requested, provide a FIS.

UKAB Note (3): AIC 54/2001 (Yellow 51) dated 28 Jun 2001, details pipeline and powerline inspection procedures. This recommends that pipeline inspection flights operate *"...in the height band 500 – 700 ft agl where they will be above and skylined to the majority of military low-flying ac which operate below 500 ft"* agl.

MIL ATC OPS reports that the B206 JetRanger pilot was conducting a pipeline inspection at 600 ft CHATHAM RPS (997 mb) in the vicinity of Kings Lynn Power Station, whilst manoeuvring in an area known as the 'Northern Gap' - the corridor of airspace between Marham's NW MATZ boundary and Kings Lynn. The JetRanger pilot was under a FIS from Marham ZONE - manned by a mentor and trainee - on 124.15 MHz. At 0845:14, ZONE transmitted to the JetRanger pilot *"C/S, fast jet traffic believed to be entering the Northern Gap, believed to be in your 12 o'clock...about 10 miles, reciprocal"*. The JetRanger crew responded *"Roger,*

do you want us to stay at this height or climb descend". ZONE initially replied *"...if you remain at the level you are now,"* and then informed APP of the helicopter's altitude; the crew of the JetRanger acknowledged *"...remaining at 600 feet"*. Shortly afterwards, APP advised ZONE that the Harrier pair was climbing to 1000 ft RPS so, at 0846:09, ZONE updated the JetRanger crew *"...that previous fast jet traffic is now climbing to 1000 feet"*, which was acknowledged. Some 30 sec later, the JetRanger crew transmitted *"Yeah, I'm not too happy about the proximity of that Harrier...I think...we could have had some better instructions or clearance"*. The ZONE mentor replied *"...you are on a Flight Information Service, we can only advise you of the traffic that's coming the other way"*. The helicopter crew responded *"I appreciate that, but it would have been nice to have a bit more of a warning there, or instructions to give us a climb or descent"*. ZONE transmitted *"Roger, that traffic did tell us they were climbing to one thousand feet, which would give you...four hundred feet over the top; did they not climb"?* The JetRanger crew replied *"We had about one hundred feet clearance there. We've got TCAS in this aircraft and it was showing us on a collision course there* (at) *about 3 miles"*. ZONE asked the JetRanger pilot if they wished to file an Airprox, which he confirmed. Details were passed to ZONE and then the JetRanger crew continued their pipeline inspection.

The lead pilot of the Harrier pair called APP on 268·875 MHz at 0844:35, as they approached the Kings Lynn/Marham (Northern) Gap and aligned with the flow arrow. APP placed the pair under FIS, passed the Chatham RPS (997 mb) but was not able positively to identify them on radar. At 0845:06, APP reported to the leader*"...there's a helicopter believed to be in the Northern Gap area at the moment around the Kings Lynn area"*, which was acknowledged. Shortly afterwards, at 0845:46, APP updated the traffic information *"...there's a contact about half a mile south east of the Kings Lynn Power Station that is possibly the helicopter*" and again the information was acknowledged. APP quickly added *"...last reported 600 feet"*, to which the Harrier leader replied *"...roger, we've* (we're) *up to 1000 feet"*. At 0846:13, APP instructed the formation leader to squawk 'ident', who 45 sec later reported his position as N abeam Marham. APP informed the Harrier crews that they were now 4 NM clear of the helicopter to which the formation leader replied *"yeah...we're visual with traffic"*. At 0848:15, APP called the Harrier leader and advised *"that helicopter has just filed an Airprox"*, which was acknowledged.

The service provided by ZONE and APP was commensurate with current military ATC practice whilst controlling in Class G airspace. Both controllers provided timely and reasonably accurate traffic information to the respective crews for the safe and efficient conduct of flight. The JetRanger pilot's comments over RT were unfounded. The JetRanger crew was provided with traffic information when the Harriers were 8-10 NM away from the helicopter (over 60 seconds flying time). Military controllers, like their civilian colleagues, are not responsible for separating or sequencing ac under FIS; suggesting avoiding action would have been contrary to regulations, because it is the pilot's responsibility to 'see and avoid' other ac. ZONE suggested that the JetRanger pilot should maintain level because he had a reasonable idea that APP was working the conflicting ac and thus, some factual information could be exchanged.

UKAB Note (4): This Airprox is not shown clearly on the LATCC radar recordings as the JetRanger is shown only intermittently by the Claxby and Debden, southbound NW of Marham squawking 0036 and indicating 1000 ft Mode C (1013 mb) - equating to about 520 ft RPS. The Harrier pair are shown tracking ENE, squawking 3/A 7001, indicating 800 ft and 700 ft Mode C, in Battle formation with the No2 about 1 NM to starboard (SE) of the leader. At 0845:14, the time of ZONE's first traffic information to the JetRanger pilot, the Harriers are 10 NM W of Marham tracking 070°, the JetRanger is not shown at this point, but last shown in the lead Harrier's 12 o'clock at about 8·5 NM. When visible on the recording the JetRanger appears to be maintaining 1000 ft Mode C. At 0846:17, the JetRanger is in the formation leader's 12 o'clock at about 2·5 NM crossing L - R on a southerly track indicating 1000 ft Mode C; the lead Harrier is still indicating 900 ft Mode C following the flow arrow. At 0846:26, the lead Harrier climbed to 1100 ft with the JetRanger still directly ahead at 1·2 NM, whilst the second Harrier is displaced 1 NM to the S maintaining 700 ft Mode C and passing clear of the helicopter. The lead Harrier and helicopter converge but the JetRanger's contact is lost after 0846:34, just before the predicted CPA at 0846:42 - about 6·5 NM NW of Marham - when the lead Harrier is shown at 1300 ft Mode C for

two sweeps, before descending to 1100 ft, with the No 2 maintaining Battle formation at 7-800 ft Mode C. Although the JetRanger is not shown at the CPA, which cannot therefore be determined with certainty, the relative geometry would suggest that the lead Harrier passed less than 0·25 NM ahead of the JetRanger; 1100 and 1300 ft Mode C would equate to about 620 and 820 ft respectively RPS (997 mb), 100 - 300 ft above the JetRanger if the latter had maintained 1000 ft Mode C - about 520 ft RPS.

HQ STC comments that the Harrier pilot, aware of the growing confliction with the JetRanger, climbed in an attempt to provide adequate vertical separation. However, it is highly likely that the call by APP to the Harrier to the effect of *"..last reported six hundred feet"* was interpreted by the pilot as meaning 600 ft agl, since he would have been flying with reference only to his RadAlt during the low level phase of his flight in order to maintain his authorised MSD. It seems that, although his climb was well intentioned, it had the effect of exacerbating the confliction and an Airprox resulted.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar and Head Up Display (HUD) video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The Board was briefed that a video recording of the Harrier leader's HUD had been provided. What appeared to be the helicopter, was shown momentarily off to the left, after the Harrier pilot had acknowledged sighting it, before it moved out of the field of view. Thereafter, the B206 was not discernible at all. Nonetheless, the HUD video did show the Harrier pilot's climb to over 1000 ft RadAlt (agl).

The Mil ATC Ops advisor explained that the B206 JetRanger pilot's comments about the ATS provided by ZONE were illfounded. He had, in essence, been provided with the rudiments of a RIS as traffic information had been provided on the Harrier section and it was not ZONE's responsibility to effect separation in the open FIR outside the MATZ. ZONE had passed on the Harrier pilot's intention to climb, apparently to remain clear of the helicopter. TCAS had given the JetRanger crew over 40 sec warning of the approaching Harriers (5 NM) but the helicopter pilot had not acquired the lead jet visually until it passed in front of him, climbing R – L through his altitude. Members wondered why the visual sighting had been delayed. Perhaps the relative angular change in azimuth, between the two acs' tracks, had been too much for TCAS to discriminate accurately. A civilian controller member added that the helicopter pilot appeared to have relied too much on ATC to sort out the separation, which was solely the pilot's responsibility in this instance and which ATC should not attempt to do. Members concurred with the HQ STC comment regarding the potential for a misinterpretation by the Harrier leader of the helicopter's *"..last reported six hundred feet" as a* **height** from the traffic information given, when it was flying at an **altitude** of 600 ft amsl. Similarly, there might have been room for a misunderstanding in the terminology used by APP, working the Harriers on UHF, who advised ZONE that the Harriers were climbing to 1000 ft RPS - an **altitude** amsl. Whereas, ZONE advised the helicopter pilot on VHF that the jets were "..*now climbing to 1000 feet"* and did not add that they were climbing to a **height** of 1000 ft agl as they were flying with reference to the RadAlt. The Board recognised that these differences could have a significant influence on perceived vertical separation as in this situation when the Harrier pilot climbed through the level of the helicopter. Why did the Harriers climb? It was clear to members that the Harrier leader's initial climb was prompted by the instructions contained in the Mil AIP to military crews, who are not permitted to fly below a height of 500 ft msd within the stipulated area around the unidirectional flow arrow. However, the height recommended in the AIC for the helicopter pilot when conducting a pipeline inspection was in the band 500 – 700 ft agl, which the B206 pilot was conforming to. These 'regulatory arrangements' induced a conflict between the helicopter and the Harrier section. Pilot members understood, therefore, why the helicopter pilot would be taken aback when he encountered the jet climbing through the recommended height at which he should conduct his pipeline inspection flight. It was surprising to many members that this endemic anomaly had not been detected beforehand and the Board was advised that efforts to discover the reasoning behind this **minimum**

height restriction had so far proved fruitless and it was not readily apparent. (Post meeting note: subsequent enquiries with HQ STC Low Flying Staff has revealed that a change to the flow restriction recently proposed by SATCO Marham is to be introduced to make this a **maximum** height of 500 ft Marham QFE through the uni-directional flow. However, the change is to deconflict military ac low-flying below the Marham instrument pattern, but would do little to resolve the potential for induced conflict at 500 ft agl with Pipeline inspection helicopters.)

The Harrier pilot had decided to climb further above 500 ft agl with the best of intentions to avoid the helicopter and to comply with promulgated procedures. Moreover, it seemed to the Board that he had taken careful account of the JetRanger and had tried to give it a reasonable berth when seen and the HUD video evidence supported that. Similarly, the B206 pilot had done everything he could to avoid this situation and the availability of TCAS had certainly been an advantage. Finally, ATC had alerted each pilot to the presence of each other's ac in this see and avoid environment and the Board concluded that this Airprox had resulted from a conflict in the UKDLFS/FIR, resolved by the Harrier pilot. The HUD video showed that the Harrier leader had purposefully made, in addition to the wing waggle, a roll to starboard and then to back port after he had apparently passed the B206; an avoidance manoeuvre which had not been evident on the radar recording. That the helicopter was outside the field of view of the HUD supported the Harrier pilot's contention that there had been no risk of a collision. Moreover, as the Harrier leader had spotted the B206 and was taking action to fly clear of it at the time the JetRanger pilot first saw the jet, the Board agreed that no risk of a collision had existed.

Notwithstanding the recent review of UKDLFS flow restrictions and the impending change proposed by Marham ATC, the members agreed that the resultant conflict in this uni-directional flow warranted further investigation. Consequently, the Board recommended that MOD/HQ STC, review the height regulations attaching to the 'flow arrow' in the Marham - Kings Lynn gap with a view to deconflicting military low flying ac and civilian helicopters engaged on pipeline inspection sorties.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in the UKDLFS/FIR resolved by the Harrier pilot.

Degree of Risk: C.

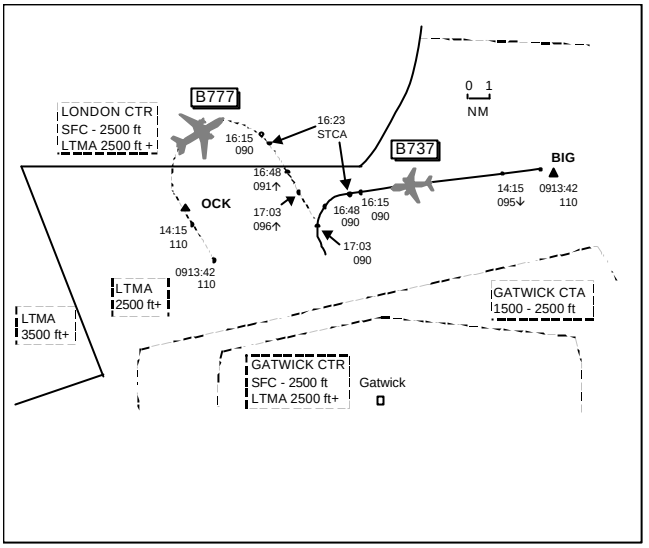
Recommendation: That MOD/HQ STC reviews the height regulations attaching to the 'flow arrow' in the Marham - Kings Lynn gap with a view to deconflicting military low flying ac and civilian helicopters engaged on Pipeline Inspection Sorties.

AIRPROX REPORT N0 117/01

Date/Time: 11 Jul 0917
Position: 5118 N 0017 W (6 NM E OCK)
Airspace: TMA (*Class:* A)
Reporter: LATCC TC

	First Aircraft	*Second Aircraft*
Type:	B777-200	B737-500
Operator:	CAT	CAT
Alt/FL:	FL 90	FL 90
Weather	VMC CLOC	VMC CLOC
Visibility:	NK	>10 km
Reported:	200 ft V 3 NM H	
Separation:		/500 ft V 2 NM

Recorded Separation: 600 ft V 1.9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LATCC TC HEATHROW INT DIR S reports that he was on duty during a busy period with the B777 in the OCK hold awaiting an Expected Approach Time (EAT). He descended the B777 to FL 100 from FL 110 which he believed the crew correctly readback. The B737 was heading 270° from BIG VOR at FL 90 prior to positioning downwind LH for RW 27L. As the B777 emerged from a cluster of SSR labels in the hold, he realised that it was at FL 90 and in confliction with the B737 to its SE. As he was about to pass avoiding action instructions, another ac called on frequency. He ignored this transmission and passed the B737 crew an avoiding action turn onto heading 180° which was unfortunately missed so had to be repeated. He then passed an avoiding action climb to the B777 crew which was also missed and had to be repeated; TI was then given to both crews. Further turns were then given to the B737 crew to reposition the ac back towards the Heathrow Radar Manoeuvring Area (RMA) from where an uneventful landing was accomplished.

THE B777 PILOT reports flying inbound to Heathrow from the USA descending in the OCK hold from FL 110 to FL 90. When turning outbound at the beacon onto heading 152°, he heard London pass another ac an immediate turn onto heading 180°; he saw the other ac as it turned and noted that it was also at FL 90. Then he received a TCAS TA *"traffic, traffic"* as ATC told him to climb immediately to FL 100; he commenced the climb and was told to return to OCK. The conflicting ac asked London how close the two ac had approached and was told 200 ft vertically although he thought that the two ac had got no closer than 3 NM horizontally. TCAS did not issue an RA alert during the encounter and an uneventful landing was subsequently completed at Heathrow.

THE B737 PILOT reports inbound to Heathrow from Italy heading 270° from BIG VOR at 220 kt and FL 90. He heard ATC give a company ac with a different suffix *"immediate turn left heading 180° avoiding action"* followed by the same instructions addressed to him. ATC then issued an avoiding action climb to another ac (the B777). He disconnected the A/P and immediately turned L as TCAS issued a TA alert on the B777; it was seen on TCAS to commence a climb. ATC confirmed the range as 2 NM as TCAS indicated the B777 climbing 500 ft above.

UKAB Note: The RT transcript shows the avoiding action instruction had been correctly addressed to the subject B737 crew; the other company ac (AC3) called on frequency as the INT DIR was about to pass the avoiding action turn. The subject ac was using an alphanumeric c/s (eg XYZ5TC) whilst AC3 had a numeric c/s (eg XYZ358).

ATSI reports that the controller was operating as the Heathrow Intermediate Director (South) Controller. Although there was provision for a support controller, one was not being used. The relevant ATC equipment was all reported as serviceable at the time of the Airprox and no other factors, which may have adversely affected the controller's performance, were identified during the course of the investigation.

At 0901:40, the B777 reported on frequency, levelling at FL 110, and was instructed to hold at Ockham. Around a minute later, the B737 reported at FL 120 in the Biggin hold and was instructed to descend to FL 110. At that time the controller, who was controlling both holds, had 4 ac holding at Biggin and 5 at Ockham. Both subject ac had been allocated 'sequence numbers' and these were '10' for the B737 and '13' for the B777; these numbers were displayed on the controller's fpss.

The controller advised that his plan had been progressively to descend the B737 to FL 90 and then, in accordance with standard procedures, to instruct it to leave the Biggin hold on a westerly heading, prior to turning R to be positioned downwind LH for RW 27L. At 0911:10, the B737 was instructed to '*leave Biggin heading 270 degrees speed 220 knots*'. This was duly acknowledged and, just less than 2 minutes later, the controller instructed the B737 to descend to FL 90 and report leaving FL 100, which was correctly read back.

The B737 reported leaving FL 100 at 0913:40 and 20 seconds later the B777 was cleared to descend to FL 90. This was also clearly and correctly read back by the crew. The controller stated that when the B737 was about to leave the Biggin hold, he would have transferred the strip to the Ockham designator. This would help draw his attention to the fact that the B737 was potentially in conflict with ac in the Ockham stack. He advised that he was concentrating on the fact that the B737 was descending to FL 90, and consequently he must not descend the B777 to FL 90. However, when he issued a descent instruction to the B777 he made a 'slip of the tongue' when passing the clearance. As a result, he cleared it to FL 90 rather than FL 100, which he had planned and correctly marked on the fps. The controller also stated that he did not register the readback by the B777 following the instruction to descend. Had he done so, he may have detected that the readback of FL 90 by the B777 crew did not accord with what he had written on the strip.

The B737 was now heading 270 degrees and passing FL 95, whilst the B777 was approaching the Ockham VOR prior to turning outbound in the hold, i.e. towards the B737. (The Ockham hold is right hand with an inbound axis of 332 degrees). At 0916:15, the controller saw the confliction and, almost simultaneously, the Heathrow Intermediate Director (North) called out to him pointing out the conflict. The controller was prevented from passing immediate avoiding action due to the initial call on frequency of another ac, AC3. Once this transmission had finished, the controller transmitted *"c/s avoiding action turn left immediately heading one eight zero*". At that time the B777, now level at FL 90, was commencing the outbound leg of the hold with the B737 in its 11 o'clock position at a range of 6·1 NM. The crew of the B737 neither acknowledged nor responded to the instruction but when the controller repeated it, it was acknowledged. In the Airprox report submitted by the crew of the B737, they stated that they believed that the 'avoiding action' turn had been directed to AC3 (same prefix) and not their ac. STCA activated at 0916:23, and the controller issued an *'avoiding action'* instruction to the B777 to climb to FL 100. This instruction also had to be repeated, at the request of the B777, before being actioned. TI was passed to the B777 whose crew reported the traffic in sight.

Minimum vertical separation occurred at 0916:48, when the B737 was in the B777's 11 o'clock position at a range of 2·5 NM and 100 ft below it. Thereafter, lateral separation continued to decrease but vertical separation was slowly restored and at 0917:03, the separation was 1·9 NM and 600 ft. The B737 was subsequently vectored back into the Heathrow landing pattern and the B777 followed soon afterwards.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

An ATCO member said that although there had been provision for a support controller for the INT DIR S position, this option was rarely needed or used in every day operations. Normally a support ATCO was used on the 'master' INT DIR N position who was responsible for issuing the sequence numbers for the approach order from both the N and S stack directions. Members were all too aware, from similar previous incidents, of the ease with which 'Freudian slips' could be made like the one apparently made by the Heathrow Intermediate Director S that had led to the Airprox. The ATCO had been aware of the potential confliction and had in mind that he should only descend the B777 to FL 100 against the B737 tracking towards the OCK area at FL 90. It appeared that in concentrating on this limitation he had said what was uppermost in his mind rather than what was intended. Moreover, the readback 'safety net' then became ineffective as this only highlighted discrepancies between what the ATCO said and the pilot's reply; in this situation, there was no discrepancy. The INT DIR had used the fpss appropriately by annotating the correct level (FL 100) to the B777 strip but he had not picked up the difference between this and the pilot's readback. The seeds were then sown for the incident as the controller had inadvertently descended the B777 to the same level as the B737.

Turning to risk, the INT DIR S very quickly noticed the confliction, once the B777's label became separated from those of other ac, and he issued avoiding action instructions initially to the B737 crew. Members thought that an element of c/s confusion may have caused the lack of response to the call but the B737 crew had erroneously assumed the avoiding action call had been addressed to AC3. The RT transcript had shown the INT DIR transmission to the subject B737 had been correctly addressed but had been passed immediately after the crew of AC3 (from the same company) had finished their initial call. The B777 crew had heard the RT call addressed to them but had asked for the controller to repeat the instruction. Airline pilots on the Board wondered if the short delay caused by this query was prompted by the nature of the avoiding action- a climb, in the stack- which was unusual. Regardless of this, however, members commended the ATCO for his use of the appropriate phraseology as well as the combined use of horizontal and vertical avoiding action manoeuvres. These actions had been instrumental in quickly changing the subject acs' flight paths which had been converging. Also noted was the ATC teamwork within TC shown by the INT DIR N alerting the S DIR to the confliction. The controller's actions, after noticing the confliction and prior to STCA activating, were both timely and commendable. Although there had been a slight delay by the crews acknowledging the controller's instructions, the TI passed enabled both crews visually to acquire each other whilst carrying out avoiding action manoeuvres and receiving TCAS TA alerts. The Board concluded that all of these factors combined had removed any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Heathrow INT DIR S inadvertently descended the B777 to the level occupied by the B737

Degree of Risk: C

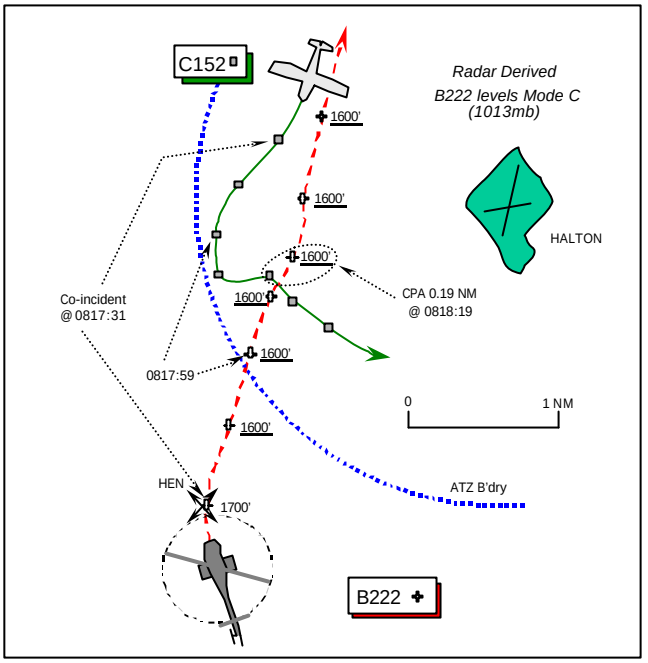
AIRPROX REPORT No 119/01

Date/Time: 14 Jul 0818 (Saturday)

Position: 5148 N 0044 W (1·5 NM WSW of Halton aerodrome - elev 370 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Cessna C152	Bell 222
Operator:	Civ Trg	Civ Comm
Alt/FL:	1000 ft (QFE 990 mb)	1500 ft (RPS)
Weather Visibility:	VMC CLBC 8 km	VMC "BLUE" >10 km
Reported Separation:	400 m H nil V	1000 ft H
Recorded Separation:		0·19 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CESSNA C152 PILOT reports that he was instructing on a circuit (Cct) training detail in the RW02 Cct at Halton, with a student flying at 90 kt at the Cct height of 1000 ft Halton QFE (990 mb). Heading 200°, as they were about to turn onto base leg, he spotted a large, black helicopter at L 11 o'clock flying in the opposite direction at the same height. He delayed the turn until the helicopter had passed abeam – he estimated it passed about 400 m or so to port i.e. inside airfield circuit – and he broadcast a warning on 130·42 MHz, the Halton A/G station frequency that an unknown helicopter was passing through the ATZ at 1000 ft S to N. He assessed the risk as low due to his visual sighting, but he contended that if they had turned onto base leg a few seconds earlier the helicopter would have been out of sight in a blind area. He added that the Airprox occurred during the Grand Prix weekend at Silverstone and several other helicopter pilots had called passing outside the ATZ.

THE BELL 222 HELICOPTER PILOT reports that his ac has a dark green livery, but the anti collision beacon and landing light were on. A squawk of A7000 was selected with Mode C and he was in communication with Halton RADIO A/G station on 130·42 MHz, whilst in transit through the Halton ATZ, heading 005° at 130 kt to a private site at Milton Keynes. A single engine aeroplane was spotted about 1 NM away, which subsequently passed about 1000 ft away with no risk of a collision.

UKAB Note (1): In a subsequent telephone conversation the C152 pilot added that his ac was the only ac flying in the Cct at Halton at the time of the Airprox; no gliding was in progress at the time. Furthermore, the A/G stn Halton RADIO was not being continuously monitored and he was, in effect, the only one listening out on the frequency whilst airborne. It was feasible that he might have missed an RT call from the B222 pilot, but he was surprised that the helicopter pilot had not responded to his broadcast on the A/G frequency. He added that glider control usually monitors the A/G frequency, when gliding is in progress.

UKAB Note (2): The LATCC Heathrow radar recording illustrates that this Airprox occurred broadly as described; the C152 is shown squawking A7000, but without Mode C, flying downwind within the Halton ATZ. The B222 helicopter is shown squawking A7000 with Mode C overhead HEN at 0817:31, turning onto a track of about 010° (T),

indicating 1700 ft Mode C (1013 mb). The B222 descends to 1600 ft Mode C – which equates to about 910 ft Halton QFE (990 mb) – and maintains that level thereafter, crossing the Halton ATZ boundary shortly before 0817:59. Simultaneously the C152 is shown commencing a rather erratic turn SE'ly onto base leg. The CPA occurs at 0818:19, about 1·5 NM WSW of Halton aerodrome, as the C152 passes 0·19 NM astern of the B222 which makes a slight jink to the R.

UKAB Note (3): The UK AIP at ENR 2-2-3-3 (17 May 01), promulgates Halton as a government aerodrome with an ATZ as a circle radius 2 NM, centred on RW02/20, from the surface to 2000 ft above the aerodrome elevation of 370 ft and active in summer, from 0600 – 1800 or Sunset - daily. The A/G station – Halton RADIO – is promulgated as operating on 130·425 MHz within the above hours.

UKAB Note (4): The UK AIP at ENR 5-5-1-2 (22 Mar 01), promulgates Halton aerodrome as a Glider Launching Site for winch and aerotow launches were cables and tug ac may be encountered to 2000 ft agl, during daylight hours.

UKAB Note (5): The UK AIP at ENR 1-4-8 para 2.7.2, promulgates that for flight within ATZs situated in Class G airspace: *"When flying within an ATZ the requirements of Rule 39...must be complied with".*

In order to comply with Rule 39 during the notified hours of operation the procedures to be adopted by pilots are stipulated at 2.7.2.3:

(a) Before taking off or landing at an aerodrome with an ATZ or transiting through the associated airspace...obtain information from the...A/G station to enable the flight to be conducted with safety.

(b) Radio equipped ac must maintain a continuous watch on the appropriate radio frequency and advise the...A/G stn of their position and height on entering the zone and immediately prior to leaving it.

Furthermore, 2.7.2.4 stipulates that:

(a) Failure to establish 2 way radio communication with the....A/G stn during their notified hours of operation must not be taken as an indication that the ATZ is inactive. In that event...pilots should remain clear of the ATZ.

UKAB Note (6): AIC 70/2001 (White 46) issued on 23 Aug 2001, makes it clear that holding a Flight Radio Telephony Operators Licence does not convey any privilege to operate an A/G Stn.

UKAB Note (7): The RAF FLIP 'Minor Aerodromes' Halton entry at the time, under remarks stated: *"For crossing or join call Halton RADIO on 130·425. If no contact transmit intentions blind and proceed with caution".* This note has subsequently been removed. 'Pooleys Flight Guide' also included a similar entry.

UKAB Note (8): An Inspector from FOI (H) comments that following two telephone conversations with the B222 pilot, the latter asserted he had been in radio contact with Halton RADIO, when he routed through the cct via the overhead. Furthermore, he was a regular user of the Halton ATZ airspace, both by day and by night, and had not encountered any problems at other times; he always operated in accordance with his company's operations manual.

UK AIP procedures for entry into ATZs, state that pilots should remain clear of an ATZ in the event of failure to establish two-way radio communication with the A/G stn, but the B222 pilot suggested (in his opinion) this was unworkable, as there were so many aerodromes with ATZs, where, during their notified hours, the A/G stn was unmanned. He mentioned several locations and also suggested that a number of A/G stations were operated from the air, citing an example. A brief scan of 'Pooleys Flight Guide' suggests that Halton is not the only airfield to advise that the A/G stn is not always manned during notified hours. Others also state if no contact, make standard calls and proceed with caution. This is contrary to the AIP.

UKAB Note (9): The UK AIP does not promulgate the same information allegedly contained within 'Pooleys' for any of the aerodromes cited.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and radar video recordings,

This was one of three Airprox considered by the Board, involving the entry of non-circuit traffic into the Halton ATZ, (the other two were 124/01 and 163/01) which had generated considerable concern amongst the members. It was recognised that the position of the aerodrome, underneath the contiguous Luton CTA/London TMA from 3500 ft amsl and the Halton ATZ up to 2370 ft amsl, produces a significant bottleneck which must either be circumnavigated or transited by traffic flying in the FIR between the many other aerodromes in the vicinity. This, it would appear, has resulted in a number of incidents with Halton circuit traffic (as here) and as a result some believed that Halton were overtly protective of the airspace within their ATZ. This was not a criticism of operators at Halton and problems should not occur if other pilots complied with established procedures, but a pilot member opined that it was a known 'sensitive area'.

The B222 pilot reported that he had called on the A/G Stn frequency. However, it would appear from the information provided by the C152 pilot that he had no warning about the B222 from any RT message - the A/G Stn was not manned at the time apparently - and he had not heard any calls on the frequency himself. Moreover, there was no response to his broadcast on the frequency after the Airprox. The Board found this difficult to reconcile with the B222 pilot's report, which could not be clarified with any certainty without the benefit of an RT recording; but that was not available as there is no current requirement to record A/G Stn frequencies. The Board was briefed on the stipulated requirements for entry into the Halton ATZ and it was clear that the advice previously promulgated within the RAF FLIP 'Minor Aerodromes' was contrary to the requirements of the ANO, as notified by the UK AIP. Blind calls on the frequency are not enough. Pertinent information is essential. If this cannot be obtained during the notified hours, then as stated in the AIP, pilots must not enter the ATZ. Members were reassured to learn that the inappropriate advice printed in the RAF FLIP had been corrected after this Airprox. Members discussed the anomaly concerning R/T calls; if the B222 pilot had called who gave the reply? It was not the C152 pilot. Moreover, if no reply with pertinent information was received from the A/G Stn then the helicopter pilot was required to remain clear of the ATZ. It was not clear if the B222 pilot had been misled by the erroneous entry in 'Minor Aerodromes' or perhaps by the entry unwittingly repeated in 'Pooleys'; there was certainly mitigation here if he had, but for whatever reason the B222 had entered the ATZ in opposition to the established circuit pattern for RW02 and its pilot had, effectively, flown through the downwind leg the wrong way. Notwithstanding any call on the A/G Stn frequency, the B222 pilot was required to conform to the established traffic pattern formed by other ac or keep clear of the airspace in which the pattern was formed, which in the Board's view he did not. Therefore, the members agreed unanimously that this Airprox resulted because the B222 pilot did not comply with Rule 17 (5) (a) and had flown into conflict with the C152 in the established Halton traffic pattern. Fortunately, the C152 pilot had spotted the helicopter and had delayed his turn onto baseleg to allow it to pass. This resulted in a CPA of 0·19 NM – just under 400 yd. Similarly the B222 pilot had spotted the C152 beforehand – he reported about 1 NM away - which was probably just before he entered the ATZ. This coupled with the reporting pilot's own assessment of the risk led the Board to conclude, therefore, that no risk of a collision had existed.

A debate ensued about the rationale behind the establishment of ATZs at aerodromes where no other form of ATC or AFIS is available and only an A/G Stn is provided. Having been granted an ATZ, a GA member believed there was an inherent responsibility to administer the airspace it contained safely. An ATZ affords a measure of protection to aerodrome traffic, but it would appear that its establishment during notified times is predicated on there being a safe means of entry into it. This presupposes that an A/G Stn is available continuously during the notified hours so that pilots can obtain relevant information to enable them to enter the ATZ with safety, either to join the circuit or transit through it. This is the presumption at civilian licensed aerodromes. However, Halton is a 'government aerodrome', and in this incident the C152 was a civilian registered ac, flown by a pilot

with civilian licence, but there seemed no less requirement for an A/G Service and members thought it incumbent on the aerodrome operator to ensure that one was provided during the notified times. Indeed, the Board was advised that the availability of an A/G Service determines the period for which an ATZ is established, during which Rule 39 to the Rules of the Air Regulations mandates that pilots must call as described earlier. Rule 39 does not apply outside those times notified. By local consensus an A/G operator was usually provided by the Volunteer Gliding School at Halton when they are operating. However, the gliding school was not flying at the time of the Airprox and the responsibility to provide an A/G operator apparently fell to the flying club on this particular Saturday morning. Civilian practice requires an A/G Station operator to be appropriately licensed and one member of staff at Halton was suitably qualified. A GA member explained that the situation at Halton was not unique and he was aware of other aerodromes where a QFI airborne in the circuit had apparently operated the A/G service from the air - as pointed out by the reported B222 pilot and FOI (H) - which in his opinion was no less safe. Whilst acknowledging this viewpoint, members were concerned here with the specific operation of the A/G Stn at Halton, where 'practice' apparently seemed at odds with established protocols; an additional factor was that Halton was a government aerodrome a situation which did not appear to be covered by specific regulations. Whichever way one looked at it, it did not seem that the A/G /Stn at Halton was operated in an appropriate manner (during the notified hours) that enabled pilots to obtain the relevant information. This arrangement was far from ideal and whilst members were conscious of the impact this could have on small flying clubs they agreed that in the interests of flight safety the whole matter warranted further clarification. The Board recommended, therefore, that the MOD/HQ PTC (as the administrative authority for Halton) review arrangements for providing an Air/Ground Service at government aerodromes where an ATZ is established, but no formal ATC is provided.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The B222 pilot did not conform to Rule 17 (5)(a), and flew into conflict with the C152.

Degree of Risk: C.

Recommendation: That MOD/HQ PTC review arrangements for providing an Air/Ground Service at government aerodromes where an ATZ is established, but where no formal ATC is provided.

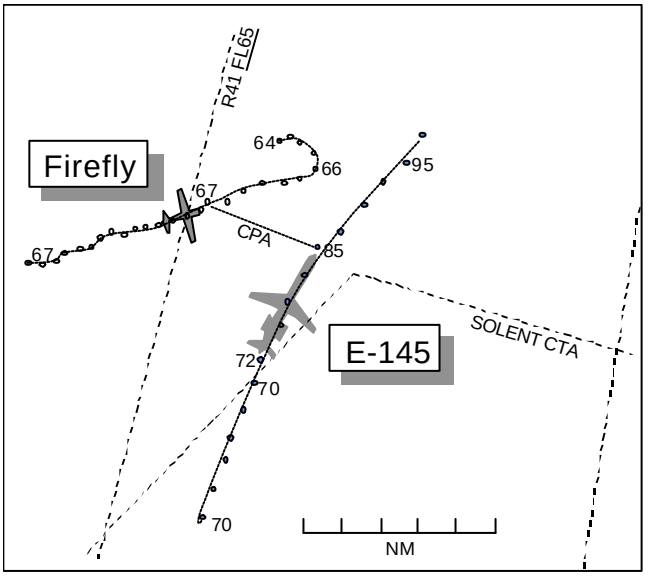
AIRPROX REPORT No 120/01

Date/Time: 11 Jul 1000

Position: 5109 N 0121 W (5 NM SE of Andover)

Airspace: Airway R41 (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	Embraer 145	Firefly
Operator:	CAT	HQ DAAvn
Alt/FL:	FL 70↑	FL 50-60
Weather Visibility:	VMC CLAC 10 km	VMC CLAC 5 km+
Reported Separation:	3 NM	
Recorded Separation:		2 NM, 1800 ft



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EMBRAER 145 PILOT reports heading 020° at 240 kt, level at FL 70 on R41 under radar control from LATCC. He saw traffic on TCAS closing in his 1030 at 5 NM and 200 ft below; ATC advised that it was outside controlled airspace. When the traffic was 3 NM abeam him he was cleared to climb to FL 100; as he started the climb the controller advised that the traffic had entered controlled airspace without clearance. He saw it briefly - it was a small ac with yellow upper surfaces. He was cleared to make a precautionary right turn of 20°; the risk of collision was low.

THE FIREFLY PILOT reports flying various headings at 110 kt on a GH instructional sortie requiring good horizons; he was receiving a RIS from Wallop Approach. The weather was deteriorating from the W with building Cu and a strong westerly wind, forcing him progressively higher and to the E to find usable conditions. By the time of the reported Airprox he had been operating between FL 50-60 over the E edge of the M Wallop MATZ, fully aware of the position of the airway. He was keeping position by range and bearings from Southampton and visual fixes along the river Test. Eventually conditions became unsuitable and he turned to rejoin at M Wallop. Having completed the turn, Wallop Approach warned him that he was getting close to CAS; he replied that he had turned away. He believed he had remained below FL 60 and accepted that he may have been blown somewhat under the airway. However, he did not believe he had climbed to FL 65; if he had, he apologised to all concerned and said that under similar circumstances in the future he would abandon the exercise sooner.

UKAB Note: LATCC radar recordings show the E145 tracking, as shown in the diagram, at FL 70, and the Firefly, identified by its M Wallop squawk, tracking 072° at FL 67 Mode C towards R41. The ac continue to close until the E145 starts to climb at 1000:19. The Firefly enters R41 at FL 67 at 1000:31. The CPA is at 1000:44 when the ac are separated by 2 NM and 1800 ft; at that point the E145 turns right 20° and the ac continue to diverge. The Firefly turns left about at 1001:30 and descends to FL 64.

ATSI reports that ATC at Middle Wallop had no reason to believe that the Firefly, under a RIS, would climb above FL 65 into CAS. At 0948 the pilot had reported operating at about FL 60 to complete his detail. The APR position was handed over at about 1000, the oncoming controller reported that he was aware of the flight's details and that it was operating VFR, on its own navigation. According to the Middle Wallop transcript, the APR warned the pilot at 1002:30 not to go above FL 65 to avoid entering CAS. The APR reported that he had seen the ac's Mode C indicating FL 67 descending. There seems to be some discrepancy, based on the controller's recollection of the event, between the RT timings and the LATCC radar recordings; at 1002:35, when the warning transmission is made by Middle Wallop, the Firefly is at FL 62, having left CAS about one minute earlier. MATS Part 1, Page 1-41, does not place any responsibility on a controller for ensuring that an ac remains outside CAS whilst being provided with a RIS, only to advise about conflicting traffic. It could be argued that the APR should have passed traffic info on the ac in the airway but he reports that he did not see it. The APR did warn the pilot of the Firefly about entering CAS but there may be some doubt as to the timing of this message.

In the event, by the time the Firefly entered CAS, the Emb145 was already more than 1000 ft above and, consequently, the LATCC TC SC did not have to take avoiding action, although to his credit he did instruct the Emb145 to turn right 20° 'just in case'.

HQ DAAvn comments that all Middle Wallop instructors are familiar with the CAS around Southampton which is adjacent to one of their frequently used training areas. This instructor, keen to gain maximum training value, continued the sortie in deteriorating weather conditions and was caught out. This incident serves as a valuable reminder of the need for accurate station keeping when operating close to CAS.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC and operating authorities.

It appeared from the information available that the Middle Wallop APR's warning to the Firefly was after the event – members considered that under a RIS the Firefly pilot was entitled to Radar Information about the Emb145; it was agreed there was no reason to suppose that it was not showing on the M Wallop radar. If APR had seen the Emb145 after the event he would probably have discounted it as it was much higher and still climbing by then.

Members discussed whether or not the Firefly pilot had actually been in Airway R1 or not. His doubt on this point, and his intention to avoid creating such doubt again was noted. If he had entered the airway, it was only by 200 ft and this was within the accuracy tolerance of Mode C, which in this case had not been verified anyway. The Emb 145's continued climb meant that separation had probably not been lost and members were not only uncomfortable about whether this was an Airprox at all but could not accept there was sufficient information to say that the cause might be an infringement of the Airway by the Firefly. There was clearly no risk of collision and the Board concluded that the incident was a sighting report.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Sighting report.

Degree of Risk: C

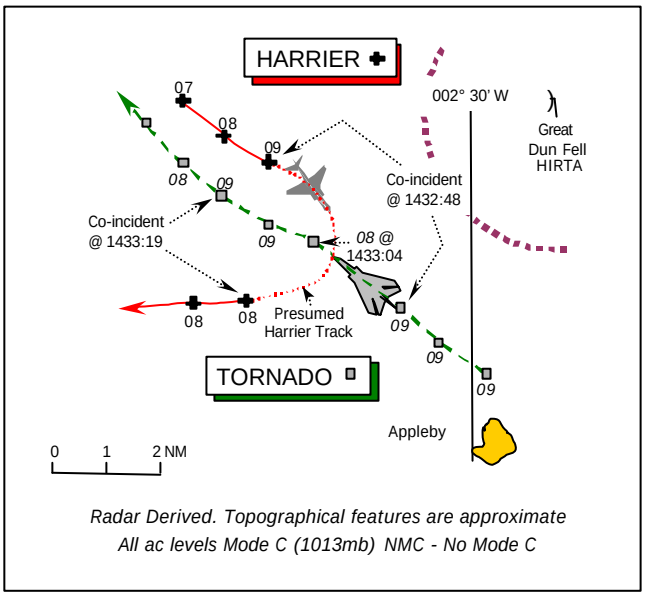
AIRPROX REPORT No 121/01

Date/Time: 17 Jul 1433

Position: 5437 N 0234 W (5 NM NW of Appleby)

Airspace: UKDLFS – LFA17 (*Class:* G)

	Reporting Pilot	*Reporting Pilot*
Type:	Tornado GR4A	Harrier GR7
Operator:	HQ STC	HQ STC
Alt/FL:	250 ft (Rad Alt)	350 ft (Rad Alt)
Weather Visibility:	VMC CLBC 15-20 km	VMC CAVOK >15 km
Reported Separation:	350-400 ft H	400 ft H, 30 ft V
Recorded Separation:		Not recorded



Radar Derived. Topographical features are approximate
All ac levels Mode C (1013mb) NMC - No Mode C

BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR4A PILOT reports that HISLs were on whilst flying at 420 kt straight and level at 250 ft Rad Alt on a heading of 310° just after completing a reconnaissance line search. His navigator first spotted the Harrier GR7 at 3-4 o'clock at range of 500 ft, southbound toward his Tornado, at the same height. He did not see the Harrier himself until it had passed astern and reappeared in his L 7 o'clock. Although the Harrier had apparently been on a collision course initially, it passed 350 – 400 ft behind the Tornado maintaining its original 60° AoB and rate of turn. No avoiding

action was taken – there was no time available - but the navigator perceived there had been a *"significant"* risk of a collision. He added that although cockpit workload was *"routine"*, the light conditions 2000 ft below a solid overcast were darker than usual, which made it hard to detect the Harrier visually.

THE HARRIER PILOT reports his ac is camouflage grey but HISLs were on whilst flying as the No2 of a low-level simulated attack profile (SAP) mission pair on an IP – target run at 450 kt. He was about 4·5 NM from the lead ac and had just initiated a R turn in accordance with his IP – target plan flying at 350 ft Rad Alt. Part way around the turn (after about 40 – 60°) a Tornado ac became visible about 400 ft away as it emerged from behind the canopy arch. He was slightly lower than the Tornado and on its starboard beam when it was first seen. As the flightpaths were beginning to diverge he continued the turn because it allowed visual contact to be maintained in case the Tornado manoeuvred (which it did not) and he passed astern and about 30 ft below it before continuing on to his target. He added that although the turn reduced horizontal separation and flight paths between the ac were close and converging, they were not on a collision course. If the Tornado had not been spotted, he believes his ac would have passed about 300 ft astern of the Tornado.

HQ STC comments that this was a very late sighting by both crews from a position that presented a significant risk of collision. For the Tornado crew, the Harrier would have been a relatively small target given the reported geometry of the encounter and the incident graphically illustrates the need for all fast-jet aircrew to move the head around to overcome the blind spots generated by canopy arches. Yet more evidence to support the case for an effective collision warning system.

UKAB Note: The Great Dun Fell radar recording does not illustrate this Airprox clearly, as the Harrier is not shown at the CPA nor continuously throughout the encounter. At 1432:48, the Harrier is shown southeast bound in a shallow climb indicating 900 ft Mode C (1013 mb), but radar contact is then lost for three sweeps. Meanwhile the Tornado is shown tracking northwest also at 900 ft Mode C (1013 mb). A momentary indication of 800 ft is shown at 1433:04, which is probably when the Airprox occurred, as the presumed track of the Harrier turns R in conformity with the pilot's report and passes astern of the Tornado. However, the Harrier is not shown until 15 sec later at 1433:19, westbound at 800 ft Mode C.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings and a report from the appropriate operating authority.

Trials had shown that it takes at least 2·5 sec for a fast-jet pilot to detect another ac, decide what to do, make a control input and thus alter the flight-path of his ac. Here, with a closing speed between the two jets of more than 800 kt – in the order of 1200 ft/sec – it was evident that there were but fractions of a second following the sighting of the Harrier by the Tornado navigator at 500 ft range and the Harrier pilot's sighting of the Tornado 400 ft away. Even allowing for estimation errors these ranges equated to less than 1 sec in time. It was evident to members that several factors had combined to hinder the pilots' detection of each other's ac – the camouflage of both proved highly effective in the adverse light conditions that pertained and the small cross-section presented by the Harrier 'head-on' at this speed with little crossing movement would have made it particularly difficult for the Tornado pilot to detect. This might explain why the navigator saw it first, when the relative crossing movement increased at very close quarters as the Harrier turned to the R, and fortuitously passed astern. Although some members reasoned that the Harrier pilot had more chance of spotting the larger Tornado first the same head-on aspect would still have applied, but as he turned R into his IP to target run he would naturally have been looking into the turn. Conjecture aside, it was clear that this was a very late sighting indeed from both cockpits. Some members pointed out the sighting by the Tornado pilot was after the fact and was effectively a non-sighting, but others felt this did not take due account of the warning by the navigator. In the end it was agreed that this Airprox resulted from very late sightings by the Tornado crew and the Harrier pilot. Furthermore, at these ranges it had been too late for them to take avoiding action. It was fortuitous that the

Harrier had passed astern of the Tornado, which led the Board to conclude unanimously that an actual risk of a collision had existed in these circumstances.

PART C: ASSESSMENT OF CAUSE AND RICK

Cause: Very late sightings by the Tornado crew and the Harrier pilot, too late to take avoiding action.

Degree of Risk: A.

Contributory factors: The camouflage colour scheme of both ac; Small cross-section presented by the Harrier 'head-on'; Adverse light conditions.

AIRPROX REPORT No 122/01

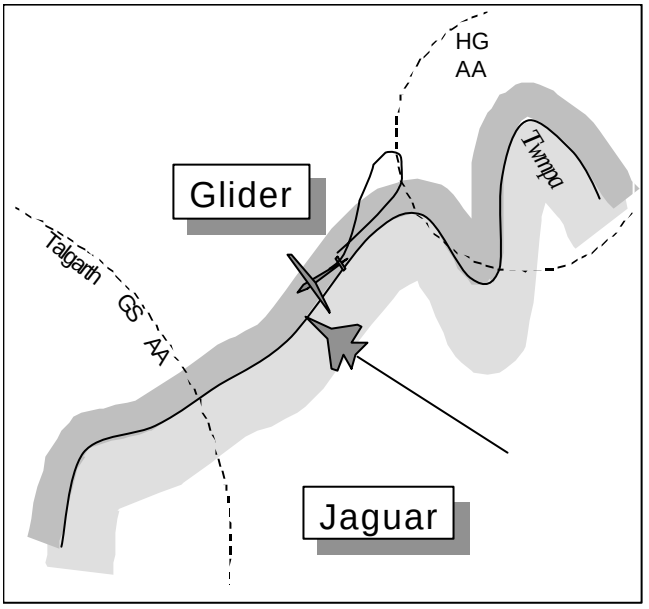
Date/Time: 19 Jul 1357

Position: 5200 N 0308 W (4 NM S of Hay on Wye)

Airspace: FIR/LFS (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Pégase Glider	Jaguar
Operator:	Civ Pte	HQ STC
Alt/FL:	2915 ft (amsl)	1000 ft (Rad Alt)
Weather Visibility:	VMC CLBH 25 NM	VMC CLBC 10 km+
Reported Separation:	150 m H	/NK

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PÉGASE GLIDER PILOT reports heading 260° at 45 kt in his white ac, ridge soaring between Twmpa and the glider site at Talgarth. He gave his altitude as 2915 ft amsl; the ridge rises to 2100-2300 ft amsl. The club 2-seat glider was about 1 NM ahead on the ridge and he was paying attention to it when a Jaguar appeared in his peripheral vision to the left. It quickly passed about 150 m in front at the same level rolling to the R onto a more northerly heading, passing between him and the 2-seater. There was no time for avoiding action and the risk of collision was high.

THE JAGUAR PILOT reports heading NW at 450 kt, transiting just below cloud along a LFS flow arrow between the Talgarth GS avoidance area and the hang glider site at Twmpa. He was acting as a bounce for a formation of Jaguars and was positioning for an intercept. He did not see any gliders as he crossed the ridge.

UKAB Note: The LATCC Clee Hill radar recording shows the Jaguar tracking 308° through the Airprox position at 1357. Its Mode C shows 3100 ft at that point (altitude, QNH 1010 mb, 3000 ft). A primary-

only return passing along the glider's track is visible up to 30 seconds before the Airprox which itself does not show on the recording. However, the glider's GPS recording shows it performing a left turn at the NE end of its beat and returning to follow the ridge. As it turns right to steady on track, at 1507:05 it passes the exact position of the Jaguar's return at 1507:00.

HQ STC comments that the Jaguar pilot correctly routed via the flow arrow to avoid the glider sites and was well aware of potential glider activity. However, despite maintaining a good lookout, his ac came into conflict with the Pégase, which he did not see.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings, GPS data and reports from the appropriate operating authorities.

Members agreed that a camouflaged Jaguar at 450 kt, skylined, approaching with its usual smoke trail, should have been relatively easy to see from the glider's cockpit. The glider, mostly white, edge on and almost on a collision course with the Jaguar would not have been as easy to see. Even if the glider pilot had seen the Jaguar earlier, there would not have been much he could have done to increase separation; he could have dived off the ridge but he was not to know the Jaguar would not do the same. Members agreed that the Airprox occurred because one pilot saw nothing and the second one saw the other ac too late to affect the outcome; this was more a statement of fact than a criticism. It was suggested that prior expectations might have helped avoid this incident. Military jets are restricted to a NW passage across this ridge below 2000 ft (the information is available in the UK AIP at ENR 6-5-2-1). At the same time, military pilots should be aware that gliders are likely to be found along this ridge in a NW wind and, because they are very hard to see, consideration should be given to avoiding the ridge or flying higher.

Members considered that there had been a risk of collision in the incident because the ac passed close without either pilot being able to avoid the other.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Jaguar pilot did not see the glider, and the glider pilot saw the Jaguar too late to avoid it.

Degree of Risk: A

AIRPROX REPORT No 123/01

Date/Time: 20 Jul 0924

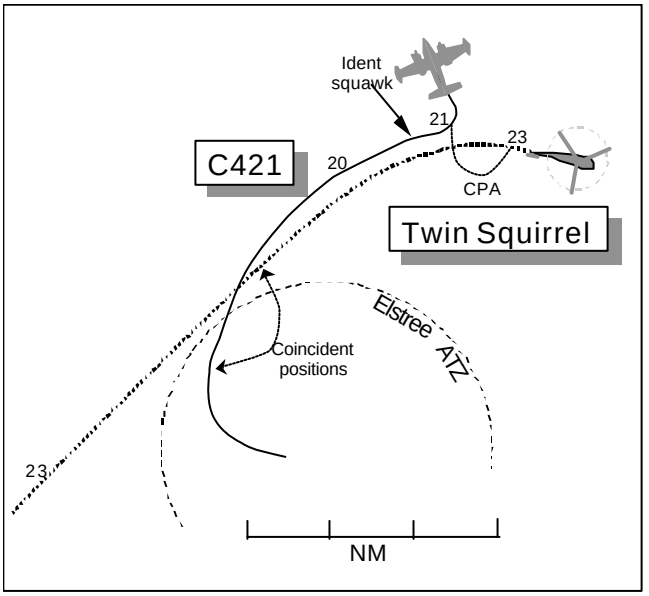
Position: 5143 N 0017 W (4 NM NE of Elstree)

Airspace: FIR (*Class:* G)

Reporter: LATCC TC

	First Aircraft	*Second Aircraft*
Type:	Cessna 421	Twin Squirrel
Operator:	Civ Pte	Civ Trg
Alt/FL:	2000 ft (QNH 1015 mb)	2400 ft (QNH)
Weather Visibility:	VMC CLOC 10 km+	VMC CLOC NK
Reported Separation:	NK	/NK

Recorded Separation: 1 NM, 200 ft



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LATCC TC reports that the C421 from Elstree contacted NE Deps SC at 0923 and requested a joining clearance at BPK. Traffic loading was not reported and all systems were serviceable. The SC asked the pilot to squawk ident, which revealed that the Cessna had traffic 1 NM ahead on a similar track and about 200 ft above. Considering the situation to be dangerous, the SC gave an avoiding action turn to the north and traffic information to the C421, even though it was not under any form of radar service. The ac took the turn and moved away clear of the traffic to the north; the pilot reported that he did not see the other ac involved.

THE CESSNA 421 PILOT reports heading 085° at 140 kt having turned right on departing from Elstree for Italy, via airways. On calling Luton on 129·55 he was instructed immediately to turn onto N for avoiding action. He complied and looked for the traffic but was unable to see it. He could not assess the risk of collision. (UKAB Note: While a call to Luton on 129·55 would have been the normal procedure, in fact on this occasion the C421 pilot communicated with LATCC TC NE Departures.)

THE TWIN SQUIRREL PILOT reports heading E at 2400 ft on a training sortie from Denham, and under a RIS from Northolt Approach on 126·45. His ac was maroon/silver, his anti-collision lights and strobe were on and he was squawking with Mode C. It was not until 24 Jul that he became aware that an Airprox had been filed; he was unaware of any other ac in his vicinity at the time and could not remember any traffic information being passed.

MIL ATC OPS reports that Northolt Approach (APP)'s workload was low; the Twin Squirrel was the only aircraft on frequency. The helicopter was flying at 2400 ft, on the London QNH (1016 mb) in transit from Denham towards Cambridge, via BPK and BKY. At 0922:18, APP transmitted *"C/S, pop up traffic, south, two miles converging, indicating one thousand feet climbing, believe it's just* (unintelligible word) *out of Elstree"* and the pilot replied that he was *"..looking."* Just over 1 min later, at 0923:34, APP updated the traffic information *"C/S, the previously reported traffic's in your six o'clock, two miles, similar heading indicating one thousand seven hundred feet, climbing"* and the pilot again acknowledged the call *"C/S looking."* APP advised the pilot that the traffic was clear of him at 0924:57. At 0926:58, APP passed the helicopter's details by landline to Essex Radar and the pilot left the frequency at 0927:52. There had been no mention of an Airprox, or any other incident, during the transit.

LATCC radar recordings show the Twin squirrel, squawking 6320, tracking about 060º at an indicated 2300 ft, on a track which passes 2 NM N of Elstree. At 0922:17, the C421, squawking 5224, can be seen about 1·75 NM S of the helicopter climbing through an indicated 900 ft in a R turn from a W'ly track having appeared to have just departed from Elstree. The C421 continues its R turn, rolling out behind and on a similar heading to the Twin Squirrel. At 0923:33, the time of APP's traffic update, the C421 is tracking about 050º at 1600 ft, 1·5 NM behind the Twin Squirrel, which is still tracking 060º. The helicopter turns onto a track of about 090º at 0924:04, at which point the C421 is about 1·25 NM WSW (260º) and also in a gentle turn onto the same heading. The C421's Mode C indication is not seen in this sweep, but in the subsequent sweep (4 sec later) it indicates 2000 ft. The C421 squawks ident at 0924:19, whilst indicating 2100 ft, and in the next sweep (0924:23) can be seen starting a L turn, rolling out on N at 0924:44 at an indicated 2000 ft. The Twin Squirrel's Mode C indication remains constant at 2300 ft throughout the encounter and at the closest point of approach, the aircraft are separated by 1 NM horizontally and 200 ft vertically.

Both traffic information calls to the Twin Squirrel pilot were reasonably accurate. Whilst it was fairly obvious that the helicopter pilot would not be able to see the C421 once it had settled in his 6 o'clock, APP was well aware of its position and the closure rate was relatively low; the need for APP to pass further information was removed by the C421's turn.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

The C421 was closing very slowly on the helicopter and members agreed that this incident was a potential confliction of flightpaths which was resolved by the Cessna pilot accepting the avoiding action given promptly by the NE Deps controller. This action, the Board concluded, removed any risk of the ac colliding.

The Board discussed the tightness of the airspace under the TMA; the fact that so much of it was over built up areas meant that the GA ac constrained to use it (particularly single engined ac) would tend to fly as high as the airspace boundary would allow. Fortunately in this case the Cessna pilot had chosen to fly at 2000 ft and it was possibly the fact that some vertical separation was reported by Northolt that caused the helicopter pilot not to take more positive action to locate or avoid the ac he was warned about, closing astern of him, nor to have remembered the event.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:Potential confliction of flightpaths in Class G airspace, resolved by the avoiding action given by the NE Deps controller.

Degree of Risk: C

AIRPROX REPORT No 124/01

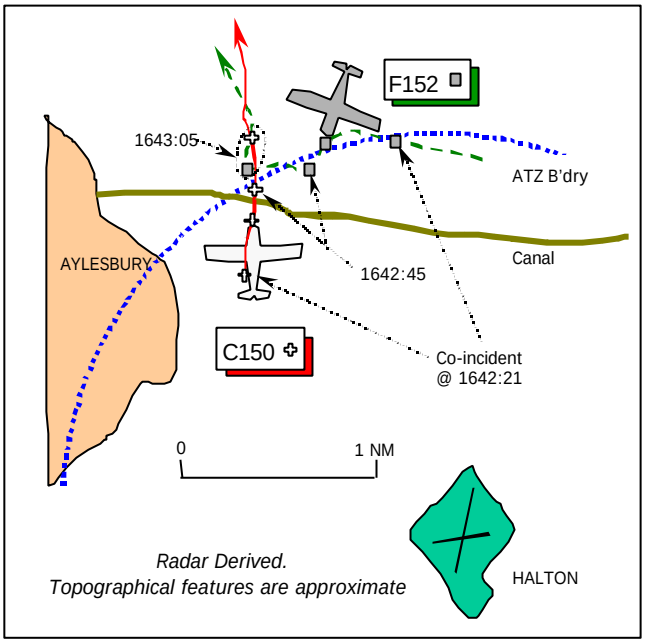
*Date/Time:*18 Jul 1642

Position: 5150 N 0045 W (2 NM NW of Halton A/D - elev 370 ft)

Airspace: ATZ/London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Reims F152	C150
Operator:	Civ Club	Civ Pte
Alt/FL:	1000 ft (QFE 984 mb)	1200 ft (QNH)
Weather Visibility:	VMC CLBC >10 km	VMC >10 km
Reported Separation:	200 m H, nil V	2-300 m H, nil V

Recorded Separation: 0·3 NM @ 1642:45



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE REIMS F152 (C152) PILOT reports his ac has a white/green colour scheme and HISLs were on whilst flying at 90 kt in the visual circuit to RW02 at Halton aerodrome; no SSR was selected. Just after rolling out downwind on 200°, at 1000 ft QFE (984 mb) - about 400 ft below the SCT cloud-base of 1500 ft (with occasional showers) - another ac was spotted 400 m away to starboard flying a reciprocal track. He turned L to avoid the other ac, which passed down his starboard side 200 m away at the same height with a *"high"* risk of collision. It was a white/red C150 and he identified the ac's registration. He believed its pilot might have descended below cloud to maintain VMC, but he had not heard any RT calls from its pilot, although he had been monitoring the Halton A/G Stn frequency of 130·42MHz continuously.

THE C150 PILOT, a flying instructor, reports his ac has a white colour scheme with a red stripe; the anti-collision beacon and nav lights were on. He was instructing a general handling sortie above the SCT cloudbase and a squawk of A7000 was selected, but Mode C is not fitted. After finding a gap in the cloudbase and descending through it at 90 kt, he was heading N at 1200 ft QNH in VMC, 100 ft below cloud with an in-flight visibility of >10 km. It was then that he realised that he had inadvertently entered the Halton ATZ and rather than overfly Aylesbury, he elected to head N to clear the ATZ as soon as possible, but he had no time to call Halton RADIO. (He later added that on those occasions that he had called the A/G stn no reply had been forthcoming). About 2 NM NW of Halton aerodrome he spotted a high-wing ac at 1 o'clock 2-300 m away, which passed down the starboard side 2-300 m away at the same altitude. When he first saw the F152 there was no risk of a collision, so no avoiding action was taken. However, the F152 pilot subsequently flew in formation with his ac – he believed it was to check his ac's registration – which was far more dangerous; he assessed at this point that there had been a medium risk of a collision.

UKAB Note (1): In a subsequent telephone conversation with the Reims F152 pilot, although he thought that the Airprox occurred S of the canal, he agreed it could have occurred at the boundary of the ATZ. He had closed on the C150 after he had first spotted it, but contended it was not close enough to be a danger at that point. He added that the airspace in the vicinity is very confined and the overlying Luton CTA creates a bottleneck with the ATZ. Consequently, they have experienced problems at Halton with pilots entering the ATZ whilst trying to remain clear of Class D airspace. He added that gliding was not in progress at the time, but could not confirm if the A/G Stn was being continuously monitored at Halton.

UKAB Note (2): The UK AIP at ENR 2-2-3-3 (17 May 01), promulgates Halton as a government aerodrome with an ATZ as a circle radius 2 NM, centred on RW02/20, from the surface to 2000 ft above the aerodrome elevation of 370 ft and active in summer, from 0600 – 1800 or Sunset - daily. The A/G station – Halton RADIO – is promulgated as operating on 130·425 MHz within the above hours.

UKAB Note (3): The LATCC Heathrow radar recording does not illustrate this Airprox clearly as the ac involved are shown as primary contacts only and not continuously. The F152 is shown flying crosswind at 1642:21, simultaneously the C150 is shown for the first time about 1·5 NM NW of Halton northbound. The F152 turned downwind and at 1642:45, the C150 is shown at 1 o'clock – 0·3 NM, about 600 yd away, as the latter crosses the ATZ boundary. Thereafter the F152 turns westbound astern of the C150, which continues northbound. At 1643:05, the F152 is shown northbound in the C150's 7-8 o'clock - 0·16 NM, about 325 yd, and maintains this horizontal separation as the F152 draws aft into the C150's 6 o'clock. The C150 then eventually turns westbound around the N of Aylesbury and the F152 turns south back toward Halton.

UKAB Note (4): The UK AIP at ENR 5-5-1-2 (22 Mar 01), promulgates Halton aerodrome as a Glider Launching Site for winch and aerotow launches where cables and Tug ac may be encountered to 2000 ft agl, during daylight hours.

UKAB Note (5): The UK AIP at ENR 1-4-8 para 2.7.2, promulgates that for flight within ATZs situated in Class G airspace: *"When flying within an ATZ the requirements of Rule 39...must be complied with".*

In order to comply with Rule 39 during the notified hours of operation the procedures to be adopted by pilots are stipulated at 2.7.2.3:

(a) Before taking off or landing at an aerodrome with an ATZ or transiting through the associated airspace...obtain information from the...a/g station to enable the flight to be conducted with safety.

(b) Radio equipped ac must maintain a continuous watch on the appropriate radio frequency and advise the...A/G Stn of their position and height on entering the zone and immediately prior to leaving it.

Furthermore, 2.7.2.4 stipulates that:

(a) Failure to establish 2-way radio communication with the....A/G Stn during their notified hours of operation must not be taken as an indication that the ATZ is inactive. In that event...pilots should remain clear of the ATZ.

UKAB Note (6): The RAF FLIP 'Minor Aerodromes' Halton entry at the time, under remarks stated: *"For crossing or join call Halton RADIO on 130·425. If no contact transmit intentions blind and proceed with caution".* This note has subsequently been removed. 'Pooleys Flight Guide' also included a similar entry.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and radar video recordings.

This was the second of three Airprox involving non-circuit ac entering the Halton ATZ (the other two were 119/01 and 163/01) that were considered by the Board, but all three were subtly different. The members appreciated that the C150 instructor had strayed into the Halton ATZ during his quest to remain VMC. However, the mistake had been unintentional and he was apparently trying to exit the zone clear of Aylesbury when he encountered the F152. Some pilot members commented on the size of the Cct flown by the F152 pilot, as revealed on the radar recording; some thought it was fairly wide and it was certainly close to the boundary of the ATZ. A GA member explained that this was not unusual but it followed that operating close to an ATZ boundary increased the risk of encounters with other ac in transit outside the zone. However, in this instance the C150 had transited through the ATZ northbound and the F152 pilot encountered the other ac as he steadied downwind. The C150 pilot had reported he did not have time to call on the A/G Stn frequency, (contrary to Rule 39 of the Rules of the Air Regulations) and he had flown through the Cct area in opposition to the established traffic pattern, (contrary to Rule 17 (5) (b)) – albeit that it was unbeknown to him at the time. Nevertheless, each pilot had spotted each other's ac – the F152 pilot reported 400 m away and turned away to avoid the C150, whose pilot had acquired the other ac 2-300 m away, probably as it turned. Although some members thought that there were two Airprox – the second occurring when the F152 pilot closed on the C150 to identify its registration - the Board's assessment of cause and risk had to focus on the first occurrence. This was the reported Airprox - though one member thought that this was more a sighting report - as the C150 pilot had not counterfiled for the second occurrence. On this basis the Board agreed that this Airprox had resulted because the C150 pilot inadvertently penetrated the Halton ATZ and had flown into conflict with the F152. However, the C150 was diverging from the F152 when the latter steadied downwind. Moreover, the radar recording showed that they were about 600 yd apart at this point. Members agreed unanimously, therefore, that no risk of a collision had existed in these circumstances.

Some members noted that the F152 pilot could not confirm if the A/G Stn was operating at the time of this Airprox and the C150 pilot's assertion that he had difficulty in obtaining a reply on some occasions. This provided added weight to the recommendation following the Board's assessment of Airprox 119/01. The Board also noted that the CPA between the two ac had occurred after the first occurrence, when the F152 pilot apparently formated on the C150 - 0·16 NM - about 325 yd astern of the latter. This had not been explained in the report submitted by the F152 pilot, but was evinced by the radar recording and mentioned by the C150 pilot. The Board took a dim view of pilots who chased other ac to identify them and indeed a GA member observed that formating on another ac without the pilot's agreement was contrary to Rule 17 (1) (c), of the Rules of the Air Regulations. It was the responsibility of AIS (Mil) - in concert with the UKAB - to identify reported ac, pilots should not deliberately fly closer to another merely to obtain the registration and should be discouraged from doing so. Though the F152 pilot contended that it was not close enough to be a danger, in the Board's opinion he had exercised poor judgement and displayed questionable airmanship in this respect.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The C150 pilot inadvertently penetrated the Halton ATZ and flew into conflict with the F152.

Degree of Risk: C.

AIRPROX REPORT No 125/01

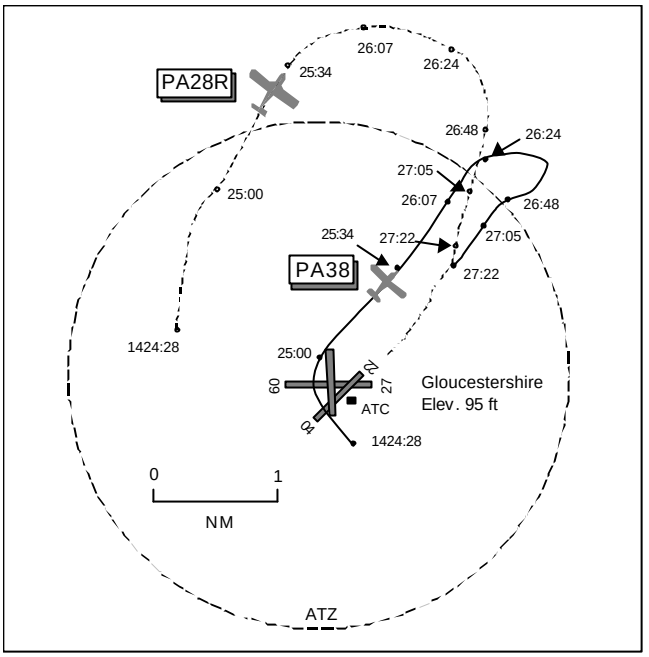
Date/Time: 23 Jul 1427

Position: 5154 N 0208 W (1 NM FIN APP RW 22 Gloucestershire - elev. 95 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PA28R	PA38
Operator:	Civ Pte	Civ Trg
Alt/FL:	700 ft ↓ (QFE 1015 mb)	1000 ft ↓ (QFE NK mb)
Weather	VMC CLNC	VMC NK
Visibility:	Unlimited	30 km
Reported Separation:	0 75 m H /0 ft V 300 m H	

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA28R PILOT reports joining the visual cct at Gloucestershire Airport inbound from Welshpool at 100 kt and receiving an ADC service from Gloster Tower on frequency 122·9 MHz. The visibility was unlimited in VMC and the ac was coloured white with a grey stripe with anti-collision light switched on. When he reported downwind, ATC cleared him "*number 2 call final*" and he then heard an ac (the PA38) make a strange call "*left base for right hand*". As he turned final RW 22 at 700 ft QFE 1015 mb, he saw a PA38 about 150 yd away on what appeared to be a L base position in a steep L turn at his level turning on to final approach. He called ATC to ask what was happening and was then told to become No 2 to the PA38 – the previous ac to which he had been No 2 had already landed. He considered that it was impossible to comply with that instruction as the PA38 was too close and he would have caught up with it well before the RW threshold. He executed a steep R turn to avoid the other ac, applied full power and called "*going around*". He assessed the risk of collision as high.

UKAB Note (1): During a subsequent telephone conversation with the PA28R pilot, he said that the PA 38 was first sighted in his 0930-10 o'clock position turning in front of him, much closer than he had first thought, probably 150-300 ft away. He initially saw the underside aspect of the ac in a steep L turn away from him at the same level and it was only when he was almost abeam and overtaking it that ATC asked him to position behind it.

THE PA38 PILOT reports flying a dual training sortie inbound to Gloucestershire from Welshpool heading 040° at 1000 ft QFE and 90 kt. The visibility was 30 km in VMC, his ac was coloured white with red/brown markings, strobe lights were on and he was receiving a FIS service from Gloucester Tower. Having turned downwind in the cct for RW 22, he reported his position to ATC and he was told to follow another ac in the cct. He had tracked downwind for RW 22, about 400 m away from the airport buildings. As he approached the position where he would normally turn R base ATC asked for a position report which he passed. He saw an ac on final approach for RW 22 and during his lookout scan and as he commenced the R turn he also saw another ac (the PA28R) in his 1030-11 o'clock position, crossing L to R in straight and level flight, 400 m away. He continued the R turn onto final approach estimating that he passed no closer than 300 m from the PA28R. Subsequently, the PA28R caught him up and overtook him slowly on his RHS and it was seen to commence a go around into the visual cct.

UKAB Note (2): During a subsequent telephone conversation with the PA38 instructor, he was unable to clarify which airport buildings at Gloucester Airport he had referred to in his report. The aerodrome plate shows three clusters of buildings, one large set S of the RW 27 threshold with two other sets on the N and NW aerodrome boundary.

ATSI reports that the Gloucester ADC described his workload level and traffic loading as moderate at the time of the incident. The reported weather for the period was: surface wind 240°/7 kt; visibility 30 km; cloud few at 3000 ft, scattered at 4000 ft.

The PA28R reported overhead Gloucestershire Airport at 1420, descending through 2800 ft. The ac was instructed to report RH downwind for RW 22 and was warned about other joining traffic i.e. another PA28 and a Campbell Cricket (an autogyro). Shortly afterwards, the PA38 made its initial call on the Tower frequency. Its pilot was instructed *"from overhead descend dead side report downwind righthand for runway 22 look out for other joining traffic".* The pilot acknowledged a standard overhead join. At 1422 the PA38 reported overhead at 2000 ft *"descending deadside"* and was instructed to report downwind.

The ADC's plan was that the PA28R would follow the other PA28 downwind, both of which would be followed, in turn, by the PA38 and, being much slower, the Cricket. Accordingly, when the PA28R reported downwind it was instructed to follow the PA28 on base leg. The controller said that he was concerned that he had not yet sighted the PA38 and asked its pilot to report his position. The pilot stated he was downwind RH for RW 22 but still not having the ac in sight, the controller requested the PA38's position again. The pilot replied *"……is now approaching er early left base two two righthand"*. The controller said that he could see the PA28R but not the PA38. Consequently, he intended transmitting to the pilot of the former ac to warn him that he 'may be' number two to a Tomahawk on a tight cct inside him. Unfortunately, in error, he addressed this call to the pilot of the PA38, who replied asking if the ac was on a L or RH circuit. The next call was from the PA28R pilot, reporting on R base for 22. Before the controller could respond to this transmission the pilot of the PA38 reported visual with the ac on R base.

The controller explained that at about this time he saw the PA38 for the first time. It was on final approach, with the PA28R turning onto finals behind it. Receiving confirmation that the PA28R was turning final, he instructed its pilot to *"position to follow the Tomahawk"*. However, subsequently, unsure of the subject acs' relative positions, he asked the pilot of the PA28R if he was number one or two on final. The pilot replied having to go around as he did not consider it possible for him to position safely behind the other ac. The PA38 was cleared to land on RW 22 and the PA28R positioned downwind behind the autogyro.

The ADC commented that he was surprised that he had not sighted the PA38 before it turned onto final approach. He explained that the downwind position is clearly visible from the Visual Control Room (VCR) and he believed that, if the PA38 had carried out a standard circuit, he would have seen it. The radar recording of the event, using LATCC recorded data, shows an ac, believed to be the PA38, routeing outbound from the overhead at 1425, tracking about 040°, i.e. on a reciprocal track to final approach. It then turns R before commencing a further R turn onto final, in front of another ac believed to be the PA28R. None of this information was available to the ADC Controller at the time.

UKAB Note (3): The Clee Hill radar recording shows the subject ac's tracks within the Gloucester cct area until 1427:22 when the PA38 fades from radar established on final approach RW 22 with the PA28R about 0·15 NM to its N tracking 200° towards final. The PA28R is seen then almost immediately to turn onto final approach at 1427:30 followed shortly by a small deviation to the R, 8 seconds later, before tracking towards the RW C/L. This accords with the PA28R pilot's description of his avoiding action manoeuvre but the incident is not seen on recorded radar.

UKAB Note (4): The RT transcript at 1424:50 shows the ADC transmission *'PA38 c/s report your position"*. The PA38 pilot replied *"PA38 c/s downwind two two righthand one thousand feet"* followed by the ADC reply "*er PA38 c/s roger"*.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

It was clear that the ADC had formulated a cct traffic plan which had included the two subject inbound ac entering the cct from an overhead joining procedure. The PA28R had joined first and on reporting downwind he was given his position as No 2 to another PA28 on base leg. It was then the ADC's intention to give the PA38 pilot instructions to follow the PA28R as No 3 followed by the autogyro. However, he had been unable to see the PA38, after it had reported overhead for a standard join and so asked for its position. This was given as 'downwind' but it appeared that the ac was not in a normal downwind position where the ADC would expect to see such traffic. Furthermore, he did not give the PA38 pilot his sequence number in traffic but simply gave an acknowledgement to his transmission while still unsure about the PA38's location. What the ADC did not realise was that the PA38 pilot had entered the cct flying an extremely tight downwind leg within/inside an already established cct pattern, but not party to the traffic sequence and under the erroneous belief that he was to follow another ac. ATCO members felt that although the ADC had been unable to see the PA38 he should have passed the pilot TI on the two established ac ahead of him, in accordance with his plan, whilst he looked for it within the cct. That aside, the onus had been on the PA38 pilot, during his overhead join and descent on the cct deadside, visually to acquire all the other ac in the cct. The radar recording had shown that when the PA38 was approaching the RW 04 threshold flying towards the crosswind section of the cct, the PA28R was almost in his 12 o'clock position downwind. Indeed, at that time the PA28R pilot had reported downwind and this call should have alerted the PA38 pilot to the ac's position. Members agreed that the PA38 pilot did not integrate safely into the cct which ultimately had led to the Airprox.

Moving on, it then appeared that pilots of both subject ac believed themselves to be No 2 to the other PA28. The PA38 pilot next reported *"early left base two two righthand"* in response to the ADC's second position report request, still being unsighted on the Tomahawk. It was presumed the Tomahawk pilot called L base since he had flown through the RW C/L from R base (a consequence of his poor downwind leg track). Unfortunately, the ADC had then added to the confusion when he addressed his next call, intended to the PA28R pilot, to the PA38 pilot warning him of him that he may be No 2 to a Tomahawk on a tight cct inside him. The PA38 pilot had seen the PA28R on R base at about the time that its pilot made his base leg call and had turned in front. The radar recording confirmed the tracks flown by both ac. The PA28R pilot had only seen the PA38 `belly up' as it was executing its L turn onto final approach. Much discussion then followed as to whether the ADC had been in the best position then to issue a revised sequence for landing. ATCO members said that in the situation faced by the ADC, both ac head-on on final, it would have been difficult to judge exactly which ac had been in front. The ADC had initially told the PA28R pilot to follow the PA38 but had then asked the pilot whether he was No 1 or No 2 on final. By that stage the Arrow pilot had elected to go-around owing to the proximity of the Tomahawk which he did. Some members felt that the ADC should have perhaps instructed the PA38 to go-around when it became apparent that there was a confliction. In the end, it was felt that the PA28R pilot, after seeing the PA38 ahead, albeit late as he was not expecting it to appear between him and the PA28 that he was following, would have been in the best position to resolve the confliction. Nevertheless, members agreed that the ADC should have exercised more positive control of the cct traffic and that, in not doing so, he had contributed to the incident.

Pilot members made further comment about the apparent size and shape of the visual ccts. It was recognised how easily visual ccts could extend outside the confines of the ATZ particularly in a busy pattern where ac are instructed to 'follow' ac ahead. For many reasons the cct pattern shape should be preserved as far as possible and one way to do that was to go-around from the end of the downwind leg, rather than extending it, and flying further upwind subsequently to achieve the desired cct 'spacing'.

In terms of risk, just as the PA38 pilot was about to turn onto base he had seen the PA28R and decided to turn on to final ahead of it. The PA28R pilot then unexpectedly saw the PA38 as it turned onto final approach ahead at a slightly slower speed; although the ADC told him to follow the PA38, by then it was too late to do so safely, so he had elected to go-around and re-position. Although the situation had been far from tidy the PA28R pilot was always in a position to avoid the PA38 and this effectively safeguarded against any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA38 pilot did not integrate safely into the cct compounded by lack of positive control by the ADC.

Degree of Risk: C

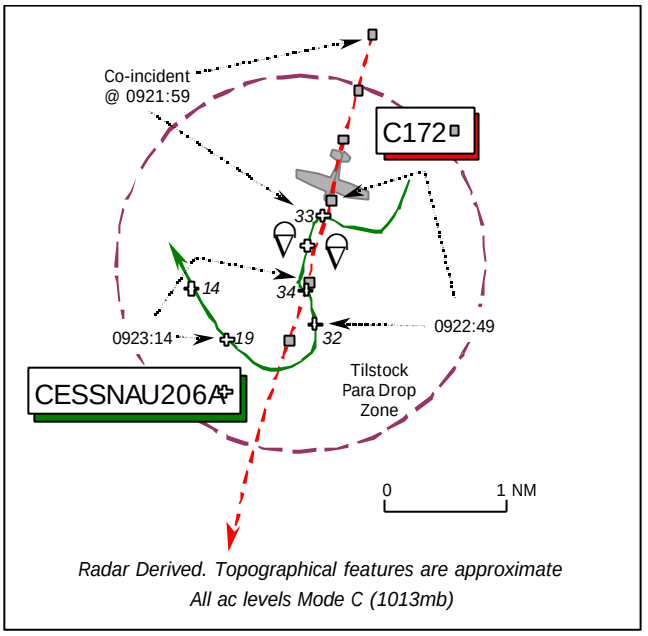
AIRPROX REPORT No 126/01

Date/Time: 21 Jul 0923 (Saturday)

Position: 5255 N 0239 W (Tilstock-elev 301 ft)

Airspace: Free-Fall Drop Zone (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Cessna U206A	C172N
Operator:	Civ Club	Civ Pte
Alt/FL:	3000 ft (QFE 1001 mb)	3000 ft (RPS 1011 mb)
Weather Visibility:	VMC CLBC >10 km	VMC CLBC 2-4 NM
Reported Separation v Parachutists:	<500 ft	Not Seen
Recorded Separation v Parachutists:	Not recorded	



Radar Derived. Topographical features are approximate
All ac levels Mode C (1013mb)

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CESSNA U206A PILOT reports that his ac has a blue livery and HISLs were on whilst conducting a parachute drop overhead Tilstock Free-Fall Parachute Drop Zone (DZ) from 3000 ft QFE (1001 mb), about 500 ft below and ½ NM horizontally clear of cloud. He was in communication with Tilstock RADIO on 122·07MHz and squawking the parachute dropping conspicuity code of A0033 with Mode C.

The parachute drop was done on a heading of 210° at 80 kt. After all the parachutists had exited his ac he was warned by Tilstock RADIO of a conflict with another ac approaching the DZ about ½ NM away. He spotted the white C172 at about 2000 ft, which then flew straight overhead the DZ without any apparent radio calls. In his estimation, the C172 came within 500 ft of one of the five parachutists in the air above the DZ as the C172 overflew them; he assessed that the risk had been *"high"*.

UKAB Note (1): The UK AIP at ENR 5-5-4-4, promulgates Tilstock Free-Fall Parachute Drop Zone

as a 1·5 NM radius centred on 52° 55' 51" N, 002° 39' 05" W, up to FL 150, active during daylight hours on Saturdays. Activity is notified to Shawbury ATC during their hours of watch and at other times to London ACC.

THE C172N PILOT'S very comprehensive report states his ac has a red/white livery but HISLs are not fitted. He departed from Manchester (Barton) aerodrome for Cardiff Airport, routeing the Manchester Low Level corridor at 1250 ft amsl and then took up a direct track to Cardiff Dock VRP, for a VFR entry into the Cardiff CTZ. A squawk of A7000 was selected but Mode C was switched off.

Along his route he was 1000 ft below cloud when flying at 3000 ft BARNSLEY RPS (1011 mb), through occasional rain showers and occasionally between layers with an in flight visibility of about 2-4 NM.

On reaching Ashcroft Farm airfield, or shortly afterwards, he 'signed-off' with Manchester and switched to Shawbury ZONE on 120·77 MHz for transit through their 'zone' en route to Cardiff. Manchester made no mention of any parachute activity at Tilstock, but they may not have been aware of it. Shortly afterwards when clear of CAS he continued the climb to his chosen cruising level of FL 40. As the cloud base appeared to be between 3500-4000 ft he stopped the climb at 3000 ft RPS, and meanwhile tried to contact Shawbury ZONE, whilst heading 198° at 110 kt. Other pilots could be heard trying to contact Shawbury and in between he made one or two transmissions but got no reply. All this took a few minutes before it became apparent that Shawbury was closed. He then looked for the Tilstock A/G Stn frequency in the left-hand column of his 1:500,000 chart, but no frequency was listed. He reasoned that at that point he would probably have levelled his ac at 3000 ft and was possibly very close to Tilstock, which he started to look for. There was no sight of the aerodrome or any activity that he could see, but his ac's nose may have obscured the aerodrome. The ac was not deliberately 'aimed' at Tilstock, but as the direct track from Ashcroft Farm to Cardiff runs almost directly over Tilstock he now realises that he had failed to take account of any possible parachuting activity there. Although, at the time, he thought that the weather conditions did not seem to him to be suitable for parachute dropping. He did not see either the parachute dropping ac or the parachutists, but added that he had been more concerned to be above the ATZ of Tilstock and that of Sleap, the next airfield close to his planned track.

He apologised for his 'intrusion' over Tilstock and reluctantly admitted that his total flying time as a pilot is some 10,300 hours spread on 'singles' and 'twins', all in general aviation.

UKAB Note (2): Tilstock is not encompassed by an ATZ and none is depicted on the CAA VFR 1:500,000 chart, hence, no frequency is listed under the table of ATZs on the chart. However, Tilstock free-fall parachute drop zone is depicted, but the upper level of FL 150 is not noted on the graphic. A general warning is contained, however, within the chart footer and Shawbury noted as the 'nominated ATSU' for Tilstock in the adjacent table of ATSU's to be contacted for DZ activity information.

UKAB Note (3): RAF FLIP En-route Supplement BINA (4 Jul 01), promulgates that Shawbury ZONE is available at times to meet operational commitments. The aerodrome hours are noted as 07 – 1600 UTC, Monday-Friday. Hence, no ATS was available from ZONE and the MATZ not extant.

UKAB Note (4): A review of the Clee Hill radar recording reveals that the C172N overflew Tilstock Free-Fall Parachute Drop Zone along a similar track to the Cessna U206 but displaced slightly to the E and about 1 min behind it. The Cessna U206 is shown level at 3300 ft Mode C (1013 mb) as it steadies on 210° on the run-in to the drop zone at 0921:59 and then turns SE 34 sec later at 3400 ft. The C172N passes overhead the vicinity of Tilstock DZ at about 0923:08, but no Mode C is evident. neither are the parachutists.

UKAB Note (5): In a further telephone conversation with the pilot of the parachute dropping Cessna U206A, he advised that the static-line drop was made into wind after approval from the DZ control situated on the DZ and after the dispatcher had checked the airspace below the ac. Telemeters are used for surveillance of the airspace around the DZ prior to dispatch of the parachutists from the ac; there is a clear field of view to the N in the direction from whence the C172 appeared. He could not explain why the C172 was not spotted before approval was given to dispatch the parachutists. The inexperienced students would

have been in free-fall for about 200 ft once dispatched - less than 10 sec; the canopies would have been deployed at about 2800 ft aal. Total time in the air for the 'stick' of parachutists could be up to 3 min. The canopies are steerable to a degree and radio communication can be effected with the students in the air.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and radar video recordings.

Although the investigation of this Airprox had been prompted by the report submitted by the pilot of the parachute dropping ac - the Cessna U206 – the Airprox actually occurred between the parachutists under the canopy and the C172 which overflew them; the Board agreed this Airprox should be assessed solely on that basis.

The members appreciated the frank and honest account from the C172 pilot, which provided a clear description of his flight. Nevertheless, GA pilot members were concerned that a pilot of such extensive experience should make such significant errors of planning. Here, in the members' opinion, lay the root cause of this Airprox, because the Tilstock DZ is clearly marked on CAA VFR charts and should have been readily apparent to the C172 pilot when he planned his flight, as a straight line joining Ashcroft to Cardiff Docks VRP cuts straight through the Tilstock DZ. This was a disappointing aspect of this Airprox being one that was all too often a recurring theme. Members stressed the importance of careful scrutiny of current charts and AIPs at the flight planning stage for potential hazards and their avoidance. This was an essential prelude to any flight cross-country to minimise the potential for occurrences such as happened in what has become a very crowded environment in the lower airspace. Again a GA member voiced the opinion that the chart symbology for parachute DZs should be marked as a hazard with a dashed outline, rather than the solid outline, a point which engendered support from the members. This would also serve to differentiate between aerodromes where GA ac may land and other facilities specific to parachuting seldom if ever used by powered ac.

Controller members thought it highly unlikely that Manchester ATC would have known about parachuting activity at Tilstock, but from the C172 pilot's report it was clear that he was aware of the existence of the DZ and it was noted he had tried to call Shawbury for an ATS who would have been notified of the activity at Tilstock - if they had been open, which they were not. At face value it appeared that establishing contact with this ATSU was continued to the detriment of safe navigation in the vicinity of the DZ whilst looking for the Tilstock A/G frequency on his chart – which is not noted. Without any confirmation to the contrary the C172 pilot should have considered the DZ to be active and should have given it a much wider berth as recommended in the AIP. Indeed, it appeared to some members that continuing to fly the straight line track through the DZ was predicated on an 'assumption' that the weather conditions precluded parachuting activity. Making such assumptions were fraught with danger, especially when parachuting was feasible up to FL 150. Moreover, the C172 pilot had not seen the parachutists at all when the DZ was overflown.

The Cessna U206 pilot had revealed that a sound system was in place to ensure appropriate surveillance of the airspace around Tilstock before the parachutists exited their ac. As the DZ was not restricted or controlled airspace, this was clearly an important element in ensuring that the drop was conducted with safety and with due regard for other aviators, but it was unfortunate that the C172 was not seen earlier. The Board considered that at a speed of 110 kt the C172 should have been visible from the DZ control - probably less than 2 NM away - when they gave approval for the drop. Similarly, the dispatcher might have detected the other ac before he dispatched the 'stick'. Some members wondered if this late sighting by the DZ ground party and non sighting by the Dispatcher were intrinsic to the cause, but others contended that this safety net was the back-stop; if the C172 pilot had not flown through this notified DZ in the first place the Airprox would not have occurred. On balance this view was supported by the majority of members but it was not a unanimous one. In the end the Board concluded that this Airprox resulted because the C172 pilot flew through an active Parachute Drop Zone and into conflict with the parachutists, whom he did not see.

Turning to the risk involved in this encounter, again this was assessed on the basis of the C172's proximity to parachutists - not the parachute dropping ac. It was not possible to determine with any certainty the height of the C172 as it overflew the DZ since Mode C was turned off. This drew critical concern as it denied ATC altitude information and also prevented TCAS from functioning efficiently. Therefore, pilots should always select Mode C when transponding in flight. There was a broad span of opinion amongst the members as to the degree of risk inherent in this encounter. Some thought it very dangerous and that it was but fortuitous that the parachutists had not collided with the C172. Nevertheless, all the parachutists were below the C172 when they were overflown (by 500 ft according to the reporting Cessna U206 pilot) and the parachutists had been dropped about 1 min before being overflown. The majority view was that the C172 and the parachutists were, therefore, never going to hit each other. Consequently, the Board concluded that a risk of a collision had not existed in these circumstances and that the vertical displacement had assured the descending parachutists' safety. However, this was not a unanimous decision.

A general discussion then ensued about the promulgation of DZ A/G Station frequencies - a point which the Cessna U206 pilot had raised in discussions with the UKAB secretariat and which the club were keen to promulgate as a contact frequency in their own efforts to reduce the potential for such occurrences. Clearly in the absence of an ATS from Shawbury, if the C172 pilot had known the frequency for Tilstock RADIO before getting close he would have been able to call them direct on RT about their activity. However, there was no mention of it on the chart or apparently in the AIP. A GA member opined that usually an ATSU is promulgated as a 'nominated' point of contact – as Shawbury is here, but that does not help at weekends or public holidays when the majority of GA pilots might be flying and most military aerodromes are closed or open at best for a few hours – H24 LARS units excepted of which there are few. It was suggested, therefore, that it might be useful to include the A/G frequencies of parachute DZs in the table of 'nominated ATSUs' at the margin of CAA VFR charts - alongside the table of aerodromes with ATZs. However, it was explained that this was not apparently in line with the policy agreed between the Directorate of Airspace Policy (DAP) and the British Parachuting Association (BPA). Consequently, though the Board viewed this as a positive step toward reducing the potential for occurrences such as this, it was up to the individual parachuting centres and the GA community to lobby for a change if they thought it appropriate.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The C172 pilot flew through an active Parachute Drop Zone and into conflict with the parachutists whom he did not see.

Degree of Risk: C.

AIRPROX REPORT No 127/01

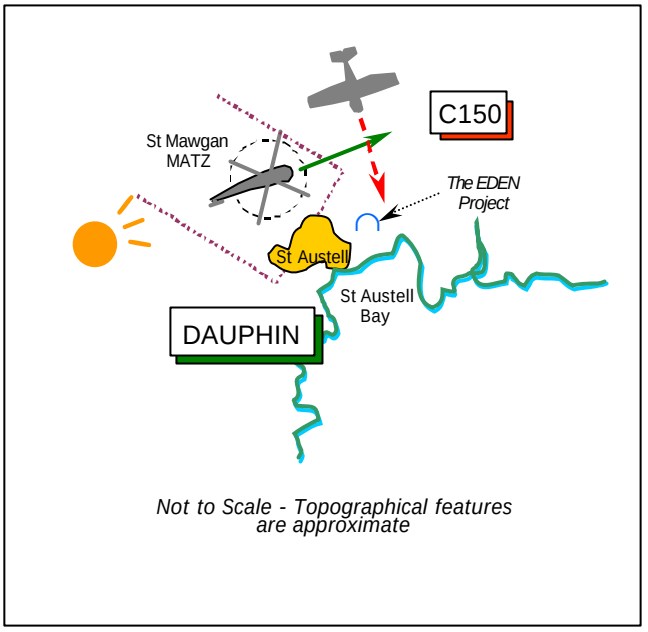
Date/Time: 26 Jul 1630

Position: 5022 N 0445 W (2 NM NE of St Austell)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	AS365N2 Dauphin	C150
Operator:	Civ Comm	Civ Pte
Alt/FL:	1000 ft (RPS 1013 mb)	1500 ft (QNH 1027mb)
Weather Visibility:	VMC Nil Sig 20 km	VMC Nil Sig 20 km
Reported Separation:	100 ft H, 100 ft V	50 – 100 ft V

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE AS365N2 DAUPHIN PILOT reports he was flying his helicopter 'single pilot' at 135 kt from Culdrose to Yeovilton at 1000 ft Wessex RPS (1013 mb), whilst under a FIS from St Mawgan APPROACH (APP) on 126·5 MHz. His helicopter has a red livery, HISLs were on and a A7000 squawk was selected with Mode C. Flying in good VMC, heading 075° just to the NW of St Austell, APP reported an ac in the vicinity of the EDEN Project at 1500 ft. He turned to fly to the N of St Austell at 1000 ft, but did not see the other ac, a high-wing Cessna, until after his passenger pointed it out, "close" in their 3:30 – 4 o'clock. It was about 200 m away to starboard and flying away, after it had overflown his helicopter by about 100 ft. He judged it had probably approached from his 10:30 position and assessed there had been a *"high"* risk of a collision – there was no time to take avoiding action although he had started to bank to the R and descend. He reported the Airprox to APPROACH on RT.

THE C150 PILOT reports his ac has a "high-conspicuity" black and yellow colour scheme and he was squawking A0457 - Mode C was U/S - whilst under a RIS he thought, from St Mawgan APPROACH on 126·5 MHz. Flying straight and level at 1500 ft ALT, he thought on the QNH (1027 mb), near the Eden Project site heading 170° toward St Austell Bay at 80 kt, with the sun on the starboard beam he spotted a red helicopter about 500 yd away to port after it had passed below his ac. The helicopter was only seen after it had crossed directly below his ac onto the port beam - he estimated by about 50-100 ft. He added that his scan had been directed ahead at the time and because the helicopter had flown directly out of the sun on the starboard beam, he had been unable to take any avoiding action. He was unable to assess the risk but thought the helicopter pilot might have been distracted by the ground feature of the EDEN Project.

MIL ATC OPS reports that the pilot of the C150 was in receipt of a FIS from St Mawgan APPROACH on 126·5 MHz. On initial contact, at about 1601, the pilot had advised that he was airborne from Bodmin Aerodrome at 1500 ft and heading for an area between the Eden Project and Carlyon Bay to undertake a *"..photo survey, not above two thousand feet, request flight information service."* APP asked the pilot to squawk A0457 and advised that the Wessex RPS was 1013 mb, which was acknowledged by the pilot – "*1013* (C/S)". Shortly afterwards, the APP position was handed over to another controller, but there were no further RT exchanges with the C150 pilot.

At 1622:10, the AS365 Dauphin pilot freecalled APP advising that he was flying at*"...one thousand feet, one zero one three...we are about two miles east of Falmouth intending to route to St Austell and then direct to Yeovilton".* APP placed the flight under a FIS and asked the Dauphin pilot to report overhead St Austell. APP did not formally identify the helicopter, but had observed a radar contact squawking A7000 to the NE of Culdrose, which tied in with the DF traces from the Dauphin pilot's transmissions.

At 1627:03, having seen an ac squawking A7000 passing Truro, APP transmitted to the Dauphin pilot *"...traffic believed to be you has traffic manoeuvring over the Eden Project, last known at one thousand five hundred feet on the regional"* and the helicopter pilot replied *"...that traffic copied, looking for that".* Immediately afterwards, APP transmitted to the C150 pilot *"...rotary traffic believed to be approaching from the south west, last known at one thousand feet"* and the C150 pilot replied *"copied the traffic, C/S"* at 1627:26. APP did not recall the tracks of the 2 ac merging, although he was not constantly monitoring their specific progress. At 1630:15, the C150 pilot transmitted *"...clear of that rotary traffic, request climb two thousand feet"*, to which APP replied *"(C150 C/S) roger, climb report level two thousand feet..."* At 1631:40, the Dauphin pilot advised APP *"..we are clearing to the east, will report changing to Plymouth Approach for on-going FIS and request the callsign of the other traffic that was near the Eden project"?* APP passed the C150's short callsign but the Dauphin pilot replied *"Can I have the full one, I will need to file an Airmiss* (sic) *for that."* APP complied and, a few seconds later, the C150 pilot transmitted *"...can I have the full callsign of the helicopter please?"* which was also passed. The Dauphin pilot left the frequency at 1634:43 and the C150 pilot switched to Bodmin RADIO at 1637:40.

APP's workload was described as being of a medium intensity at the time, with 5-6 ac under FIS and another ac under a RIS; this traffic loading is typical for the time of day during the summer months.

UKAB Note (1): In a subsequent telephone conversation the C150 pilot reiterated that he was probably flying with the Bodmin QNH set, which is his normal practice when operating close to the aerodrome, though he could not be certain. If the C150 pilot was flying at 1500 ft Bodmin QNH, which he reported to be 1027 mb at the time of the Airprox, this would equate to about 1080 ft Wessex RPS (1013 mb), suggesting that the C150 was about 80 ft above the Dauphin and in general accord with the vertical separation reported by both pilots. The C150 pilot stressed that though he had reported to St Mawgan APPROACH that he was conducting a photographic survey, his RHS passenger, who is a qualified pilot, was not taking photographs at that moment and they were in transit to a potential photographic location.

UKAB Note (2): This Airprox occurred outwith the coverage of recorded radar.

UKAB Note (3): From Meteorological Office archive charts, the Bodmin QNH was probably about 1017 mb.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies and reports from the appropriate ATC authorities.

Though some members and the C150 pilot postulated that the unusual ground feature might have distracted the Dauphin pilot there was nothing to support this view, which was conjecture. A helicopter pilot member thought that transiting at 1000 ft was too low and unwise, and that lookout was the crux of this problem. APP had passed the Wessex RPS to the C150 pilot on initial contact some 29 min before the Airprox occurred. This pressure setting had been duly acknowledged by the C150 pilot, and had been used by APP within the traffic information provided to the Dauphin pilot when he reported the C150 to be *"...manoeuvring over the Eden Project, last known at one thousand five hundred feet on the regional"*. Whereas the C150 pilot reported that he was operating on the Bodmin QNH (1027 mb) and had reaffirmed that this was his normal practice, archive data showed that he may have set 1017 mb. This, however, could not be determined with any certainty. Nevertheless, members were of the opinion that the C150 pilot should have told APP that he was

still operating on the Bodmin QNH not the Wessex RPS. Therefore the traffic information passed in good faith by APP could potentially have been somewhat misleading to the Dauphin pilot. Following the traffic information proffered by the APP controller under the FIS – not RIS as the C150 pilot thought – members thought that the C150 pilot having been warned about the presence of the helicopter should have been looking out for it more. The Board recognised that the C150 pilot was required to give way in this situation. However, he could only do that if he could see it, which, partly due to the sun, it would appear he did not, until after the event – effectively a non-sighting on his part. Similarly the C150 should have been in the field of view of the Dauphin pilot, but downsun in this instance and the helicopter pilot should have been able to spot the other ac sooner than he did in these weather conditions. Again it was not until the C150 had overflown his helicopter that the Dauphin pilot had seen it – according to his laudably frank report following the prompt from his passenger - again effectively a non-sighting. Here then was the cause of this Airprox, which was in the Board's opinion effectively, a non-sighting by both pilots.

Turning to risk, both pilots were in general agreement about the relative vertical separation that pertained at the time – fortuitously about 100 ft. As neither had seen each other before their paths crossed and were thus unable to influence the outcome, the Board agreed unanimously that an actual risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively, a non-sighting by both pilots.

Degree of Risk: A.

AIRPROX REPORT No 128/01

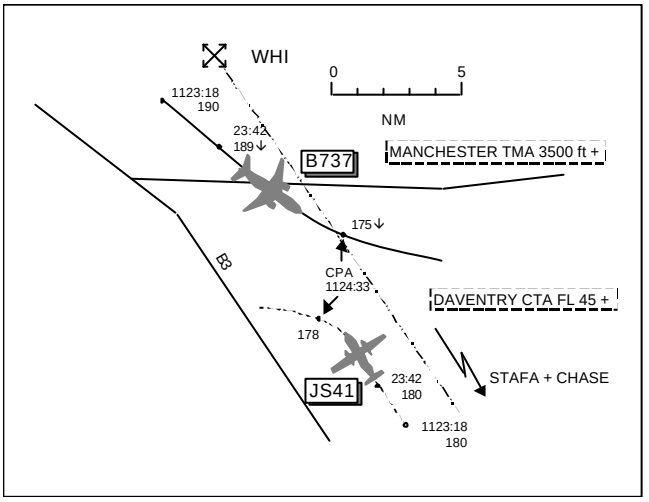
Date/Time: 27 Jul 1125

Position: 5302 N 0230 W (10 NM SE WHI NDB)

Airspace: CTA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	JS41	B737-200
Operator:	CAT	CAT
Alt/FL:	FL 180	FL 190 ↓
Weather	VMC CLNC	VMC CLNC
Visibility:	40 km	>10 km
Reported Separation:	0 ft V 1 NM H	/1000 ft V 3 NM H

Recorded Separation: 300 ft V 3·2 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JS41 PILOT reports heading 330° at M0·47 (approx. 290 kt) and FL 180 en route to Belfast. The visibility was 40 km in VMC and he was receiving a radar control service from Manchester on frequency 124·2 MHz. When about 30 NM SE of WAL VOR, he was given an avoiding action 60° L turn onto heading 270° and ATC was then heard to issue an avoiding action instruction to another ac (the subject B737) flying in the opposite direction. He manually rolled the ac into a steep L

turn and the B737 was seen by the PNF, the FO on the RHS, and another Capt, sitting in the jump-seat, pass 1 NM down the RHS of the ac at a similar level. He assessed the risk of collision as high. TCAS equipment was not fitted to his ac.

THE B737 PILOT reports heading 155°, he thought, at 320 kt en route to Birmingham at FL 190. The visibility was >10 km in VMC and he was receiving a radar control service from Manchester on frequency 124·2 MHz. After passing WAL VOR on track to CHASE and commencing a descent, he was issued with an avoiding action L turn on to heading 090°. He banked to the L and saw a low wing twin turbo-prop ac at a range of 5 NM in a climbing L banked turn; it was seen to pass 1000 ft vertically and 3 NM horizontally clear on his RHS. He assessed the risk of collision as low. The ac was fitted with TCAS but the equipment was unserviceable.

ATSI reports that Manchester TMA SE SC described the sector as "very quiet" at the time of the incident. He was acting as mentor to a trainee who, at the time, had completed about 70-80 hours training. He mentioned that, whereas most trainees at MACC have had previous experience at another unit, this trainee was ab initio, having been posted in direct from the College of ATC. The mentor confirmed that he was well aware of his trainee's experience, having been allocated as one of his OJTIs.

The incident occurred within an area where the use of 3 NM radar separation is approved (MACC MATS Part 2, Page RSEP 1-1).

The JS41 established communication with the MACC SE Sector at 1111, reporting at FL 180 routeing direct to WAL. Once this call was acknowledged, no further calls were made to, or received from, its pilot until the incident occurred thirteen minutes later. The SC explained that the JS41 had been routed, following co-ordination between LATCC and his trainee, further W than the normal route (i.e. via TRENT to WAL) in order to shorten its track distance.

At 1121, the B737 made its initial call on the SE Sector frequency. The pilot reported in a R turn to CHASE, level at FL 190. Shortly afterwards, following some initial confusion between the pilot and ATC, the flight was placed on a radar heading of 135°. The mentor said that, although no discussion took place between himself and the trainee about his plan, he assumed that the latter's intention was to issue descent to the B737 after it had passed the JS41. This theory, he felt, was reinforced when, to facilitate this plan, another Belfast City inbound was routed, by the trainee, to the W of the sector, clear of the B737.

The trainee instructed the B737 to descend to FL 150 at 1123:20. The radar shows the subject ac, on reciprocal tracks, 16 NM apart. The mentor admitted that he had not heard this transmission, or the pilot's readback, because he had been in discussion with the Co-ordinator about joining traffic at the time. However, returning his attention to the radar display, he noticed straight away that a down arrow had appeared against the B737's Mode C readout, which was now showing FL 189. He immediately asked his trainee if he had cleared the B737 to descend. The trainee acknowledged his error and issued avoiding action turns to the subject ac i.e. the JS41 left heading 270°, the B737 left heading 090°. The pilot of the JS41 reported visual with the traffic. The mentor said that if he had been faced with this situation on his own, he would have instructed the B737 to climb back to FL 190 but using the predict vectors to check whether the avoiding action taken was sufficient to resolve the situation, it was quickly established that standard separation should be maintained. This, subsequently, proved to be the case when the two ac passed each other 3·2 NM apart, at 1124:33, by which time the B737 was passing FL 175 and the JS41 was at FL 178. The mentor commented that STCA did activate during the encounter but only after he had noticed the confliction.

It was decided not to interview the trainee, as, in the opinion of the mentor, it was unlikely that any reason for his error would be forthcoming. The mentor said that, following the incident, his trainee could offer no explanation for creating the confliction, between the subject ac, when issuing descent clearance to the B737. He had confirmed that he had been aware of the presence of the JS41 but inexplicably he had overlooked it at the time. NB: The confliction would have been apparent from the fps display as fpss for both ac would have been displayed under the STAFA designator.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members initially wondered whether this had in fact been an Airprox as standard separation had not been lost during the incident. However, it was readily apparent that there had been confliction and there were several points that could be drawn out of the encounter. The sector had been quiet, a situation which was known to lead to low arousal states and this was combined with the mentor/ trainee manning complement. ATCO members fully understood how easy it was for a mentor to be distracted for a few moments away from monitoring his trainee, as in this case, by having a discussion with his co-ordinator. However, knowing the trainee's relative lack of experience, ATCO members were disappointed that this lapse had occurred; the mentor had missed both his trainee's descent instruction and the readback from the B737 crew. Admittedly he had subsequently noticed the B737 Mode C readout showing FL 189, but he then had to clarify the situation with his trainee, which had taken time to resolve. In all, twenty seconds elapsed from first noticing the B737's label change to issuing avoiding action instructions to the JS41 crew. Members commended the avoiding action manoeuvres given by the trainee but thought that although standard separation was not lost, it was probably more attributable to the very prompt actions of both crews, but particularly by the JS41, that had preserved 'status-quo'. Pilot members commented that this had been an unusual encounter within Class A airspace where the TCAS 'safety net' was absent and this may well have accounted for the JS41 crew's steep L turn to avoid. At the end of the day, members were clear that the TMA SC had allowed his trainee to descend the B737 through the JS41's level.

Turning to risk, the SC had noticed the confliction as the B737 commenced its descent and alerted the trainee who had then passed avoiding action turn instructions to both crews. The JS41 crew had turned sharply L and seen the B737 pass down their RHS, albeit at a perceived close range. The B737 crew had turned L as instructed and had seen the JS41 initially at 5 NM range; they watched it subsequently pass clear and below. These actions combined led the Board to conclude that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The MACC TMA SE SC allowed his trainee to descend the B737 through the JS41's level.

Degree of Risk: C

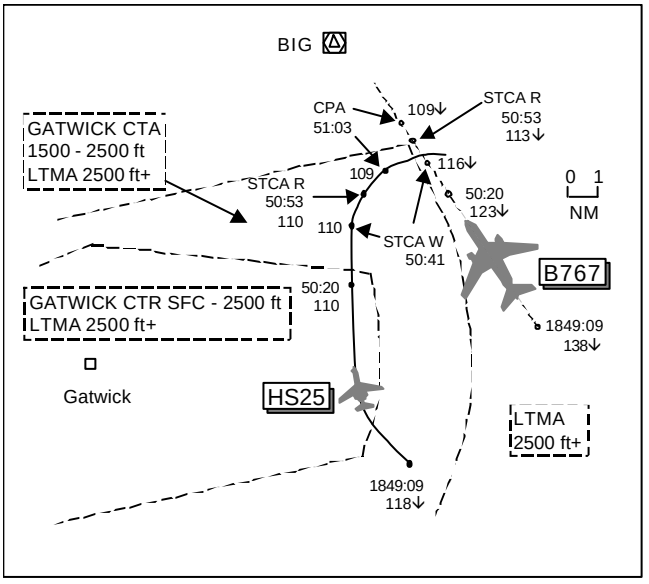
AIRPROX REPORT No 129/01

Date/Time: 31 Jul 1851

Position: 5116 N 0005 E (4 NM SSE BIG VOR)

Airspace: TMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B767-300	HS25
Operator:	CAT	Civ Exec
Alt/FL:	↓ FL 70	FL 110
Weather Visibility:	VMC NK 10 km	VMC CLAC 60 NM
Reported Separation:	200 ft V 0 H	/1000 ft V 4 NM H
Recorded Separation:	0 V 1·7 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B767 PILOT reports heading 325° inbound to BIG descending to FL 70. The visibility was 10 km in VMC and he was receiving an approach radar control service from Heathrow on 134·97 MHz. On passing through FL 110 (he thought), he was asked to expedite his descent so he selected the speedbrakes in order to comply. ATC then issued instructions to fly after passing BIG a heading change onto 270° and a speed reduction to 220 kt. Shortly thereafter, he received a TCAS TA on traffic 10 o'clock (he thought) range 1 NM 600 ft below followed 2 seconds later by an RA alert *"monitor vertical descent"*. The ac symbol was on the bottom of the `trapeze' which was coming down from the top of the ADI. He disconnected the AP, the autothrottle was at flight idle in `FLCH' descent mode and the ROD was increased; the TCAS alert ceased after a few seconds. He assessed the risk of collision as high as the conflicting ac passed only 200 ft above him.

THE HS25 PILOT reports flying inbound to Northolt and being given a vectored arrival via BIG which necessitated a 3000 ft/min ROD in order to comply with a level restriction of FL 160 abeam TIGER. ATC issued further descent clearance to FL 110 with further vectors and he descended at 300 kt IAS, which is standard practice. On levelling-off at FL 110, he allowed the speed slowly to 'bleed off' from about 20 NM range from BIG. The controller was very busy but dealt with ac in a cheerful and calm manner. The visibility was 60 NM 3000 ft above cloud in 'excellent' VMC and he was able to see many ac including the other subject ac. The controller asked for him to report his speed and appeared to be surprised at his 300 kt even though he had maintained this speed in the descent for the previous 10 minutes. ATC then vectored him first towards the subject ac, he thought it was a B737 which appeared to be in a slow descent, next onto S for about 10 NM whilst he slowed to 220 kt, then back onto N towards BIG. A few minutes later, another controller asked if he had been told to maintain 300 kt; he replied negative and was subsequently transferred to Heathrow Director. In hindsight, he thought that he should have confirmed his speed with the controller, as he approached the Speed Limiting Point (SLP) on the arrivals chart, but the ATCO was busy and seemed to be in control. However, he believed that he had not been on an arrival procedure but on ATC vectors (ie heading and speed); he was used to being taken through the LTMA at high speed. He never felt that the safety of the subject ac had been compromised by their relative proximity as he had seen the other ac visually for approx. 5 minutes prior to the incident, only losing sight of it when being vectored away. He estimated that the ac passed clear by 1000 ft vertically and 4 NM horizontally; his ac was not TCAS equipped.

ATSI reports that the controller was operating as the TC SE SC, combining the functions of the TC BIGGIN, TIMBA and SE (Low) positions, although staff were available to split these positions if considered necessary. The controller reported his workload as 'quiet' and the traffic loading as 'normal for the time of day'. However, analysis of the RT recording shows a relatively high RT loading, with 15 ac reporting on frequency during the 10 minute period during which the Airprox took place. The relevant ATC equipment was reported as serviceable at the time of the Airprox and no other factors, which may have adversely affected the controller's performance, were identified during the course of the investigation.

The HS25 established communication with the SC at 1842:10, on a radar heading of 320° and descending to FL 160 to be level abeam TIGER; the SC immediately cleared the HS25 to descend to FL 110. 30 seconds later the B767 called, heading 320° and descending to FL 160 to be level at TIGER. The SC cleared the B767 to descend to FL 120 with these two ac roughly line abreast with the HS25 the most westerly and the B767 to the east of it.

The SC's initial plan was to make the HS25 number 1 and the B767 number 2, when allocating stack levels at Biggin. The controller initially perceived that the HS25 was slightly ahead of the B767 and this reinforced his initial plan. However, shortly afterwards, the SC detected that the B767 was now slightly ahead and so the order was changed with the HS25 becoming number two. The SC re-arranged his strips and the Co-ordinator passed the release messages to the Heathrow Director.

The B767 was given further descent to FL 90 and, at 1847:20, was instructed to resume its own navigation to Biggin. At that time the two ac were 5·1 NM apart, with the B767 slightly ahead and

indicating a ground speed of 369 kt whilst the HS25 was indicating 339 kt. It would be normal practice to keep both ac on headings until the 'drop through' had been accomplished, thereby ensuring the ac remained separated from each other. As the B767 was heading virtually direct to Biggin, there was no appreciable change in its heading. The HS25 remained on a radar heading of 320° which was keeping it to the W of the B767, and both ac were approximately 22 NM from Biggin. The UK AIP, page AD 2-EGLL-7-1 states that ac must cross the Speed Limit Point (SLP) or 3 min before the holding facility at 250 kt IAS or less. Approaching Biggin, the SLP is at 12 DME.

At 1849:05, the HS25 was instructed to *"..go direct to Biggin now".* The SC stated that, at that time, he was dealing with another confliction elsewhere in the sector and intended to return to monitoring the HS25 and the B767 once this other action had been completed. At 1849:10 the SC transmitted *"B767 c/s can you just increase rate of descent please all the way down now to Flight Level Seven Zero"*. This was acknowledged by the crew and then they were instructed to contact Heathrow Director. By the time the crew of the B767 had acknowledged this, their ac was passing FL 138 and slowing down as it approached the SLP, with the HS25 in their 8 o'clock position at a range of 6·4 NM, passing FL 118.

The LATCC Part 2 (TC) requires that ac should be released in level order. However, it is incumbent on the offering controller to ensure that separation will exist between ac which have been transferred and those which are about to be. In this case the B767 was to be released at the lower level but was above the HS25 when instructed to contact the Heathrow Director. Therefore, the SC had to ensure that horizontal separation was maintained between the B767 during its descent and the HS25 until the B767 was below, and vertically separated from, the HS25. The SC had been planning on the Heathrow Director taking the B767 straight off the Biggin stack on a heading of 270°, in order to position it into the landing sequence. What the SC had not taken into account was that the HS25 had not reduced its speed as it approached Biggin, even though the UK AIP, on page AD 2-EGWU-1-4, states: 'London TMA speed restrictions apply to inbound flights'. At 1850:20, the B767, now working the Heathrow Director, was passing FL 123 and indicating a ground-speed of 270 kt with the HS25 4·6 NM to the SW, level at FL 110, with a ground-speed of 355 kt. At this point the SC instructed the HS25 to turn R onto a heading of 055° to take it behind the B767. The SC explained that he was unable to turn the HS25 L, owing to the Ockham stack, and so he turned it R towards the B767. He realised that he would not prevent a loss of separation but the turn would prevent a collision. Although this was an 'avoiding action turn' the SC did not use the words "avoiding action". The HS25 was slow to take the turn, even though the instruction had been acknowledged, so the SC asked the ac what its speed was. The crew replied *"Three hundred knots".*

The controller responded by saying *"Well that's crazy back now to two twenty and turn right immediately heading zero seven five degrees"*. Once again, the words "avoiding action" were not used but the controller stated that the pilot would have been able to tell from his tone of voice that prompt action was required. At 1850:41, STCA activated when the ac were 3·3 NM apart and the SC shouted to the Heathrow Director to "*..get B767 c/s down"*. The Heathrow Director reacted by instructing the B767 to increase its ROD, passing TI and instructing the ac to continue on its present heading as "*avoiding action"*. STCA turned to red at 1850:53, when the B767 was in the HS25's 12 o'clock position at 2·4 NM and 300 ft above. Separation reduced to a minimum, at 1851:04, as the HS25 passed 1·7 NM behind the B767 at the same level. The SE SC instructed the HS25 to turn further R onto S, but did not pass any TI.

At 1851:25, the B767 advised the Heathrow Director, that an Airprox would be filed. The HS25 was subsequently repositioned back towards Biggin and transferred to the Heathrow Director.

The SC was asked why he didn't use the expression 'expedite descent' which is defined in both MATS Part 1 and CAP 413 as 'the best rate of descent' rather than just 'increase rate of descent'. The SC replied that he was aware of the phrase being in the books and probably should have used it. He was also asked why there were numerous occasions when, as indicated by the RT transcript, he had not identified himself as London Control and wrongly abbreviated ac C/Ss to just the numeric part. He replied that to identify himself, although it was in the books, would overload the frequency. Similarly, he adapted phraseology for operational

use once two way communications had been established with an ac. Evidence from previous investigations shows that the likelihood of confusion is increased significantly if C/Ss are just abbreviated to numbers rather than in the approved manner.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

ATCO members said this scenario was routine in terms of ac arriving into the LTMA. The SC's overall plan had been sound but it appeared his technique/ execution went awry when he released the HS25 onto its own navigation to BIG. This meant the HS25 had tracked towards the B767, which was still above it at that stage but which had been cleared to descend through the HS25's level, with lateral separation reducing. Adding to the difficulty, he had then transferred the B767 to the Heathrow Director before separation was assured. It appeared that the SC had become victim to a common mistake. Having earlier changed the subject ac's arrival order, he had intended to monitor the situation but had turned his attention to other traffic elsewhere in the sector. Both ac had been separated on radar headings originally but he had not waited until the B767 had descended below the HS25 before allowing the ac to resume their own navigation. The Board identified this lack of adequate control over the subject acs' flight paths as the factor that had led to the Airprox. It was noted that SC had based his plan on both ac complying with the promulgated LTMA speed limiting point restrictions but ATCOs believed that the SC should have noticed the HS25's speed differential with the B767 during the later stages. High-speed arrival into and through the LTMA could be useful on certain occasions but this had to be at the behest of the ATCO. Pilot members thought that the HS25 crew should have been well aware that the speed restrictions in the LTMA applied to all arrival routes at notified SLPs and any deviation from these, flying radar vectors or under speed control, would be assigned by ATC. If the pilot had been unsure whether his 'high speed' had been acceptable, he should have confirmed this with the SC. Members agreed the HS25 crew's non-compliance with the speed restriction had contributed to the Airprox.

The SC did notice the confliction when the subject ac were about 5 NM apart but members were dismayed that, apart from his poor RT discipline throughout, he had not used the words "*avoiding action*". He had also turned the HS25 towards the B767, not away, thereby exacerbating the situation; some ATCOs were not convinced by the `Ockham stack' argument. Another point was that the SC seemed still to be intent on executing his arrival plan and had `pressed-on' with it, even though it had meant a loss of separation. The radius of turn by the HS25 would have been greater than normal because of its speed but it was felt that using incorrect phraseology, when separation was about to be lost, could also account for the HS25's slow turn rate. Members also thought that the SC had possibly underestimated the traffic loading when the RT transcript showed 15 ac on frequency during the 10 minutes leading up to the incident. The SC's perception that he needed to modify the RT phraseology because of possible `frequency overload' should have indicated to him that the bandboxed sector was busy and perhaps should have been split.

Looking at risk, the B767 had received a TCAS TA alert and had complied with the subsequent RA which was reinforced by the Heathrow Director's correctly worded avoiding action instructions. The HS25 pilot had been watching the B767 visually for several minutes before the incident and had only lost sight of it when the SC vectored him away behind it. These elements combined led the Board to conclude that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The TC SE SC did not control adequately the flight paths of the B767 and the HS25.

Degree of Risk: C

Contributory Factor: The HS25 pilot did not comply with the London TMA speed restrictions.

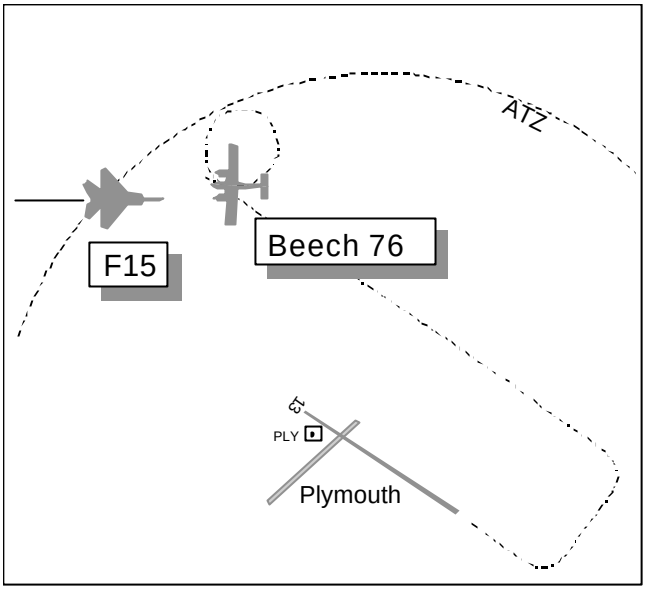
AIRPROX REPORT No 130/01

Date/Time: 25 Jul 1318

Position: 5027 N 0407 W (1.5 NM NW of Plymouth airport - elev 485 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Beech 76	F15
Operator:	Civ Trg	Foreign Mil
Alt/FL:	800 ft (QFE)	
Weather Visibility:	VMC CLNC 25 km+	VMC CLNC
Reported Separation:	300 m, 150 ft V	/NK
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BEECH 76 PILOT reports flying training circuits to RW 13 LH at Plymouth at 800 ft QFE. He had been asked to hold at the end of the downwind leg to allow other traffic to clear the runway. As he was coming out of his right orbit, at 110 kt, he found himself head-on to an F15. It was closing from 0·75 NM ahead and passed 300 m to his left at the same level as he made a diving turn to the right. He described the risk of collision as moderate, but high if he had not been seen. His DME showed 1·5 NM from the PLY; both ac were certainly inside the ATZ at the time.

THE F15 PILOTS report being part of a Flight of 4 F-15s briefed to fly a surface attack tactics mission in SW England. Planning was shared with another flight of four F-15s so they could use the same training target attack before providing intercept training.

On the sortie numerous contacts in the low level structure were avoided. They had radar situational awareness on all contacts. They climbed out of the low level just after the target attack and called a controller at Plymouth on the return leg who voiced the concerns of the civilian pilots. They assured him that they had all traffic on radar and avoided them. The controller gave the impression that there was no airspace violation and that they had avoided all traffic well outside the see and avoid criteria. He did not know which formation the civil pilot was complaining about.

The 2nd formation entered the low level structure at about 1310 Z after an air to air engagement with the first in the airspace above it. They were in tactical line abreast formation spaced 1 – 2 miles apart with a 75 second (10-12) mile spacing between each element. They flew past Plymouth to the north to avoid built-up areas and south of D-011, tracking approximately 250°, closest point of approach to Plymouth being the N50°-30' parallel. They noted other traffic on radar, gained a tally and ensured they avoided it. After a simulated attack on a target between Lostwithiel and St Austell they turned east, climbed out of the low-level structure again and engaged their bandits a second time. After the second air to air fight they ran the target attack twice more, however they did not reset as far east as Plymouth on the last attack. To summarise; the 2 F15 formations passed Plymouth airport three times, following 'See and Avoid' rules. No near misses were noted.

UKAB Note: Since the withdrawal of the Burrington primary radar there is no recorded primary radar

coverage in the area, and the BE 76 was not squawking while in the circuit. The F15s can be seen entering and departing from the area but are below all coverage at the time of the incident.

ATSI reports that there are no apparent civil ATC implications in this incident or a similar one (131/01) which occurred a few minutes later. The RT recording shows that at 1313 the pilot of the Beech 76 reported downwind for a touch and go. Due to other traffic ahead, including a straight-in approach, the Plymouth ADC instructed the flight to enter a right hand orbit upon reaching the end of the downwind leg. A C152 subsequently joined overhead and was instructed to orbit right at the beginning of the downwind leg. At 1318:02, the pilot of the Beech 76 called Plymouth Tower. The controller did not, however, respond to the Beech 76 but directed his next transmission to the C152, stating *"……there's a couple of fast jets just passed north abeam eastbound going through the downwind leg",* which was acknowledged by the C152 pilot. The controller concerned explained later that by the time he had seen the military traffic he had judged they were less of a threat to the Beech 76 and the priority had now changed to issuing a warning to the C152 as its position was to the east of the Beech 76. The pilot of the Beech 76 then called again, this time reporting *"yeah we had to take avoiding action on those"* adding moments later *"he missed us he's returning but higher level"* and *"I would say that was well in the ATZ"*. The controller then notified other traffic in the circuit that another *"fast jet"* was about to cross through the RW 13 extended centreline, westbound. The RT recording shows no evidence of an attempt by the unknown military traffic (F15s) to establish communication with Plymouth City Airport ADC, either before or after the reported events.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the Be76 pilot and the F15 formation and reports from the appropriate ATC and operating authorities.

It was clear that the report from the F15s' wing was incomplete in some respects. Members wondered if only element leaders had been consulted; there was possibly at least one wingman flying wider than realised or whose navigation equipment may not have been updated recently enough. Clearly the belief that none of the 8 ac involved had flown S of 5030N (some 3 NM N of the ATZ boundary) was mistaken. With the F15 passing to the L of the Be76 as the latter completed its orbit, it was clear that the F15 had penetrated the Plymouth ATZ without clearance and members agreed that this was part of the cause of the Airprox.

The other point which could not be conclusively resolved was whether or not the F15 crew had seen the Be76. The F15s' report that they had by radar and visual means identified other traffic, and avoided it, could only be relevant to traffic which they had spotted. 'No near misses were noted' suggested in this case that they had not seen the Be76 and no avoiding action by the F15 was seen. Another possibility was that the F15 crew had seen the Be76 but had not been asked about it and had not volunteered the information, but that was pure supposition; from the information available, members concluded that the F15 crew had not seen the Be76 in time to avoid it. The Board concluded that this was also part of the cause, and the possibility of the ac passing that close with one unsighted led to the conclusion that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F15 crew inadvertently penetrated the Plymouth ATZ and flew into confliction with the Be 76 which they apparently did not see.

Degree of Risk: B

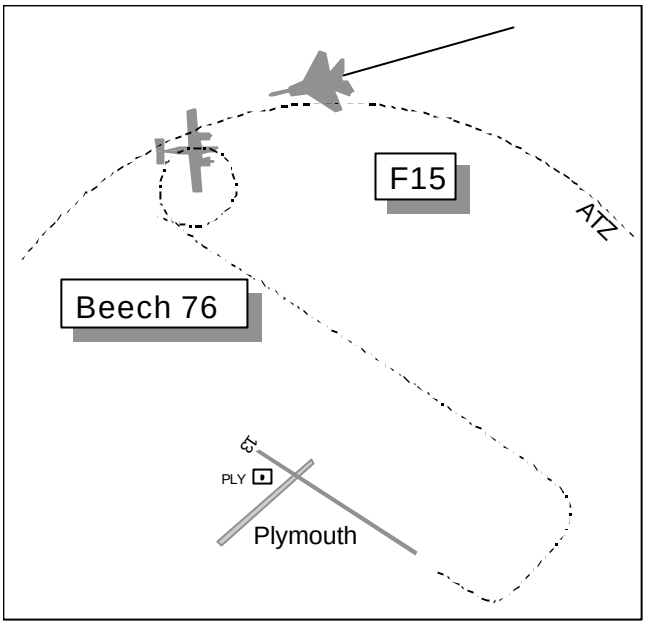
AIRPROX REPORT No 131/01

Date/Time: 25 Jul 1334

Position: 5027 N 0407 W (1.5 NM NW of Plymouth airport - elev 485 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Beech 76	F15
Operator:	Civ Trg	Foreign Mil
Alt/FL:	800 ft (QFE)	
Weather Visibility:	VMC CLNC 25 km+	VMC CLNC
Reported Separation:	500 m, 150 ft V	/NK
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BEECH 76 PILOT reports flying training circuits to RW 13 LH at Plymouth at 800 ft QFE. He was asked to hold at the end of the downwind leg to allow a DHC-8 to land on RW 31 and was circling right at 110 kt when he found himself head-on to an F15. It was closing from 1 NM ahead and passed 500 m to his left and 150 ft above as he made a diving turn to the right. He described the risk of collision as 'lowish' but since his DME gave 1·5 NM, he was certainly inside the ATZ at the time.

THE F15 PILOTS report being part of a Flight of 4 F-15s briefed to fly a surface attack tactics mission in SW England. Planning was shared with another flight of four F-15s so they could use the same training target attack before providing intercept training.

On the sortie numerous contacts in the low level structure were avoided. They had radar situational awareness on all contacts. They climbed out of the low level just after the target attack and called a controller at Plymouth on the return leg who voiced the concerns of the civilian pilots. They assured him that they had all traffic on radar and avoided them. The controller gave the impression that there was no airspace violation and that they had avoided all traffic well outside the see and avoid criteria. He did not know which formation the civil pilot was complaining about.

The 2nd formation entered the low level structure at about 1310 Z after an air to air engagement with the first in the airspace above it. They were in tactical line abreast formation spaced 1 – 2 miles apart with a 75 second (10-12) mile spacing between each element. They flew past Plymouth to the north to avoid built-up areas and south of D-011, tracking approximately 250°, closest point of approach to Plymouth being the N50°-30' parallel. They noted other traffic on radar, gained a tally and ensured they avoided it. After a simulated attack on a target between Lostwithiel and St Austell they turned east, climbed out of the low-level structure again and engaged their bandits a second time. After the second air to air fight they ran the target attack twice more, however they did not reset as far east as Plymouth on the last attack. To summarise; the 2 F15 formations passed Plymouth airport three times, following 'See and Avoid' rules. No near misses were noted.

UKAB Note: Since the withdrawal of the Burrington primary radar there is no recorded primary radar coverage in the area, and the BE 76 was not

squawking while in the circuit. The F15s can be seen entering and departing from the area, but are below all coverage at the time of the incident.

ATSI reports that the Plymouth ATC RT recording shows that at 1334:13, when the Beech 76 was orbiting at the end of the downwind leg for runway 13 awaiting other traffic, its pilot called the Tower. The controller immediately responded with *" (callsign) yeah okay we've just seen him go through again",* referring to a similar approach by an F15 some 16 min earlier Airprox (130/01). The pilot replyed *" yes we just had to dive".* The Plymouth ADC then broadcast the message *"there's another fast jet going just to the north of us westbound"* and moments later transmitting to the Beech 76 *" (callsign) can you see the other pair there just about to go through the extended centreline ahead of you"* the pilot reporting that he could. The Beech 76 subsequently completed its training circuit without further incident. The RT recording shows no evidence of an attempt by the unknown military traffic (F15s) to establish communication with Plymouth City Airport ADC, either before or after the reported events.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the Be76 pilot and the F15 formation and reports from the appropriate ATC and operating authorities. The F15s' report contained the same information as presented for Airprox 130/01.

It was clear that the report from the F15s' wing was incomplete in some respects. Members wondered if only element leaders had been consulted; there was possibly at least one wingman flying wider than realised or whose navigation equipment may not have been updated recently enough. Clearly the belief that none of the 8 ac involved had flown S of 5030N (some 3 NM N of the ATZ boundary) was mistaken. However, unlike the situation in Airprox 130/01, the Be 76 would have been very close to the boundary of the ATZ in the part of its orbit closest to the F15's track and members were not convinced that the F15 had infringed the ATZ. While the Be 76 pilot estimated a 500 m separation, members were aware that the large size (for a fighter) of the F15 often made it seem closer than it was. The Board concluded that this was an encounter close to the boundary of the ATZ, observing that flight close to airspace boundaries was a frequent factor in Airprox with ac operating within the boundary.

The other point which could not be conclusively resolved was whether or not the F15 crew had seen the Be 76. The F15s' report that they had by radar and visual means identified other traffic, and avoided it, could only be relevant to traffic which they had spotted. 'No near misses were noted' suggested in this case that they had not seen the Be 76 and no avoiding action by the F15 was seen. Another possibility was that the F15 crew had seen the Be 76 but had not been asked about it and had not volunteered the information, but that was pure supposition; from the information available, members concluded that the F15 crew had not seen the Be 76 in time to avoid it. The Board concluded that this was also part of the cause. However, the miss distance and the more timely sighting by the Be 76 pilot led members to conclude that there had not in this instance been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F15 pilot did not see the Be76 near the boundary of the Plymouth ATZ.

Degree of Risk: C

AIRPROX REPORT No 132/01

Date/Time: 31 Jul 1326

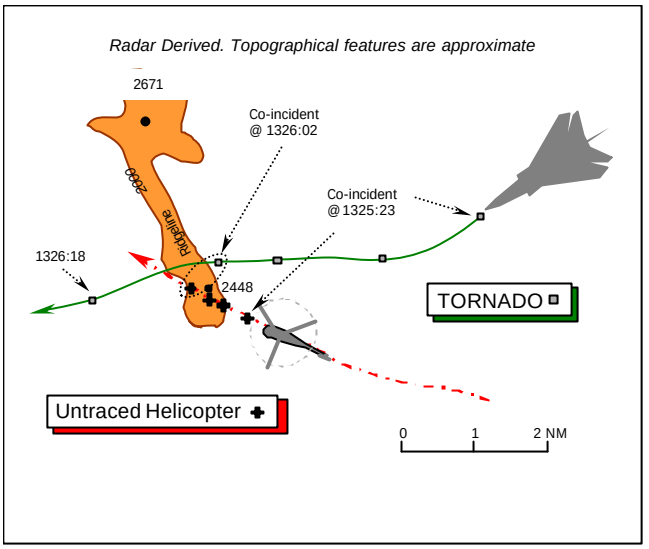
Position: 5507 N 0420 W (6·5 NM SW of NGY –elev 2448 ft)

Airspace: UKDLFS – LFA20T (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR4	Untraced helicopter
Operator:	HQ STC	Unk
Alt/FL:	615 ft↑ (Rad Alt)	Unk
Weather	VMC CLBC	Unk
Visibility:	30 km	Unk

Reported Separation: 50-100 m H, nil V

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR4 PILOT reports he was the rear L element of a 3-ship Tornado GR4 escort formation executing an OLF affiliation sortie in LFA 20T. The ac is camouflage grey but HISLs were on and a squawk of 3/A 7001 selected with Mode C. About 27 NM NE of W Freugh, heading 253° at 400 kt, when bunting over a ridge with the RadAlt indicating 615 ft, he suddenly spotted what he perceived to be a Lynx helicopter slightly L of the nose crossing their track. There was no time to take avoiding action as they crossed about 50 m ahead of the helicopter. He added that both he and his navigator were working hard but would have been unable to spot the Lynx any earlier as it was on the far side of a ridge. If it had been 50-100 m further along its track they would have collided.

AIS (MIL) report that despite exhaustive tracing action they have been unable to ascertain the identity of the reported helicopter. Though the LATCC Great Dun Fell radar recording does partially illustrate this encounter, thereafter, the helicopter's radar contact and that of the Tornado quickly fades and AIS (Mil) were unable to determine either the point of origin of the reported helicopter's flight or its destination. Therefore, in the absence of radar data, all units that operate Lynx, or helicopters of a similar description, were contacted during procedural tracing action. This proved fruitless. It was confirmed that there were no military Lynx helicopters in the area at all, so civilian helicopter operators in the vicinity were contacted individually; though a CANP suggested two potential civilian helicopters, positive identification could not be ascertained.

UKAB Note (1): Tracing action was terminated by the UKAB on 20 Dec 2001. Therefore, the reported ac remains untraced.

UKAB Note (2): The Great Dun Fell radar recording illustrates this Airprox as described by the reporting pilot up until the final moments of the conflict. The Tornado flown by the reporting pilot is shown squawking 3/A7001 as the L element of the formation tracking WSW, but no Mode C is evident at all. An A7000 squawk commensurate with the reported helicopter is shown tracking slowly WNW on a steady heading, but again without Mode C. The two ac converge, the helicopter appears to pass just to the S of the 2448 spot height and to

the S and W of a ridge as the Tornado approaches the ridgeline at 1326:02. At this point the helicopter is in the Tornado pilot's L 11 o'clock at about 0·5 NM. The Tornado and helicopter contacts are lost just before the predicted CPA; the helicopter contact fades totally and the Tornado is not shown again until after 1326:18. Interpolation of the contacts on the predicted tracks suggests that the CPA was probably around that reported by the Tornado pilot.

HQ STC comments that at the time the Airprox occurred, at OLF heights, the Tornado crew would have been working extremely hard at terrain avoidance whilst attempting to maintain an effective lookout as they crested the ridge. Whilst they had anticipated the need to be particularly vigilant, they would have been extremely unlikely to see a helicopter behind and close to the ridge, 90° off track. The incident once again highlights the conflicting demands placed on the UKDLFS and it therefore remains incumbent on all users to combine good lookout with careful pre-flight planning and intelligent anticipation in order to minimise the risks.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

The only information available to the UKAB was a report from the pilot of the Tornado GR4, radar video recordings and a report from the operating authority.

It was explained that all possible tracing leads had been followed up to no avail and the identity of the helicopter remained unknown. Each pilot had every right to be flying where they were and it was unfortunate that the helicopter pilot had neither been traced nor filed an Airprox report of his own volition. This was surprising in view of the apparent closeness of this encounter in the Scottish FIR and civilian pilot members were absolutely amazed that no report had been made separately – if the Tornado had been seen. This led some members to speculate that the helicopter pilot had not spotted the jet at all. Pilot members agreed with the HQ STC comments and thought the Tornado crew could not have detected the presence of the unknown helicopter on the other side of the ridge any earlier than they did. This did give rise to criticism by some members of the helicopter pilot's airmanship – whoever he was – for flying so close to the ridgeline but as it had been impossible to ascertain what he was doing at the time this was thought to be unfair. There were few facts for the Board to debate apart from that provided by the jet pilot and the members concluded that this Airprox resulted from a very late sighting by the Tornado crew of an untraced helicopter, because it had been masked from view by the terrain. This very late spot with no time to take avoiding action led the Board to agree with the Tornado pilot's view, that any separation that did exist was purely fortuitous and the radar recording provided some evidence to support this. Consequently, the members agreed unanimously that an actual risk of a collision had existed in the circumstances described by the Tornado pilot.

PART C: ASSESSMENT OF CAUSE AND RISK

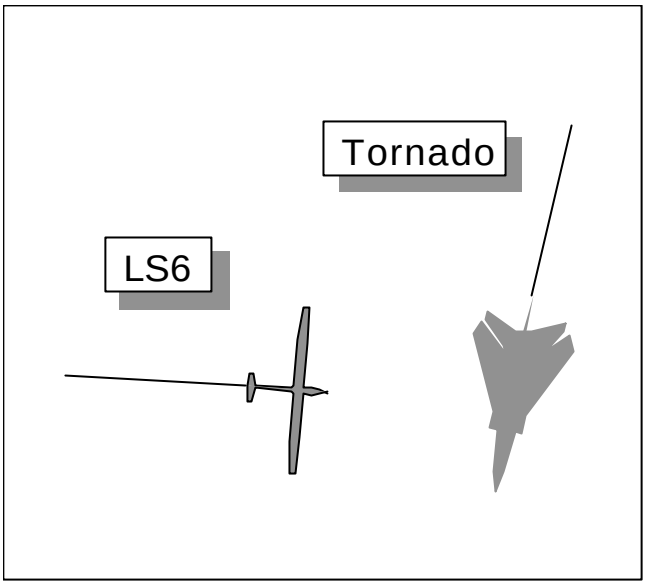
Cause: Very late sighting by the Tornado crew of an untraced helicopter, because of terrain masking.

Degree of Risk: A.

AIRPROX REPORT No 133/01

Date/Time: 20 Jul 1409
Position: 5214 N 0018 W (1 NM W of St Neots)
Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	LS6 Glider	Tornado GR
Operator:	Civ Pte	DPA
Alt/FL:	2100 ft ↓ (QNH)	2000 ft (QNH)
Weather Visibility:	VMC CLBC 30 km+	VMC CLOC 10 km
Reported Separation:	30 m	300 m
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LS6 GLIDER PILOT reports heading 093° at 60 kt on a cross country flight. Just NW of St Neots, at 2100 ft, she saw a swept wing fighter 30 m away as it passed L to R across her nose at the same level, tracking from her 8 o'clock to her 1:30. There was no time for avoiding action and the risk of collision was high.

THE TORNADO PILOT reports heading 200° at 300 kt, maintaining 2000 ft. He saw a glider 0·5 NM ahead and to the left and banked right slightly to pass 300 m in front of it (see UKAB Note). Although it was small and hard to see, he thought the risk of collision was low. He reported on 13 Aug from memory; neither crew member had thought the incident was significant enough to report as an Airprox. He thought the glider had been tracking from his 08:30.

UKAB Note: The glider pilot had initially reported that the incident took place at 1404 BST. No fast jets at low level were seen on radar recordings anywhere near that time and AIS (M) discussed with the glider pilot to see if a GMT had been reported as a BST, which took some time to resolve. The only ac to pass through the area was the Tornado, on a delivery flight. It passed close to the reported Airprox position at 1409:45 and the crew reported they had seen a glider in the area but the geometry of the encounter did not agree with the glider pilot's perception of events (See below). No gliders are visible on the radar recording near the Airprox position and the reporting glider does not show at any time during its sortie. Eventually the glider pilot's logger data was obtained, and the software to interpret it. However, the glider pilot did not know what time datum had been set in the logger before flight so the time information it provided was inconclusive.

The glider flew out and back from Little Gransden to Husband's Bosworth and the glider pilot, and another who heard her report the Airprox, confirmed that it occurred on the return leg. The Airprox position is therefore assumed to be the point where the glider pilot's inbound GPS track crosses the Tornado's radar track at 1409:52 on the radar clock. The Tornado shows 2400 ft Mode C at that point and the glider's log shows it in a descent at 2394 ft (1013 mb) as it crosses the eastings of the Tornado's track (17·88' W). The glider's landing time was logged at Gransden Lodge as 1521 and the logger showed the glider passing the Tornado's eastings 1:09 hrs before that, which is within 3 min of the Tornado's radar time crossing the glider's track.

Because the incident as seen by the Tornado pilot (right) is so different from the incident as seen by the glider pilot (left), it is probable that the glider seen by the former was not the reporting glider.

DPA has no comments to add.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings and data from the glider's logger.

Despite the assistance given by the glider pilot and software company in interpreting the logger data there was still only the glider pilot's impression to go on as to the seriousness of the Airprox; the Board accepted that the glider seen by the Tornado pilot could not have been the reporting pilot's. From this it was deduced that the Tornado pilot had not seen the reporting glider and the Board agreed that this was part of the cause of the Airprox. Also, the glider pilot did not see the Tornado in time to take any avoiding action and members agreed that this was part of the cause. Without a radar service, collision avoidance depends on seeing another ac in time to avoid it, and in any case this particular glider seemed to be a particularly poor radar reflector. Members pointed out that the late and non-sightings were simply a matter of fact – modern gliders are particularly hard to see edge on from a fast jet cockpit, and fast jets tended to materialise very quickly and, being camouflaged, are designed not to be seen against a terrain background. In discussing the risk level, members agreed that the crews of both ac were fortunate not to have collided. There was only the glider pilot's estimate of miss distance to go on but even if the surprise factor had made the Tornado appear twice as close as it was, with the lack of timely sightings, the Board agreed that there had been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non sighting of the glider by the Tornado pilot and a late sighting by the glider pilot.

Degree of Risk: A

AIRPROX REPORT No 134/01

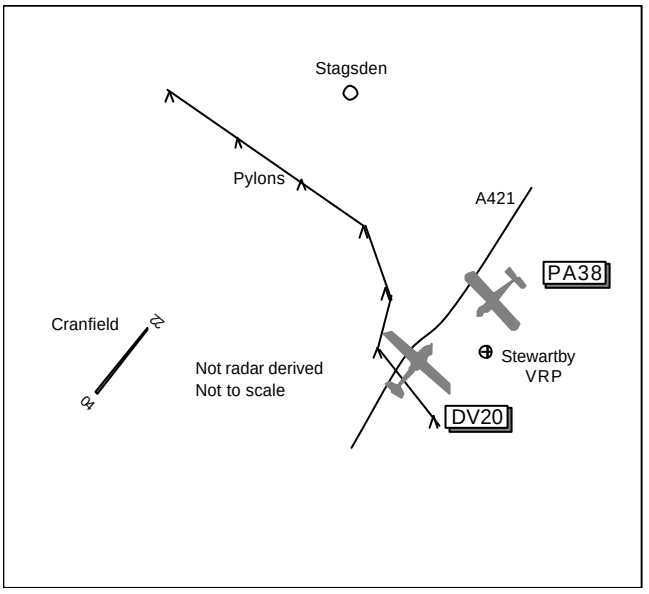
Date/Time: 30 Jul 1157

Position: 5205 N 0032 W (3 NM E of Cranfield - elev 364 ft)

Airspace: FIR (*Class:* G)

Reporter: Cranfield ADC

	First Aircraft	*Second Aircraft*
Type:	DV20 Katana	PA38
Operator:	Civ Trg	Civ Trg
Alt/FL:	800 ft (QFE 995 mb)	800 ft (QFE 1010 mb)
Weather	VMC NK	VMC CBLC
Visibility:	NK	15 km
Reported Separation:	0 ft V 500 m H	/0 ft V 250 m H
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CRANFIELD ADC reports that during a busy cct pattern two ac were joining from Stewartby VRP onto a L base position for RW 22; the first was a DV20 (not the one involved in the incident) followed by the subject PA38. The subject DV20 reported downwind and was informed of the joining traffic and was asked to report ready to turn L base. The PA38, which had an instructor on board, then asked for a RH orbit, which he approved, and recognising that the DV 20 would conflict with the joining PA38, he passed TI to him. He then observed the DV20 leaving the cct, by heading towards the PA38, so he passed TI and requested the pilot's intentions; no reply was forthcoming. This request was repeated but to no avail. He again passed TI to the PA38 pilot who reported visual with the DV20 and offered to follow the Katana onto base leg.

UKAB Note (1): The Cranfield METAR shows EGTC 1150UTC 26007KT 230V290 25KM SCT035 23/16 QFE 1010 QNH 1023.

THE DV20 KATANA PILOT reports flying as a solo student on a cct training sortie heading 060° at 90 kt. The weather was VMC and his ac was coloured white with blue stripes. He reported downwind LH for RW 22 at 800 ft QFE 995 mb, he thought, on his 5th and final cct; ATC informed him that he was no 6 in traffic. He counted 5 other ac ahead, the 5th ac was joining on a L base position from the Stewartby VRP direction. He turned R to maintain separation of at least 500 m from the joining traffic which was a high wing single engine type, he thought, coloured white with blue stripes. Whilst he carried out his downwind checks ATC then asked him for a position report but he did not know how to respond as he was unfamiliar with his position relative to a standard cct pattern. He didn't think that the other ac had been in confliction and he had followed it onto base leg.

THE PA38 PILOT reports flying a dual local training sortie from Cranfield approaching Stewartby VRP from the NE to rejoin the cct at 90 kt. The visibility was 15 km 1500 ft below cloud in VMC and he was receiving an ATC service from Cranfield TOWER on 134.92 MHz. The ac was coloured white with blue stripes and the landing light plus the strobe lights were switched on. ATC cleared him to join the cct L base for RW 22 and he was warned of a DV20 Katana (not the ac involved in the incident) also joining from the same direction. He immediately saw the joining DV20 crossing L to R about 400 m ahead at his level (800 ft QFE 1010 mb) and he informed ATC that he would follow that ac. After completing the turn in to follow behind it, he realised that he was too close; he requested permission from ATC to orbit R for spacing which was granted. This orbit was between Stewartby VRP and the A421, well outside the ATZ. Halfway around the orbit he heard the controller asking downwind traffic of its intentions (was it leaving the cct?) as it appeared to ATC to be heading directly towards his ac. After ATC received no replies to two calls to the subject DV20 pilot, ATC warned him of a possible confliction. During ATC's TI transmission to him and as he passed heading 240°, he caught a glimpse of movement ahead but promptly lost contact. Before he could reply he saw the DV20 in a L turn across his flightpath, 2-300 yards ahead, at the same level; it continued to track N bound towards Stagsden (3·5 NM final approach RW 22). His student said he could almost read the other ac's registration letters, but not quite. He informed ATC that he had the DV20 in sight and would follow it. He completed his orbit 15-20 seconds later and took up a heading of 310° to follow the pylons about 2·5 NM out to establish on a wide base leg. The Katana again had disappeared from sight but was re-sighted as it turned onto final approach. At the time he had considered this incident to have been just another event in the daily life of an instructor at a busy training airfield. However, in retrospect he believed that the alertness of the controller combined with the use of his landing light may possibly have averted a more serious incident. The ADC had been aware that the young foreign student in the DV20 may possibly have been lost in the cct or may not have been keeping a good lookout. ATC would also have been aware that he would be unable to see the Katana easily on a reciprocal course. He opined that had the DV20 switched his landing light on, he would probably have seen him earlier. He believed that there was a problem with this type of ac being unable to use their landing light continuously owing to insufficient generator power. He suggested that the use of headlights and high intensity strobes by difficult to see ac (DV20 or similar) may help to avoid a serious

incident in the future. The ac was carrying a portable traffic detector that alerts the operator to proximate transponding ac by giving a range but it does not indicate the direction of the traffic. However, the instructor reported that it did not alert him to the subject DV20 as it was probably not squawking.

ATSI comments that, unfortunately, when the Transcription Unit went to Cranfield, they were told that, although the relevant tape had been impounded correctly, it had been inadvertently erased by the unit. However, from the reports received, it would appear that ATC recognised the situation and took action to resolve the problem. Regrettably, no further input from ATSI was possible.

UKAB Note (2): Analysis of the Debden radar recording at 1152:35 shows a 7000 squawk with no Mode C, believed to be the PA38, tracking 200° 3 NM NE of Stewartby VRP with another 7000 squawk indicating FL 013 (1600 ft QNH 1023 mb), believed to be the joining DV20, 3·5 NM E of Stewartby tracking 270°. 2 minutes later the joining DV20, now at FL 009 (1200 ft QNH 1023 mb) and steady on track 270°, crosses <0·25 NM ahead of the PA38. The PA38 is seen to commence a R turn to follow the DV20 but at 1154:57 the squawk disappears and the ac fades from radar. The subject DV20 in the visual cct and the incident as reported by ATC and both pilots is not seen on radar.

UKAB Note (3): During a subsequent telephone conversation with the PA38 pilot, he confirmed that he had approached the VRP as described in the radar analysis and that the joining DV20 had crossed his track W bound. He went on to say that he would normally switch his transponder to standby in that area as he joined the cct.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members expressed surprise that the RT tape, although impounded, could have been 'inadvertently' erased at the unit. That aside, pilot members pondered over the procedure used by the pilots of the two joining ac onto the L base leg position for RW 22 after a R turn from the NE. At one stage the joining ac would be initially heading in the opposite direction to the downwind LH cct traffic, followed by a 'belly-up' turn R onto base leg. Much depended on how far out the ac were before they became established on L base and how many ac were already in the cct pattern. Presumably the joining pilots were able to see the cct traffic to their L but options of giving way subsequently would have been somewhat limited. It was clear in this incident that the Cranfield visual cct was busy, with 4 ac in the pattern before 2 more had called for join from the Stewartby VRP. The PA 38 pilot had positioned himself to follow the joining DV20 ahead but got too close behind it. At that stage he would have been better advised to have commenced a go-around, but instead he elected to do an orbit for spacing. Meanwhile, the inexperienced pilot in the subject DV20, on seeing the PA38 ahead, diverged from his D/W heading to give himself spacing and it was this situation, plus the orbit, that had led to the Airprox. Turning to the ATC aspect of the incident, although there were no rules governing the number of ac allowed in the cct at any one time, the safe and expeditious flow was dependant on the way joining ac integrated with traffic already established in the cct. Some members thought that the Cranfield ADC should have exercised more positive control. Firstly, at an early stage, the controller could have held off the joining ac to prevent bunching until it was safe for them to proceed towards the cct and secondly, during the later stages, he could have denied the requested orbit by the PA38 pilot on base leg. That said, the ADC had noticed the potential conflict, after approving the PA38 orbit, and had passed TI to both pilots. Taking all of these points into consideration, members agreed in the end that it was the orbit flown by the PA38 pilot on base leg that had disrupted the pattern and triggered the Airprox.

Looking at the risk element, it was noted that the ADC had unsuccessfully attempted twice to pass TI to the Katana downwind but then had called the PA38 pilot to warn him of the DV20. The DV20 pilot had seen the PA38 initially and tried to follow it by widening his cct but he ended up turning in front of the PA38, during its orbit at the end of the downwind leg, for whatever reason. However the PA38 pilot was aware of the missed calls to the

Katana pilot, had acknowledged the TI call to him and had seen the DV20 as it crossed in front of him; he followed it onto base leg. All of these elements combined persuaded the Board to decide that, despite the untidy flying aspects involved, any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA38 pilot did not integrate safely into the circuit.

Degree of Risk: C

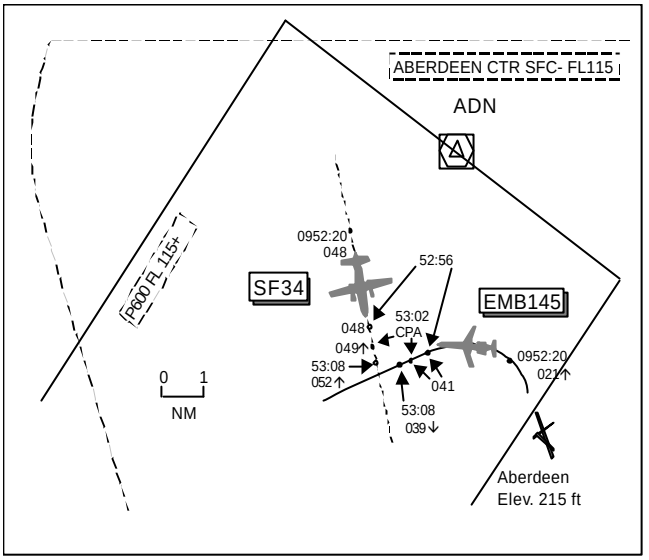
AIRPROX REPORT No 135/01

Date/Time: 28 Jul 0953 (Saturday)

Position: 5714 N 0219 W (4 NM WNW of Aberdeen)

Airspace: CTR (*Class:* D)

	Reporting Aircraft	*Reported Aircraft*
Type:	SAAB 340	Embraer145
Operator:	CAT	Civ Comm
Alt/FL:	5000 ft (QNH 1019 mb)	↑ 4000 ft (QNH 1020 mb)
Weather Visibility:	VMC CLAC 10 km	IMC CLAC 9 km
Reported Separation:	700 ft V 1 NM H	/700 ft V 600 m H
Recorded Separation:	800 ft V 1 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SAAB 340 PILOT reports flying inbound to Aberdeen heading 180° at 200 kt and cleared to descend to 3000 ft QNH. The visibility was 10 km in VMC and he was receiving an approach radar control service from Aberdeen on 119.05 MHz. ATC then changed the cleared level to 5000 ft and, as they approached that level, they were asked to confirm that they were about to level off. He continued as directed and looked out for the aerodrome which was partly obscured by patchy low cloud. He saw a company EMB145 climbing out from Aberdeen, which turned L towards him, and assumed that it would pass clear below. However, it quickly produced a TCAS TA alert followed by an RA *"climb, climb now"*; he disconnected the AP and commenced a climb following the TCAS indications. He informed ATC who had also issued climb instructions to level at 6000 ft; he stopped the climb at 6300 ft and then descended back to his cleared level. He saw the EMB145 pass 700 ft below and 1 NM clear during the manoeuvre and he assessed the risk of collision as medium.

THE EMBRAER 145 PILOT reports departing Aberdeen RW 34 on a positioning flight to Edinburgh having been passed by ATC a revised outbound clearance to level off at 4000 ft and to fly radar heading 260°. Climbing through 1500 ft the heading was set to 260° and speed mode was selected at 230 kt with the ac configuration clean; AP was not engaged with the FO handling. Shortly thereafter, the 1000 ft to go alert sounded which he called with the ROC showing in excess of 3000 ft/min. He then received a TCAS TA on traffic and, as he scanned and visually acquired it (the SF34),

he called 'ASEL' and to 'level off as quickly as possible'. Whilst the FO was levelling the ac, he received a TCAS RA 'adjust vertical speed' and ATC instructed them to descend back to 4000 ft; they went through their cleared level by 300 ft. He responded to ATC that they were visual with the traffic 700 ft above them in their 2 o'clock and that they were descending. The Saab 340 was seen to pass 600 m ahead and he assessed the risk of collision as low. He opined that to prevent this type of incident in the future it would be prudent to engage AP when assigned a low initial altitude on climb out to enable better speed control and ALT capture.

THE COMPANY FLIGHT SAFETY MANAGER reports that the empty EMB145 was being hand flown by an inexperienced FO at a very high ROC to a low level-off altitude. This incident, combined with other previous ASRs showing similar occurrences, have been forwarded to the company Fleet and Training Managers to see whether there are any training or operational areas that can be improved upon and to agree a course of action.

THE EMB145 FLEET MANAGER reports the RA was caused by the EMB crew climbing at an excessive rate in relation to their assigned altitude and that the subsequent 'altitude bust' was relatively minor but did occur nonetheless. There was also one other reported example of this problem within the company fleet. This has prompted an amendment to Part B Section 2 Normal procedures, Sub-sections 13 and 14 on AP and TCAS procedures. Additionally a memo was sent out to all EMB crews. The information contained therein was for crews to climb and descend at rates commensurate with that required in relation to the assigned level-off altitude/level. It also requires crews more closely to monitor nearby TCAS traffic and make maximum use of the AP in such circumstances. In both reported incidents, the AP was either not engaged or was disconnected after the TCAS RA. The crews were then distracted by the TCAS indications and inadvertently passed slightly through their cleared altitude/level.

ATSI reports that the EMB145 was outbound and had been cleared for an immediate take off to climb to 4000 ft on a heading of 260°; this was correctly readback by the crew. The Aberdeen APR was vectoring the inbound SF34 which was descending to 5000 ft. The ADC instructed the EMB145 crew to maintain 4000 ft and to change frequency to radar when it was passing 3200 ft. He observed the Mode C readout on the Air Traffic Monitor continue to rise and reach 4200 ft and he instructed the EMB145 to descend to 4000 ft. At the same time the APR instructed the SF34 to climb to 6000 ft which the crew acknowledged and advised that they had received a TCAS RA. No ATC errors were detected.

UKAB Note (1): Met Office archive data shows Aberdeen METARs EGPD 0920Z 05002KT 9000 SCT009 BKN019 17/14 Q1020 0950Z 09003KT 9000 SCT010 BKN019 18/15 Q1019.

UKAB Note (2): The RT transcript shortly after 0952:40 shows the ADC transmit *"EMB c/s maintain four thousand feet and contact radar one one nine decimal zero five"* which went unanswered. A few seconds after 0952:50 the ADC transmits *"EMB c/s descend now four thousand feet"* which was acknowledged by the crew who replied *"EMB145 c/s yeah descending sir and I've got the traffic"*. The ADC in his CA1261 report stated that he had been concerned at the EMB145's ROC displayed on his ATM and had instructed its crew to level at 4000 ft before transferring the ac to APR. The lack of response from the crew had been noted and as the ac quickly converged, he issued descent clearance to 4000 ft, which was acknowledged.

UKAB Note (3): Analysis of the Alanshill radar recording at 0952:20 shows the EMB145 2 NM NW of Aberdeen in a L turn passing FL 021 (2275 QNH 1019 mb) with the SF34 4·8 NM to its NW steady tracking 170° at FL 048 (4975 QNH). At 0952:56 the EMB145 is steady tracking 260° stopping its climb at FL 041 (4275 QNH) 1·5 NM SE of the SF34. CPA occurs 6 seconds later as the SF34 commences a climb passing FL 049 (5075 QNH) with the EMB145 in his 10 o'clock range 1 NM 800 ft below. The next radar sweep at 0953:08 shows the SF34 climbing through FL 052 (5375 ft QNH) as the EMB145 passes FL 039 (4075 QNH) in a descent.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from

the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The ATSI advisor commented and members agreed that the Aberdeen ADC did well to notice the EMB145's high ROC and to prompt the crew to level at 4000 ft. The lack of response to the frequency change call was thought by pilot members indicative that the crew were busy in the cockpit. Before take-off it should have been apparent to the crew that the 'empty ac' would have different handling characteristics than normal, a CRM matter that should have been covered to include the early anticipation needed in levelling-off. Also, the use of AP or reduced power settings once safely airborne were both thought to be options available to the crew. It was apparent that even with a prompt from the Capt to level-off with a '1000 ft to go' call, the situation very quickly got ahead of the crew who were distracted by TCAS alerts, self-generated in this case owing to the high ROC. In the end, the EMB145 climbed above the required level which ultimately led to the Airprox. Members noted with interest the EMB145 Fleet Manager's comments about crews being distracted by TCAS indications after disconnecting the AP. Pilot members stressed the importance of disconnecting the AP when an RA alert is received, in accordance with SOPs, to enable a faster manual response to any avoiding action requirements. The lesson to be learnt from this incident was 'fly the ac first' and avoid the distraction of looking for the TCAS indicated traffic whilst also 'monitoring' the PF.

In terms of risk, the SF34 crew had seen the EMB145 visually as it climbed out from Aberdeen below and had climbed in response to the RA alert. The EMB145 crew were alerted to the SF34 by the TCAS TA and had visually acquired it, before eventually stopping their climb and descending back to 4000 ft; an RA alert had also occurred during the manoeuvre. RA alerts in both cockpits had been reinforced with instructions from Aberdeen ATC in the same vein, all of which led the Board to conclude that any risk of collision had been removed.

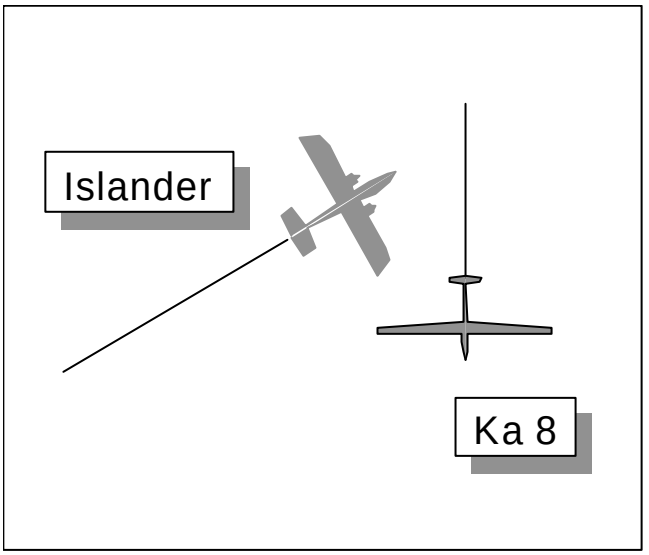
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The EMB145 crew climbed above their cleared level.

Degree of Risk: C

AIRPROX REPORT No 136/01

Date/Time:	1 Aug 1547	
Position:	5120 N 0133 W (Rivar Hill - elev 730 ft)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Ka 8 glider	BN2T Islander
Operator:	Civ Pte	Civ Pte
Alt/FL:	1500 ft ↑ 2500 ft (QFE)	(RPS)
Weather Visibility:	VMC CLBC 20 NM	VMC CLOC 10 km+
Reported Separation:	300 ft H /NK	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KA 8 GLIDER PILOT reports heading 180° at 56 kt on a winch launch from Rivar Hill when, passing 1500 ft, he saw a red Islander approaching from his 2:30 600 ft away, coming out of the sun. He released the launch cable and maintained his heading; the Islander passed 300 ft astern at the same level. He considered the risk of collision had been high and there was the additional danger from the winch cable even after release from the glider. He pointed out that Rivar Hill glider site is clearly marked on charts with its elevation, and a warning of cables to 3000 ft above that.

THE ISLANDER PILOT reports heading 060° at 140 kt while cruising at 2500 ft en route from Netheravon to Earls Colne, with parachutists aboard. He transited the Rivar Hill area, aware of possible glider operations. While both pilots identified a number of gliders in the area which presented no risk of collision, neither he nor the second pilot nor the parachutists saw a glider that presented a risk of collision.

UKAB Note: LATCC radar recordings show the Islander departing D128 and climbing to 2300 ft Mode C, tracking 060°. On this track it crosses the SE half of the Rivar Hill site as marked on the 1:250,000 chart, at 2100 ft Mode C, at 1546:30. Shortly afterwards, a single primary return appears just to the S of the Islander's track. Other very slow moving primary returns show in the area. Taking terrain elevation and the local QNH into account, 2100 ft Mode C equated to 1600 ft above Rivar Hill.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and radar video recordings.

The Board agreed that the glider pilot had done well to spot the Islander in time to drop the cable which, since the Islander subsequently passed astern of him, might well have been struck by the Islander had he not done so. Members considered that it was very unwise of the Islander pilots to have flown over the glider site, well below the advertised maximum cable launch height, and that this action, combined with their non-sighting of the glider, was the cause of the Airprox. It was also pointed out that it would take well under a minute for a glider to rise into confliction, and that its rate of climb on a winch launch was such that it would be very hard to spot in time from a passing ac. It might remain concealed from a pilot by his ac's nose until too late, rising like a missile from beneath with its own pilot also unsighted by his high nose attitude, although the danger was lessened in this case because the ac were not exactly head-on.

The Board was aware that powered ac flying over glider sites was one of the most common causes of dangerous Airprox. At the same time, members were concerned that such incidents could often be prevented by a proper check of the safety of the airspace by the glider launch team, before a launch was initiated. Winch operators were in an excellent position to check the area above, behind and to the sides of the launch area before initiating a launch and the wing-holder at the launch point had a clear duty to check all round when asked to do so by the glider pilot. While a winch operator would probably not be able to hear an approaching powered ac, this did not apply at the launch point and members found it hard to understand why, in this Airprox, the approaching Islander was neither seen nor heard before the launch was initiated; it would have been less than 2 NM away at that point. The Board considered that gliding clubs should be encouraged to take very seriously this part of their contribution to a safe glider launch.

In assessing the risk of collision, members took into account the fact that the glider pilot saw the Islander in time to stop his launch, but because of the element of good fortune in this, considered that the safety of the ac had been compromised.

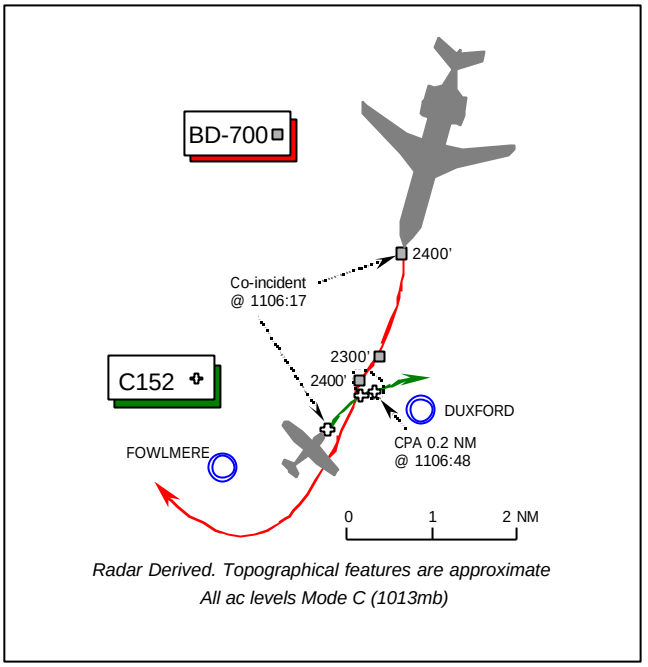
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Islander pilot flew over Rivar Hill glider site and into confliction with the glider which he did not see.

Degree of Risk: B

AIRPROX REPORT No 137/01

Date/Time:	4 Aug 1106 (Saturday)	
Position:	5205 N 0007 E (0·75 NM W of Duxford - elev 125 ft)	
Airspace:	London FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	C152	BD-700
Operator:	Civ Club	Civ Exec
Alt/FL:	2300 ft (QNH 1015 mb)	2400 ft (QNH 1015 mb)
Weather Visibility:	VMC CLBC >10 km	VMC CLBC >10 km
Reported Separation:	100 ft H, nil V	100 m H, 300 ft V
Recorded Separation:	0·2 NM H	



Radar Derived. Topographical features are approximate
All ac levels Mode C (1013mb)

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE C152 PILOT reports he was inbound to Newmarket Heath from Denham cruising at 86 kt. The ac colour scheme is white with blue/red stripes, HISLs were on and a A7000 squawk selected with Mode C (though neither is evident on the radar recording), whilst 'listening-out' with Duxford AFIS on 122·075MHz. Flying at 2300 ft QNH (1015 mb) about 2000 ft below 2/8 cloud, overhead Duxford aerodrome heading 035°, a dark coloured business jet – like a Learjet – was sighted about 1 NM away flying toward his ac at the same altitude. A 30° AoB R turn was made to avoid the other ac, which passed 100 ft down the port side at the same altitude with a *"high"* risk of collision. The pilot of the other ac did not appear to take any avoiding action.

THE BOMBARDIER BD-700 GLOBAL EXPRESS PILOT reports his ac has tan upperworks with a brown underside; HISLs, anti-collision beacon and the landing light were on and TCAS was fitted. Following 3 'touch & goes' at Cambridge they departed in good VMC to position at Biggin Hill at 200 kt, the first Officer was flying from the RHS on, it is reported, an IFR flight plan. Their departure instructions from Cambridge were "....after the touch and go to climb straight ahead to 2000 ft, then towards BPK climbing to 2400 ft", a squawk was assigned and they were instructed to contact Essex RADAR. After climbing to 2000 ft they set course for BROOKMANS PARK, whilst he contacted Essex RADAR, but he could not recall what ATS was provided. Heading 190° passing abeam Duxford, he spotted the Cessna at 10-11 o'clock, in level flight below his ac. They were behind the Cessna and it was heading away from his ac – he stated "away from the airframe flying towards his wing tip". No avoiding action was taken as the other ac did not "represent a threat" and it passed 100 m down the port side about 300 ft below his ac. A 360° orbit was then flown to enable Essex RADAR to hand them over to the next ATSU - he thought Thames RADAR or Stansted. He assessed the risk as *"none"*.

UKAB Note (1): A review of the LATCC Debden radar recording shows this Airprox clearly, in which the C152 is displayed only as a primary contact throughout. The BD-700 is shown southbound squawking A7000 level at 2400 ft Mode C (1013 mb). At 1106:17, about 2 NM N of Duxford the BD-700 turned onto a SSW'ly track as the C152 tracked NE, midway between Fowlmere and Duxford. The ac converge and at 1106:42, the C152

is shown at 12 o'clock 0·5 NM to the BD-700 which has momentarily descended to 2300 ft Mode C. The following return at 1106:48, shows a discernible R 'jink' in the track of the BD-700 and the C152 also turns R in conformity with the reported avoiding action turn. The two ac pass 'port to port' with a horizontal separation of 0·2 NM at the CPA, the BD-700 indicating 2400 ft Mode C. The BD-700 continues SW and a moment later commences a wide RH orbit as reported. A level of 2400 ft Mode C (1013mb) would equate to an altitude of about 2460 ft QNH (1015mb), suggesting that the BD-700 was in the order of 30 ft above the C152 just after it was seen by the pilot of the latter and about 130 ft above the Cessna when they passed abeam. The Airprox took place clear above the Duxford/ Fowlmere Combined ATZ - sfc to 2125 ft amsl.

UKAB Note (2): A review of the Essex RADAR RTF recording reveals that the BD-700 crew called at 1105:00, *"...maintaining 2400 ft on course BROOKMANS PARK"*, whereupon RADAR instructed the crew to remain clear of CAS, passed the London QNH (1015 mb) and placed the flight under a FIS. No further transmissions were made to either RADAR or the pilot until after the Airprox at 1107:50, when the BD-700 crew reported turning R into a 360° orbit to avoid CAS and requested if they could *"...climb a little bit and...have full IFR coverage..."*. RADAR subsequently assigned a discrete squawk and placed the flight under a RIS at 1110.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, a transcript of the Essex RADAR RT frequency and radar video recordings.

Some civil pilot members wondered if the BD-700 crew was totally conversant with the nature of the airspace in which they were flying and the ATS provided when they departed from the Cambridge Cct and set course for Biggin Hill. It was evident that they were eager to obtain an ATC service and continue under IFR from their comment to Essex RADAR after the Airprox; members concurred that 200 kt seemed a sensible speed for the transit in this busy and confined piece of airspace. Though they had filed an IFR FPL, it was evident that they were flying to VFR in the see and avoid environment of the FIR beneath the LTMA and evidently they had not obtained a radar service from Essex RADAR before this Airprox occurred. The RT transcript revealed that they had called at 1105:00, less than 2 min before the Airprox occurred, but they did not request "IFR coverage" until several min later and were not placed under a RIS until 1110:00. Though this length of time seemed excessive to some members, the onus was on the BD-700 crew to effect a good lookout, which some pilot members thought, was lacking. The BD-700 pilot reported they were behind the C152 when he first saw it at close quarters, probably after its pilot had initiated his avoiding action turn, hence he had not seen it before their tracks crossed. The C152 is a small ac and its relatively low crossing movement did not contribute to its conspicuity, but it should have been visible from the BD-700 flightdeck and detected by the crew sooner than it was. Consequently, the Board agreed that part of the cause was effectively, a non-sighting by the BD-700 crew.

The faster but larger BD-700 should have been easier to spot from the C152 cockpit but there was still the same problem of a relatively low crossing movement. The C152 pilot reported sighting the BD-700 at a range of 1 NM; with a closing speed of about 286 kt - just under 5 NM/min - thus the C152 pilot had in the order of 12 sec to do something about it, which led members to conclude it was a late spot for the C152 pilot. Consequently, the avoiding action turn did not seem sufficiently robust to some pilot members in this situation. Nonetheless, it did enable the C152 pilot to ensure some separation - 0·2 NM according to the radar recording. The Board concluded therefore, that this Airprox had resulted from effectively a non-sighting by the BD-700 crew and a late sighting by the C152 pilot.

Turning to risk, members agreed that at 0·2 NM this was a close encounter, though apparently the C152 pilot had managed to avoid the BD-700 by a greater margin than he had thought. The absence of a transponder return from the C152's SSR caused the members some concern; it was reported to have been selected but it evidently was not working at the time. This would have denied the BD-700 crew TCAS information and the Board recommended that pilots should always transpond on Modes A & C in accordance with recommended

practice. This had significant weight in the Board's determination of risk, as one of the potential safety nets had apparently been neutralised. As the C152 pilot had seen the BD-700 and managed to avoid it this ensured that the two ac did not collide, but it was fortunate he had time to do so, since the BD-700 crew had not seen his ac in time to react. Consequently, the Board agreed that the safety of the ac involved had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively a non-sighting by the BD-700 crew and a late sighting by the C152 pilot.

Degree of Risk: B.

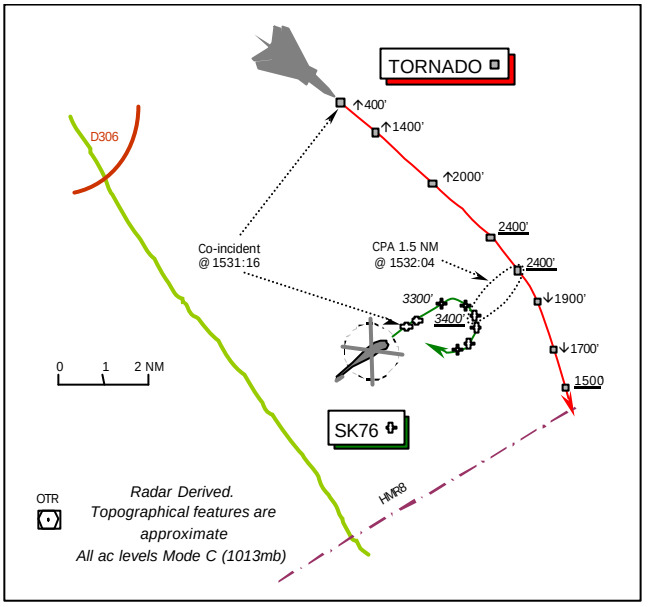
AIRPROX REPORT No 138/01

Date/Time: 6 Aug 1532

Position: 5346N N 0013 E (11 NM ENE of OTR)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	SK76	Tornado GR4A
Operator:	Civ Comm	HQ STC
Alt/FL:	3000 ft (RPS 1003 mb)	↑3000 ft (RPS 1003 mb)
Weather Visibility:	IMC In cloud —	IMC In cloud 100 m
Reported Separation:	Not seen	Not seen
Recorded Separation:	1000 ft V, 1·5 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SK76 PILOT reports he was flying outbound from Humberside to the Ravenspurn ST3 Gas Rig at 140 kt. A squawk of A0242 was selected with Mode C, whilst in receipt of a RAS from Anglia RADAR, IMC at 3000 ft HUMBER RPS (1003 mb). Shortly after establishing two way RT contact with RADAR, the Anglia controller advised him of pop-up traffic from the N and the best course of action was to maintain his heading of 055°. At 068° OTR 11 NM, Anglia instructed him to turn R immediately onto 090° and then to continue the R turn onto 310°. The other ac was not seen. After it was reported to be clear he was instructed to resume his own navigation. He was informed that the other ac was a Tornado, whose crew were not communicating with Anglia RADAR at the time and had flown straight through the HMR. He was unable to assess the risk.

THE TORNADO GR4A PILOT reports he was flying at low level over the N Sea at 400 kt and squawking A7001 with Mode C; HISLs were on. A rapid deterioration in visibility below VMC minima necessitated a climb to his safety altitude. He climbed to 3000 ft HUMBER RPS, he thought, to the NE of OTR heading 150° and called Humberside for a LARS service, specifically requesting traffic information on any helicopters on the Helicopter Main Routes (HMRs). On being informed of a helicopter in a right-hand turn at 3500 ft, he elected

to descend to 2000 ft to increase separation. Neither he nor his navigator saw the helicopter at any time and were, therefore, unable to estimate its proximity to his jet. He acknowledged that if they had made their initial call to Anglia RADAR rather than Humberside, swifter co-ordination might have been achievable and the Airprox report may not have been necessary.

UKAB Note (1): The UK MIL Aeronautical Planning Document at Vol. 3 Part 1 Pg. 1-2-11-8 (LFA 11) promulgates a warning of helicopter activity on HMR8. Although, HMRs have no specified lateral dimensions, for avoidance purposes they are regarded as *"...nominally 1·5 NM either side of the route".* Furthermore, at Pg. 1-8-14, HMRs are described as *"..ATS routes where civilian helicopters operate on a regular and frequent basis.....Military operations near HMRs should normally be conducted at or below 1000 ft amsl, or above FL 85, with due regard for civil helicopter operations when crossing HMRs".* The CAA Topographical Air Chart – East England – specifies that HMR 8 extends from 1500 ft amsl to FL 60.

THE ANGLIA RADAR CONTROLLER reports he was just about to complete a handover when he observed an A7001 squawk – the Tornado unbeknown to him - about 15 NM to the N of the SK76, whose crew had not yet called on RT. When they did he advised them they were identified and requested their flight conditions at 3000 ft, which were IMC. Traffic information was passed on the jet whose Mode C indicated below the SK76; on its present track the helicopter would pass behind the jet, but he informed the SK76 crew that he would keep them advised. The A7001 was then seen to turn and start climbing, so the SK76 crew was given an avoiding action turn onto 090° followed by further traffic information on the jet. The unknown Tornado then turned R toward the SK76, whose crew was instructed to turn further R onto 360° and traffic information was updated on the jet, which by then was about 0·5 NM away, he thought, indicating 2100 ft Mode C. Once the confliction was resolved the SK76 crew was told to resume their own navigation to Ravenspurn.

The Humberside APR subsequently called to say that the 7001 was a Tornado, whose crew had called him when it was about 1·5 NM to the N of the SK76, passing approximately 2000 ft in the climb. The SK76 pilot was advised of the details of the occurrence and stated that he wished to file an Airprox.

THE HUMBERSIDE APPROACH RADAR CONTROLLER (APR) reports that at about 1532, the Tornado crew called on 119·125 MHz giving their position as about 10 NM NE of OTR at 2000 ft, asking if there were any helicopters on the HMR in confliction. He confirmed that there was a helicopter at 3000 ft in the Tornado's 2 - 3 o'clock at 1 – 1·5 NM; the Tornado crew had then reported descending to 1500 ft and requested the HUMBER RPS. APR attempted to contact Anglia RADAR on the landline but because it had been diverted to the Aberdeen switchboard there was a delay before he could pass the ac details to the Anglia controller. Further traffic information was passed to the Tornado crew before they switched frequencies to London MILITARY.

ATSI comments that the Anglia RADAR controller, whilst not obtaining 5 NM horizontal separation, did well to resolve the conflict between the SK76 and the Tornado. By the time the Tornado crew had contacted the Humberside APR, the Anglia controller had issued avoiding action to the SK76 crew; the passing of traffic information by the Humberside APR was considered appropriate in the circumstances.

HQ STC comments that the Tornado crew was caught out by the weather, which deteriorated more rapidly than they had expected. Once in that situation, their immediate priority, quite rightly, was to fly the ac, achieve a safe altitude and then to seek an ATC service. It is unfortunate that on this occasion the unit they chose to call was not the one which might have been of most immediate help in avoiding this confliction. Indeed, the UK MIL Aeronautical Planning Document, at Vol. 3 Part 1 Pg. 1-8-13, specifies that a low-level traffic information service is available from Anglia RADAR.

UKAB Note (2): A review of the LATCC Claxby radar recording confirms that the Airprox occurred some 11 NM ENE of OTR. At 1531:16, the SK76 is shown outbound, N of HMR 8 tracking direct to the Ravenspurn ST3, level at 3300 ft Mode C (1013 mb). The Tornado GR4A is shown SSE bound in a level cruise at 3-400 ft Mode C (1013 mb) until 1531:24, when a rapid climb of 1000 ft in one radar sweep is evident to 1400 ft, before passing 2000 ft at 1531:40. Simultaneously, the avoiding action

instruction issued to the SK76 crew is seen to take effect as the helicopter enters the R turn and climbs 100 ft to 3400 ft Mode C, which equates to about 3100 ft RPS (1003 mb). The CPA occurs at 1532:04, as the Tornado levels out at 2400 ft Mode C (1013 mb), equating to about 2100 ft RPS (1003 mb) and passes 1·5 NM NE abeam the helicopter in the turn and 1000 ft below the latter which maintains 3400 ft Mode C and continues to turn R as reported. The Tornado then descends and maintains 1500 ft Mode C – about 1200 ft RPS - before crossing the HMR.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The HQ STC member reiterated that it would have been more appropriate if the Tornado crew had called Anglia RADAR in the first instance when they encountered worse weather than expected. Nevertheless, it was evident to the Board that the crew had acted with the best of intentions and paid due regard to their proximity to the HMR and obtained pertinent traffic information from an ATSU notified as providing LARS. Notwithstanding the unverified Tornado Mode C indications, its crew had apparently complied with the spirit of this regulation albeit they had not quite got below 1000 ft msd when they crossed the HMR according to the radar recording. That said, the SK76 crew had apparently elected to route direct to Ravenspurn instead of following the HMR. A discussion ensued about the applicability of the HMR and whether the SK76 crew did not have a similar responsibility to fly along the promulgated HMR which did terminate at their destination. A controller member familiar with off-shore operations advised that the crew might request a direct routeing or equally it might be proffered by ATC. Some members pointed out that in Class G airspace ac can be encountered on a multitude of tracks and they did not think there was any compunction on helicopter crews to stick rigidly to the promulgated route when in transit to a rig. Conversely, others thought this defeated the purpose of an established route structure. Whilst no firm conclusions were drawn on this point, when deviating from the notified routes pilots and controllers should certainly consider any inherent risks beforehand. Nonetheless, it was clear that the Anglia RADAR controller had astutely detected the confliction and had done his best to resolve it with his advisory avoiding action instructions, which it would appear were promptly complied with by the SK76 crew. Similarly the Tornado crew had taken steps to obtain traffic information which had been promptly provided by the Humberside APR; this enabled the Tornado crew to descend to 1000 ft below the helicopter. Whilst the nominal horizontal separation of 5 NM was unlikely to be maintained in this scenario it appeared to the Board that these combined actions had prevented the situation from deteriorating any further. The Board concluded that this Airprox resulted from a conflict in Class G airspace resolved by ATC, whose actions had been instrumental in removing any risk of a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in IMC, in Class G airspace, resolved by ATC.

Degree of Risk: C.

AIRPROX REPORT No 139/01

Date/Time: 13 Aug 1001

Postion: 5413N 0025 W (3NM S of Scarborough)

Airspace: FIR (*Class*: G)

Reporting Aircraft	*Reported Aircraft*
F50	F15
Operator:	
CAT	Foreign Mil

NOTE FOR THE RECORD

At the time of printing, this incident was still subject to an AAIB inquiry. Because of this, UKAB assessment will therefore be published in Report Book Number 8.

AIRPROX REPORT No 140/01

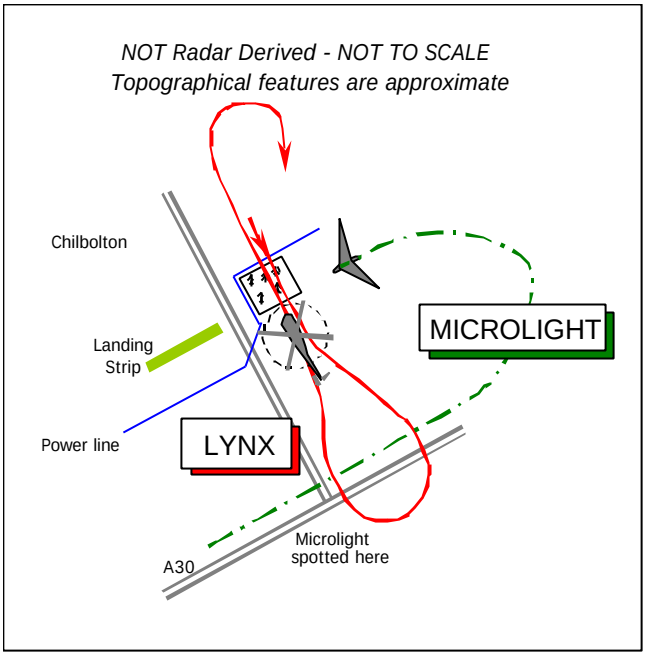
Date/Time: 14 Aug 1515

Position: 5108N 0125W (Chilbolton aerodrome) - elev 297 ft)

Airspace: London FIR/LFS (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	KOLB Twinstar	Lynx
Operator:	Civ Pte	HQ DAAvn
Alt/FL:	400 ft ↓ (QFE 1002 mb)	125 ft (agl)
Weather Visibility:	VMC CAVOK 10 km	VMC NR Good
Reported Separation:	300 ft V, 200 m H	>200 m H

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KOLB TWINSTAR MK3 MICROLIGHT PILOT reports that his flying machine is coloured blue/white, but has neither lighting nor radio fitted. He was inbound to Chilbolton aerodrome from the SE and had descended to 800 ft agl to fly below the Middle Wallop MATZ stub on the usual preferred noise abatement route to Chilbolton, which he had flown many times before. As he approached Chilbolton he became aware of an Army helicopter in the area, which he identified as a Lynx. It appeared to come from behind and beneath him and he watched the Lynx come to a slow forward creeping hover some 700 ft or more below his ac at 11 o'clock - 400 m away - to the S of the A30 and W of the A3420 roads. Continuing his approach to Chilbolton, initially for a base leg join to land, he watched the helicopter climb and turn R across his path and depart to the N at low level about 500 m E of the threshold of Chilbolton RW24.

He then elected to carry out an overhead join into a standard LHD 600 ft Cct to the S of Chilbolton and overflew the windsock noting that the wind was less than 10 kt from the SW. As the Cct appeared to be clear, he turned L but remained at 800 ft and when downwind, N of the A30, saw the same helicopter again, this time crossing E of RW 24 threshold from N to S still at low level. He remained at 800 ft and extended his downwind leg longer and higher than usual. By then the helicopter appeared to have cleared well to the S, so he turned onto an elliptical base leg and started to descend. At that stage with no sign of the helicopter he turned onto a finals heading of 240° at 600 ft. Flying at 60 kt, he continued his descent until short finals to RW 24, with about 500 m to go - at about 400 ft agl and visual with the power lines which cross the approach – he saw the same helicopter again as it crossed below his ac at about 80 kt from L to R about 200 m ahead and at about 100 ft agl. As the helicopter cleared to the N, he elected to continue his approach but experienced severe air turbulence and had to apply full power to regain control. After clearing the power lines, he reduced power and landed safely onto the runway, but over half way along its length.

Whilst backtracking on the runway, the helicopter again passed from N to S very low (he estimated below 100 ft agl) at about 80 kt. After he had shut down his machine he immediately called the SATCO at Middle Wallop by mobile phone and notified him of the incident.

He subsequently spoke to 3 other pilots who had witnessed the incident from the ground. One of whom was the Chilbolton Club Safety Officer. He said this was a regular occurrence with Army helicopters and an accident waiting to happen. He added that he had written to the CO at Middle Wallop about previous incidents of this sort but had not received a reply.

UKAB Note (1): Chilbolton - also known as Stonefield Park - is a grass strip 450 yd long, orientated on RW24/06. No A/G Stn is provided.

THE LYNX AH1 HELICOPTER PILOT, a QHI, reports his ac is camouflaged grey/green and HISLs were on whilst conducting an instructional sortie from the LHS with the student in the RHS. He was under a FIS from Middle Wallop and had just started a general handling exercise, when he spotted the microlight to the SE of Chilbolton, heading he thought directly for Popham, a busy aerodrome to the NE of Chilbolton. He elected to fly behind the microlight - heading 150° - expecting the microlight to continue toward Popham, so he teardropped onto a reciprocal heading of 320° intending to carry out an exercise with the student in the clear area N of Chilbolton. As they rolled out of the turn he noticed that the microlight was turning, apparently onto finals for the landing site (LS) at Chilbolton, just as they crossed at 100 kt in front of the microlight about 100 m to the NE of the RW threshold at 125 ft Rad Alt. Here, the microlight was cross-cockpit in his 3 o'clock position on his blind side. The least dangerous option, he believed, was to maintain his heading, expecting the microlight pilot to overshoot and go around and not, as he subsequently did, land his machine.

Chilbolton LS is underneath the Middle Wallop MATZ stub and less than 1 NM from the MATZ boundary. He stated that this area is popular for general handling exercises and thought that the microlight pilot was aware of this and would no doubt have seen him flying in this area. Without RT he could only guess at the microlight pilot's intentions and whether or not he was in the circuit pattern for this quiet private LS. The microlight pilot had apparently made a safe landing, as he did not overshoot, he opined that there was no problem caused to his approach and believed that there was little downwash danger for the other ac. He added that the QHI to student instruction creates a high workload.

UKAB Note (2): This Airprox occurred outwith the coverage of recorded radar.

HQ DAAvn comments that the area around Chilbolton represents an ideal general handling training area. Pilots normally confirm that Chilbolton airstrip is clear of activity before commencing their training. In this case the pilot saw the microlight, but assumed, incorrectly, that it was in transit to Popham (to the NE) rather than extending its downwind to land at Chilbolton.

The School of Army Aviation (SAAvn) has been trying to encourage a dialogue with Chilbolton for some time, but with little success thus far. In the meantime all SAAvn pilots have been reminded of activity levels at Chilbolton and the potential dangers of turbulence on small ac.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, and reports from the appropriate operating authority.

It appeared to the Board that this was a case of two pilots making assumptions about each other's intentions and then flying on without checking if their assumptions had been correct. From the Lynx instructor's perspective he had assumed the microlight was in transit to another site (Popham), which in the end was proved incorrect – a salutary lesson. The Microlight pilot had spotted the Lynx for a second time as it passed to the E of the LS southbound; similarly, he made an assumption that the helicopter was clearing to the S, which it was not. The Board took the view that each pilot had sighted each other's ac, assumed it was doing something it was not, then promptly lost sight of it as they continued with their respective tasks. Subsequently, both pilots were caught out when they suddenly sighted each other's ac again - at a late stage - when the microlight was on long finals into Chilbolton. From all of this the Board concluded unanimously, that the cause of this Airprox was that both pilots lost sight of each other's ac and flew into confliction, whilst the microlight was on final approach to land.

It was clear from both reports that each thought they had a right to be where they were and here - in Class G airspace - this fact was unimpeachable.

It was explained that this area is quite flat and a good location for the helicopter training exercise being undertaken at the time. However, military pilot members questioned the airmanship aspect of flying across the approach to a known LS, albeit not a particularly active one. Fast jet pilot members opined that they would plan their flights to avoid such LSs where they could, but the Board recognised that this was very close to the Lynx pilot's base. Nevertheless, there was a consensus that this instructional exercise should have been conducted elsewhere.

Although the microlight pilot had elected to continue with his approach and land his machine, some thought this unwise. It should have been readily apparent to him that the air would have been significantly disturbed by the passage of the helicopter – as he subsequently found out – and a further circuit to allow time for the wake vortex to dissipate would probably have been wise. Turning to the risk of a collision between the two ac, unlike the helicopter pilot the microlight pilot had the Lynx in view as it crossed ahead and he could have altered course to avoid it or elected to 'go around' if necessary but he did neither. Consequently, the members agreed that no risk of a collision had existed in these circumstances.

A number of communication breakdowns were implied in what had been reported and the HQ DAAvn member reiterated that the Unit had endeavoured to engender a liaison with Chilbolton users. Equally the same held true, reportedly, for the Chilbolton Flying Club. However, for whatever reason, neither side appeared to have been successful and the Board believed that the two airspace users must renew their efforts to start a meaningful dialogue. It was imperative that each should be aware of each other's activities, understand each other's concerns and endeavour to operate harmoniously. To this end it was requested that a copy of the findings on this Airprox report be sent to the Chilbolton Flight Safety Officer.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Both pilots lost sight of each other's ac and flew into confliction, whilst the microlight was on final approach to land.

Degree of Risk: C.

AIRPROX REPORT No 141/01

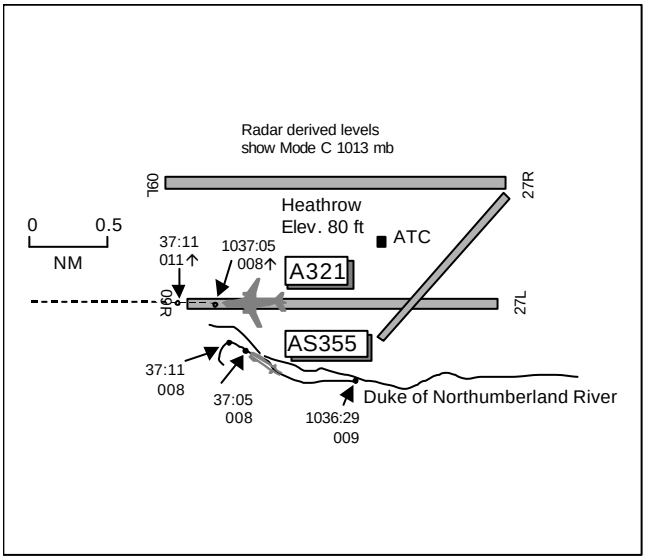
Date/Time: 15 Aug 1037

Position: 5128 N 0028 W (S Abm RW 09 Threshold Heathrow - elev 80 ft)

Airspace: CTR (*Class:* A)

Reporter: Heathrow DEPS

	First Aircraft	*Second Aircraft*
Type:	A321	AS355
Operator:	CAT	Civ Comm
Alt/FL:	NK↑ (QNH 1010 mb)	800 ft (QNH 1010 mb)
Weather Visibility:	VMC CAVOK 10 km	VMC CAVOK >10 km
Reported Separation:	NK	400 ft V 250 m H
Recorded Separation:	0 ft V 0·35 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HEATHROW DEPS reports that the AS355 was carrying out security checks on the area S of the departure RW 27L and he was providing reduced visual separation. After the Twin Squirrel passed the end of RW 27L, it was seen to turn 30° R and into confliction with the departing A321; the ATM showed the ac co-incidental, with the AS355 at 800 ft and the A321 at 1100 ft, which was also confirmed by the VCR Supervisor.

UKAB Note (1): The Heathrow METAR shows EGLL 1020 19010KT 170V230 CAVOK 28/17 Q1010.

THE A321 PILOT reports heading 270° at 150 kt on departure from Heathrow RW 27L. During the handover to London, the TOWER controller advised that a report would be filed as a helicopter had passed underneath him without clearance when airborne. He had received no TCAS alerts and had not sighted the helicopter - the first indication of the incident had been the Tower report.

THE AS355 PILOT reports heading 270° at 800 ft QNH 1010 mb and 70 kt following the course of the Duke of Northumberland River (DoNR), in accordance with SOPs, whilst conducting a security check at Heathrow. The helicopter was coloured white with orange/red stripes, strobe lights and Mode C were switched on and he was receiving an ATC service from Heathrow TOWER on 118·5 MHz. As he commenced a L turn away from the RW to continue to the E, ATC commented on his proximity to a departing ac. An Airbus had been observed during its take-off roll and climb and had passed 250 m clear to his R and about 400 ft above. To follow the river course on this task does involve a small R turn towards the RW near to the RW 09R threshold area and this profile was flown as normal prior to commencing a L turn back onto a reciprocal track. No avoiding action was required or taken as the acs' tracks were parallel then diverging as the L turn was started. He assessed that there had been no risk of collision whatsoever as the departing traffic had been observed throughout the incident and neither ac had presented the slightest threat to each other. TCAS equipment was not fitted to the helicopter.

THE AS355 CHIEF PILOT reports that the company operating procedures for Heathrow Westerly departures, in use at the time of the incident, state that the helicopter should: -

a) Comply with ATC instructions at all times.
b) Remain S of the DoNR at all times.
c) Make all turns away from the RW in use whenever possible.
d) Maintain visual separation from departing and landing ac.
e) Remain at or below 800 ft agl at all times.
f) Confine flight path to between the thresholds of the RW.
g) Start initial run away from the threshold of the landing/departing RWs.
h) Notify ATC on starting the East bound run.

Post incident, changes to these procedures were introduced: -

b) Remain S of the DoNR and Helicopter Crossing route at all times. Maintain a Westerly track once abeam the W end of the Cargo Handling area. Notify ATC if the area adjacent to the threshold RW 09R needs closer investigation.
e) Remain at or below 600 ft QNH at all times.

CAA FLIGHT OPERATIONS INSPECTORATE (FOI) reports that security flights like the one in question here are conducted daily at Heathrow, flown by crews who are both familiar with the area and 'checked out' for the task. These pilots are required to remain over the Duke of Northumberland river, which, at its closest point, is some 0·25 NM S of RW 27L/09R. It may be noted that towards the western end of the DoNR route, the track kinks slightly to the N and it is presumed that this is the 30° turn witnessed by the controller.

ATSI reports that the helicopter was carrying out a routine security check at Heathrow Airport and reported at Bedfont. The helicopter was instructed to continue along the course of the DoNR, on the S side, in accordance with normal practice. The A321 had been cleared for take off on RW 27L. When the helicopter reached the SW corner of the airport it turned to proceed eastbound along the river, once again, in accordance with normal practice. The controller made the comment "*...really a bit close on the departure wasn't it*". He reported that the helicopter and A321 were "*coincidental on the ATM*". The departing A321 crew did not see the helicopter and the helicopter crew have stated that they were following the river and that there was never any risk of collision as

they turned. Analysis of the radar video shows that the helicopter remained S of RW 27L throughout the manoeuvre.

Although no ATC errors were detected, a Unit Supplementary Instruction has been issued detailing the procedures for such security patrols. Furthermore, it is now a requirement that the Air Controller will pass TI to all Heathrow traffic operating on the RW adjacent to the helicopter.

UKAB Note (2): Analysis of the Pease Pottage radar recording shows the AS355 following the river W bound to the S of Heathrow. At 1037:05 the AS355 is seen tracking WNW towards the RW 09R threshold at FL 008 (700 ft QNH 1010 mb) as the A321 pops up in his 1 o'clock range 0·35 NM at the same level. 6 seconds later, the A321 is seen climbing W bound through FL 011 (1000 ft QNH 1010 mb) as the Twin Squirrel commences a L turn away to the E at a range of 0·4 NM.

UKAB Note (3): The DoNR is approx. 275 m S of RW 27L/09R C/L at its closest point in the area S of the 09R threshold area.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

ATCOs fully understood this scenario, which occurred on a daily basis. The Heathrow DEPS controller would be seated facing in an Easterly direction towards the RW 27L threshold area to control departing traffic. He would as a matter of routine check that the previous departing traffic was safely airborne before clearing the next ac in the departure sequence for take-off; this would entail a look over his shoulder towards the RW 09R threshold area. It was then that the controller had been surprised by the R turn executed by the AS355 towards the RW; the helicopter appeared to be in confliction with the departing A321. From his VCR viewpoint, which is over 1 NM from the 09R threshold, the DEPS could see both ac visually and thought they were too close, an impression which was further backed up on looking at the ATM. Pilot members thought that the R turn in question was almost certainly the slight R turn needed to follow the course of the DoNR, to the W of the Cargo Handling area, and wondered if the DEPS believed the helicopter had turned off its normal routeing. It was felt that the picture displayed on the ATM, owing to the radar range resolution/ discrimination characteristics of the Heathrow 10 cm radar combined with the normal display range (20 NM), would probably show the ac as co-incident. From the recorded radar, it is clear that the AS355 remained well to the S of the RW and the crew appeared to have flown the ac in accordance with the operating procedures in use at the time of the incident. These facts persuaded the Board that the DEPS controller had perceived, understandably, a loss of horizontal separation between the subject ac but no such loss had occurred. A NATS advisor explained that the changes to the Heathrow helicopter procedures were introduced following a Safety Based Management System risk assessment carried out prior to the incident. Members felt that these alterations - a lowered altitude restriction and the requirement to route W when abeam the Cargo area which removed the R turn towards the RW S of the RW 09R threshold - would eliminate any problems in the future. Also, the new requirement to pass TI to all ac operating on the RW adjacent to the helicopter would keep all parties in the loop.

Turning to risk, the A321 crew were only aware of the incident when they were informed by the DEPS controller, no TCAS alerts had been received. The DEPS controller had been concerned with the situation, as he was providing reduced visual separation and the ATM backed up his perception; he had no requirement to pass TI. The AS355 pilot had been fully aware of the scenario, had seen the A321 throughout its departure, and had operated in accordance with the procedures, maintaining visual separation. In doing so the AS355 pilot had always been in a position to avoid the departing ac, even if it had encountered difficulties during its take-off. This led the Board to conclude that any risk of collision had been satisfactorily removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Mistaken impression by the Heathrow DEPS controller of loss of horizontal separation.

Degree of Risk: C

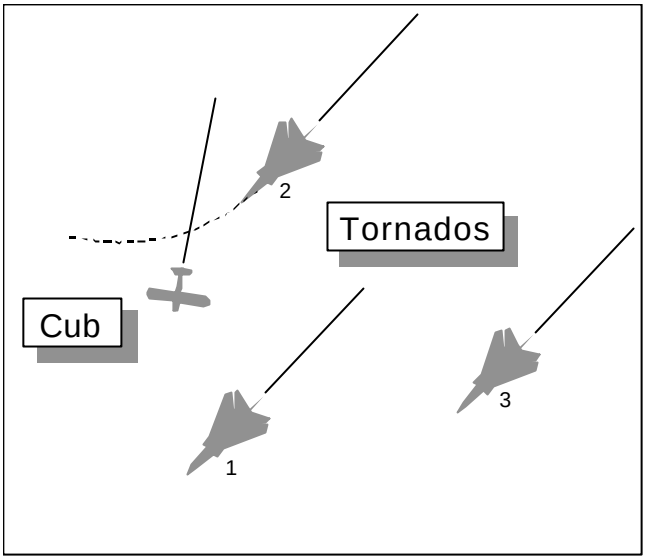
AIRPROX REPORT No 143/01

Date/Time: 15 Aug 1424

Position: 5710 N 0547 W (Sound of Sleat)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR	Piper Cub
Operator:	HQ STC	Civ Pte
Alt/FL:	2000 ft ↓ (Rad Alt)	2500 ft (QNH)
Weather	VMC CLBC	VMC CLBC
Visibility:	30 km	30 km+
Reported Separation:	300 ft /250 m H, 10 ft V	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO PILOT reports heading 227° at 420 kt while descending in a relatively tight escort formation to low level with the No 2 on the right; a service from Scottish Military had been terminated at 7000 ft. A Piper Cub was seen simultaneously by all 3 pilots; it was 500 m ahead, crossing from right to left and passed below and to the right of the leader before he could react. The No 2 broke right and up, passing about 300 ft above the Cub. There had been a high risk of collision with the leader and No 2.

THE PIPER CUB PILOT reports heading 185° at 60 kt level at 2500 ft QNH. He was receiving a FIS from ScACC who called, asking for his position. He looked around to check his position and saw a Tornado pass down his left side. Looking for 'the second one' he saw it heading directly for him so he rolled left to increase his conspicuity. The Tornado broke right to pass some 250 m away and 10 ft above. He thought the risk of collision had been high and considered that the fortuitous call from ScACC had saved the day.

UKAB Note: The incident occurred below the coverage of recorded radar.

HQ STC comments that the Tornados were in a tight escort formation in a gentle descent to low level and had cancelled their radar service with Scottish Mil as they descended below radar cover. The weather was good and yet with apparently 6 aircrew looking in the direction of the Cub; none saw it until it was about 500 m from the formation. It is fair to say that the navigators, with a severely restricted forward view and a radar optimised for ground mapping, had little part to play in this incident. The Nos 2 and 3 pilots were in a relatively close escort position requiring much of their lookout to be concentrated on their leader. That said, it is probable that the lack of relative motion, the small size of the Cub and the relative inconspicuity were all factors, and it is extremely likely that the decision by the Cub's pilot to present a plan view to the Tornados alerted the formation to his presence. This chance meeting in the open FIR left the lead Tornado pilot with insufficient time to take avoiding action. Without the benefit of a radar service or a CWS the likelihood of such close encounters can only be reduced by sound formation management and improved lookout from all involved.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and reports from the appropriate operating authorities.

Members agreed that the formation being flown by the Tornados did not optimise the crews' ability to look out for each other. Not only would the wingmen have had to concentrate on their leader more than if they had been in a wider formation, an ac on a collision course would have been on a constant bearing to all the pilots for longer. While members agreed that a silver/grey Cub over a gun-metal sea would have been very difficult to see anyway, its angular motion would more easily have been picked up by a displaced wingman who could have warned those members closer to the action. Lookout was all the participants had to avoid a collision and the Board concluded that the cause of the Airprox was the late sighting of the Cub by the Tornado formation.

The Board commended the Cub pilot for his presence of mind in manoeuvring his ac to increase its conspicuity which may well have avoided a collision. Members noted that both pilots had considered there had been a high risk; this and the fact that the lead Tornado had passed the Cub before he could react led the Board to agree that there had been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Tornado formation of the inconspicuous Cub over the sea.

Degree of Risk: A

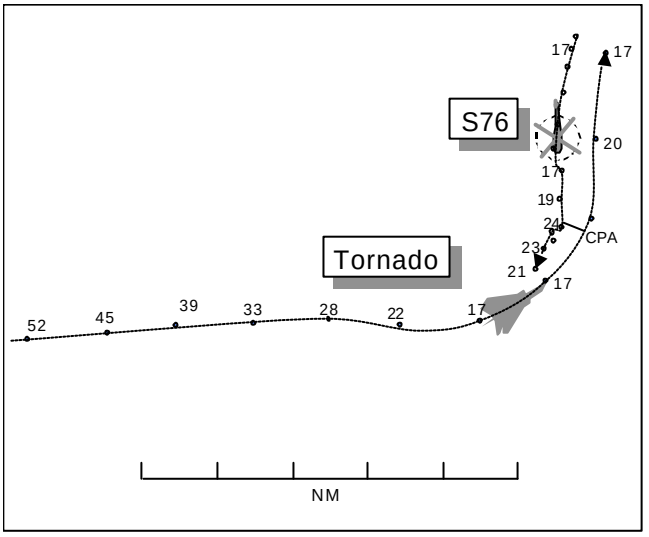
AIRPROX REPORT No 144/01

Date/Time: 16 Aug 1322

Position: 5308 N 0128 E (14 NM NE of Cromer)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	S76	Tornado F3
Operator:	Civ Comm	HQ STC
Alt/FL:	1500 ft (RPS 1005 mb)	↓ LL (RPS)
Weather	VMC CLNC	VMC HZNC
Visibility:	30 km+	30 km+
Reported Separation:	200 m, 100 ft V /0.3-0.5 NM, 500-1000 ft V	
Recorded Separation:	0·3 NM	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE S76 PILOT reports heading 170° at 142 kt and receiving a RIS from Anglia Radar on 125·275. Anglia warned him of 2 contacts at 5 NM in his 2 o'clock crossing R to L. His co-pilot saw one and he was advised to turn 30° L, which he did immediately. He then saw the traffic 1·5 - 2 NM away at the same level (he thought it was a Jaguar) in his 11:30 turning left towards him. He turned right to avoid it by turning inside it and to present a moving plan view, but it continued to turn towards him; having lost sight of it behind his instrument panel he pulled up quickly into the vertical and his co-pilot saw it roll out of its turn. He considered the risk of collision was very high and commented that this was the closest to a collision he had ever been.

THE TORNADO F3 PILOT reports he was the front seat handling pilot of a formation of F3s on their first formation convex sortie. The formation was receiving a FIS from LATCC (Mil) in a descent to low level from 12,000 ft in battle heading 090°. His rear seat captain called for a 60° double assisted turn on to 030°. He was on the right of the formation and began the left turn towards his wingman, whilst still descending. As the outside man he was responsible for collision avoidance so his lookout initially concentrated on his wingman and then the area he was turning towards. As he rolled wings level on 015° at 420 kt, at about 2,500 ft, he was aware of an object appearing from behind the canopy arch into the HUD field of view. It took him a few moments to realise it was another ac and not a surface contact. He commenced avoiding action at approx 1·5 NM, rolling and pulling high and right. He called the stranger to his wingman who was now further east and higher and who reported seeing the helicopter as the avoiding action was taken. After what he considered to be a sufficient period, he rolled out in a shallow climb and looked left. His ac passed the helicopter about 1/3 to 1/2 NM laterally and 500 - 1000 ft vertically; his rear seater was unsighted until this point. As the ac passed he noticed that the helicopter was in a very nose high climbing attitude. He then concentrated on getting the formation back together before calling the incident to the LATCC (Mil) controller, who reported seeing nothing on radar until about 5 minutes later when a slow moving contact was observed coasting in north of RAF Coltishall from the direction of the Airprox.

UKAB Note: The LATCC Cromer radar recording shows that the Tornado passes the helicopter by about $^{1}/_{3}$ NM. Both ac pull up through the same level in avoiding action.

ATSI reports that the S76 was under modified RAS, as per MOU between ATC and the company. The Anglia Controller passed avoiding action instructions and traffic information in respect of both Tornados, updating the information when the Tornado turned. However, he was not able to provide 5 NM/3000 ft from the unknown a/c because of their differing performances and the unpredictable flight path of the Tornados.

MIL ATC OPS reports that the Tornado F3s had just descended to operate VFR below 5000 ft beneath the SE corner of the Wash ATA. The crews were receiving a FIS from London Radar Console 15 (CON15), squawking 6153 and, due to their range from the Claxby and Debden radar heads, were not in continuous radar cover. At about 1322, the lead F3 asked the controller to make a note that both crews had observed and avoided a helicopter by 1 NM, at an altitude of about 1500 ft and that the helicopter had also appeared to have taken avoiding action. Shortly afterwards, whilst CON15 discussed the incident with the Supervisor, a radar contact appeared, about 5 NM S of the lead F3, squawking 0251 and indicating 1700 ft Mode C, which was thought to have been the helicopter involved. The Airprox can be seen clearly on the Cromer radar recording, but this radar is not available to London Radar controllers.

HQ STC comments that the Tornado formation was conducting visual manoeuvring at medium and low level over the sea in the area to the north of Blakeney Point. The sortie was an early OCU conversion exercise to practise co-ordinated tactical formation turns. Student pilots flew both ac, with instructor pilots in the rear seats, and the formation was descending to low level when the incident occurred. Both crews were operating with due regard for other airspace users and were aware of the helicopter routes (HMR 3 and 4); however, it would seem that inaccuracies in navigational equipment led the crews to believe that their ac were still some 6 NM to the west of HMR 4. The crews' workload was assessed as medium and as the exercise was purely visual, all 4 pilots were looking out. No contact was seen on the ac radar due to the low track crossing angle of the helicopter and the background clutter. The lead Tornado F3 was the first to turn towards the helicopter and the pilot, whilst concentrating on formation collision avoidance as well as clearing his flightpath, spotted the slow moving helicopter late.

This was an unfortunate sequence of events that typifies the hazards of operating close to or below the limit of radar cover and it is fortunate that the Tornado crew picked up the helicopter in time to take avoiding action, albeit at a late stage. This is a good and timely lesson to all of the importance of careful and continuous visual lookout and radar search.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Questions were raised before the Board's meeting as to whether the Anglia controller could have co-ordinated with London Radar on seeing the F3s with their 6153 squawk descending into confliction. It transpired that at the time the communication link to London Radar was not working. It had also been suggested that while London Radar did not have the Cromer radar picture, the S76 was showing on the Claxby radar, which was available. The Board was advised that for that area, London Radar would have been using a composite Claxby/ Debden picture and that the incident occurred just S of the dividing line and the helicopter would not have been disclosed at 1500 ft by the Debden radar.

The F3s were not where their leader thought they were; they were in fact crossing between HMRs 3 and 4 at the time of the Airprox. Members agreed that because helicopters can be found anywhere over the N Sea and would not necessarily be following an HMR (the S76 was not), the F3s' uncertainty over their position was not considered to be a direct factor in this Airprox. It was always necessary to keep a lookout for helicopters, on or off HMRs, particularly in the 1000-2500 ft band, and the Board concluded that the cause of this Airprox was the late sighting of the helicopter by the Tornado crew.

Helicopter pilot members of the Board suggested the problem was that the F3s were operating in the same area as the helicopters but on a different RT frequency. It was agreed that if the F3s were to conduct their exercise on Anglia Radar's frequency, with all the intra-formation RT communication involved, they would soon be asked to leave the frequency. A member suggested listening to the Anglia frequency on another radio but ATC members quickly commented that this could make matters worse and that if an ac was to be on a frequency it should receive an appropriate ATS. It was suggested, however, that while letting down through levels most used by helicopters, a call to Anglia Radar for traffic information could be made, and that the absence of such a call might be construed as not 'operating with due regard' to helicopter traffic. This requirement is specified when crossing an HMR.

The discussion of the risk level was protracted. It was clear to members why the helicopter pilot had considered there was a very high risk of collision; when last seen by him the F3 was in a descent and still turning towards him at high speed and the extreme nature of his avoiding action was quite understandable to members. However, he was not to know that at about the time he became unsighted, the Tornado pilot saw his helicopter and took firm and effective avoiding action. While many members considered that this had removed any risk of collision, and that the F3 had in fact passed a safe distance away, because both pilots were unsighted for a short period during their avoiding action, a very small majority of members considered that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Tornado F3 crew in the vicinity of an HMR.

Degree of Risk: B

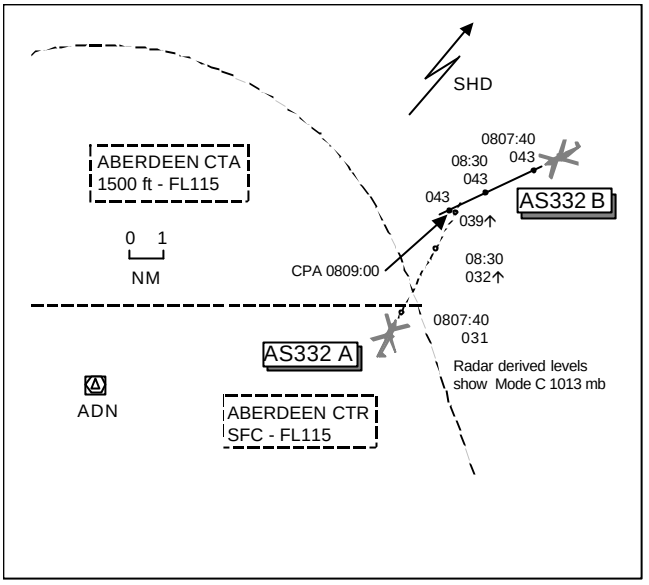
AIRPROX REPORT No 145/01

Date/Time: 17 Aug 0809

Position: 5724N 0156W(15 NM NE of Aberdeen - elev. 215 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	AS332 A	AS332 B
Operator:	CAT	CAT
Alt/FL:	↓ FL 50	4000 ft (QNH 1010 mb)
Weather	VMC CLNC	VMC CLOC
Visibility:	20 NM	>10 km
Reported Separation:	200 ft V 100 m H	200 ft V 350 m H
Recorded Separation:	400 ft V <0·15 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE AS332 (A) PILOT reports departing Aberdeen RW 16 en route to Magnus Offshore Platform on a radar heading 030° at 100 kt and cleared to climb to 3000 ft. The commander, a training captain, was NH in the LH seat with a FO, PH, undergoing RH seat familiarisaton prior to a command course. The visibility was 20 NM in VMC and he was receiving a radar control service from Aberdeen on frequency 119·05 MHz. The ac was coloured red/white/blue with Mode C and HISLs switched on. He was transferred to Aberdeen radar on 134·1 MHz and he requested a climb to FL 50 which was granted. While in the climb at 1000 ft/min he was advised of training traffic holding at SHD and was told to 'expect own navigation' on passing 4000 ft. As he passed FL 39 (3800 ft QNH), the PH in the RH seat saw another AS332 helicopter suddenly appear very large crossing R to L in the right then front OH (eyebrow) windows. It had come into his field of view just where the leading edge of the RH cockpit crew door frame joined the OH window and crossed through into the centre screen; the RH sunvisor had partly obscured the initial view. The PH prepared to turn R but realised that they were not going to collide. It took about 5 seconds from first sighting until CPA and there had been almost no time to take avoiding action. He estimated the two helicopters passed 200 ft vertically and 100 m laterally. When he asked the height of the conflicting ac, ATC advised that it was at least 1500 ft above, which he queried. ATC went on to say that the traffic had been at 4000 ft on radar vectors to the ILS working Aberdeen on frequency 119·05 MHz. After landing back at Aberdeen, the crew discussed the apparent size of another AS332 viewed through the cockpit window as they taxied in, which served to confirm their individual observations as to the miss distance. He assessed the risk of collision as high.

THE AS332 (B) PILOT reports inbound to Aberdeen from Claymore Offshore Platform at 4000 ft QNH on a radar vector for the ILS RW 16 at 120 kt. The visibility was >10 km in VMC and he was receiving a radar advisory service from Aberdeen on 119·05 MHz. The ac was coloured red/white/blue with Mode C and HISLs both switched on. The FO, PH in the LH seat, first saw a company AS332 in his 11 o'clock low (about 500-600 ft below) at a range of about 0·5 NM; its track appeared to be diverging slowly. Moments later he realised that the other helicopter was climbing so he commenced a R turn as the conflicting ac passed 200 ft below and 300-400 m clear on his LHS. He estimated that from first sighting until passing abeam lasted between 10-15 seconds; his initial reaction on first

sighting the traffic was that the situation was under ATC control. He assessed the risk of collision as high.

ATSI reports that resectorisation of Aberdeen Approach took effect on 11 June 2001. The Approach Control position was withdrawn and the Radar 1 and 2 control positions were renamed as Initial (INT) and Final (FIN). The Radar Controllers provide ATC services within 40 NM of the Aberdeen ATZ boundary. Guidance notes, published as an addition to the Supplementary Instruction notifying the introduction of the resectorisation, included: *"The optimum situation should be an equalised workload between the three positions (INT/FIN/ HELS). Controllers should not confine their awareness to defined geographical "boxes" but should be aware of the general traffic situation. The INT controller's role is mainly seen as a tactical co-ordinator and looks at the overall traffic situation within 40 NM of Aberdeen. Traffic can be distributed to each sector depending on their workload. Although there are defined boundaries between INT/FIN/HELS, the INT controller can vary the transfer points on a tactical basis depending on the traffic situation at the time"*. Approach Radar was bandboxed onto the INT Controller's position at the time of the incident, although a controller was available to open the FIN position if required. The INT Controller described his workload as light.

The HELS Sectors at Aberdeen were also resectorised, the effective date being 4 June 2001. The HELS 1 and 2 Sectors were combined into one HELS position. This is responsible for providing radar services out to either 80 or 90 NM, depending on the routeing. The HELS Controller at the time of the occurrence described his workload as medium-high.

Following a Memorandum of Understanding between NATS Ltd. and the two helicopter companies at Aberdeen, a modified form of RAS (MRAS) is provided to their helicopters within "North Sea Airspace". Although the subject helicopters were being provided with an MRAS at the time of the incident, it was still the responsibility of the controllers concerned to provide standard separation between the two flights. Because the Airprox occurred within 40 NM of the Perwinnes Radar Head, the Aberdeen MATS Part 2, allows, subject to certain conditions, which were met on this occasion, a horizontal separation of 3 NM to be applied.

In accordance with local procedures, AS332 (A) was transferred, from the ADC Controller to the INT DIR, climbing to 3000 ft, en route from Aberdeen to the Magnus Offshore Platform, which is situated in the East Shetland Basin. The INT DIR said that, following co-ordination with the HELS Controller, he issued the helicopter with a radar heading of 030°, to route it clear of traffic holding at Scotstownhead (SHD) NDB at 3000 ft. Shortly afterwards, the flight was transferred to the HELS Controller.

AS332 (A) contacted the HELS Controller at 0804 reporting level at 3000 ft. The helicopter was instructed to continue on the radar heading and informed that it would be provided with an MRAS on leaving the CTR. Meanwhile, AS332 (B), which was inbound to Aberdeen from the Claymore Oil Platform, had been cleared at an altitude of 4000 ft in order to provide separation from the traffic holding at SHD at 3000 ft. The INT DIR could see that the HELS Controller was becoming busy and in the spirit of the resectorisation procedures, whereby the workload is equalised when possible, he offered to take AS332 (B) on his frequency at that point. Accordingly, the flight was transferred at 0805. Consequently, AS332 (A) was working the HELS Controller, outbound at 3000 ft, and AS332 (B) was inbound, at 4000 ft, under the control of the INT DIR. The helicopters were on crossing tracks.

A short time later, the INT DIR requested co-ordination, with the HELS Controller, for an inbound fixed-wing ac from the N, to descend to an altitude of 4000 ft; this was agreed. Shortly afterwards, AS332 (A) requested a climb from 3000 ft to FL 50. When the HELS Controller asked the INT DIR if he could clear the helicopter to climb, the latter agreed and changed the cleared level of the fixed-wing ac to FL 60 to accommodate the request. AS332 (A) was cleared to climb to FL 50 at 0807:40. The HELS Controller admitted that, when he cleared the helicopter to climb, he had overlooked the presence of AS332 (B), even though he had only transferred it about 3·5 minutes earlier. He could offer no explanation why he had made this omission. He commented that when helicopters are transferred between the INT DIR and the HELS

Controllers, the relevant fps is transferred at the same time. Consequently the fps display does not show potential conflictions in such circumstances. The radar timed at 0807:40, when the climb clearance was issued to AS332 (A), reveals that the two helicopters were then 5·5 NM apart and converging. The INT DIR said that, when the HELS Controller asked him if AS332 (A) could be climbed to FL 50, he assumed that the request was made in respect of the previously co-ordinated ac descending to 4000 ft. He, therefore, looked at his upper radar console (this ac would not have been within the displayed range of the lower display) and noting, he believed, that the subject helicopters were about to pass, he agreed to the request and adjusted the inbound ac's cleared level to ensure separation from the outbound helicopter. He did not think it necessary to mention AS332 (B) as, not only did he think that the subject helicopters were about to pass each other but also he believed that the HELS Controller would have been well aware of its presence at 4000 ft, since he had recently been working it. Neither controller was conscious that, once climb clearance was passed to AS332 (A), the subject helicopters were on conflicting flight paths.

The HELS Controller mentioned that, as AS332 (A) was on a comparatively long-distance flight, it would need to resume a direct track as soon as possible. Hence, once AS332 (A) had been cleared to climb to FL 50, the HELS Controller advised its pilot that he should be able to turn back on track after passing 4000 ft. At 0809:20, the pilot of AS332 (A) queried the presence of traffic which had just gone overhead. The controller explained that, initially, he had not realised the situation as the SSR radar returns of the subject helicopters were 'garbled'. Following discussion with the INT DIR and seeing the radar returns of the two helicopters separate, he realised the problem but not the vertical separation which had existed at the time of the cross. As he only became aware of the situation after the helicopters had passed, he had not passed any avoiding action instructions to AS332 (A). The INT DIR, meanwhile, had also received a query, from the pilot of AS332 (B), about the height of crossing traffic. He, too, observed that the two helicopters' SSR labels were 'garbling' but believed that AS332 (A) was still maintaining the altitude at which it had been transferred to the HELS Controller (3000 ft). Because he had noted, previously, AS332 (B)'s SSR Mode C showing 4200 ft QNH, he informed its pilot that the other traffic was 1200 ft below. It was only on subsequent discussion with the HELS Controller that he realised that AS332 (A) had been cleared to climb before the subject helicopters had crossed. Aberdeen ATC radar displays are not provided with STCA and neither helicopter was equipped with TCAS.

UKAB Note: Analysis of the Alanshill radar recording shows that AS332 (A) commences its climb at 0808:30, when it is 2·4 NM SW of AS332 (B). Subsequently, CPA occurs slightly after 0809:00 as the two helicopters pass each other by less than 0·15 NM with a vertical separation of 400 ft indicated, with AS332 (A) still below AS332 (B).

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members wondered whether the resectorisation within Aberdeen had been a factor in this incident. The three controller positions are alongside each other within the control room (INT/FIN/HELS) and on this occasion the INT/FIN positions were bandboxed. The HELS controller had accepted AS332 (A) from the INT controller tracking NNE outbound at 3000 ft whilst he had transferred AS332 (B) to INT inbound at 4000 ft. Following later co-ordination between INT and HELS regarding climb with helicopter (A) to FL 50 against an inbound fixed wing ac, HELS had overlooked the presence of helicopter (B) on its crossing track. Although the fps on AS332 (B) was with INT and therefore not available to him as an 'aide-memoire', in the radar orientated environment where the INT/FIN/DIR share the same airspace, the HELS controller should have seen helicopter (B) on his display and queried its level before he commenced the climb to FL 50. Likewise, during this co-ordination, the onus was on INT to point out the presence of the conflicting inbound helicopter (B) at 4000 ft to HELS. INT had erroneously assumed that HELS was requesting the climb with respect to the other inbound fixed wing ac descending to 4000 ft and

that he would be aware of the presence of AS332 (B); a further assumption by INT was that HELS would commence the climb after the subject helicopters' tracks had crossed, which was about to occur on his display. Why HELS did not notice AS332 (B) remains unknown. With the resectorisation, he may have been unused to working ac that close to Aberdeen if the outbound helicopter (A) had been transferred to him earlier than usual but (B) was identified known traffic showing on the radar converging from the NE. Similarly, INT may have been working the inbound helicopter (B) further out from the aerodrome than usual; he believed that the helicopters were about to pass when they were still over 5 NM apart, probably owing to the range selected on his upper radar display. One ATCO member thought that, with the benefit of hindsight, it might have been prudent for control of both the subject ac to have been retained either with the INT or HELS on one frequency/position until they had passed. However, leaving conjecture aside, members agreed that this Airprox had been caused initially by inadequate co-ordination between the INT and HELS controllers followed by HELS climbing AS332 (A) into conflict with AS332 (B).

Turning to risk, both helicopters were flying IFR and receiving an ATC service; ATC only became aware of the incident when both crews queried the presence of adjacent crossing helicopters - there is no STCA at Aberdeen. The crew in AS332 (A) saw AS332 (B) very late and for just 5 seconds, but long enough to judge that the ac were not going to collide and with almost no time to take avoiding action. AS332 (B) FO, PH on the LHS, saw AS332 (A) 5-600 ft below about 0·5 NM away apparently slowly diverging but then realised that it was climbing; he commenced a R turn to avoid as it passed 3-400 m clear horizontally and 200 ft vertically below. The geometry of the situation combined with the sightings by both crews persuaded members that there had been no actual risk of collision. However, considering the radar service being provided, the absence of any safety nets (STCA or TCAS) and the lateness of the sightings, it was fortuitous that the helicopters had crossed on their respective flight paths clear of one another. This led the Board to conclude that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Following inadequate co-ordination between the HELS and INT controllers, HELS cleared AS332 (A) to climb into conflict with AS332 (B).

Degree of Risk: B

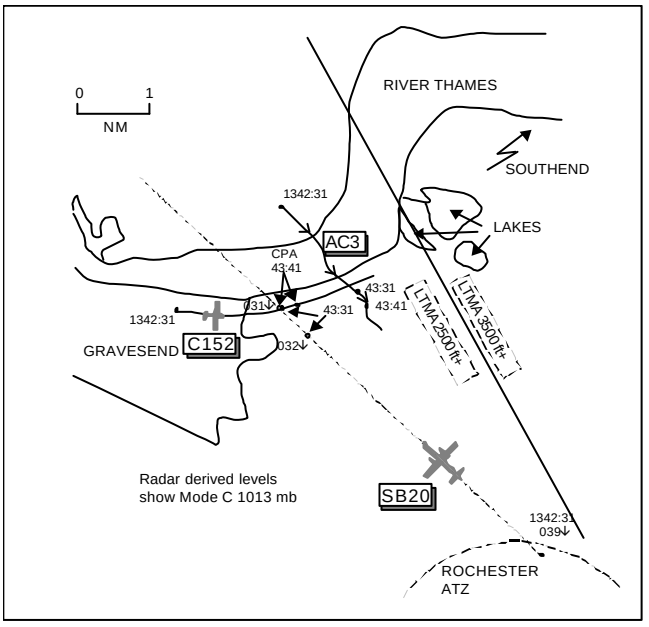
AIRPROX REPORT No 146/01

Date/Time: 20 Aug 1344

Position: 5126 N 0025 E (6 NM NW of Rochester)

Airspace:	TMA	(*Class:* A)
	Reporting Aircraft	*Reported Aircraft*
Type:	SAAB 2000	C152
Operator:	CAT	Civ Trg
Alt/FL:	3000 ft (QNH NK mb)	2800 ft (QNH 1015 mb)
Weather	VMC CLOC	VMC CAVOK
Visibility:	15 km	>10 km
Reported Separation:	100 ft V 300 m H	250 ft V 650 ft H

Recorded Separation: NK V 0·25 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SAAB 2000 PILOT reports flying inbound to London City from Switzerland at 3000 ft QNH and 180 kt. The visibility was 15 km 1000 ft below cloud in VMC and he was receiving an ATC service from Thames Radar on frequency 132·7 MHz. His TCAS gave a TA warning on traffic in his 1 o'clock range 2 NM so he scanned the area ahead and saw an ac, almost immediately, about 500 ft below. Fortuitously, whilst he monitored the TCAS traffic, he also noticed another ac in about the same direction but only 100 ft lower, much closer (about 900 m)- it passed quickly on his RHS about 300 m away. Only 15 seconds elapsed between sighting the second ac and it passing clear. The second one was a C152 coloured white/red/blue flying in a nose-up climbing attitude and heading approx. 090°; it did not appear to be taking any avoiding action. The ac was not squawking so it was not showing on TCAS but he had seen it early enough to judge that no avoiding action was needed, as it appeared to be on an opposite direction parallel track. He assessed the risk of collision as high.

THE C152 PILOT reports flying on an instructional training sortie from Redhill and he was listening out with Redhill TOWER on 119·6 MHz squawking 7000 with NMC, he thought. The visibility was >10 km in CAVOK and the ac was coloured white/ blue with anti-collision light switched on. When approx. 11 NM SW of Southend heading 080° climbing at 70 kt through 2800 ft QNH 1015 mb, he saw a twin engine turbo-prop ac in his 1 o'clock high, range 2-3 NM, heading directly towards him. He altered course 10-15° to the L to increase separation as a R turn would have entailed turning across the other ac's track. The other ac passed 600-700 ft horizontally and 200-300 ft vertically clear on his RHS and he thought it was flying straight and level or possibly descending. About 30-40 seconds had elapsed between his first sighting of the conflicting ac and it subsequently passing clear. He had been briefing his student on trimming during the climb and he thought he had stopped climbing until after they had passed. He did not report the incident as he had not been worried by the other ac's proximity and he believed he had taken enough action to avoid a collision.

THE THAMES RADAR CONTROLLER reports that the SB20 was about 15 NM SE of London City on a radar heading of 315°, to intercept the ILS LLZ RW 28 at 3000 ft QNH - the base of CAS in that area is 2500 ft. The SB20 pilot reported seeing a light ac pass 0·5 NM down his RHS at about the same level which he later reported, through City Tower, as a C152 coloured white/blue/red and that he wished to file an Airprox. This ac had not been squawking and had not been observed on radar. A 7000 squawk with NMC had been seen which he initially thought may have been the ac involved but the SB20 crew said that they had seen that ac 500 ft below them.

UKAB Note (1): Met Office archive data shows the London City METAR EGLC 201320Z 27008KT 9999 SCT035 20/13 Q1015.

UKAB Note (2): The RT transcript at 1343:30 shows the SB20 crew transmission "*SB20 c/s we had the traffic in our at three o'clock same altitude about half a mile away from us"*. In response to the controller's request to confirm that the traffic was at 3000 ft, the SB20 crew replied "*almost yes"*

ATSI comments that the SB20 was given descent to an altitude 500 ft above the base level of the LTMA in accordance with MATS Pt 1, Page 1-58. The conflicting ac was not transponding therefore the controller had no way of knowing its altitude and whether it had penetrated CAS. MATS Pt 1, Page 1-51 states, with reference to unknown ac "*Within Class A airspace – neither avoiding action nor traffic information shall be passed unless radar derived or other information indicates that an aircraft is lost, has experienced a radio failure, or has made an unauthorised penetration of the airspace"*.

UKAB Note (3): During a subsequent telephone conversation with the C152 instructor, he stated that he was very familiar with the area and had over 4500 hr instructional experience in the SE of the UK. He used 'the lakes' on the S side of the Thames to the E of Gravesend as a known ground reference which coincided with the LTMA airspace boundary line orientated NW-SE delineating the base level change. He said that he had commenced the climb from 2000 ft to 3000 ft near Gravesend to give the student sufficient time/practice at trimming the ac, in anticipation of the ac crossing

the TMA line, in the vicinity of 'the lakes', clear of CAS. He had been distracted by the student during the climb but he had seen the SB20 in good time to turn slightly L to increase the separation distance. He said that he had stopped the Cessna's climb at 2800 ft and it was only after the SB20 had passed that he noticed that he was still approaching 'the lakes'. He now realises that he was probably further to the W of 'the lakes' than he had intended to be and that he may have penetrated CAS in error. He apologised for any mistake on his part.

UKAB Note (4): Analysis of the Heathrow and Debden radar recordings at 1342:31 shows the SB20 2 NM N of Rochester tracking 310° descending through FL 039 (altitude 3960 ft QNH 1015 mb) with a primary only return, the C152, in its 11 o'clock range 6·3 NM tracking 090°. The SB20 continues on a steady track whilst at 1443:03 the C152 is seen to turn L about 15° to track 075°. At 1443:31 the C152 crosses 0·5 NM ahead of the SB20 which is passing FL 032 (3260 QNH) in the descent; CPA occurs at 1443:41 as the C152 passes 0·25 NM E abeam the SB20 who is descending through FL 031 (3160 ft QNH). Immediately after the time of the SB20's report on RT at 1443:30, the primary only return on the C152 fades from the Heathrow radar until 1443:54; the Debden radar recording captures the incident. The other ac seen on TCAS by the SB20 crew, AC3, is seen, on both recorded radars continuously, to pass 1 NM E of the Saab on a reciprocal track squawking 7000 with NMC.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members were dismayed that the C152, with an experienced instructor on board, had ended up flying in the LTMA at 2800 ft. It appeared that the instructor, who was monitoring a student on an early flying training exercise, had concentrated too much on the situation 'in house' rather than affording more priority to his navigation in a training area he knew had Class A airspace commencing from 2500 ft. This basic navigation error had occurred on a day when the weather was CAVOK and the incident position was over 2 miles W of the 2500 ft boundary line which straddled 'the lakes'. Members questioned the wisdom of the instructor's intention to climb from 2000 ft to 3000 ft for the trimming exercise, commencing near Gravesend (3 NM W of 'the lakes') whilst anticipating remaining clear of the LTMA CAS base. This would have required good ground feature clues with constant monitoring to ensure flight path accuracy. Comment was also made that a listening watch from Redhill was perhaps not the most appropriate service in that area; Thames radar might have been a better option (although they were known to be too busy on many occasions to provide any service) or alternatively, Southend. The Board were in no doubt that the C152 pilot had penetrated the London TMA without clearance owing to a navigational error.

Looking at the risk element, the Thames Radar controller was unaware of the Airprox until the SB20 pilot reported it. The Saab pilot had only seen the C152 whilst he was fortunately looking out for the TCAS traffic, AC3. The Cessna was seen in his 1 o'clock range 0·5 NM about 100 ft below, and in enough time to judge that no avoiding action was required, eventually passing 300 m clear on his RHS. The C152 pilot had seen the Saab about 2-3 NM away slightly above him and had turned L 10-15° to cross ahead of it to increase his separation distance. Pilot members thought such a gentle turn had little prospect of achieving the desired result and this proved so. However, he had also stopped the C152's climb and then watched the Saab pass clear on his RHS, 2-300 ft above. Members agreed that the C152 pilot could have taken more robust avoiding action but conceded that he had seen the SB20 early enough always to be in a position to manoeuvre his ac clear of the Saab. This persuaded the Board that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised penetration of the London TMA owing to a navigation error by the C152 pilot.

Degree of Risk: C

AIRPROX REPORT No 147/01

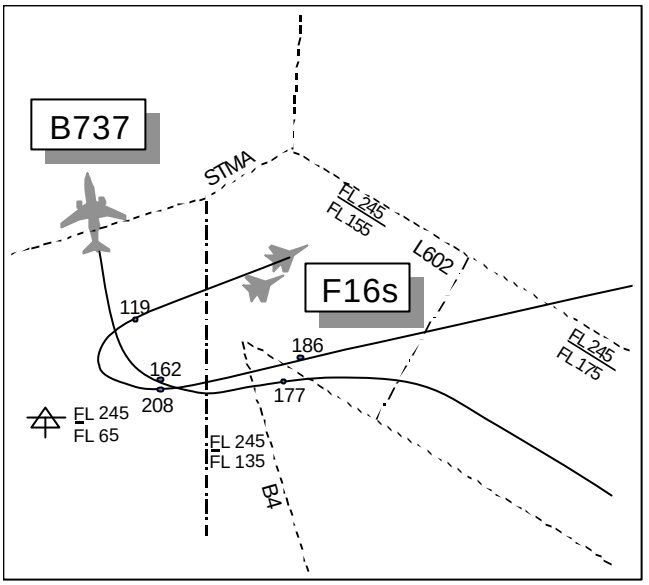
Date/Time: 21 Aug 0856

Position: 5519 N 0300 W (17 NM SE of TALLA)

Airspace: Airway B4 (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737	F16 x 2
Operator:	CAT	Foreign Mil
Alt/FL:	FL 180↓FL 130	FL210↓ FL 140
Weather Visibility:	IMC INCL < 3 NM	VMC CLBC 10 km+
Reported Separation:	2.5 NM, 600 ft 5 NM, 3000 ft	

Recorded Separation: 0.6 NM, 4000 ft



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 290° at 300 kt, descending on Airway L602 for Glasgow, IMC. He heard ScACC advising other ac about unidentified high speed multiple contacts and he was given an immediate left turn for separation. He complied but the traffic closed and he received a TCAS TA. ScACC recommended a further left turn, but he requested an immediate right turn and increased his rate of descent considerably. The traffic cleared for 20 seconds but then closed again triggering a further TA before clearing. The traffic had followed him through 3 heading changes and he appreciated the latitude he was given by ScACC to take avoiding action. He considered the risk of collision may not have been high if the intruders were using airborne radar, but the avoiding action he was having to take was hazardous for his passengers and crew.

THE F16 LEADER reports heading 270° at 450 kt on an air exercise, in communication with an AWAC ac, with a simulated surface target in Class G airspace below B4 near ESKDO. They had taken the airway into account during planning. They approached their target at 21500 ft, in mixed VMC/ IMC, and performed a simulated 30° dive attack on the target, exiting via a right turn at 14500 ft. They were at all times visual with the airliner and thought they had maintained 5 NM and 2000 ft separation from it. The AWAC passed no information on it but was giving information about ac attacking another formation of exercise ac.

SCACC reports that when the Talla (T) SC became aware from the increased activity on the Tay sector next to him that there was an incursion into controlled airspace (CAS), he saw 2 returns squawking 1616/7 closing rapidly from astern the B737. At 0854:05 he told the B737 pilot *"turn left now onto a heading of 260, immediate left turn there is traffic very close to you on your right hand side . . . turn left now"*. The pilot acknowledged the turn and advised TCAS contact. The SC suggested a climb but the pilot advised that the contacts appeared to be above him. At 0850:10 the SC cleared a further left turn, advising *"they are on your right hand side about the same level as yourself, slightly above"*. The pilot requested a right turn and further descent and the controller cleared him to FL 140. The SC then advised another airliner of the intruders 5 NM from it; its pilot confirmed TCAS and visual contact. The B737 pilot acknowledged that the intruders were turning away to his left but some 40 seconds later requested a further right turn as they began closing on him again. By 0858 the intruders had ceased to be a threat to sector traffic.

ScACC radar recordings show the F16s entering L602 at around FL 200 on a track of 250° and closing on the B737 as it descended through FL 185 in a left turn which eventually took it out of CAS. At this point the F16s are in the B737's 4 o'clock, 2 NM and 900 ft above on Mode C. As the B737 then continues into B4, the F16s continue to close to about 0·6 NM but have by then begun a climb and the vertical separation is 4500 ft at that point. The B737 has by then turned right, crossing under the F16s which continue SW for a while before turning sharply right behind it, descending rapidly out of CAS and clearing on a ENE track at FL 119.

ASACS SSU comments that the F16s were operating in the UK as part of the LAKENHEATH EXERCISE 002. They were in communication with an AWAC ac which was operating under the TACON of CAOC 9 High Wycombe; the exercise orders stated that the service operated by the AWAC would be a RIS. This Composite Air Operations (COMAO) exercise involved a total of 22 ac and the incident in question occurred during the first of 2 planned waves of activity for the day. The F16s were operating in the Offensive Counter Air (OCA) role using an AWAC frequency which was subject to moderate jamming and spoofing. At about 0850 the AWAC controller reports having noticed a potential confliction between the F16s and stranger traffic. The subsequent account from the AWAC controller differs from the perception of the calls reported by the F16 crew.

The AWAC controller indicates that he made 'stranger point-outs', initially from the bullseye reference point in use, and subsequently directly from the F16s to the stranger traffic. These calls were not acknowledged so the AWAC Fighter Allocator and 'London Military' started making traffic advisory calls to the F16s on the guard frequency. However, the F16 crews believed that the AWAC '*never gave us info on that ac but was giving info about Red air attacking the COMAO ac'.* The differing perceptions of the RT calls made may well be explained by the presence of the communications jamming or possibly that the stranger warnings were mistaken by the F16 aircrew to be information calls against 'target' ac. It is not possible to determine if either of these factors were of significance without access to RT transcripts. However, no 'cease jamming' calls (as detailed in exercise orders) were made.

Surprisingly, the AWAC report indicates that in this exercise all ac under their service, including the F16s, were provided with a RIS, contrary to orders for AWAC operations in UK airspace which requires a FIS, not a radar service, to be provided in the event of communications jamming. Furthermore, given this diversion from regulations concerning the application of services, it does not appear from the AWAC report that any attempt was made to apply Radar Control to the F16s once they had entered CAS. Although this incident did not involve an RAF AEW aircraft, UK AEW staff maintain a close liaison with their NATO counterparts and, in order to be of assistance, will draw the attention of the wider AEW community to the control service aspects of this incident at a forthcoming Multinational AEW Commanders Conference.

It is clear that the F16 crews believed they stayed outside of a 5 NM/2000 ft bubble from the conflicting traffic although the fact that they entered CAS in doing so raises a number of mission planning issues. In particular, the F16 crews statement that they *'took the airway into account during mission planning ingressing at 21500 ft'* must be called into question.

UKAB Note: CAOC confirms that while target and TOT are specified in an ATO, attack profile and route are left to the designated aircrew. The ACN associated with the exercise (01-08-0302) made it clear that normal airspace rules applied. Para 14 states *"Activities in the lower/middle airspace are to be carried out iaw standard ATC procedures. Aircraft are to remain clear of all regulated airspace and are not to climb above FL 245 until positively cleared by the appropriate controlling authority."*

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Members were advised that in addition to the encounter described between the F16s and the B737, the other traffic mentioned had also been forced to take avoiding action, and the potential knock-on effects of the last minute avoiding action

on other traffic in this busy airways junction was very serious indeed. The nature of the incursion indicated an almost unbelievable naïveté on the part of the F16 pilots; military members of the Board were firstly very embarrassed at this demonstration of military incompetence and secondly, unable to conceive how 2 pilots could together have made such a mess of planning the mission or how their plan could have been approved by any supervisors. Members concluded that if there was any supervision, it had been totally ineffective.

The Board took up the point raised by the ASACS SSU, that the pilots stated they had 'taken the airway into consideration when flight planning'. Members wondered which airway they had considered?; it did not appear to have been L602 or B4 or A1, all of which they had infringed. The Base of A1 and B4 over the target is FL 65 and it was entirely clear that a high dive attack on it from FL 200 was not feasible under the exercise orders, of which 2 copies had been sent to the F16s' base, and which stated that CAS was to be avoided. Members also had no idea where the F16 pilots' concept of a '5 NM / 2000 ft bubble' around airways traffic had emanated; it had nothing to do with UK procedures which the ACN also stated participating crews were to follow. Members also wondered what charts the F16 pilots had used since all relevant information was on the current ones.

The Board discussed the issue of whether the AWAC controller had a responsibility to keep ac under service out of CAS. Without doubt it was primarily the responsibility of pilots to avoid CAS, but members made the point that any controller had a duty of care, if he saw such an infringement occurring, to try to prevent it. It was not known at the meeting what the NATO AWAC orders stated on this issue (members requested that this should be ascertained), but in this case the AWAC controllers had apparently passed traffic information to the F16s which they had either not heard or not understood. It was probable therfore that if the AWAC ac had issued direct instructions to the F16s to turn away, they would have been no more effective.

Members concluded that the cause of the Airprox was the unauthorised penetration of Class A airspace (Airways L602, B4 and A1) by the F16s which flew into repeated confliction with the B737. The Board agreed that there had been no risk of collision in the incident since the F16 pilots were aware of the B737, and the latter's TCAS was giving good directions to its pilot to avoid the F16s.

Some members observed that writing orders for exercises in UK airspace and expecting foreign air forces to adhere to them did not appear to be a completely effective way of ensuring safety in UK CAS. The Board was advised that overseas based military aircrew were obliged to obtain a briefing on the UK LFS from UK based military aircrew before flying below 2000 ft over the UK; members suggested that the MOD should put a similar requirement upon pilots, at least from the F16s' Air Force, to obtain similar briefing and supervision before flights at any level in UK airspace. Some members considered that there might be other, as yet unconsidered, ways of achieving the desired object and consequently the Board recommended that the UK MOD should review the supervision of mission planning and briefing of foreign military aircrew on flights in UK airspace.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised penetration of Class A airspace (Airways L602, B4 and A1) by the F16s which flew into repeated confliction with the B737.

Degree of Risk: C

Recommendation: That the UK MOD considers a review of supervisory arrangements attaching to mission planning by foreign military aircrew taking part in Exercises in UK airspace.

AIRPROX REPORT No 148/01

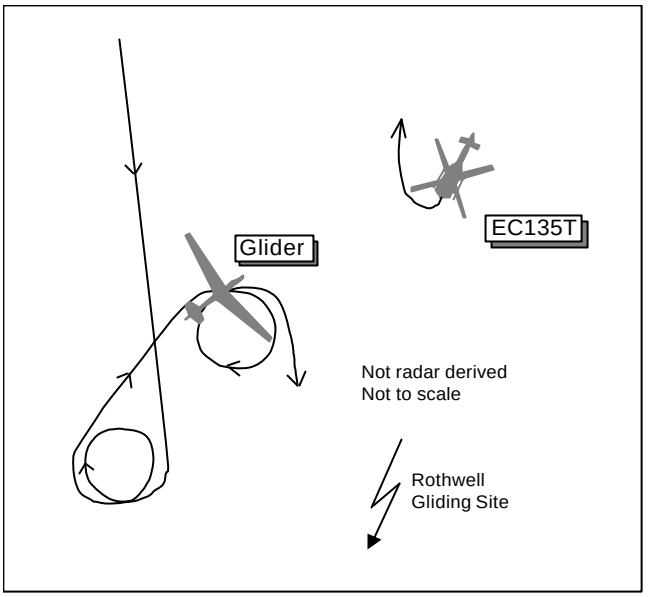
Date/Time: 21 Aug 1409

Position: 5226 N 0047 W (0·5 NM N of Rothwell)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	EC135T	Untraced Glider
Operator:	Civ Comm	NK
Alt/FL:	2500 ft (QNH 1016 mb)	NK
Weather	VMC CBLC	NK
Visibility:	>10 km	NK
Reported Separation:	0 ft V 200 m H	

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EC135T PILOT reports flying on a local photographic sortie from Husbands Bosworth Gliding Site approx. 0·5 NM N of Rothwell village. The visibility was >10 km, 1500 ft below cloud, in VMC and he was receiving a FIS/listening watch from Sywell Information on 122·7 MHz. The helicopter was coloured blue/yellow, Mode C and HISLs were switched on. He manoeuvred the helicopter into a 'free-air' hover heading 210° at 2500 ft QNH 1016 mb and noticed a glider in his 3-4 o'clock position range 0·5 NM at the same level tracking S. The glider initially passed clear but it was then observed to begin circling on the Northern edge of Rothwell in RH orbits. During its second orbit, owing to the prevailing wind (210/15 kt), the glider drifted downwind and closed to within 200 m of him at the same level. As the glider turned through about 040° towards him, he pedal-turned the helicopter to the R and dived clear on a Northerly heading subsequently returning to the same spot at 1000 ft to complete the task. It was then he observed another glider in the vicinity, at the same level as the first one, but he subsequently lost sight of both gliders in the bright sunlight conditions. He opined that the first glider had probably been riding a thermal over Rothwell and the pilot had possibly been concentrating on his ground position. He assessed the risk of collision as moderate to high.

AIS (MIL) reports that after analysis of numerous radar recordings and extensive procedural tracing action, the identity of the reported glider could not be established. There had been a regional gliding competition in progress which had a second leg which passed near to the Airprox position. Analysis of all competition ac data loggers by the Glider Club CFI revealed that no gliders were near the Airprox position during any period of the competition.

THE CAA FLIGHT OPERATIONS INSPECTORATE (FOI) reports that the helicopter crew concerned had not seen any identifiable markings on the glider and were unable to ascertain whether it had been a single or dual seat ac. Communications with Husbands Bosworth Gliding Site had enabled them to disregard any locally based gliders which were not operating in the area at the time of the incident.

UKAB Note (1): Analysis of the Clee Hill, Claxby and Debden recorded radars clearly shows the EC135T positioning to the N of Rothwell and entering a climbing RH orbit at 1408. At 1409:20 the helicopter steadies on a SSW track and 8 seconds later levels at FL 026 (2690 ft QNH 1016 mb). Two pop up primary only returns, possibly gliders, are seen at 1406:52 and 1416:20, 2 NM W

and 2 NM N of Rothwell respectively. At 1409:36 is EC135T is seen steady tracking N and descending through FL 023 (2390 ft QNH) which accords with the EC135T pilot's reported avoiding action manoeuvre; the close encounter, as described by the reporting pilot, is not observed on recorded radar.

UKAB Note (2): The incident occurred on a Tuesday about 1 NM N of Rothwell Lodge Glider Site which is only active Sat, Sun and PH during daylight hours.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the reporting pilot, radar video recordings and reports from the appropriate operating authorities.

The glider in this incident had 'right of way' and members wondered why the EC135T pilot had chosen to watch it approach for so long before taking his avoiding action. Pilot members were aware that a 'free-air' hover was an unusual manoeuvre and that it was difficult to execute accurately. It was thought that the pilot would have been concentrating quite hard on keeping a balanced/stationary flight profile which he may have been reluctant subsequently to leave after becoming established 'on task' i.e. only when the glider drifted and turned into conflict. That said, the helicopter pilot had monitored the glider's progress, realised the situation warranted action and had turned/descended out of confliction. Although some members thought this manoeuvre was left somewhat late, it was clear that the EC135T pilot was always in a position to avoid collision with the glider, even if the glider pilot had not seen his helicopter. This persuaded the Board that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction with an untraced glider resolved by the EC135T pilot.

Degree of Risk: C

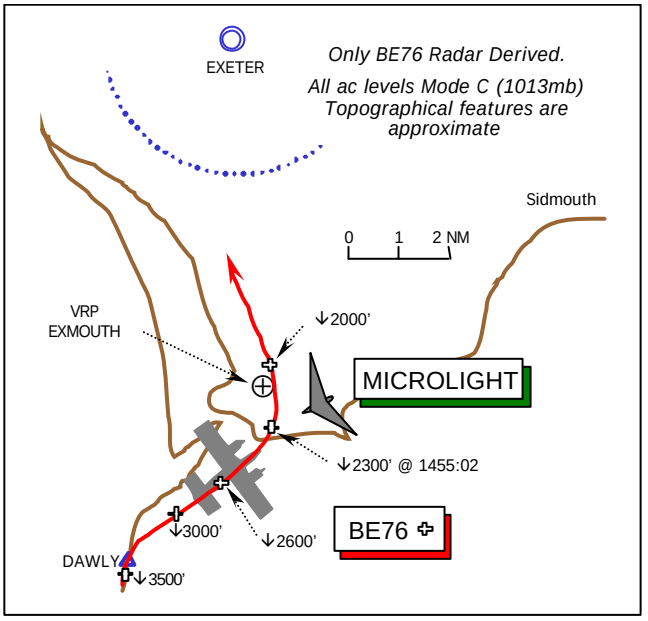
AIRPROX REPORT No 149/01

Date/Time: 24 Aug 1455

Position: 5037N 0324 W (Exmouth)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Pegasus Quantum 912 Microlight	Beechcraft 76
Operator:	Civ Pte	Civ Trg
Alt/FL:	3000 ft (QNH 1016 mb)	2700-2000 ft↓ (QNH 1016 mb)
Weather	VMC SKY CLEAR	VMC CAVOK
Visibility:	10 km	>10 km
Reported Separation:	100 ft H, 100 ft V	0.5 NM H, 300 ft V
Recorded Separation:	Not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PEGASUS QUANTUM 912 PILOT reports his microlight has a red, white and black colour scheme; neither SSR nor HISLs are fitted. He was in receipt of a FIS from Exeter APPROACH on 119·05

MHz. Flying westbound along the coast at Exmouth in a level cruise at 3000 ft QNH (1016 mb) at 50 kt under a clear sky, a low-wing twin engined ac was spotted about 0·5 - 0·75 NM away crossing from L - R. The other ac was also descending and its pilot did not appear to have seen his microlight as it descended through his altitude. To avoid the twin he made a climbing L turn and it passed 100 ft directly below his ac. He had been looking for traffic reported at 4000 ft, but had not spotted it earlier because it had been obscured behind the front strut and he had been looking higher than necessary - it had not been readily apparent to him that the other ac had been descending.

THE BEECHCRAFT DUCHESS 76 PILOT reports his ac has a white and brown livery and HISLs were on whilst returning to Exeter Airport in CAVOK conditions after a refresher flight for a student preparing for the multi-engine skills test. He was under a FIS from Exeter APPROACH on 119·05 MHz. They completed the detail near the BHD VOR at 4000 ft QNH, so they set course for the EXMOUTH VRP at 140 kt and requested a rejoin, whereupon ATC advised them of a microlight in the Exmouth area at 3000 ft QNH.

Reasoning that the microlight would not fly out to sea he instructed his student to fly just off the coast toward the EXMOUTH VRP while in the descent, which he did, until they had both acquired the microlight visually about 0·5 - 0·75 NM away and 300 ft above his ac. With the microlight in sight he instructed the student to turn L in toward the airport and they passed no closer than 0·5 NM ahead of, and 300 ft below the microlight. The subsequent descending L turn increased the vertical separation to about 1000 ft below the other ac. Neither he nor his student considered that there was any risk of collision at all, at any stage.

THE EXETER APPROACH RADAR CONTROLLER (APR) reports that he was providing a FIS to the microlight pilot who was on a local flight from Dunkeswell aerodrome at 3000 ft, Exeter QNH (1016 mb), routeing Sidmouth, Exmouth and overhead Exeter Airport, before returning to Dunkeswell.

The BE76 was also under a FIS, on a local training flight from Exeter and had been operating in the Torbay area up to 4000 ft Exeter QNH, squawking A7000 with Mode C before the pilot called to rejoin. At about 1450, the Microlight was believed to be at Exmouth westbound before turning N, but was only showing on radar intermittently as a faint primary contact. The BE76 was passing Dawlish and as both ac converged traffic information was passed to both pilots about each other's ac, which both acknowledged. As both ac passed each other in the vicinity of Exmouth, the microlight pilot commented *"that was close"*, but the BE76 pilot never reported seeing the microlight. He was advised later that evening that the microlight pilot was filing an Airprox.

ATSI comments that both pilots' were being provided with a FIS by the Exeter APR. Neither flight was identified. Traffic information was passed to both pilots' based on observation of the radar display. The BE76 crew was informed of the microlight, last reported at 3000 ft. The microlight pilot was told about the BE76, last reported at 4000 ft. The RT transcript reveals that, although the BE76 pilot reported climbing to 4000 ft, he did not report reaching the level, or descending again from it. It is not known if the transponder, which would have shown the actual level of the BE76 at the time, was visible on the display but in any case it was not verified/validated squawk - A7000. It is considered that the controller more than fulfilled his responsibilities with regard to providing a FIS.

UKAB Note: This Airprox is not shown on LATCC radar recordings; as the microlight is not fitted with a transponder it is not shown on the Burrington SSR (unlike the BE76) nor on the Clee Hill or Pease Pottage primary. The BE76 is shown descending inbound to Exeter through DAWLY at 1453:32, passing 3500 ft Mode C (1013 mb) and descending through 2600 ft Mode C – about 2690 ft EXETER QNH (1016 mb) - midway between Dawlish and Exmouth. Crossing the coast S of the EXMOUTH VRP at 1455:02, the BE76 is shown passing 2300 ft Mode C, which would equate to about 2390 ft QNH.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and a report from the appropriate ATC authority.

The Board recognised that the Exeter APR had astutely passed traffic information to the pilots of both the microlight and the BE76, which had ultimately assisted the visual sighting of each other's ac. This was sound professional practice under the FIS that pertained for the benefit of each pilot but it was based on the last reported altitudes given. It was unfortunate, therefore, that the BE76 pilot had not informed the APR that he had started a descent from 4000 ft which is where the microlight pilot was apparently looking for it. As both pilots were on the same frequency, the BE76 pilot should have heard the APR pass traffic information to the microlight pilot. Here then was an important airmanship point for all pilots - to keep ATC updated about their intentions - and pilot members considered that this might have contributed to the reported late sighting by the microlight pilot of the BE76. The microlight pilot also reported that his machine's front strut had obscured the BE76 and it is also incumbent upon pilots to ensure that they systematically check the airspace obscured by such obstructions at regular intervals. From the BE76 pilot's perspective, the small microlight might well have been a difficult target to spot head on at similar altitudes, hence, pilot members opined that the BE76 pilot had probably seen the microlight as soon as he could. Furthermore, he had taken due account of its presence and was wise to fly his initial routeing off the coast as he did. Some members also thought it would have been useful to inform the APR that he had spotted the microlight, which might also have reassured its pilot. Separation of VFR flights in the FIR relies on 'see and avoid' and here all pilots had seen each other at about the same range, albeit that the microlight pilot thought he had spotted the BE76 somewhat late. The Board concluded that this Airprox had resulted from a conflict in the FIR resolved by the actions of both pilots.

Turning to risk; the microlight was not evident on the radar recording and hence the minimum horizontal separation could not be established. However, it would appear that the BE76 was passing about 2390 ft as it crossed the coast heading toward Exeter aerodrome, albeit unverified Mode C, which might suggest that the vertical separation was perhaps more than the 100 ft reported by the microlight pilot. Some pilot members thought the BE76 crew might have been better to turn astern of the microlight, having spotted it in good time, rather than turning in front of it as they did to achieve separation. That said, the microlight pilot had made a climbing L turn which also increased separation. The Board considered unanimously that these actions had effectively removed any risk of a collision in the circumstances that pertained.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in the FIR resolved by both pilots.

Degree of Risk: C.

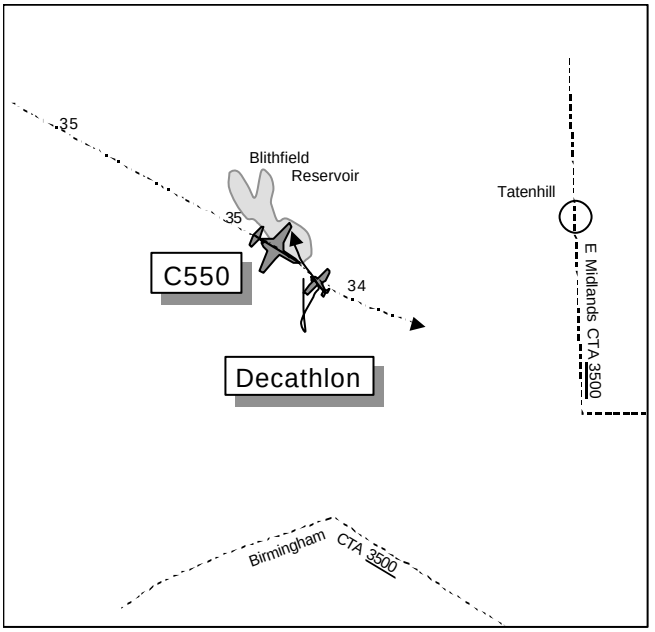
AIRPROX REPORT No 150/01

Date/Time: 25 Aug 1527 (Saturday)

Position: 5248 N 0054 W (7 NM E of Stafford)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Bellanca Decathlon	Cessna 550
Operator:	Civ Pte	Civ Pte
Alt/FL:	3000 ft (QFE 1001 mb)	3500 ft (QNH 1013 mb)
Weather Visibility:	VMC CLBC 10 km+	VMC HZBC 6 km
Reported Separation:	100 m	0.25NM
Recorded Separation:		0.2 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DECATHLON PILOT reports that having completed some aerobatics he levelled at 3000 ft, heading NW at 120 kt, and saw a civil twin jet in his 11:30 500 m away on a reciprocal track at the same level. He turned hard right, as did the jet which passed 100 m away at the same level. The risk of collision would have been high if avoiding action had not been taken, but was low because both ac turned. He was flying on the Tatenhill (elev 450 ft) QFE. He believed he was squawking 7000, no Mode C fitted.

THE CESSNA 550 PILOT reports heading 125° at 250 kt en route to Turweston at 3500 ft and receiving a RIS from E Midlands ATC. From his recollection, traffic information was passed at his 1 o'clock, 3 NM, no height information. It was hazy but he saw a high wing single engine ac about 0·5 NM ahead and turned right to avoid it; it passed about 0·25 NM away at the same level. There had been a medium risk of collision. He made the point that, while he was receiving a RIS, was transponding with Mode C, and was at the correct quadrantal with all his lights on, the other ac was receiving no ATS while flying in hazy conditions close to controlled airspace, was at the wrong quadrantal and did not appear to have its transponder or lights switched on.

UKAB Note: LATCC radar recordings show the ac closing as described by the pilots. The C550 is at 3500 ft Mode C with an E Midlands squawk, and a primary only return passes it as described, and in the reported position. There is no sign of the Decathlon pilot's reported 7000 squawk.

ATSI reports that the RT transcript confirms that the C550 pilot requested and was given a RIS by East Midlands. The pilot was warned about glider activity and, at 1526:32, was passed traffic information on a contact in his one o'clock, range 4 NM, routeing southbound, with no height information. The LATCC radar recording at the time shows the C550 at FL 35, with a primary contact in its one o'clock at a range of about 5 NM, tracking S. The recording subsequently seems to indicate aerobatic manoeuvres being carried out by the unknown ac which then tracks NW. Arguably, the East Midlands APR should have updated the traffic information, as the unknown was now routeing in the opposite direction to that previously reported, into potential confliction. (MATS Part 1, Page 1-41, RIS (b) refers). Nevertheless, the C550 pilot apparently looked in response to the traffic information, and saw the conflicting ac.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, 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.

Members could find little to discuss with this incident; it appeared that both pilots were doing their best to operate safely, and while it appeared that the sightings of each other's ac were not early, they were timely enough for both pilots to take appropriate action. The Board assessed that this had removed any risk of the ac actually colliding and that the incident resulted from a confliction of flightpaths which was resolved by both pilots.

While the traffic information supplied by E Midlands was, arguably to a small extent, technically deficient, the Board agreed that it had got the C550 pilot looking in the right direction and had assisted his sighting of a fairly small ac. Members discussed whether or not the Decathlon pilot should have obtained an ATS from E Midlands. While in this case it might have helped, members were not sure of the extent to which the unit might become swamped by local GA in Class G airspace. The Board was advised that a member had suggested to the pilot that at least it would be helpful if he was to inform E Midlands that he was about to perform aerobatics and give his location. At the same time he could get his transponder checked; on this occasion while he thought it was on, and may have been, a check could have triggered a recycling or at least made the pilot aware of the problem with it. Members also pointed out that 7004 is a squawk which will indicate to a controller that an ac is performing aerobatics.

There was also some discussion of the 'quadrantal' flown by the C550 pilot; it was fortuitous that the QNH was 1013 mb so that 3500 ft QNH was also the minimum FL. Members agreed that the minimum FL should not be used as a quadrantal

level, particularly in IMC, but while under VFR, the use of quadrantals was only advisory.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths resolved by both pilots.

Degree of Risk: C

AIRPROX REPORT No 151/01

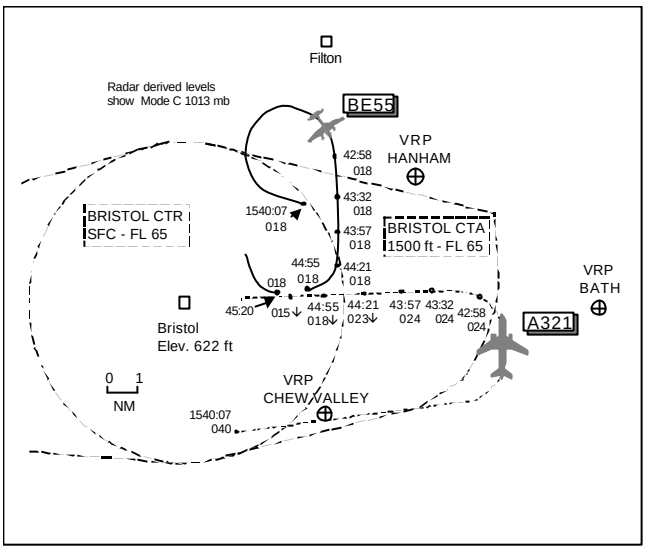
Date/Time: 25 Aug 1545 (Saturday)

Position: 5123 N 0237W (4 NM FIN APP RW 27 Bristol - elev. 622 ft)

Airspace: CTR (*Class:* D)

	Reporting Aircraft	*Reported Aircraft*
Type:	A321	BE55
Operator:	CAT	Civ Pte
Alt/FL:	1800 ft ↓ (QNH 1015 mb)	1800 ft (QNH NK mb)
Weather Visibility:	VMC CBLC 9 km	VMC HAZE 2 NM
Reported Separation:	0 V 1000 m H	400 ft V 900 ft H

Recorded Separation: 300 ft V 0·4 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A321 PILOT reports heading 271° at 150 kt established on the RW 27 ILS at Bristol and he was receiving an ATC service from Bristol TOWER on frequency 133·85 MHz. The visibility was 9 km in VMC, strobe and landing lights were switched on and he was squawking 5304 with Mode C. When he approached 4 NM DME on final approach with AP and autothrust engaged, ATC informed him of a light twin engined ac that was approaching the extended C/L from the N. TCAS annunciated a TA alert showing the traffic, initially 500 ft below, and he acquired it visually to his R in a 10° banked R turn. ATC was heard to issue instructions to the conflicting ac to turn onto a Northerly heading; it slowly diverged from the C/L as he descended below its level. He estimated the other ac passed 1000 m clear at the same level and he assessed the risk of collision as low.

THE BE55 PILOT reports flying solo inbound to Bristol from White Waltham and he was receiving an ATC service from Bristol TOWER on 133·85 MHz. The visibility was 2 NM owing to haze in VMC, the ac was coloured white/blue stripes, HISLs were on and he was squawking 0413 with Mode C. Approaching Bristol at 1800 ft QNH at 135 kt he was given continuous vectors, instructions to proceed to a VRP and was then told to orbit. Next he was issued with further vectors for R base followed by a R turn onto N. As he was commencing his R turn he saw an A321 in his 10 o'clock about 800-1000 ft away horizontally and slightly above. He increased the rate of turn, owing to the late sighting, and became unsighted, until passing 290°, when he acquired it again as it passed S abeam of him, 400 ft vertically below. He assessed the risk of collision as low. Although the Airbus had

appeared slightly closer than expected, he was not alarmed by its proximity. The hazy weather conditions had delayed acquisition, while the high ATC workload had interrupted his approach on several occasions resulting in several orbits. Once he was transferred back to the Approach frequency, he completed his approach successfully with further radar vectors.

UKAB Note (1): Met Office archive data shows the Bristol METAR EGGD 1520Z 28003KT 9000 FEW016 SCT085 23/19 Q1015.

ATSI reports that at the time of the Airprox, the relevant ATC equipment was all reported to have been serviceable and no other factors, which may have adversely affected the controllers' performance, were identified during the course of the investigation.

The BE55 pilot was inbound to Bristol Airport from White Waltham. He called the Bristol LARS Controller at approx 1528:45, gave his flight details and was allocated a squawk of 0413. The controller identified him, placed him under a FIS adding: *"....continue towards Bath for the moment and to expect to enter not above 2000 feet VFR QNH 1015*". This would have positioned the flight for a straight in approach to RW 27. The pilot said he was flying a Beech Baron (BE55), but BE36 (single engined type) was entered on the fps and this was passed to the ADC.

At 1533:30, a new LARS Controller informed the BE55 pilot that inbound ILS traffic meant he must route either to the N or S of the extended RW C/L. Expressing no preference, he was instructed by LARS to turn R 20° and route towards Hanham VRP (8 NM ENE of Bristol Airport, outside CAS). Informed that the VRP was 12 o'clock at 5 miles, he was then instructed to contact Bristol Tower for further instructions. At about the same time, the A321 pilot informed Bristol APR he was 22 NM SW, descending to FL 40. The A321 was placed under a RAS and told to expect radar vectors for an ILS approach to RW 27.

By now the BE55 pilot had contacted Bristol Tower; he was instructed to enter CAS, routeing towards R base RW 27, and was passed the QFE. Subsequently he was told to report R base for RW 27, being advised that he was number 2, possibly number 3 in traffic. The unit's MATS Part 2 states: '*APC will instruct all inbound VFR aircraft, to remain outside CAS and to enter, when instructed, via a VRP or other nominated point, ... The aircraft will then be instructed to contact Bristol Tower for onward clearance. ADC will clear the aircraft to enter controlled airspace specifying an interim reporting point as a clearance limit or circuit joining instructions.*' In this case, the clearance (direct from present position to R base RW 27) omitted the standard 'from - to - via - at' format, which meant technically the BE55 could have entered the Bristol CTR on a choice of tracks. Furthermore, the BE55 pilot was not told to remain VFR.

Both controllers explained it was usual procedure for traffic to be transferred from approach to tower, near a suitable VRP, regardless of weather conditions. Furthermore, the LARS Controller did not expect the BE55 pilot to see Hanham when transferred - that VRP is extremely difficult to identify from the air, but would be more so in the reported visibility of 9 km. The option of vectoring the BE55 into the IFR sequence was not considered since it was unit policy to hold VFR traffic off, while giving priority to IFR traffic - so the BE55 had been transferred to tower, as it approached Hanham, and no further co-ordination or discussion on the ac took place between LARS and ADC. Bristol's MATS Part 2 states: '*It is expected that the ADC will exercise positive control over all aircraft joining, leaving or operating within the traffic circuit, irrespective of their flight rules.*' A range check was to be provided by APR when inbound IFR traffic reached 12 NM from touchdown, unless otherwise specified by ADC. The ADC confirmed that checks were given but he could not recall at what range.

By 1540:00, the BE55 was 5 NM NE of Bristol Airport, inbound traffic was on a 7 NM final and the subject A321 was 4 NM S of the airport being vectored D/W LH. At that stage the BE55 pilot was instructed to carry out a RH orbit, for spacing and to report the orbit complete and the traffic in sight. On completion of the orbit the ADC told the BE55 pilot he could *"continue inbound to join R base for RW 27",* which was acknowledged correctly. Events then ran as follows:

1543:15 - ADC said "*(c/s BE55) continue inbound to right base to hold in that position there's further IFR traffic inbound now, you're number three in traffic number one is an Airbus A Three Two One*

on a seven mile final ". The BE55 pilot acknowledged (1543:25) by saying: *"Roger we'll maintain a southerly track for the moment*". At that juncture the BE55 was tracking S, not inbound, to intercept final approach at approx 5 NM from touchdown and the A321 was just establishing on the ILS at 8 NM.

1543:40 - The A321 reported 7 NM final (on the tower frequency) and was advised "*... traffic's a light aircraft is holding approximately five miles northeast of the aerodrome...*".

1544:00 - The ADC sees on the ATM the BE55 still heading south, so he instructed the BE55 pilot "*... the Airbus traffic's on a six mile final, turn right in your current position and take up a right hand orbit until advised".*

1544:10 - The BE55 pilot replied "*Take up a right hand orbit until advised (c/s)".*

1544:25 - Marks the next transmission when the ADC said "*(c/s BE55) turn right now avoiding action traffic Airbus A Three Two One in your ten o'clock range half a mile".*

1544:30 - The crew of the A321 were asked if they were visual with "*the Beech 36*" at 2 o'clock range 0·5 NM, which they confirmed they were.

Following this sequence, the BE55 pilot was told to continue the R turn and fly northwards until advised, while the A321 pilot informed ADC an Airprox would be filed. In a subsequent telephone conversation with ATSI, the owner of the BE55 (not the pilot on the day of the Airprox) advised that the pilot had flown all allocated headings by means of the autopilot.

The ADC explained that he believed the BE55 would stay sufficiently far N of the final approach for RW 27 so as not to constitute a hazard to the A321. It had been his plan to hold the BE55 on base leg and fit it in behind the A321. However, given that the next IFR inbound was less than 7 NM behind the A321 and the BE55 would require 6 NM spacing for vortex purposes, it is difficult to see how this plan would have been accomplished.

UKAB note (2): Analysis of the Clee Hill radar recording shows the incident clearly as described by ATSI until the BE55 fades from radar at 1544:55 passing heading 260° in a slow R turn at FL 018 (1860 ft QNH 1015 mb) with the A321 0·48 NM to its SE at the same level. Taking into account the BE55's rate of turn and constant speed, prior to and post radar fade, CPA is estimated to occur immediately prior to the BE55 reappearing on radar at 1545:20 (3 sweeps later) just R of the A321's 12 o'clock range 0·4 NM who is descending through FL 015 (1560 ft QNH) whereafter the BE 55 starts to diverge from RW 27 extended C/L.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

The BE55 pilot had been initially directed by ATC towards Hanham VRP from where he would eventually be integrated into the landing sequence. ATCOs thought that the ADC's plan to position the BE55 on R base (after establishing the ac over the VRP) was basically sound but the actual holding position was imprecise. However, the BE55 pilot had known from his general position that a Southerly track would put him onto extended R base and he had told the ADC "*...we'll maintain a southerly track for the moment"*. Pilot members pointed out that with the prevailing visibility, the BE55 pilot's use of AP whilst flying single crew had been entirely reasonable but, the ac should have been held over a more easily recognisable point from which the pilot would know exactly where he was relative to the airport and the RW extended C/L. The ADC had probably seen the BE55 (on the ATM) well to the N of final approach and had recognised the need for it to fly closer to the extended C/L but perhaps should have recognised that the pilot might not know exactly where he was on `base leg' when he had instructed him to *"...hold in that position"*. Conversely, the pilot should have informed ATC if he could not comply with their instructions or wished to be positioned in a more suitable area. The ADC instructed the BE55 pilot at 1544:00 to *"....turn right in your current position and take up a RH orbit until advised"*, which was acknowledged; this had in

effect re-iterated the ADC's previous instruction to the BE55 pilot to hold on R base. Much discussion followed as to whether the ADC's actions had contributed to the incident, first by not ensuring that the BE55 was held at a more suitable position for better integration and second by not ensuring that the BE55 had started to turn as instructed. However, members acknowledged the ADC had endeavoured to exercise `positive control' of the VFR BE55, but its pilot had not complied with ATC instructions and this had caused the Airprox.

Turning to risk, the ADC had passed TI to the A321 crew who then received a TA alert. Visually acquiring the BE55 turning slowly from their R, the crew watched it as it diverged away from the C/L whilst they descended through its level. The BE55 pilot had received TI on the A321 and then 'avoiding action' instructions, seeing the A321 whilst commencing the R turn, slightly later than usual, above him to his L; he had then tightened the turn and had seen the Airbus again S abeam of him and below. Taking into account the geometry of the encounter and the knowledge that the A321 crew were always in a position to take avoiding action on the BE55 if necessary, persuaded the Board that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The BE55 pilot did not comply with ATC instructions and flew into conflict with the A321.

Degree of Risk: C

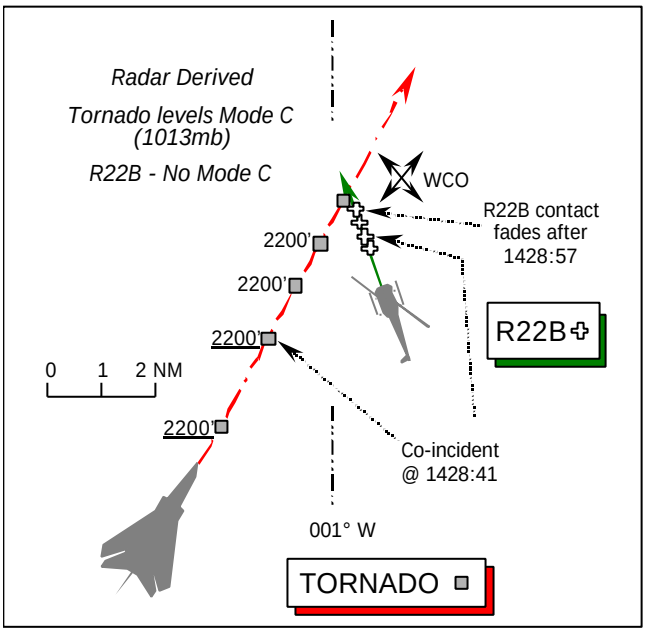
AIRPROX REPORT No 152/01

Date/Time: 16 Aug 1429

Position: 5151 N 0058 W (Westcott)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Robinson R22B	Tornado GR
Operator:	Civ Trg	HQ STC
Alt/FL:	2200 ft (QNH 1015 mb)	2000 ft (RPS 1010 mb)
Weather Visibility:	VMC CLBC >20 km	VMC CLBC 20 km
Reported Separation:	200 ft H, nil V	0·5 NM H, nil V
Recorded Separation:		Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ROBINSON R22B HELICOPTER PILOT reports his ac has a white livery and HISLs were on whilst conducting a navigation exercise with a student pilot in the RHS. He was in communication with Wycombe TOWER on 126·55 MHz and squawking A7000, but Mode C is not fitted.

Heading 330°(M) overhead Westcott disused aerodrome at 2200 ft QNH (1015 mb), flying straight and level at 80kt, he picked up a fast moving ac at 9 o'clock in his peripheral vision. The ac, a Tornado with the wings swept fully aft, then passed about 200 ft ahead from L – R within 5

seconds of first sensing its presence at the same altitude. No avoiding action was taken – there was no time available at all and neither did the Tornado pilot show any sign of taking avoiding action. He assessed the risk as "high", adding that he was flying at an altitude commonly used by GA pilots, but the workload was low.

THE TORNADO GR4 PILOT reports his ac is camouflage dark grey, but HISLs were on whilst outbound from Benson VFR at 2000 ft, after a PD. Heading 360° at about 420 kt, above LFA 1c, he was still in receipt of an ATS from Benson ATC – he thought a RIS, when he was informed of slow moving traffic ahead. He soon became visual with a small Robinson helicopter in his 12:30 – 4 NM away at the same altitude – he thought it was red and white in colour – and advised ATC that he was visual. He opted to jink L to avoid it because of the relatively restrictive and busy airspace 22 NM N of Benson, so quickly side-stepped over and passed 0·5 NM down the helicopter's port side, very slightly above it on a similar heading. Visual contact was maintained with the helicopter throughout and he believed he had maintained reasonable and safe separation from it. The helicopter was predictable and there was no risk of a collision.

MIL ATC OPS confirms that the crew of the Tornado was receiving a RIS from Benson APPROACH (APP) on 268·82 MHz whilst departing from Benson. After initially taking up a NE heading at 1500 ft Cotswold RPS (1010 mb) to depart the immediate vicinity of the airfield, the Tornado crew continued NE on their own navigation and climbed to 2000 ft RPS. After initial contact, APP passed 6 traffic information calls to the Tornado crew on otherwise unrelated traffic as they transited towards Westcott aerodrome. At 1428:21, APP reported *"...traffic right, 1 o'clock, 4 miles, similar heading, no height, possibly a glider"*, which was acknowledged. Shortly afterwards, at 1428:41, APP updated the previous report, *"...previous reported traffic right, 1 o'clock, 3 miles, right/left – correction – right/left, no height*; the Tornado crew replied, *"C/S is visual; seems to be a helicopter"*. At 1429:25, the Tornado crew transmitted *"C/S, descending to low level and thanks for the service, going en-route"*. APP confirmed the Tornado's position as 3 NM N of Westcott, instructed the crew to squawk 3/A 7000 and reaffirmed the Cotswold RPS. The Tornado crew left the frequency at 1429:35.

The LATCC radar recording shows the Tornado N of Benson squawking 7373 indicating 2200 ft Mode C and tracking 030°. At 1428:21, when APP passed initial traffic information the trail dots of a primary response – believed to be the helicopter which has faded – can be seen in the Tornado's 1 o'clock at about 4 NM crossing R - L whilst tracking NW; the primary radar response shows again at 1428:23. Both ac continue to converge on their respective tracks over the next 18 sec. At 1428:41, when APP made the next call, the R22 is slightly R of the Tornado's 12 o'clock at 2·5 NM maintaining track. At 1428:57, the R22's primary return disappears and the Tornado passes slightly ahead of the projected track of the helicopter about 5-7 seconds later on a steady course. The R22's primary response does not reappear, whilst the Tornado eventually descends once well clear to the NE.

The traffic information provided by APP was both accurate and timely enough for the crew to see and avoid the R22. With the high level of traffic in this 'popular' flying vicinity it might have been more prudent if the R22 pilot had called Benson and requested a FIS/RIS, rather than remaining with Wycombe TOWER, which is not equipped with radar.

HQ STC comments that it is unfortunate that the separation could not be verified independently. The Tornado pilot clearly believes that he saw the helicopter in good time and manoeuvred to achieve sufficient horizontal separation, although there is no evidence of this manoeuvre on the radar recording. Nonetheless, it is easy to understand how the helicopter pilot was startled by the sudden appearance of a fast moving military ac from his blindspot (although a radar service from RAF Benson might have covered this sector more effectively). Nevertheless, the Tornado crew could still have done more to avoid the situation. Having seen the helicopter in good time (4 NM), they did not take any overt action to reassure the helicopter pilot that his ac had been seen. Furthermore, given that in less restrictive airspace the crew would have more likely chosen to give the helicopter a wider berth, the decision to transit at 420 kt in an altitude band commonly used by GA traffic is questionable.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Members recognised that the R22 helicopter pilot must have felt rather vulnerable in his small machine and there was a general consensus that he would not have been able to spot the jet any earlier as it approached his helicopter from the port quarter. The Board was well aware of the general difficulty associated with the visual detection of the small Robinson R22 helicopter, highlighted by other occurrences and it may be that the HISLs had helped here. Consequently, the HQ STC member thought that the Tornado pilot did well to spot the helicopter at a range of 4 NM, which should have given a good margin of thinking/manoeuvring time. The Tornado crew were wise to obtain a RIS and the traffic information provided by Benson ZONE clearly facilitated this relatively early spot by the Tornado pilot, but the amount of traffic information conscientiously provided by APP was indicative of the traffic intensity in this fairly busy piece of airspace.

The Tornado crew evidently thought they flew no closer than 0·5 NM, but this was not apparently borne out by the radar recording. It was unfortunate that the small return of the R22 faded at the critical moment and prevented accurate determination of the CPA with certainty. Nonetheless, the projected track of the R22 placed the two ac well inside the minimum range reported by the Tornado pilot and the Board was dismayed that the Tornado crew still apparently pressed on and got as close as they did to the R22 even with the benefit of this early sighting. However, it was feasible that the very small size of the R22 had deceived the Tornado crew into misjudging their separation. Furthermore, it was possible that the relatively slow data update rate of the Clee Hill and Debden radar recording may not have captured the snap avoiding action side-step manoeuvre reported by the fast-jet pilot, but controller members were very surprised that this had not been shown clearly. A general discussion then ensued about the airmanship aspects of flying at the Tornado pilot's reported speed of 420 kt. Pilot members concurred with the HQ STC view that this was faster than it needed to be; good airmanship suggested a slower speed would have been more appropriate in this relatively crowded airspace. A controller member observed that there appeared to be little value in remaining with Wycombe TOWER for an ATS and agreed with the Mil ATC Ops perspective that an ATS from Benson might have been of more benefit to the R22 pilot. On balance there was little that the R22 pilot could have done to prevent this encounter when flying at 80 kt other than obtain a RIS, but there was widespread agreement that the Tornado crew could probably have given the helicopter a wider berth. The Board agreed unanimously that this Airprox resulted because the Tornado pilot flew close enough to cause considerable concern to the R22 pilot. That said, the Tornado pilot, who had the helicopter in sight throughout from a range of 4 NM was taking action to stay clear although not it would appear by much. The Board concluded, therefore, that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Tornado pilot flew close enough to cause considerable concern to the Robinson R22B helicopter pilot.

Degree of Risk: C.

AIRPROX REPORT No 153/01

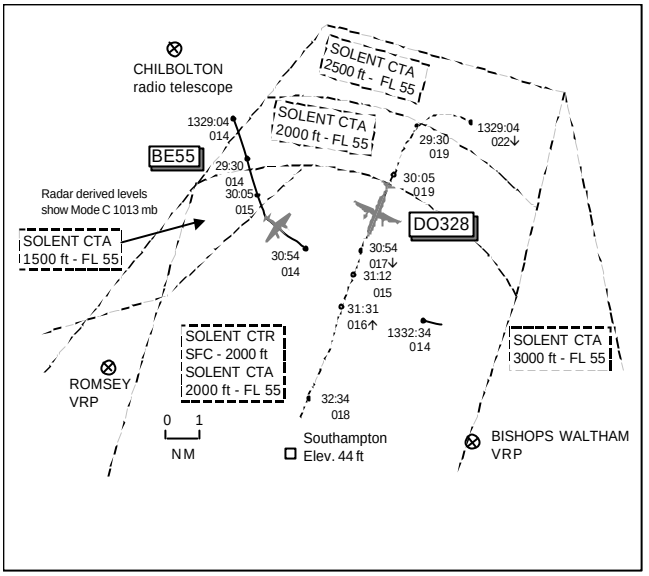
Date/Time: 24 Aug 1331

Position: 5101 N 0118 W (4 NM FIN APP RW 20 Southampton - elev. 44 ft)

Airspace: CTR (*Class:* D)

	Reporting Aircraft	*Reported Aircraft*
Type:	Dornier328	BE55
Operator:	CAT	Civ Pte
Alt/FL:	1600 ft ↓ (QNH 1017 mb)	1500 ft (QNH NK mb)
Weather	VMC CLNC	VMC CAVOK
Visibility:	>10 km	20 NM
Reported Separation:	0 ft V 0·5 NM H	0 ft V 1 NM H

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DORNIER328 PILOT reports flying inbound to Southampton from Amsterdam established on the ILS RW 20. The visibility was >10 km with no cloud in VMC and he had just been transferred to Southampton TOWER on 118·2 MHz. The ac was coloured white/red with landing anti-collision and strobe lights switched on and he was squawking 7332 with Mode C. TCAS was displaying several cyan diamonds but it was only after he had commenced descent from 2000 ft on the GP heading 205° and reducing speed through 150 kt that a TA alert drew his attention to a conflicting ac. The traffic, a light twin-engined ac, was sighted by the FO, PNF on the RHS, at about his 2 o'clock, range 2·5 NM and below. He continued descent and passing about 1600 ft QNH 1017 mb he came abeam the traffic, now at 2-3 o'clock range 1000 m. The TCAS alert changed to an RA *"climb, climb"* with which he complied and he saw the traffic pass about 0·5 NM behind. After completing the RA manoeuvre, he judged that he could no longer continue the approach so he commenced a go-around. He assessed the risk of collision as low owing to the TCAS alert even though he remained unsighted from the LH seat on the conflicting ac.

THE BE55 PILOT reports heading 140° at 160 kt and 1500 ft QNH 1015 mb en route from Thruxton to France in receipt of a FIS from Solent on frequency 120·22 MHz. The visibility was 20 km in CAVOK, the ac was coloured white/blue stripes with strobe lights switched on; TCAS was not fitted to the ac. He informed ATC of his intended track (140°) and he was allocated a squawk code 3667 which he selected with Mode C; he understood that it was OK to enter the CTR after he was placed under a FIS. The RT was very busy throughout his transit of the Solent area and it was when he was about 9 NM N of SAM, he thought, that he first saw a Dornier ac in his 10 o'clock range 2 NM crossing L to R which he believed was descending on the ILS RW 20; he had received no warnings from ATC on this traffic. He continued on track maintaining 1500 ft, whilst monitoring the DO328 visually, as he thought ATC were happy with the separation. When the horizontal separation distance approached 1 NM with the DO328 at the same level, he decided that the distance was inadequate so he altered course by turning L initially onto heading 090° to pass behind and informed ATC of his manoeuvre. The Solent controller advised that he had not been given clearance to enter CAS at which point the Dornier was seen to commence a go-around, he presumed in response to a TCAS RA alert. He replied that he would vacate the CTR as quickly as possible to the NE. He later

spoke to the Solent Supervisor after landing and believed that there had been a basic misunderstanding about his initial clearance through the zone. He assessed the risk of collision as low.

UKAB Note: The Southampton METAR shows EGHI 1320Z 18006KT 9999 FEW028 24/15 Q1016

ATSI reports that there were three controllers involved in this Airprox, one of whom was working with a trainee. These controllers were operating Southampton ADC (mentor and trainee), Southampton APR and Solent APR positions. The relevant ATC equipment was reported as serviceable at the time of the Airprox and no other factors, which may have adversely affected the controller's performance, were identified during the course of the investigation. The radar equipment used at Southampton comprises of a Plessey Watchman primary radar with secondary supplied via a feed from the Pease Pottage SSR. At the time of the Airprox, the Solent APR's workload was quite high due to the large number of VFR flights in the area, together with a minor air display taking place at Portsmouth.

The DO328 contacted Southampton Approach at 1320:25, maintaining FL 80 on course to PEPIS, 15 NM NNE of SAM. The controller advised that the RW in use was RW 20 and that the crew could expect radar vectoring to the airport overhead, followed by a LH cct for an ILS approach. Subsequently, the DO328 was given descent to 3000 ft and soon after, at 1327:55, to 2000 ft when the ac was approx 8 NM NE of Southampton, late downwind LH. Southampton Approach instructed the DO328 to turn L onto base leg at 1328:20 and, shortly afterwards, the BE55 called Solent Approach. The pilot of the BE55 gave his details advising that he was on a direct track from Thruxton to Rambouillet at 1500 ft, passing Chilbolton, 12 NM NNW of SAM, and would pass "*just east of the airport*". The Solent Controller instructed the BE55 to squawk 3667, passed the QNH and advised that the ac was receiving a FIS. A primary return was seen in the approx location but the controller did not see the allocated squawk appear and so the ac remained unidentified and, furthermore, the discrete code was both unvalidated and unverified. The controller reported that it was common practice at the unit to allocate a squawk to such traffic, especially when Solent and Southampton Approach were operating from separate but adjacent positions, to assist the controllers in monitoring traffic in communication with the unit. MATS Part 1 requires controllers to validate Mode A codes as soon as possible and, once the ac is identified, to verify the Mode C. The controller recalled that he had been engaged in co-ordination and RT calls at the time and, consequently, he did not ask the BE55 pilot to recycle the squawk when it did not appear on his radar display. He also advised that it was his normal practice to instruct such ac to remain outside CAS but, on this occasion, he had inadvertently failed to do so. It was not until he heard the RT recordings that he discovered his omission and he believed this was due to the fact that his workload was starting to increase. In his report, the pilot of the BE55 confirms that he was seeking a clearance to transit controlled airspace. He wrongly believed that once the Solent Controller advised that he was providing a FIS it was "..*OK to enter the zone*".

The Solent Controller reported that the SSR code allocated to the BE55 did not appear until the time of the Airprox. However, a replay of the relevant radar recording from the Pease Pottage SSR data shows a slightly different picture with the 3667 squawk appearing at 1329:04, approx 9·5 NM N of Southampton and just over 7 NM W of the Dornier. The recording shows the squawk following a track of 140° into Southampton's airspace but it disappears at 1330:54 when 1·65 NM W of the DO328. It reappears at 1332:34 after the Airprox has occurred. It has not been possible to explain why the radar recording differs from the controller's recollection.

The Solent Controller did not recognise that the BE55 was tracking towards the zone and, because the base of the CTA in that area is 2000 ft, the ac could have routed clear of the CTR maintaining 1500 ft. Although the pilot had stated he was on '*a direct track*', it would have been unreasonable to expect the Solent Controller to be aware of the track from Thruxton to Rambouillet, which was approximately 140°, and would pass some 4 NM E of SAM. Furthermore, the pilot had not requested a clearance to enter Southampton's CAS and accordingly the controller believed that the ac would be routeing around the zone to the E. The Solent Controller explained that he had remained busy, co-ordinating traffic with both the ADC and

Southampton APR, throughout the period between the BE55 first calling and the time of the Airprox, a period of some 3 minutes. This is borne out by the relevant RT recordings.

The LATCC radar recording shows the BE55 crossing the CTA boundary 8 NM N of Southampton shortly after 1329:30, maintaining 1500 ft when the DO328 is 5·5 NM E of it. The Dornier pilot reports established on the LLZ and is instructed to contact Southampton Tower at 1330:05. The Solent APR observed the 3667 squawk at 1331:20 and asked the BE55 to confirm he was squawking the code, almost in disbelief because of where it had appeared. The pilot replied "*Affirm, we have the ATR in sight doing a go around*". The ADC stated that he had checked the ATM when the DO328 reported on frequency and saw no traffic other than that, which was known. At 1331:35, the Dornier pilot reported that he was responding to a TCAS RA whilst at 3·5 NM. Meanwhile, the Solent Controller informed the BE55 pilot that the ac he could see had been making an approach to land and that he must turn L immediately and leave CAS to the E. The pilot was also reminded that he had not been issued with a clearance to enter CAS and, incorrectly, that he had been instructed to remain outside CAS.

There is no evidence to indicate the Southampton APR became aware of the presence of the BE55 before the Solent Controller and she did not recognise the confliction between it and DO328. Even when the Solent Controller became aware of the contact, he did not pass TI nor give avoiding action to the BE55. He explained that this was due to the relative positions of the returns at the time the conflict was observed. Although the words 'avoiding action' were not used, the instruction to turn L immediately served to resolve the conflict quickly.

The controller was asked about the radar coverage at the unit and if he could account for the difference in what he reported and the SSR recording obtained by ATSI. He was unable to explain the latter but advised that primary cover to the W of the unit is often poor. On occasions ac approaching the CTR from that direction at 1500 ft had not be seen on radar until the CTR boundary. Following the Airprox, work was carried out on the radar and it is understood that the primary coverage has improved as a result.

On a direct track, the distance from Thruxton to the Southampton CTR boundary is approx 12 NM. It was therefore not possible for the pilot of the BE55 to have provided the Solent Controller with 10 minutes notice of his request to enter CAS. Under such circumstances it is incumbent on the pilot to take particular care and ensure that he does not enter CAS until the necessary joining or transit clearance has been issued.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, recordings of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

It was apparent from the BE55 pilot's report and the RT recording that he had erroneously mistaken the sequence of obtaining a squawk allocation and the provision of an ATC FIS as formal approval to enter the Class D Solent airspace on his planned direct track (140°). He must have thought this by-passed the standard sequence of requesting, obtaining and acknowledging an ATC clearance to do so. Although the pilot had not specifically asked for transit clearance, only informing the ATCO of his "*direct track.....to pass just E of the airport"*, it may have been prudent for the Solent APR to have asked the pilot what he wanted to do. As it was, the Solent APR was sure that he had instructed the pilot to "*remain outside CAS"* but this was not borne out on the RT. Even so, ATCO members thought that the onus was squarely on the BE55 pilot to remain outside CAS until cleared in even if the controlling ATCO had not told him to do so. Members agreed therefore that the actions of the BE55 pilot had caused the Airprox.

A good learning point from this incident was that pilots must ensure they get a specific ATC entry/ transit clearance before penetrating CAS even if placed under an ATC service by the controlling ATSU. Also noteworthy, pilots intending to transit through CAS should always have an alternative routeing planned to enable them to route clear in case ATC entry/transit clearance is not forthcoming.

Moving on, members were concerned that the radar data displayed and seen at Solent/Southampton had been different to that available to ATSI/UKAB

from recorded radars. It was understood that the Southampton primary radar coverage had been less than ideal but had improved post incident. Yet there had still been a discrepancy between the Pease Pottage SSR data (seen in the Southampton Approach Room and in ADC on the ATM) and the LATCC recorded information. The Solent APR had not seen the BE55's SSR code until immediately before the Airprox whilst LATCC radar had shown the allocated SSR code as it approached the CTA boundary until it faded 15 seconds prior to the encounter. The loss of SSR data on the BE55 would have denied the Solent APR the ability to see and react to its CTA/CTR entry and potential confliction. However, the Solent APR had been busy during the 3 minutes between the BE55 pilot's initial call and the Airprox and may have consequently missed the BE55's CAS entry. Also, neither the Southampton APR nor the ADC had commented on, or apparently observed, the BE55 in potential confliction with the Dornier. However, the Southampton APR had transferred the DO328 to ADC and probably had been busy with other ac in the sequence whilst the ADC would probably only have used the ATM to check the distance from touchdown of the DO328 and not for radar traffic conflictions. No reason had been forthcoming on this label display anomaly and the NATS advisor agreed to follow up the matter with the Southampton ATSU.

Post Meeting Note: No technical faults had been found with the Southampton Radar Display System (RDS) post-incident. The Southampton ATC Manager had, in agreement with locally based operators, agreed to carry out flight path monitoring of ac, within similar quadrants as flown by the BE55, to ensure that the RDS is functioning correctly.

Turning to risk, pilot members made comment that the DO328 pilot had seen the conflicting ac yet had continued descent on the ILS without making comment to ATC of its presence. Perhaps, in the circumstances, he assumed that ATC had the BE55 under control on another frequency and that it would turn clear of his flight path. But it did not and both ac closed sufficiently to trigger a TCAS RA alert. The BE55 pilot meanwhile had seen the Dornier in good time and had turned to pass behind it when he thought that separation was becoming inadequate. All this had been monitored by the DO328 crew who had received a TA alert on the conflicting BE55 before complying with the RA climb manoeuvre. On the ground, the Solent APR had only seen the BE55 late as its pilot reported visual with the Dornier carrying out a go-around. After some debate, two points - the visual acquisition by the subject ac pilots and consequent avoiding action manoeuvres - led the Board to conclude that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised penetration of Class D airspace by the BE55 pilot.

Degree of Risk: C

AIRPROX REPORT No 154/01

Date/Time: 24 Aug 1054

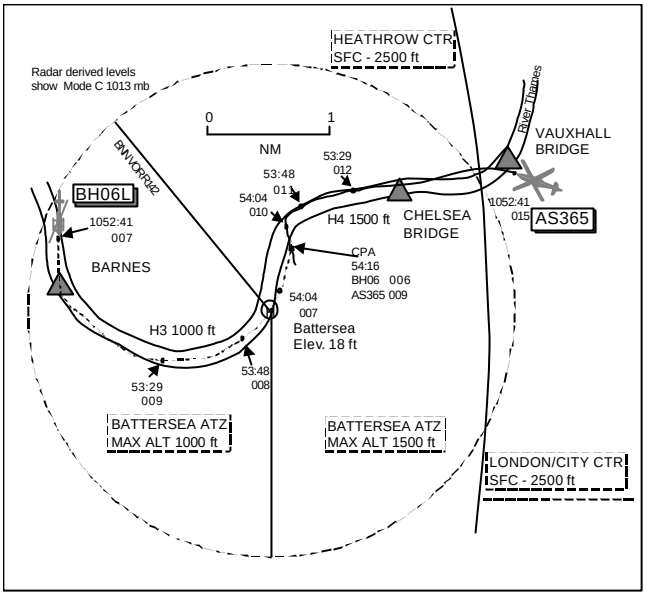
Position: 5128 N 0010 W (0.5 NM NNE of Battersea - elev. 18 ft)

Airspace: CTR (*Class:* A)

Reporter: Battersea ADC

	First Aircraft	*Second Aircraft*
Type:	BH06L (Long Ranger)	AS365 (Dauphin)
Operator:	Civ Exec	Civ Comm
Alt/FL:	1000 ft (QNH NK mb)	1500 ft (QNH NK mb)
Weather Visibility:	VMC CAVOK >10 km	VMC CAVOK >10 km
Reported Separation:	300 ft V	500 ft V 0 H

Recorded Separation: 300 ft V 0 H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BATTERSEA ADC reports that the BH06L had been co-ordinated with Heathrow to join D/W LH for RW 21 and was seen from the VCR as it passed Barnes reporting point. He passed TI on the subject AS365, which was joining from Vauxhall Bridge and which had been co-ordinated earlier with Thames Radar, to the Long Ranger pilot who had called on frequency first. The AS365 pilot called and was cleared to join straight-in for RW 21 to position No 2 to the BH06L, which was by now D/W LH and No 1 in traffic. The ADC saw the Dauphin, which appeared too high (he estimated about 1500 ft) to complete a straight-in approach and too close to 'fit in' behind the BH06L, which was now commencing a turn onto base leg. He instructed the AS365 to continue on the Northern side of the river Westbound, which would have given the Dauphin pilot more space to position behind the BH06L; he passed this instruction twice. The AS365 pilot then turned to position himself No 2 behind the Long Ranger, both helicopters landing safely thereafter. He later spoke to the Co-pilot of the AS365 who apologised for the incident, citing poor command of the English language by the Capt. He also believed that neither crew members carried out their D/W or final calls as instructed by ATC and that the AS365 had completely overshot the Heliport during their arrival.

UKAB Note (1): The Battersea METAR shows EGLW 1020Z 24007KT 180V270 CAVOK 25/// Q1016.

THE BH06L LONG RANGER PILOT reports flying inbound to Battersea from a private site near East Midlands and he was receiving an ATC service from Battersea TOWER on 122·9 MHz. The weather was CAVOK, his helicopter was coloured blue/white with anti-collision light switched on and he was squawking 7054 with Mode C. He was approaching the Heliport from the W at 1000 ft QNH and had been asked to report D/W LH for RW 21. He heard on frequency another helicopter joining from the E, whose pilot was told of his position and their number in the traffic sequence. When D/W heading 030° at 100 kt, he sighted the AS365 in his 11 o'clock range 1000-1500 m and above him; ATC were heard to instruct the other helicopter to turn away. As he commenced a turn onto base leg, the Dauphin was heading towards him in a descent and passed about 300 ft above and close behind him although he was not at all concerned by his proximity. He thought that the Dauphin's crew may

have been unfamiliar with the Battersea procedures or their position. They appeared not to have seen him initially and were positioning for an approach to RW 21 and may not have understood the ATC instructions passed to them. TCAS was not fitted to his helicopter and he thought that the incident would have looked far worse from the ADC's perspective than his.

THE AS365 DAUPHIN PILOT reports flying inbound to Battersea from Ostend at 1500 ft QNH and receiving an ADC service from Battersea TOWER on frequency 122·9 MHz. The weather was CAVOK, the helicopter was coloured yellow with anti-collision light switched on and he was squawking 7062 with Mode C. Owing to intensive helicopter traffic at and expected over the Heliport, Thames Radar instructed him to proceed via Vauxhall or Chelsea Bridges (he could not remember precisely) at 1500 ft instead of routeing directly to Battersea for which he had initially been cleared to do. He altered course and proceeded along the RHS of the riverbank and contacted Battersea stating position, POB and negative refuel required, in accordance with standard procedures. The controller then passed him a long transmission which instructed him to position No 2 behind a helicopter which was LH D/W for RW 21 and to proceed via the N side. Before he had fully understood the message and was able to comply, he was then rather close to the Heliport and with only a short time to react. The inbound routeing via H4/Chelsea Bridge showed an inbound track from the NNE which involved crossing the RW 21/ 03 extended C/L in order to remain on the N side which had confused him slightly. Almost immediately he saw the Long Ranger 500 ft below him in his 11 o'clock range 0·5 NM, in the D/W position at 1000 ft. He commenced descent and turned L to pass 500 ft over and just behind the BH06L into a D/W position as No 2 in traffic. He assessed that there had been little risk of collision owing to the vertical separation during the encounter. He went on to say that there had been only a very short reaction time owing to the late radio change-over point near Vauxhall Bridge and the long radio transmissions/instructions from ATC had complicated the situation very quickly. He thought that it would have been better had he been instructed to hold over Chelsea Bridge until the other helicopter had positioned onto final approach to ensure better separation.

ATSI reports that London Battersea Heliport is situated within Class A airspace of the London CTR. Arriving/departing traffic operate on Special VFR clearances, with separation being provided geographically, using the N and S side of the River Thames. The heliport has an ATZ of 2 NM radius, with an overall upper altitude of 2000 ft aal. The UK AIP (AD 3-EGLW-4-1) shows that, to the E of a line drawn from due S of the heliport through to the Bovingdon VOR Radial 142, the maximum operating altitude is 1500 ft and to the W 1000 ft, cct height is 1000 ft amsl.

The Battersea ADC described his workload at the time of the incident as light and the weather conditions were CAVOK.

The Heathrow Special VFR Controller, who was controlling the subject helicopters, telephoned the heliport at 1051 to update the ADC about their arrival. At the time, the BH06L was approaching Barnes and the AS365 was inside the London City CTR routeing towards Vauxhall Bridge; the BH06L established communication with London Battersea Heliport shortly afterwards. The controller said that he could see the Long Ranger at the time and cleared it to join D/W LH for RW 21. TI was passed on the subject Dauphin inbound via Vauxhall Bridge and the pilot reported looking for the traffic. The ADC admitted that specification of a cct direction was at variance with procedures detailed in the Battersea MATS Part 2, Page 3-7, which states that *"The direction of the circuit will not normally be specified, as confusion may arise during application of geographical separation. Reference to left/right hand circuit patterns will only be made to traffic joining from direct tracks from the East/Southeast".* The controller said his initial intention was to clear the BH06L for a straight-in approach on RW 03 but realising that the surface wind now favoured RW 21, he changed his mind. This, he reasoned, may have led to him, inexplicably, stipulating the cct direction.

The AS365 pilot made his initial call on the Battersea frequency at 1052 (corrected to 1052:40 see UKAB Note 4) reporting over Vauxhall Bridge, which is situated just outside the ATZ, at 1500 ft. He was informed that: *"you're number two following a Bell Long Ranger that's joining downwind left for two one surface wind two three zero degrees seven report traffic in sight"*. The pilot's reply, saying he

was number one, was corrected by the controller. This was acknowledged and the pilot confirmed he would report the traffic in sight. No specific joining instruction e.g. a straight-in approach, was passed to the AS365, nor was any mention made of the flight remaining N of the river to maintain separation from the BH06L.

The controller said that when the AS365 pilot contacted him, the BH06L was overhead the heliport on its D/W leg.

UKAB Note (2): The RT transcript shows that the AS365 contacted Battersea passing Vauxhall Bridge over 70 seconds before the BH06L pilot reported downwind.

Due to bends in the river, the ADC as unable to see the AS365 at Vauxhall Bridge (approx. 2 NM away) but estimated that the BH06L would be able to complete its approach safely ahead of it. His plan, although admittedly not with the benefit of separation being established initially by geographical means, was to provide separation by using 'reduced separation in the vicinity of an aerodrome' as stated in the MATS Part 1, Page 1-13, i.e. *"In the vicinity of aerodromes, the standard separation minima may be reduced if: (a) adequate separation can be provided by the aerodrome controller when each aircraft is continuously visible to this controller, or (b) each aircraft is continuously visible to the pilots of other aircraft concerned, and the pilots report that they can maintain their own separation, or (c) when one aircraft is following another the pilot of the succeeding aircraft reports that he has the other in sight and can maintain separation"*. The controller said that, although he continued looking for the AS365, he did not see the helicopter because, being above the circuit height at an altitude of 1500 ft, the view of it can be obscured by a beam in the window of the VCR. He eventually spotted the AS365 at a range, he estimated, of 1800 m. Immediately, realising that the subject helicopters were on conflicting flight paths, he instructed the AS365 pilot to *"continue downwind northern side to continue behind the traffic that's joining downwind left"*.

UKAB Note (3): The RT transcript shows this transmission at 1053:18 (corrected to 53:58 see Note 4); the pilot responded *"and we er going downwind north heli AS365 c/s"*. The ADC then replied at 1053:30 (corrected to 54:10) "*continue joining downwind northern side continue straight ahead you're routeing now nose to nose an aircraft joining downwind ..northern side of the Thames sir"*. The pilot replied "*north down ?????? AS365 c/s*".

No avoiding action instructions were passed. The pilot of the AS365 later reported that he had been rather confused by this initial instruction but almost immediately he had spotted the other helicopter in his eleven o'clock, 0·5 NM away, 500 ft below. Keeping it in sight, he had started his descent, turned L behind it, and had positioned number two. The radar recording of the event, using LATCC supplied information, reveals that as their respective radar blips merge the subject helicopters are separated vertically by 300 ft. NB Battersea ATC is not equipped with radar.

The ADC agreed that he should have provided separation between the subject helicopters in accordance with local procedures. However, he made several comments about the operation at Battersea which he felt may have contributed, in some measure, to this occurrence: The view of helicopters turning onto final approach for RW 21, from the S, is partially obscured by trees; helicopters approaching from the E are not visible until they are quite close to the heliport due to bends in the river. He considered that, on this occasion, if the pilot of the AS365 had made a position report at Chelsea Bridge, a compulsory reporting point on route H4, it would have assisted him in determining the correct order and in taking appropriate action. When inbound helicopters call at, or close to, the ATZ boundary, there is little time for ATC to resolve any conflictions. The UK AIP, Page AD 3-EGLW-1-5, specifies that inbounds '**MUST**' establish radio contact with ATC Battersea before entering the ATZ but in his experience this does not always occur.

These comments, made by the controller about the factors which may have contributed to this incident have foundation i.e. trimming of trees on the S bank of the river to the E of the heliport would be beneficial, as would earlier calls by inbound helicopters before the ATZ boundary. Telling pilots, approaching from the E, to report at Chelsea Bridge would also assist controllers in planning traffic sequencing. It is understood that these matters are being addressed by local ATC management.

UKAB Note (4): Analysis of the Heathrow radar recording shows a discrepancy between the radar positions of the AS365 and BH06L with the PIREPs on the RT transcript. Further investigation with Battersea, through ATSI, showed that the timing clock on the RT recorder, was adjusted on the 2nd September (9 days after the incident), as it was then 32 seconds slow. This timing check for accuracy was carried out monthly using an allowable tolerance of ±15 seconds. Correlation of actual positions on radar and RT transcript indicates about 40 seconds difference between the two. CPA occurs at 1054:16 when radar returns merge as the helicopters cross in opposite directions separated by 300 ft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

ATCO members sympathised with Battersea ADCs whose operational controlling options were limited owing to the ATZ's position within the Class A London CTR, relative to the Helicopter low level routes and being sandwiched between Heathrow SVFR operations to the W and Thames Radar operations to the E. Therefore, strict adherence to the promulgated procedures was essential. It was known that calls from pilots, required before entering the ATZ, did not allow the ADC much time to sort out the traffic; in this case only 70 seconds elapsed between the AS365 pilot's call at Vauxhall Bridge and the BH06L reporting D/W. The ADC had told the Dauphin pilot that he was number two following the Long Ranger but he did not pass specific instructions to maintain geographical separation – e.g. remain N bank of the river - until reduced separation in the vicinity of an aerodrome could be used. Although the AS365's pilot did not report at the compulsory reporting point Chelsea Bridge, his initial call at Vauxhall Bridge approaching from the E had given the ADC enough warning of his impending arrival. Owing to an obscured view in that direction, the ADC would only see the approaching traffic late. It was essential for him therefore to adhere to the local separation procedures until visual with the subject ac or either pilot could see each other and could separate themselves. The option of holding at Chelsea Bridge was not available owing to noise constraints but pilot members thought an alternative would have been to ask the helicopter pilot to reduce his speed to fit into the cct pattern. However, on this occasion the ADC had not separated the subject helicopters in accordance with local procedures which members agreed had led to the Airprox.

Looking at the risk element, the helicopters were fortunately vertically separated by 500 ft on their respective inbound routeings. The ADC had noticed the confliction but then proceeded to pass confusing instructions to the AS365 pilot with respect to the downwind position and the northern side of the river. Although the AS365 pilot had left the N bank of the river towards the Battersea overhead, he was above the BH06L when he saw it, albeit late, and was able to manoeuvre above and behind into a LH cct pattern. The Long Ranger pilot had seen the Dauphin when established D/W and watched it carry out its descending turn whilst he turned onto base leg. These elements, although untidy on there own , combined effectively to persuade the Board that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Battersea ADC permitted a loss of geographical separation before being able to establish reduced vertical separation in the vicinity of an aerodrome.

Degree of Risk: C

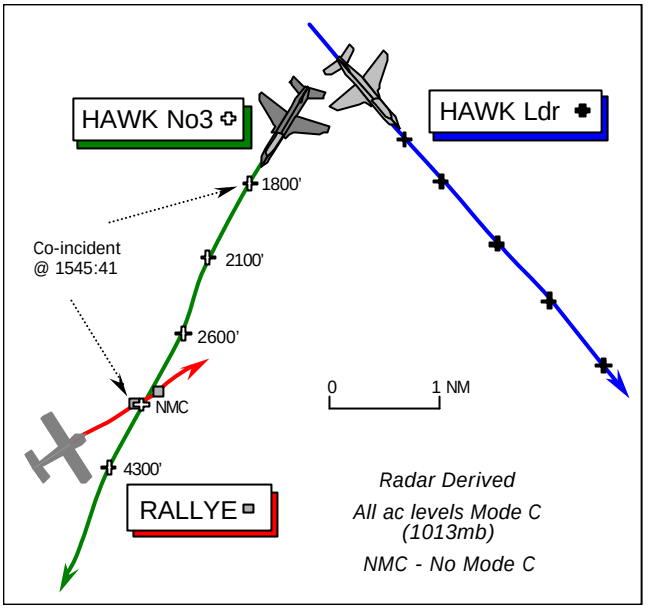
AIRPROX REPORT No 155/01

Date/Time: 28 Aug 1545

Position: 5358 N 0035 W (8 NM NW of Leconfield)

Airspace: Vale of York AIAA (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Hawk	Rallye 150
Operator:	HQ STC	Civ Pte
Alt/FL:	2000 ft ↑ (RPS 1014 mb)	2000 ft (RPS 1014 mb)
Weather Visibility:	VMC Nil Sig >20 km	VMC Nil Sig Unlimited
Reported Separation:	100 ft V	1000 ft H, 500 ft V
Recorded Separation:	Not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK PILOT reports he was the No3 of a formation of 3 Hawks conducting practice intercepts (PI) in the Vale of York under an Air Defence Information Service (ADIS) from CRC Buchan. HISLs were on. After completing a low level run whilst acting as target, heading SW about 8 NM NW of Leconfield, he was climbing to 5000 ft RPS (1014 mb) in good visibility with no cloud. Passing 2000 ft at 400 kt, he spotted a light ac - blue in colour - heading E, at R 1 o'clock about 400 m away at the same altitude; he pulled up sharply to avoid the other ac, which he overflew by about 100 ft with a *"medium"* risk of a collision. The Airprox was reported to CRC Buchan.

UKAB Note (1): The Hawk pilot reports the GCI Weapons Controller (WC) had not offered any traffic information or avoiding action until a call of "...traffic right 1 o'clock, 1 NM". A review of the Buchan transcript reveals that at 1545:42, the WC reported to the No3 Hawk pilot *"...one stranger dead ahead 13 heading towards slow no height".* Four sec later, the No3 Hawk pilot reported *"I think we've just had an Airprox"*. Subsequently, when asked *"...how close"* by the WC, the No3 responded, *"Quarter of a mile, and we managed to get out suitable vertical displacement by about...50 to 100 feet"*.

THE RALLYE 150 PILOT reports he was flying alone from Sherburn-in-Elmet to Eddsfield; his ac has a dark blue colour scheme, but HISLs are not fitted. SSR is fitted but neither Mode A nor Mode C was selected on. He was heading NE cruising in level flight at 2000 ft BARNSLEY RPS (1014 mb), he had just selected the next radio frequency when he looked up and saw a jet, about 1000 ft to port and 500 ft above his ac banking away. No avoiding action was taken as none was required at that stage. He checked to see if any other jet was in the area, as he was aware that they invariably operate in pairs, but saw no other ac and assessed the risk as *"none"*.

UKAB Note (2): The LATCC Claxby radar recording shows the lead and No3 Hawks commencing a split to open for their next PI at 1545:30. The leader heads SE climbing to FL 95, whilst the No3 steadies south-westerly and climbs through 1800 ft Mode C (1013 mb) – equating to about 1830 ft RPS (1014 mb) - at 1545:41. Meanwhile, the Rallye is shown as a primary contact only, tracking slowly ENE, in the No3 Hawk pilot's 12 o'clock just over 2 NM away, but fades from radar contact on the next sweep. The No3 Hawk and Rallye converge on their respective headings; the Hawk indicating 2600 ft Mode C - equating to 2630 ft RPS at 1545:56.

No Mode C is shown on the next sweep at 1546:05, which is when the Airprox probably occurred, as the Hawk overflew the Rallye, but as the latter is not shown the minimum separation cannot be determined with certainty. The next radar return shows the Hawk at 4300 ft Mode C - equating to 4330 ft RPS – in conformity with the avoiding action 'pull-up' reported by the Hawk pilot.

ASACS SSU comments that the Hawk leader and No3 were in the Vale of York with the No2 holding over the sea to the N under the control of CRC Buchan. The Buchan WC was providing the No3 with an ADIS, which below 5000 ft was deemed to be a FIS.

The WC was alert to other potentially conflicting low level traffic during the sortie, but switched from the Claxby to the Staxton Wold Radar for a crucial period just prior to the Airprox. A standard Transmit Inhibit Sector (TIS) was in place on the Staxton Wold radar which meant that, over a defined sector, detection and tracking was only possible on secondary radar. Subsequent analysis shows that the non-squawking Rallye was, during this period, detected for almost 2 min on the Claxby Radar although the WC was not aware of this at the time. After switching back to the Claxby Radar to finalise the intercept, the WC detected 2 non-consecutive unassociated contacts, which he discounted as ground clutter. The supervising Fighter Allocator (FA) only saw the primary response from the Rallye at about the same time as the No3 reported the Airprox.

A review of the RT transcript reveals that the WC advised the Nos2 & 3 that they are under an *"Air Defence Information Service 5000"*, which, in accordance with HQ 2 Gp GASOs means that:

a. Below 5000 ft (the base of the radar coverage in this area) the service will be a FIS.
b. From 5000 ft to 7000 ft the service provided will be a Limited RIS.
c. From 7000 ft to 24000 ft the service will be a RIS.

Although the WC fulfilled his obligations under FIS and may well have been prioritising his attention on providing a RIS to other elements of the formation, his inappropriate selection of the Staxton Wold radar head denied him an opportunity, albeit narrow, to detect the non-squawking Rallye. Under the terms of the ADIS in this busy area of airspace the pilot of the No3 was, however, responsible for the safe avoidance of other ac. We note that, although it was not switched on, the Rallye was SSR equipped. On this occasion, selection of the VFR conspicuity code would have aided radar detection and hence, possibly traffic information, which would have alerted the Hawk pilot to the presence of the civilian light ac earlier.

This use of the term ADIS is promulgated in the GASO to obviate the need for an otherwise lengthy and complicated RT exchange, covering each permutation of the service applicable throughout the extensive altitude band used for this sortie.

As a result of this Airprox, HQ 2 Gp is pursuing a number of issues relating specifically to the TIS and generation of radar track data. It is clear, however, that on this occasion, the Rallye was only detected on radar for a relatively short period.

HQ STC comments that the area in which the Hawk was operating was known by the pilot to be an area of high traffic density and he had, therefore, prioritised his workload to improve his lookout scan. Nevertheless, he saw the light ac late and it is fortunate that there was sufficient time available to take avoiding action. Although the pilot was clearly surprised at the lack of traffic information, it should be noted that, under the terms of the ADIS he was receiving at the time, the WC was providing a FIS. This incident serves as a reminder to all aircrew of the need for extra vigilance when traversing the levels commonly used by GA ac and of the importance of clearing the flightpath ahead. The ASACS SSU have undertaken a thorough investigation into the GCI aspects of this incident. A number of issues relating to the WC's handling of the radar have been raised and each is being pursued by HQ 2 Gp directly with the unit involved.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequency, radar video recordings and reports from the appropriate AD and operating authorities.

The ASACS advisor explained the large number of radar sources available to the WC. Consequently, it was up to the controller to select the most

appropriate radar head for the task in hand. The WC's choice of radars here was questionable as the small Rallye had been displayed on the Claxby before the Airprox and he had been using the Staxton Wold until just before the Airprox occurred. This might have been necessary for the task at that time, but at the critical moment the WC had not detected the presence of the small Rallye when he switched back to this source from the Staxton Wold radar and had discounted the Rallye's intermittent return. One adverse effect of changing radar heads was that the new picture was not displayed instantaneously. Some civilian controller members thought this unsatisfactory but it was clear to the Board that the limitations of radar coverage had already been taken into account in the application of the ADIS agreed between the WC and the formation leader. When the Airprox occurred the No3 Hawk pilot was under a FIS below the base of 'solid' radar coverage, making him entirely responsible for detection and separation against other traffic in the see and avoid environment of the FIR – as was the Rallye pilot. Although the jet pilot thought that traffic information had been given to him by the WC about an ac 1 NM away he was mistaken. The transcript revealed that the traffic referred to was thirteen miles away and clearly the WC could not guarantee to see traffic at or below the base of radar coverage where the Rallye was flying. Indeed, the radar contact on the Claxby had faded moments before the Airprox occurred as revealed by the LATCC radar recording. Under the FIS that pertained, below 5000 ft, any traffic information provided to the Hawk pilots was a 'bonus' and not guaranteed correct. Some members were surprised therefore that the No3 Hawk pilot's report cited the lack of traffic information or avoiding action and they wondered if this indicated a lack of understanding about the ADS. The STC member thought not – just a momentary lapse. Though not all of the unit's pilots were from an air defence background, all should be intimately familiar with the nature and limitations of the services provided – as stated in GASOs.

The Board was dismayed to see yet another occurrence of a civilian GA pilot not selecting his SSR Mode A/C 'on' whilst airborne in the FIR. Members agreed unanimously that the Rallye pilot should have switched on his SSR transponder during flight, in accord with the promulgated national advice. TCAS has been one of the greatest advances in flight safety in recent years and although not applicable here, the lack of SSR data can deny the pilots of TCAS equipped ac conflict resolution information. Similarly, the lack of SSR data denied the WC important information. Military pilot members also recognised that if a collision warning system had been available to the Hawk pilot, its value would have been negated by the absence of critical SSR information. As it was the only safety net available here was both pilots' eyes and the Hawk pilot reported that he saw the Rallye at a range of 400 m whilst passing about 2000 ft in the climb. The radar recording revealed a possible anomaly here as the No3 Hawk was shown climbing through 2000 ft about 1·5 NM away from the Rallye's projected position, but members agreed it was still a late spot regardless. Conversely, the Rallye pilot never saw the Hawk until it was pulling up above his ac and after its pilot had initiated his avoiding action. Members agreed therefore, that in this see and avoid environment, this Airprox was caused by a late sighting by the Hawk pilot and effectively, a non-sighting by the Rallye pilot.

Turning to risk, that the Rallye pilot had not seen the Hawk would probably not have materially altered the outcome at high closing speeds, as the Rallye pilot may not have been able to avoid the head-on faster Hawk. Although this encounter was much closer than it should have been, it was fortunate that the Hawk pilot had spotted the light ac when he did and was able to take robust avoiding action. This lifted his Hawk above the Rallye and it would appear from the radar recording by a margin significantly more than the 100 ft reported by the jet pilot. Although the Board recognised the vertical separation could not be determined from the radar recording, it was evident that the Hawk was indicating 2600 ft Mode C before it overflew the projected track of the Rallye suggesting that vertical separation was more akin to that reported by the Rallye pilot. Consequently, the Board agreed that the Hawk pilot's avoiding action had effectively removed any risk of a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Hawk pilot and effectively, a non sighting by the Rallye pilot.

Degree of Risk: C.

AIRPROX REPORT No 156/01

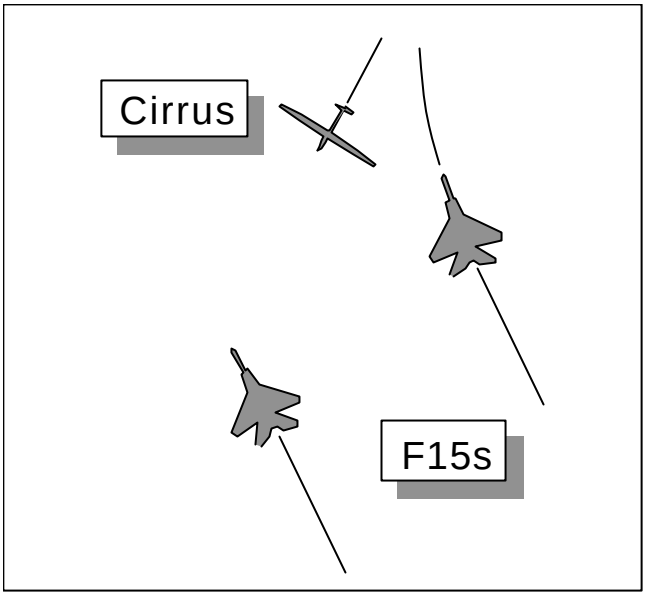
Date/Time: 28 Aug 1551

Position: 5201 N 0308 W (3·5 NM NE of Talgarth GS - elev 970 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Cirrus glider	F15 x 2
Operator:	Civ Pte	Foreign Mil
Alt/FL:	3000 ft ↓ (QFE)	2050 ft (Rad Alt)
Weather Visibility:	VMC CLBC 15 NM+	VMC CLBC
Reported Separation:	300 ft V,300 m H	1000 ft

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CIRRUS GLIDER PILOT reports heading 225° at 50 kt in a gentle descent some 500 ft below and 0·5 NM from cloud. He saw 2 F15s closing fast from his left about 1·5 NM away and banked right to increase his visual profile. The F15s passed either side of him some 5 – 10 seconds later; the one on his left/astern 300 m away in a left climbing turn, and the one ahead some 500 m away, also pulling into a climb. It felt as if the ac had passed close and the noise was very loud; he assessed the degree of risk as 'reasonable'. The ac had been somewhat below him, against the mountains, and he did not think he could have seen them earlier.

THE F15 PILOTS report heading 340° at 400 kt, 2050 ft agl when they saw the glider about 1 NM ahead at a similar level, closer to the track of the RH ac. They performed a climbing turn to avoid it after which the separation was about 1000 ft; the risk of collision was moderate.

UKAB Note: LATCC radar recordings show the F15s tracking 335° in ¾ NM line abreast with the RH ac at 3900 ft Mode C and the LH ac at 3400 ft. The RH ac closes on a primary only return close to the reported Airprox position which is moving very slowly SW, and passes about 0·2 NM behind it. At that point both F15s start a rapid climb to FLs 74/66. The QNH was 1018 mb; 3900 Mode C would have equated to 4035 ft amsl and the reported altitude of the glider was 3970 ft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, and radar video recordings.

Members agreed that this encounter, though probably startling for those involved, demonstrated good airmanship by all the pilots. Neither a glider against the sky nor fighters against a terrain background would be easy to see and it appeared that the pilots probably saw the conflicting ac about as soon as could be expected; in this respect the action of the glider pilot in changing his attitude to improve his conspicuity would have been helpful. Having seen the other ac, both the glider pilot and the F15 pilots reacted correctly to resolve the confliction; in the Board's view this occurred in time to remove the risk of the ac actually colliding. Members concluded that the incident was a confliction of flightpaths in Class G airspace which was resolved by all 3 pilots.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths in Class G airspace,resolved by all 3 pilots.

Degree of Risk: C

AIRPROX REPORT No 157/01

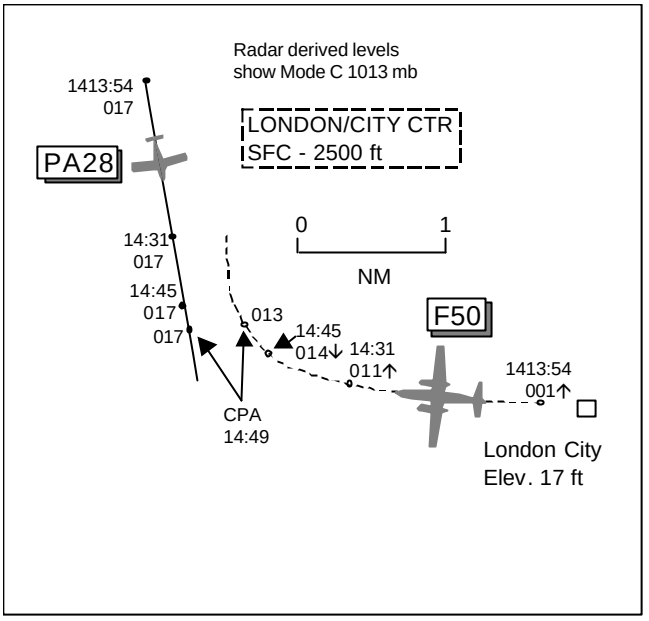
Date/Time: 27 Aug 1415

Position: 5131 N 0001 W (2·5 NM WNW of London/City - elev. 17 ft)

Airspace: CTR (*Class:* D)

	Reporting Aircraft	*Reported Aircraft*
Type:	F50	PA28
Operator:	CAT	Civ Pte
Alt/FL:	↑3000 ft (QNH 1023 mb)	2000 ft (QNH NK mb)
Weather Visibility:	VMC CBLC >10 km	VMC CLNC 'Unlimited'
Reported Separation:	300 ft V 3-400 m H	NK

Recorded Separation: 400 ft V 0·4 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE F50 PILOT reports on departure from London/City RW 28 following a CLN 5T SID and in communication with City TOWER on frequency 118·07 MHz. The visibility was >10 km in VMC, his strobe lights were switched on and he was squawking 6253 with Mode C. He commenced a R turn at DME 1·5 NM whilst climbing at 140 kt through 1300 ft QNH 1023 mb. On turning through 310°, having just completed the acceleration phase and after T/O checks (flaps and power), he received a TCAS TA alert; the F/O, PNF on the RHS, saw the conflicting ac in his 1 o'clock about 300 ft above. TCAS very quickly gave an RA "*descend, descend*", between 1000-1200 ft/min commanded, so he lowered the nose and reduced power to 30% torque and continued to turn keeping the ac in sight. London/City ADC tried to pass TI on the traffic which he thought had been passed far too late and wondered why this TI had not been passed before T/O or why they had not had their departure delayed. The other traffic, a red/beige PA28, was seen to pass 300-400 m clear on the LHS 300 ft above; he could almost read the registration. TCAS annunciated "*adjust vertical speed*", showing a green arc between 0 and 200 ft/min, followed quickly by "*clear of conflict*"; he then adjusted his flight profile to regain the SID. Only 8-12 seconds had elapsed between receiving the TCAS TA alert and being clear of the traffic. He wondered why the PA28 ac was flying in the busy CTR and whether a single engine ac at 1500 ft could glide clear in the event of an engine failure. He assessed the risk of collision as medium.

THE PA28 PILOT reports flying solo enroute from Fenland to his home base at Biggin Hill heading 170° at 110 kt and 2000 ft on the London QNH and he was receiving a Radar Advisory Service, he thought, from Thames Radar on frequency 132·7 MHz. The visibility was unlimited with no cloud in VMC, the ac was coloured white/blue/orange, his strobe lights were on and he was squawking 7063 with Mode C. He had contacted Thames Radar near BPK VOR and requested clearance to cross London/City airspace on a direct track to BIG which was approved. As he proceeded Southbound, he was asked to take up a RH hold owing to departing traffic from City Airport. After completing one orbit, he was told that he could once again proceed Southbound as the departing ac was now clear. A short time later, he was told that there was another departing ac and "*Did he have it in sight?*". He first saw the second departing ac, a high wing twin-engined Fokker type, on his LHS, below him in a

climbing R turn; it did not appear to be in any conflict as it was moving in such a direction as to increase the separation distance between them. He told ATC that he could see the other ac and he maintained 2000 ft on his original track. He was unable to assess the separation distances or the risk involved.

UKAB Note: The London/City METAR shows EGLC 1350Z 33006KT 220V050 9999 FEW048 22/06 Q1023

ATSI reports that Thames Radar is established to provide an Approach/Approach Radar service for London City Airport and an Approach Radar service for IFR traffic inbound to and outbound from Biggin Hill Airport. As the London City CTR is categorised as Class D, ac wishing to transit the airspace are required to contact Thames Radar and obtain an ATC clearance.

The Thames Radar controller was acting as mentor to a trainee at the time of the incident. He explained that his trainee was an experienced controller who held a Certificate of Competence for ADC at Heathrow. He estimated that his trainee had completed about 75 hours training on the Thames Radar position over a six-month period. He, together with his trainee, had only been in position for about five minutes prior to the occurrence and he described the workload and traffic loading as light.

The PA28 was cleared to transit the London City CTR at 1410, en route to Biggin Hill, VFR. The pilot was informed of opposite direction, VFR traffic, at 2300 ft and reported maintaining 2000 ft. This entry clearance was issued before the mentor and his trainee took over the Thames Radar position at 1412.

The mentor explained that he allowed his trainee to plug in first to take the handover from the previous controller. During the process, a request was received, in accordance with local procedures, from London City Tower, for a release on the F50. This ac was outbound on a Clacton 5T SID from RW 28, the initial routeing of which is *"Straight ahead to I-LSR D1.5 then turn R onto LON VOR R083 by LON D19."* Again in accordance with local procedures, a release for this flight was requested from the LATCC-TC NE SC, who restricted it to an altitude of 3000 ft. The trainee passed this release, together with the TC altitude restriction, to London City Tower. The mentor said that after he had plugged in to the position he was aware of the PA28 and the other ac transiting the CTR VFR but he had not realised that the F50 had been released for departure by his trainee. He reasoned that he must have missed this call because it occurred during the handover, before he had plugged in.

Shortly after taking over, the trainee updated TI to the pilots of the two transiting ac about their respective flights. The mentor said that about this time, on checking through the fpss, he realised that the F50 might have been released. Receiving confirmation of this from his trainee and checking that no TI had been passed to either the PA28 or through London City Tower to the F50, he immediately told his trainee to ensure that this information was passed. The PA28 was informed, at 1414:27, "*.....there's traffic just departing off runway two eight er left er right just going down your lefthand side at eighteen hundred feet."* The radar timed at 1414:31 shows the PA28 heading S at FL 017 (2000 ft QNH) with the F50 heading W, passing FL 011 (1400 ft QNH), 1·6 NM to its SE. Because the pilot of the PA28 reported the traffic in sight it was not considered necessary to pass any avoiding action instructions. Additionally, the trainee telephoned London City Tower saying "*F50 c/s traffic information for him there's one southbound at er just erm the seven zero six three squawk."* This information was passed to the F50 by the ADC, using data observed on the ATM, as *"light ac routeing north to south one mile to the west of you at altitude two thousand feet".* The pilot reported *"visual TCAS manoeuvring"*; the flight was then transferred to Thames Radar, by which time it had passed the PA28. The radar recording of the event reveals that the F50 passed 0·4 NM to the E of the PA28 at 1414:49, by which time the former had descended from FL 014 (1700 QNH) to FL 013 (1600 ft QNH) in reaction to a TCAS alert.

The mentor agreed that he should have complied with the requirements stated in MATS Part 1, Page 1-3, whereby the minimum service to be provided by an ATC Unit in Class D airspace is to: *"pass traffic information to IFR flights on VFR flights and give traffic avoidance if requested; pass traffic information to VFR flights on IFR flights and other VFR flights"*. He confirmed that, had he realised that his trainee had released the F50, he would have ensured that the appropriate TI was passed.

He admitted that he should have monitored the handover, given to his trainee, more closely. He added that his trainee, who was not interviewed, was experienced enough to realise his responsibilities with respect to IFR/VFR traffic. His trainee had not been able to account for his error.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members initially discussed the handover situation that occurred immediately prior to the incident. The oncoming mentor had allowed his trainee to 'plug in' to the only spare socket (only two sockets available in total) to receive a handover from the off-going ATCO. In doing so, the onus was on the mentor to monitor the handover carefully as he was unable to listen to the RT or telephones whilst unplugged. The mentor would normally then indicate to the off-going controller that he was willing to accept the position; any missed RT or telephone calls would need to be relayed to the mentor verbally to ensure that he had the full 'picture' and once satisfied he would then plug in to the socket vacated by the off-going ATCO. However, in this incident, for whatever reason, it appeared that the mentor did not monitor the hand-over process closely enough. He may have been falsely lulled by the experience of the trainee - although a validated Heathrow ADC, his likely level of knowledge after 75 hr training on Thames Radar spanning 6 months or so was thought by members to have been somewhat limited still. Sometime between the off-going ATCO commencing the handover to the trainee and the mentor being in position, an outbound release on the F50 had been passed to London/City. Both during and after the handover the mentor was responsible for his trainee and any of his actions. Although this 'release' telephone call had been missed by the mentor, the information should have been obvious to him from the strip marking on the fps display. ATCO members also pointed out that, after the mentor had noticed the F50's release and after he had prompted the trainee, the TI passed by the latter to London/City had been less than ideal; the City ADC had to interpret and expand this TI from the data displayed on his ATM before passing it to the F50 pilot. Owing to the late detection of the confliction some members felt that the mentor should have taken action/control when it appeared the trainee was not 'up to speed'. By the time the TI on the PA28 was being passed the F50 pilot was already manoeuvring in response to a TCAS RA alert. Members agreed that the Thames Radar controller mentor had not monitored the hand-over to his trainee closely enough since the trainee had released the F50 without his mentor's knowledge; the latter action had ultimately caused the Airprox.

Turning to risk, a TCAS TA had alerted the F50 crew to the crossing PA28, which they saw. The crew had then complied with the RA '*descend*' whilst monitoring the PA28 visually as it passed 400 ft above on the LHS. Some members believed that in descending from 1700 ft to 1600 ft, before reaching the Minimum Sector Altitude (2100 ft), the F50's safety had been compromised. Conversely, other members pointed out that although the F50 was technically flying under IFR, the weather conditions at the time were VMC. Therefore the F50 pilot could see that he was never in a position to collide with any obstacle nearby (the highest ones were some 500 ft below his ac at the time) before the two ac passed each other. Once clear, the F50 pilot had simply climbed to regain the SID profile. Although TI was given by London/City to the F50 crew on the PA28, it was only after they had commenced manoeuvring in response to TCAS. Likewise, the tardy TI given by Thames Radar had alerted the PA28 pilot to the F50's presence which he saw passing below and apparently not in confliction. Taking all these elements into account, the majority of the Board concluded that the timely actions of the F50 crew had effectively and safely removed any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Thames Radar controller mentor did not monitor sufficiently the hand-over to his trainee which resulted in the trainee releasing the F50 without his mentor's knowledge.

Degree of Risk: C

AIRPROX REPORT No 159/01

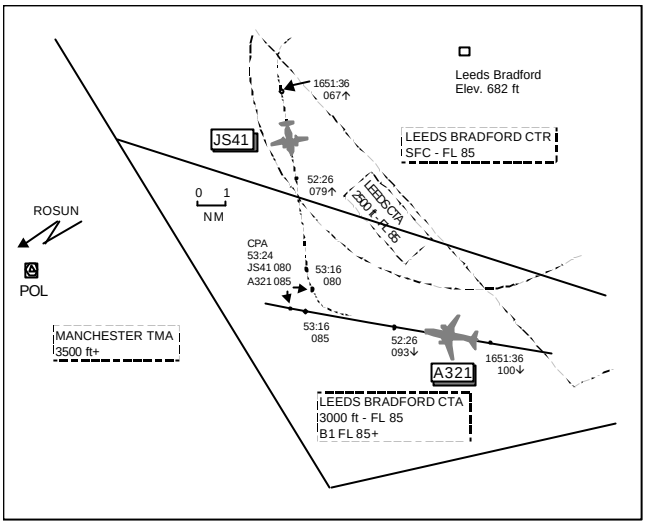
Date/Time: 31 Aug 1653

Position: 5344 N 0148 W (11 NM ESE POL)

Airspace: CTA (*Class:* A/D)

	Reporting Aircraft	*Reported Aircraft*
Type:	A321	JS41
Operator:	CAT	CAT
Alt/FL:	FL 87 ↓	FL 80
Weather	VMC CLAC	VMC CLOC
Visibility:	NK	NK
Reported Separation:	500 ft V 0 H Not seen	

Recorded Separation: 500 ft V 1.2 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A321 PILOT reports flying inbound to Manchester from Greece routeing direct to POL descending to FL 70, he thought, at 220 kt and he was receiving a radar control service from Manchester. When about 8 NM E of POL passing FL 77, he thought, he saw traffic on TCAS in his 2 o'clock range 2 NM and 700 ft below. TCAS quickly annunciated "*traffic, traffic"* followed by "*monitor vertical speed"*; during these alerts he had instructed the FO (PF) to level-off which he did by applying TOGA thrust and disconnecting the AP. The other ac passed 500 ft below on TCAS, it was not seen visually as they were approaching the top of a cloud layer and he estimated the conflicting ac was within it. No warning was received from ATC and he assessed the risk of collision as high.

THE JS41 PILOT reports flying outbound from Leeds to Southampton at 210 kt level at FL 80 and he was receiving an ATC service from Manchester. He requested further climb, owing to cloud ahead on his track, and was told to expect clearance shortly as there was inbound traffic, 1000 ft above, in his 1230 position. ATC then issued a large heading change to the L followed by a further 40° L turn using the words *"avoiding action"*. He disconnected the AP and executed the L turn; no other ac was seen and the flight continued uneventfully. TCAS was not fitted to his ac and he was unable to assess the collision risk.

ATSI reports that three controllers were directly involved in this Airprox, one working as the Manchester APR and the other two operating as mentor and trainee on the Ribble Radar position. The APR was operating with the N and S approach positions in 'bandboxed mode'. A fourth controller was operating in the Ribble Co-ordinator position. The relevant ATC equipment was all reported as serviceable at the time of the Airprox and no other factors, which may have adversely affected the controllers' performance, were identified during the course of the investigation.

The A321 was inbound to Manchester on a ROSUN 1D STAR. It was descending to the standing agreement level of FL 200 when, at 1645:30, the crew contacted the Ribble Radar Controller. He gave further descent to FL 140 and at 1647:50 instructed the Airbus to route direct to POL. At 1648:30 the Ribble Co-ordinator rang the Manchester APR to obtain a release level. It was agreed that the A321 would descend to FL 90 "*...on the readout of XYZ66Z*" which was another ac ahead in the sequence. Releases on two other ac were passed and these were all acknowledged but none was read back.

At 1649:50, the JS41 called the Ribble Radar Controller having departed from Leeds on a POL 1W SID, approaching 4000 ft. The JS41 was

instructed to 'squawk ident' and to climb to FL 80. The Manchester APR had no information on this ac as such flights are, effectively, outside the approach area of operation. The Manchester MATS Part 2, APR 1-10, para 10.3 states: '*Traffic shall not be transferred from Area Control to the Manchester Approach Sector until either -*

a) there is no conflicting traffic remaining under the control of the transferring sector to affect the descent of the aircraft, or

b) any conflicting traffic is notified to Manchester Approach by means of a radar release.'

In the absence of a radar release, this meant that it was the responsibility of the Ribble Radar Controller to ensure that, when the A321 was transferred to Approach Control, it was not in potential confliction with any sector traffic, including the JS41. At the same time as the JS41 called, the APR telephoned the Ribble Co-ordinator and requested that when the A321 was transferred it be 'released for turn', which was agreed. This would permit the APR to vector the ac prior to it reaching the release point, which in this case was ROSUN.

The Ribble Radar Controller instructed the A321 to descend to FL 90 and then transferred it to Manchester Approach at 1650:25 but without telling the latter about the JS41 climbing to FL 80. The APR, on observing that FL 80 was clear in the stack and being unaware of the JS41, immediately instructed the A321 to descend to FL 80 and informed the crew that they could expect to be turned before POL. The MATS Part 2 permits approach control to issue instructions for ac to descend to the minimum stack level provided the ac is within 30 NM of Manchester. The JS41 was now 16 NM NW of the A321 and climbing through FL 50. At 1651:30, having been prompted by his mentor, the Ribble Radar Controller informed the APR that the JS41 was on radar heading of 180°, climbing to FL 80 underneath the A321 and would go behind it. The APR acknowledged this and produced a 'blocking strip' which he placed in his fps display directly below the strip for the A321. This strip correctly indicated both the c/s of the ac and the co-ordinated level of FL 80. He stated that he had forgotten that he had already instructed the A321 to descend to FL 80 and the presence of the blocking strip had not alerted him to the confliction. Furthermore, he realised that a heading of 180° would not provide the requisite 5 NM lateral separation as the JS41 passed behind the A321. (*Note: It is usual for approach controllers to be able to utilise 3 NM separation between their traffic and aircraft working Area, provided certain conditions are satisfied. However, on this occasion, a Temporary Operating Instruction had been issued withdrawing this authority.*)

At 1652:30, the JS41 reported approaching FL 80 and requesting further climb. The Ribble Radar Controller advised that further climb could be expected soon. At that time the A321 was shortly to cross, from left to right, through the 12 o'clock position of the JS41 at a range of 6·2 NM. STCA activated but, as the A321 had not yet descended below FL 90 and the APR had been told about the JS41, the Ribble Radar Controller did not believe a problem existed. Once it was observed that the A321 was descending through FL 90, the Ribble Radar Controller turned the JS41 L onto 155° and then followed it with an 'avoiding action' turn onto 110°. The APR was somewhat shocked to see the confliction and, initially, was unable to take remedial action and momentarily 'froze', however, he quickly recomposed himself and instructed the A321 to "*...climb immediately to flight level niner zero*". He stated at interview that he had not used the words "avoiding action" as it was as much as he could do to speak.

Separation reduced to 1·2 NM horizontally and 500 ft vertically as the A321 passed to the S of the turning JS41. The A321 pilot reported that he had received a TCAS RA warning and that he would have to file an Airprox.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members focused on the ATCOs' actions leading up to the encounter. The Ribble Radar trainee had released the A321 to the Manchester APR in the descent to FL 90 but had then climbed the Southbound JS41 to FL 80. The onus was then on the Ribble Radar controller to ensure that the JS41 remained separated from the A321 or to effect a

radar release, before he transferred the A321 to the Manchester APR. Neither was done which then made the original release 'unsafe'. The Board agreed that the Ribble Radar mentor had allowed his trainee to transfer the A321 into potential confliction and this had been a part cause of the Airprox. The Manchester APR had seen that FL 80 was available as the minimum stack level and, without knowledge of the JS41 at that stage, had cleared the A321 to descend to that level. The Ribble Radar trainee, after being prompted by his mentor and about a minute after he had transferred the A321, had then telephoned the Manchester APR to effect the necessary co-ordination with respect to the JS41. ATCO members sympathised with the APR, as this co-ordination had been carried out 'with hindsight'; they felt that had it been done prior to the A321 being transferred, the APR's situation awareness may well have spotted the conflict. However, the APR had already started to execute his plan to descend and vector the A321 for an expeditious arrival into Manchester and it appeared he was now mentally looking ahead. In doing so, he overlooked the fact that he had descended the A321 to FL 80. Perhaps, if the Ribble Radar controller (who was unaware of the A321's new cleared level) had pointed out his error within the original release during this 'hindsight' co-ordination, this may well have alerted the APR to the developing confliction. However, the Ribble Radar controller had 'led' this co-ordination without linking it verbally as an afterthought to the 'unsafe' release earlier. Instead he simply pointed out the JS41 heading South and climbing to FL 80 underneath the Airbus, which he thought was only descending to FL 90. The APR's subsequent actions in writing a blocking strip for the JS41 and then inserting it into his fps display directly below the A321's strip did nothing to help. This traffic did not feature in the APR's 'game plan' and the strip re-inforced the Ribble Radar controller's plan, not his. Had the Manchester APR recognised the information passed by the Ribble Radar controller as an 'update' he could have refused this co-ordination but he didn't because he saw no reason to. Moreover, if he had cognitively realised his previously given A321 descent clearance he could have asked the Ribble controller to stop the Jetstream's climb at FL 70 or to vector it horizontally clear by 5 NM. Alternatively, he could have stopped the A321's descent at FL 90. However, all of these options were foreclosed because the Manchester APR had not acted on the updated information from the Ribble Radar controller and members agreed that this was a further part cause of this Airprox.

Turning to risk, members commended the APR's action in issuing an immediate climb to the A321 pilot when STCA alerted him to the conflict, after his initial disbelief at the situation. When he saw the A321 descend through FL 90, the Ribble Radar controller had turned the JS41 L, which he subsequently continued further by 45° with "*avoiding action"* which was sufficient to ensure the JS41 would pass behind. Meanwhile, TCAS had alerted the A321 crew to the conflicting JS41 and the former had arrested their descent at FL 85 following the RA "*monitor vertical speed"*. They never did see the JS41 visually owing to the cloud layer below. For their part the JS41 crew were anticipating climb clearance, once crossing traffic 1000 ft above had passed, but instead they were then given an avoiding action L turn to pass behind the A321 which was not seen owing to cloud. In the end both controllers had taken action to resolve matters quickly and both crews had acted promptly to comply with TCAS/ATC instructions. All of these elements combined led the Board to conclude that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

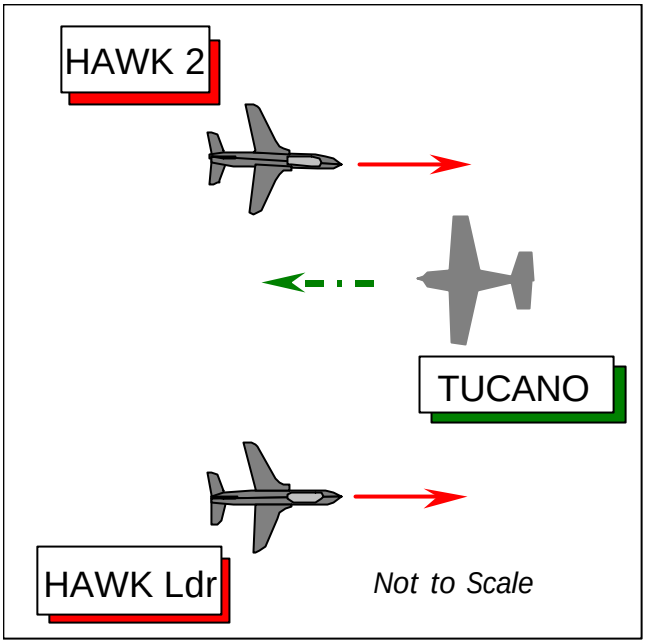
a. The Ribble Radar mentor allowed his trainee to transfer the A321 into potential confliction.

b. The Manchester APR did not act on the updated information from the Ribble Radar controller.

Degree of Risk: C

AIRPROX REPORT No 160/01

Date/Time:	6 Sep 1145	
Position:	5415 N 0254 W (4 NM E of Lake Windermere)	
Airspace:	UKDLFS – LFA17	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Tucano	Hawk x2
Operator:	HQ PTC	MOD DPA
Alt/FL:	250 ft msd	250 ft msd
Weather Visibility:	VMC CLBC 20 km	VMC CAVOK 50 km
Reported Separation:	Nil V, 50 m H	Nil V, 100 m H
Recorded Separation:		Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TUCANO PILOT reports his ac has a 'high conspicuity' black/yellow PTC colour scheme and the landing light and HISLs were on whilst flying a low-level sortie in LFA 17 from the rear seat with another pilot in the front seat. He was monitoring the LFS frequency of 300·8 MHz and squawking 7001 with Mode C.

Flying out of the sun heading 283° at 250 kt, they were approaching the southern tip of Lake Windermere from the east at 250 ft msd, about 2000 ft below scattered cloud. Another ac was spotted at 09:30 - about 2000 m away - which was identified as a Hawk and tracked visually for 1½ – 2 sec. Whilst the pilot in the front seat continued to track this ac, he looked to the front and immediately spotted another jet as it appeared at 02:30 about 50 m away at the same height on a reciprocal track. There was no time to take avoiding action against the other ac, which was just recognisable as another Hawk, as it passed 50 m to starboard in a *"blur of motion"* with a *"high"* risk of a collision. A hard starboard turn was initiated to try and regain visual contact, but the black Hawk could not be re-acquired against the terrain.

He opined that their lookout had not been degraded by concentrating on the first Hawk, which was probably in 'battle' formation, but he contended that a black Hawk ac - head on at low level – is virtually impossible to detect except for its landing light, which was not seen. He reaffirmed that the PTC black colour scheme is particularly difficult to detect at low level against terrain and reiterated that there was a real risk of collision during this Airprox.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

THE HAWK PILOT reports his ac has a 'high-conspicuity' black colour scheme and a squawk of 3/A 7001 was selected with Mode C. They were operating on 344·5 MHz and he was flying as the No2 of a pair of Hawk ac conducting a 'conversion to type' low-flying sortie in CAVOK conditions; the high-intensity 'headlight' in both ac was on. Flying at 250 ft msd in low-level cruise at 420 kt, they had just completed a 60° 'assisted battle turn' onto a heading of 090°, where each pilot's attention would have been concentrated on each other's ac to ensure the correct formation geometry when they rolled out of the turn. Immediately on rolling-out with about 1 NM between the pair in line abreast, when usually each pilot would be checking each other's 6 o'clock, he suddenly spotted the

Tucano. It passed 100 m away on the starboard beam on a reciprocal heading at the same height, flying between his ac and the lead Hawk, with a *"medium"* risk of a collision. He was unable to take avoiding action; the lead pilot never saw the Tucano at all.

HQ PTC comments that this is the closest that this Tucano pilot has ever come to a collision. That they did not collide is sheer fate; he saw the No2 Hawk too late to have affected the outcome and the lead Hawk did not see the Tucano at all. With each going about their lawful occasions in accordance with the rules and the Hawks necessarily concentrating on each other to achieve their training aim, no amount of exhortations to "lookout" would prevent a recurrence. This is just such a case where a collision warning system (CWS) would have alerted each other sufficiently early for effective avoidance manoeuvres. The need is urgent and ought to be emphasised yet again. Meanwhile, there is a growing feeling that a black colour scheme may be best against a nice blue sky, but against European countryside it is only marginally better than camouflage.

UKAB Note (2): The Hawk leader conducting this 'conversion to type' exercise was a civilian pilot flying under contract to the RAF. The 2 Hawk ac were government furnished equipment provided by HQ PTC under a contract let by HQ PTC. It has subsequently transpired that HQ PTC believed that flights were conducted in conformity with published 'Instructions to Contractors', and that MOD DPA were overseeing flight safety aspects. Whereas MOD DPA were unaware of this and believed the flights were conducted in conformity with JSP 318 under the auspices of HQ PTC.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and a report from an operating authority.

The HQ PTC member clarified the operating authority matter for the benefit of the members and explained that the company involved was contracted to HQ PTC to provide up to 600 hr of military pilot training on RAF-owned Hawk ac allocated from RAF Valley. The training syllabus is defined by HQ TGDA (GCTA), but ac operations are conducted in accordance with Aviation Publication 67 (Flying Orders to Contractors) issued by the DPA (Director of Flying). Nonetheless, the Board was content that sufficient information was available to assess this report in the absence of further comment from DPA and there was little to be gained from further delay.

None of the Board members doubted that this was a lookout issue as each pilot had been legitimately proceeding about their sorties in the LFS immediately before the Airprox. Concerns about 'high conspicuity' colour schemes, raised in the Tucano pilot's report were noted. The pilot contended that the black/yellow PTC colour scheme had not helped visual acquisition of the two similarly coloured Hawks. Given that his Tucano was painted in a very similar scheme it was axiomatic that such comments applied equally to his ac fleet. Dark colours – particularly black – are reputed to provide the best all-round compromise for conspicuity in most situations by day at the ranges required for visual detection at fast-jet speeds. However, it is the contrast of the ac against the background at the time that determines how well they stand out and colour is not so important at long range. Clearly, relative conspicuity of different schemes will differ e.g. over a snow covered backdrop compared to that of wooded ground. In this instance – confronted with a head-on aspect - the PTC standard scheme had apparently provided little contrast against the local terrain making the Hawks difficult to see from the Tucano's cockpit. Members noted that these difficulties had been acknowledged by HQ PTC in their comments and felt they were up to the Command to resolve if need be.

Although both Hawks' headlights were reported to be on, neither light was seen by either Tucano pilot when the Hawks steadied eastbound. This was when the Tucano's landing light should have become apparent to the jet pilots and some members were surprised that the lead Hawk pilot had not seen the Tucano at all. Some military pilot members thought that both Hawk pilots had been concentrating more on their assisted turn manoeuvre than on all-round lookout just before the incident and subsequent events appeared to bear this view out. That said, the turning manoeuvres should have made the Hawks more obvious to the pilots in the Tucano - but this did

not appear to be the case here. Similarly, HISLs did not appear to have materially effected conspicuity and in summary all the normal methods of attracting the attention of pilots to the presence of each other's ac appeared to have little effect. None of the pilots involved had seen each other's ac in time to do anything, either to avoid the other ac or increase the separation between them. There appeared to be no apparent remedy to this dilemma, apart from a 'collision warning system' akin to TCAS, which has proved its worth beyond doubt. The members agreed, therefore, that this Airprox resulted from what was effectively, a non-sighting by all the Tucano and Hawk pilots and that none of the pilots was able to effect the outcome of this chance encounter in the LFS. Each pilot's report agreed that no vertical separation had existed, with at best 100 m and at worst 50 m between the Tucano and the jets as the former flew between the pair. This was purely fortuitous and the members agreed unanimously that an actual risk of a collision had existed in these circumstances.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively, a non-sighting by all the Tucano and Hawk pilots.

Degree of Risk: A.

AIRPROX REPORT No 161/01

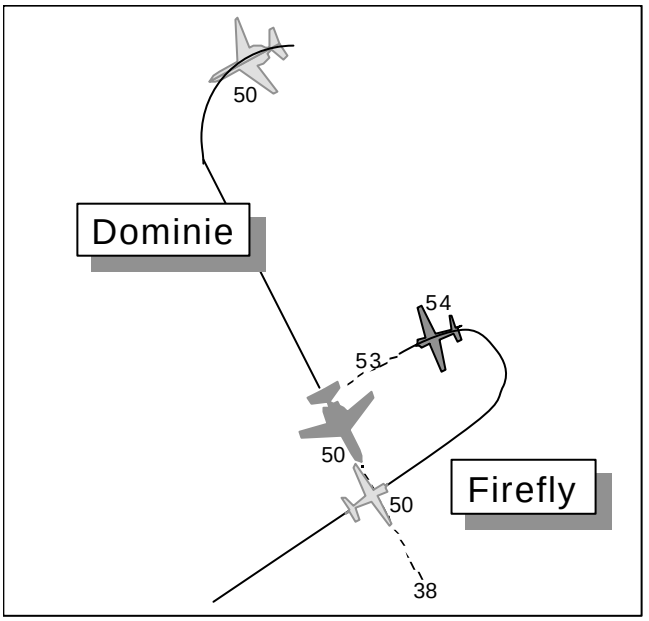
Date/Time: 7 Sep 1045

Position: 5256 N 0022 W (4 NM SE of Sleaford)

Airspace: FIR(AIAA) (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Dominie	Firefly
Operator:	HQ PTC	HQ PTC
Alt/FL:	FL 50	↑↓ FL45 - 55
Weather Visibility:	VMC CLOC 10 km+	VMC CLOC 10 km+
Reported Separation:	500 ft V	/NK

Recorded Separation: 500 ft, 0.35 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DOMINIE PILOT reports heading 151° at 180 kt, inbound to the fix in the Cranwell RW 27 Tacan hold, at FL 50. His ac was red and white and his HISL was on. He saw a Firefly in his 9 o'clock about 500 ft above, starting aerobatics. As it descended towards him he was forced to start a rapid descent as it passed about 500 ft above. He considered the risk of collision was high.

THE FIREFLY PILOT reports flying a dual aerobatics detail. He was operating in an area to the E and S of Barkston Heath in which there were other Fireflies and Tutors, between FLs 45-55. He was using the A52 road as a line feature and saw a black and white Dominie some 1500 ft below. Although he was in the area of the Airprox, he could not be sure that his was the ac involved.

MIL ATC OPS reports that the Dominie crew were established in the TACAN hold at Cranwell at FL 50 whilst receiving a RIS from Cranwell Director (DIR) on frequency 282.0. DIR was manned by a mentor and trainee controlling team with one other ac on frequency, a Tucano, which was also in the TACAN hold at FL 65. After establishing the order of recovery of the ac in the hold and passing TI to the non-subject ac, DIR transmitted *"(Dominie) C/S, traffic twelve o'clock, three miles, manoeuvring indicating Flight Level four five"*; the Dominie crew replied *"C/S, we are visual. Can you contact your Stud seven* (a PTC 'quiet' discrete frequency) *and tell him to get out of the TACAN hold please"*? DIR was unable to contact the conflicting traffic at the time and so declined the request. Shortly afterwards, DIR passed TI to the crew of the Tucano, who identified the conflicting traffic as a Firefly. The crew of the Tucano made 2 blind transmissions on both Stud 7 and 282.0 to try and contact the Firefly pilot and request that he cleared Cranwell's TACAN hold. Both ac in the TACAN hold continued their approaches. The crew of the Dominie filed an AIRPROX about one hour later.

The TI provided by DIR to the Dominie was in accordance with the conditions of RIS and appears to have been accurate enough for both ac in the TACAN hold to become visual with the Firefly. Cranwell's TACAN hold was about 6-10 NM SE of the airfield in a busy area of Class G airspace used by civilian and military pilots. Whilst the pilot of the Firefly was entitled to operate in the vicinity, it may have been prudent for its crew to have first established the status of the hold/local airspace with Cranwell ATC before manoeuvring.

UKAB Note: LATCC radar recordings show the Dominie holding at FL 50 although the TAP for the procedure gives the minimum holding level as FL 55. 4 other ac are manoeuvring in the same geographical area as the hold, 3 with squawks associated with Lincolnshire Agreed Airspace procedures and the other, with a Cranwell squawk, the Tucano mentioned above. 2 of the LAS squawks are above FL 60 and the other crosses the Dominie's inbound track some 2·5 NM ahead, R to L, at FL 50, (not FL 45 as per DIR's TI) before climbing and turning back towards it at FL 54 in what appears to be a wing-over to the left. Minimum separation appears to be just over $^1/_3$ NM with the Firefly closing from slightly aft of the Dominie's port beam and 400 ft above. The Dominie then enters a steep dive, showing FL 38 15 sec later.

HQ PTC comments that while aircrew should, as a matter of good airmanship, conduct their general handling exercises clear of known airfield departure and recovery lanes, it must be recognised that within the congested Lincolnshire airspace this is not always possible. Light ac, with their limited flexibility for moving or climbing into clear weather areas can be particularly handicapped. In this case, the location of the Tacan hold close to a busy light ac training base almost invited such an infringement; the hold is now being moved to a more suitable area. Ultimately, however, both ac were operating in Class G airspace, and each saw and avoided the other.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC and operating authorities.

Members considered the Dominie captain's request to have the Firefly pilot told to clear the Tacan hold was inappropriate, not least because the controller he was talking to had no means to do so. In addition, by flying at FL 50, he was not actually in the hold anyway, and furthermore the hold was in Class G airspace, in an AIAA, and not 'protected' in any way from passing traffic. The onus was clearly on the Dominie pilot to keep a good lookout for such traffic. At the same time, the Board assumed that the Firefly pilot, being based at Barkston Heath, should have been aware of the position of the Cranwell Tacan hold, and would have been wiser to have checked with Cranwell ATC before performing aerobatics close to the Min Hold level. The Board agreed that aside from these issues, both pilots were required to see and avoid each other.

While the Firefly pilot saw a Dominie, it was the wrong colour, and members felt that the pilot would not have performed the manoeuvre he did if he had been aware of the passing Dominie in question. From this the Board concluded that the Firefly pilot did not see the filing Dominie and that this was part of the cause of the Airprox.

The Dominie pilot was passed traffic information which appeared reasonably accurate in bearing and range but the Firefly was 500 ft above the level given in the TI. Whether or not this led to an acquisition problem was not known but the Dominie pilot's report gave the impression that he did not see the Firefly until it was almost passing them. The Board agreed that this late sighting was also a factor in the cause.

The radar recording showed that the Firefly eventually passed some distance behind the Dominie and the Board assessed that there had in fact not been a risk of the ac actually colliding.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: In the vicinity of the Cranwell Tacan hold, the Firefly pilot did not see the Dominie and the Dominie pilot saw the Firefly late.

Degree of Risk: C

AIRPROX REPORT No 162/01

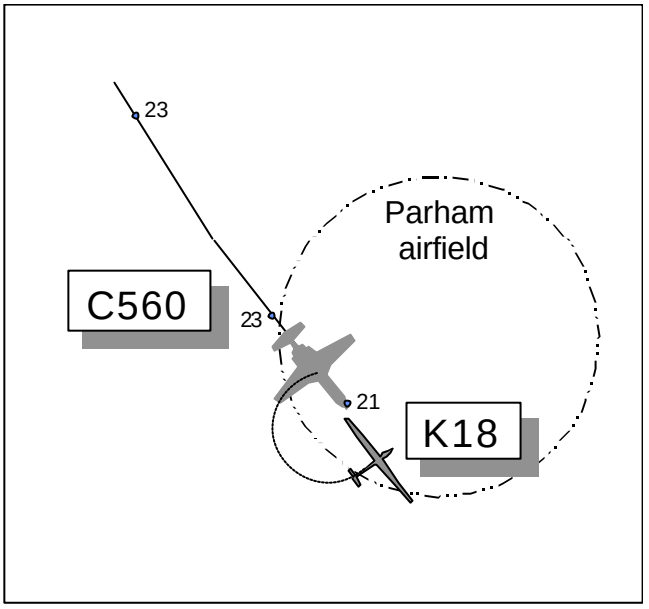
Date/Time: 9 Sep 1514 (Sunday)

Position: 5055 N 0029 W (Parham glider site - elev 110 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	K18 glider	C560
Operator:	Civ Club	Civ Exec
Alt/FL:	2300 ft (QFE)	2400 ft (QNH)
Weather Visibility:	VMC CLBC 30 NM	VMC CLOC 10 km+
Reported Separation:	300 ft V /3-400 ft V, 0.5 - 1 NM H	

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE K18 GLIDER PILOT reports circling to the left at 42 kt over Parham airfield at 2300 ft in clear air when an executive jet passed directly beneath him by 300 ft on a track towards Shoreham. It had approached while he was mainly tail on to it in his orbit so he was not able to see it earlier or take avoiding action. He considered the incident to be 'potentially fatal'.

THE C560 PILOT reports heading 140° at 220 kt while on a positioning flight to Shoreham via MID. He had been receiving a RIS from Farnborough until just past MID when he was advised that there were multiple contacts from 12 to 2 o'clock and 'handed over' to Shoreham. He turned a further 20° left, but no more because of the Gatwick zone. He saw a glider in his 1-2 o'clock 3-400 ft above in a left turn so he turned further left and descended to remain clear of it, thereafter resuming track for Shoreham. He considered the risk of collision was low to medium.

UKAB Note: LATCC radar recordings show the C560, identified from its Farnborough squawk,

tracking as described by its pilot. It passes over the SW side of Parham airfield, having been cruising at 2300 ft Mode C. It starts a descent to pass the airfield at 2100 ft, continuing to 1900 ft when 1 NM past the field. There are several primary returns manoeuvring over the Downs to the S of Amberley, and one brief return just to the SW of Parham shortly before the C560 passes, but no radar information on the Airprox itself. On the existing QNH (1018 mb), 2300 ft Mode C equates to 2450 ft and the glider at 2300 ft QFE would have been at 2400 ft QNH.

UKAB Note (2): RT recordings show that after take-off the C560 is placed under a RIS by Farnborough. The controller tells the pilot that there is intense gliding activity in the Parham area and to keep a good look-out. One minute later the controller tells the C560 that there are numerous contacts between his 12 o'clock and 2 o'clock for the next 6 miles at Parham and to keep a good look-out. The radar service is then terminated, 12 miles NW of Shoreham and the C560 changes frequency. There is no mention of the subject glider or an Airprox on either the Farnborough or Shoreham frequencies.

UKAB Note (3): A UKAB Executive who lives 2 NM W of Parham advised that he sees this C560 flying the same route fairly regularly from his home and that its usual track passes close to Parham. The C560 pilot confirmed that he flies the route regularly between MID and Shoreham, taking radar information as it is a busy piece of airspace under the TMA. Parham is over 5 NM from the nearest (SW) corner of the Gatwick CTZ. UKAB staff have suggested to the pilot that he tries to avoid overflying Parham when making this journey.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, 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.

At first sight this incident seemed to members like another in a depressingly long list of Airprox caused by GA pilots overflying glider sites. Certainly, if the C560 pilot had flown further to the E, and there was in fact plenty of room between Parham and the Gatwick CTZ for him to have done so, the incident would have been avoided. However, the C560 was well above the permitted cable launch height, in as much as one could be 'well above' while transiting under the LTMA, and members were aware of how very busy the airspace is over Sussex. Indeed, the majority of Parham's gliders appeared to be well away from the overhead, soaring along the Downs. Members concluded that the C560 pilot had seen the glider about as soon as could be expected and that the incident was a confliction of flightpaths which was resolved by the C560 pilot in time to remove any risk of collision.

Members concluded that, for a VFR journey, the C560's regularly flown sortie could be made safer at the planning stage by taking more account of the features on a topographical map, rather than relying on 2 Midhurst radials.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths resolved by the C560 pilot.

Degree of Risk: C

AIRPROX REPORT No 163/01

Date/Time: 4 Sep 1210

Position: 5148N 0046W (1½ NM W of Halton a/d - elev 370 ft)

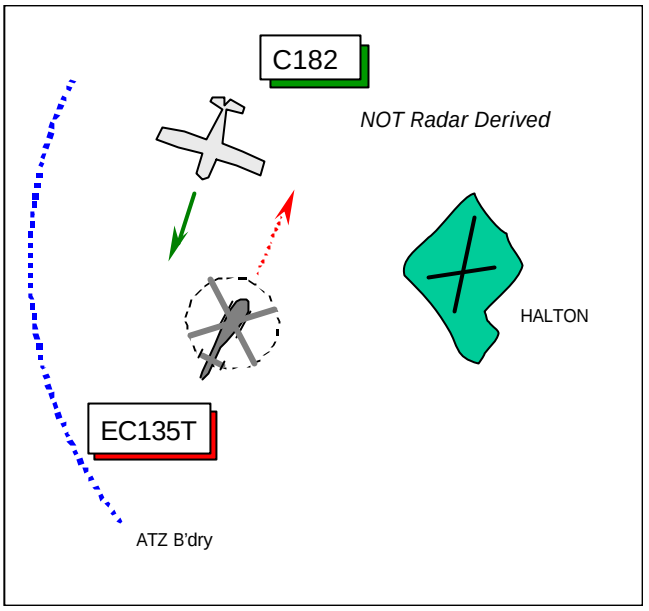
Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	C182	EC135T
Operator:	Civ Club	Civ Comm
Alt/FL:	1000 ft (QFE 1008 mb)	800 ft (QNH 1017 mb)
Weather Visibility:	VMC CLBC Unlimited	VMC CLOC 20 km+

Reported Separation:

200 ft V, 200 ft H/300 ft V, ¼ - ½ NM H

Recorded Separation: 400 yd



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE C182 PILOT reports his ac has a white/blue colour scheme; the landing light and red anti-collision beacon were on but HISLs are not fitted. He was inbound to Halton from Hinton-in-the-Hedges and in communication with Halton RADIO on 130·425MHz. Whilst flying downwind for RW02, heading 200° at 100 kt, a helicopter was spotted about 2 NM away and appeared to be within the ATZ, but its pilot had not called on the RT. The helicopter, which had a blue/yellow livery, then proceeded to fly below circuit height on the live side in between the active runway and the downwind leg, maintaining straight and level flight heading about 020°. No avoiding action was taken and he stated there was "little" risk of a collision.

He opined that Halton is a very busy airfield, with motor gliders, winch launched gliders, microlights and powered light ac. He did not believe that the helicopter pilot should have entered the ATZ without calling on the A/G Stn frequency to check on traffic within it and added that after the helicopter flew through the ATZ, a Tucano executed a low level flypast at 240 kt a for a graduation ceremony.

THE EC135T PILOT reports his helicopter has a blue/yellow livery and red anti-collision beacons and HISLs were on. He had departed from his home base at Benson, in transit at 1200 ft to a 'call-out' at Luton at 120 kt and was in the process of changing from Benson ZONE, who had been providing a FIS, to Luton RADAR. A high wing light ac was first spotted about 5 NM away well above but heading towards him, it then descended but he judged it would pass clear to port so he maintained his heading of 050° and descended to about 800 ft London QNH with Halton aerodrome about 1·5 NM to starboard. He could not see any other activity at the aerodrome and considered it safe to proceed as the other ac had not altered course and its pilot waggled his wings as he approached; so they waved back as a matter of course as the other ac passed ¼ - ½ NM to port and about 300 ft above his helicopter. Maintaining his course until past Halton aerodrome, he then turned R to regain their intended track, which would have initially taken his helicopter overhead Halton aerodrome.

MIL ATC OPS reports that the pilot of the EC135 checked in with Benson ZONE at 1202:06, after departure from RAF Benson in transit to Luton. The pilot reported passing 1250 ft, but did not advise the altitude he was climbing to. ZONE placed the flight under a FIS, advised the pilot of the London QNH (1017 mb) and asked him to report

changing frequency to Luton. There were no further transmissions to or from the helicopter until 1205:55, when the pilot transmitted *"Benson Zone,* C/S *coming up to Halton, QSY* (switch to) *to Luton please?"* to which ZONE replied *"...roger, freecall 129 decimal 55..."*. The pilot left the frequency at 1206:04. Benson ATC were first made aware of the Airprox one week later and neither the ZONE controller, nor the SUPERVISOR could recall anything notable about the flight.

UKAB Note (1): The UK AIP at ENR 2-2-3-3 (17 May 01), promulgates Halton as a government aerodrome with an ATZ as a circle radius 2 NM, centred on RW02/20, from the surface to 2000 ft above the aerodrome elevation of 370 ft and active in summer, from 0600 – 1800 or Sunset - daily. The A/G station – Halton RADIO – is promulgated as operating on 130·425 MHz within the above hours.

UKAB Note (2): The UK AIP at ENR 5-5-1-2 (22 Mar 01), promulgates Halton aerodrome as a Glider Launching Site for winch and aerotow launches where cables and tug ac may be encountered to 2000 ft agl, during daylight hours.

UKAB Note (3): The UK AIP at ENR 1-4-8 para 2.7.2, promulgates that for flight within ATZs situated in Class G airspace: *"When flying within an ATZ the requirements of Rule 39...must be complied with".*

In order to comply with Rule 39 during the notified hours of operation the procedures to be adopted by pilots are stipulated at 2.7.2.3:

(a) Before taking off or landing at an aerodrome with an ATZ or transiting through the associated airspace...obtain information from the...A/G station to enable the flight to be conducted with safety.

(b) Radio equipped ac must maintain a continuous watch on the appropriate radio frequency and advise the...A/G stn of their position and height on entering the zone and immediately prior to leaving it.

Furthermore, 2.7.2.4 stipulates that:

(a) Failure to establish 2 way radio communication with the....A/G stn during their notified hours of operation must not be taken as an indication that the ATZ is inactive. In that event...pilots should remain clear of the ATZ.

UKAB Note (4): The RAF FLIP 'Minor Aerodromes' Halton entry at the time, under remarks stated: *"For crossing or join call Halton RADIO on 130·425. If no contact transmit intentions blind and proceed with caution".* This note has subsequently been removed. 'Pooleys Flight Guide' also included a similar entry.

UKAB Note (5): LATCC archive radar data confirms that this Airprox occurred broadly as described by both pilots. Minimum horizontal separation was in the order of 400 yd. The EC135T is shown transiting through the ATZ at 1100 ft LONDON QNH (1017 mb), which would equate to about 830 ft Halton QFE (1008 mb).

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, digital radar recordings and reports from the appropriate ATC authorities.

This Airprox was the third report considered by the Board that had occurred in 2001 (the other two were 119/01 and 124/01), which related to non-circuit traffic flying through the Halton ATZ and another instance involving a civilian helicopter. Some members thought that the tone of the EC135T helicopter pilot's report suggested that he saw nothing wrong in his actions, and clearly the nature of his task might seem to some to add weight to that contention. However, it was evident to the Board that the pilot was not absolved from compliance with the Rules of the Air Regulations. The C182 pilot had no prior warning on RT of the presence of the EC135T helicopter or its pilot's intentions before it entered the ATZ. It was clear that the helicopter pilot had made no attempt to call on the A/G Stn frequency, as required by Rule 39, prior to entering the ATZ as he was apparently switching between Benson ZONE and Luton at that time - according to the RT transcript. Consequently, the helicopter pilot had no information about circuit traffic, and thus the pattern formed, from Halton RADIO. Indeed despite sighting the C182 in good time he had flown through the 'live' side of the circuit area in opposition to the established traffic

pattern, which was also contrary to Rule 17 (5) (b). Moreover, he had no information relating to gliding at the aerodrome which is 'notified' as taking place during daylight hours. With this in mind pilot members took a critical view of the helicopter pilot's planned track, which crossed the aerodrome (at circuit height) with potential to conflict not only with a glider, but also with the glider launching cable. This seemed a wholly unnecessary risk, when a small detour to circumnavigate the ATZ would have removed the potential for danger. Nevertheless, that decision was the helicopter pilot's alone, who had to balance the potential risk to the safety of his helicopter and other airspace users when flying through the ATZ unannounced, against the inherent urgency of his task and the need for prompt arrival at the scene of an incident.

The Board recognised all these points, and the BHAB member undertook to re-emphasise the presence of Halton ATZ to BHAB members, but some controller members contended that whilst all these facts had been established the occurrence did not necessarily constitute an Airprox. The C182 pilot had spotted the helicopter about 2 NM away in good weather conditions and he had been able to watch the EC135T as it closed on a parallel course and passed down the port side - about 400 yd away from the radar recording. In his own words, there had been "little" risk of a collision and he had apparently acknowledged the helicopter's presence with a wing waggle. Similarly, the EC135T pilot had spotted the C182 in good time – he reported 5 NM away – and had descended below the C182's circuit height purposely to provide additional vertical separation. He had also decided subsequently to give the aerodrome a wider berth on a reciprocal parallel course about 1·5 NM to the W of Halton. This scenario did not seem to members to be in accord with the definition of an Airprox in which, *"…their relative positions and speed had been such that the safety of the ac involved was…compromised".* Widespread agreement was reached that whilst this occurrence might be a multiple breach of the Rules of the Air Regulations, it fell more into the classification of an ATZ infringement than it did an Airprox. As such it could and should have been reported through other channels. This majority view prompted the Board to agree that this was a sighting report, in which no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Sighting report.

Degree of Risk: C.

AIRPROX REPORT No 164/01

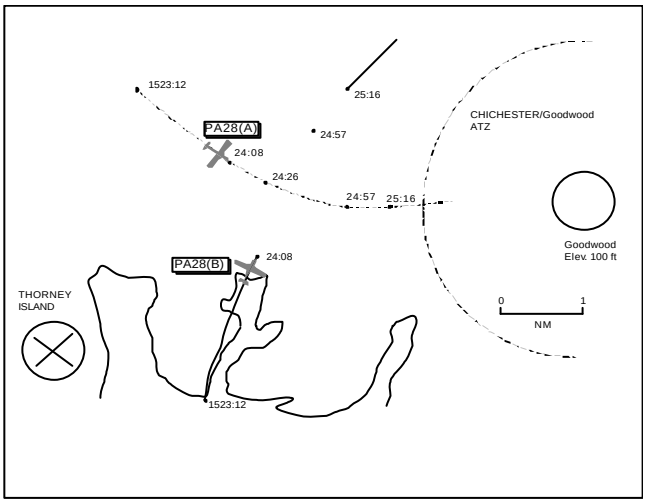
Date/Time: 16 Aug 1524

Position: 5051 N 0151 W (4 NM W of Goodwood - elev. 100 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PA28 (A)	PA28 (B)
Operator:	Civ Trg	Civ Pte
Alt/FL:	2000 ft (QNH NK mb)	2000 ft (QNH NK mb)
Weather	VMC CBLC	VMC HAZE
Visibility:	40 km	3000 m
Reported Separation:	20-30 ft V 100 m H	0 ft V 500 m H

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA28 (A) PILOT reports flying on a dual training sortie from Fairoaks to Goodwood at 2000 ft QNH and he was receiving a FIS from Goodwood Information on frequency 122·45 MHz. The visibility was 40 km in VMC, the ac was coloured blue/yellow with anti-collision light switched on and he was squawking 7000 with Mode C, he thought. When about 4 NM W of Goodwood heading 100° at 100 kt, he saw a white low wing single engined ac, possibly a PA28, 200 m off to his RHS, nose-on heading directly towards him, at the same level. He entered a rapid descent to avoid and saw the conflicting ac pass 20-30 ft above and 100 m behind and he assessed the risk of collision as extremely high.

THE PA28 (B) PILOT reports flying with one passenger en route from Bembridge to Biggin Hill at 2000 ft QNH and he was receiving a FIS from Bembridge Radio on frequency 123·25 MHz. The visibility was 3000 m in haze in VMC, the ac was coloured white with anti-collision and strobe lights switched on and he was squawking 7000, he thought, with NMC. When routeing W of Goodwood heading 040° at 115 kt he saw another ac, he could not identify the type, crossing about 1000 m ahead at the same level which then passed 500 m clear. He was based at Biggin Hill and was used to flying through areas of 'heavy traffic' and he thought a crossing ac 500-1000 m away would not pose any risk; no avoiding action was needed nor taken as their flight paths were thought not to be in confliction.

UKAB Note (1): A METAR was not available for Chichester but Met Office archive data for Southampton and London/Gatwick show EGHI 1520Z 21015KT 170V260 9999 SCT023 20/// Q1015 EGKK 1520 21011KT 180V250 9999 BKN035 20/11 Q1015.

UKAB Note (2): The PA28 (A) pilot's report was received at the UKAB approx 3 weeks post incident. This had delayed the AIS MIL tracing action and therefore, the PA28 (B) pilot's report was received well over 1 month after the Airprox. Following a subsequent telephone conversation with the latter pilot, his recollection of the flight had been rather vague owing to the elapsed time between the flight date and receiving the CA1094 form for completion. In hindsight, he may have made an erroneous estimation of the in-flight visibility, but he believed that it was certainly hazy in the area of the South Coast.

UKAB Note (3): Analysis of the Pease Pottage radar recording at 1523:12 shows PA28 (A) squawking 7000 with NMC 5·7 NM W of Goodwood tracking 120° with a primary only return, PA28 (B), 4 NM to its SSE tracking 015°. Both ac continue on generally steady tracks until PA28 (B) fades from radar at 1524:08 in PA28 (A)'s 0130 position range 1·2 NM. At 1524:26 PA28 (A) is seen to commence a L turn on to an Easterly track towards Chichester/ Goodwood. PA28 (B) pops up at 1524:57 for one sweep, 1 NM NW of PA28 (A), fading once more finally reappearing at 1525:16 3·2 NM WNW of Goodwood commencing a R turn onto a NE track. The incident, as described by the reporting PA28 (A), is not observed on recorded radar. Approx two minutes prior the Airprox, at 1522:40, an ac is seen to cross 0·5 NM ahead of PA28 (B) on an Easterly track when it is 2·5 NM SE of Thorney Island which accords with the sighting of an ac by the reported pilot.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and radar video recordings.

Members were dismayed at the late filing of the Airprox. Prompt reporting gives all parties involved the opportunity to complete the CA1094 form whilst the memory of the subject flight is still fresh in the mind. However, when lengthy delays occur it is often the case that busy pilots/ATCOs can recall only vague details or sometimes have no recollections of the particular flight/session in question. This held true particularly when there had been no apparent unusual occurrence to associate with it. Information pertinent to incidents but lost in this way does not help in the assessment of Airprox. A good example which members noted was the discrepancy of reported visibilities by both pilots. METARs for Southampton and Gatwick airports to the W and E of the area had shown visibilities of >10 km but as no weather reports were available for the IOW/Solent area, it was not possible to assess exactly the weather conditions at the time. It is, however, not unknown to

experience reduced visibility in the vicinity of the coast when the inland weather is CAVOK; the reported pilot (traced by AIS MIL) only had a vague recollection of his flight details owing to delayed contact post tracing action. Members also wondered if the pilot in PA28 (B) had actually seen PA28 (A). Pilot (A) had seen PA28 (B) close on his RHS (200 m) whereas pilot (B) had reported seeing an ac cross 1000 m ahead (about 0·5 NM) passing 500 m clear. Analysis of the radar recording had shown another encounter, as described by pilot (B), occurring about 2 minutes prior to the Airprox when PA28 (B) was coasting in near Thorney Island and this is probably what he had recalled. From the geometry of the Airprox encounter, the subject ac were seen on constant relative bearings for a considerable time until PA28 (B) faded from radar, a known scenario in which an object does not have any relative movement across the field of view (the object appears stationary on the windshield). Although the Airprox is not captured on recorded radar, PA28 (B)'s projected track would have crossed (A)'s path at about 1524:30 with both ac in very close proximity to the W of Goodwood. After much debate and taking into account the limited facts available, members agreed that this had been a late sighting by PA28 (A) pilot and, on the balance of probability, a non-sighting by pilot (B).

Looking at the risk element, the non-sighting of the crossing PA28 (A) by the pilot of PA28 (B) had meant that it had been fortuitous that the PA28 (A)'s pilot had seen the confliction and had been able to manoeuvre his ac to de-conflict their flight paths. The PA28 (A) pilot had seen the conflicting ac, albeit late on his RHS at the same level, and had initiated a rapid descent whilst he watched it pass above and 100 m behind. His actions had been timely enough to remove an actual risk of collision, but the ac had still come too close together to an extent that persuaded the Board that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the PA28 (A) pilot and a non-sighting by the PA28 (B) pilot.

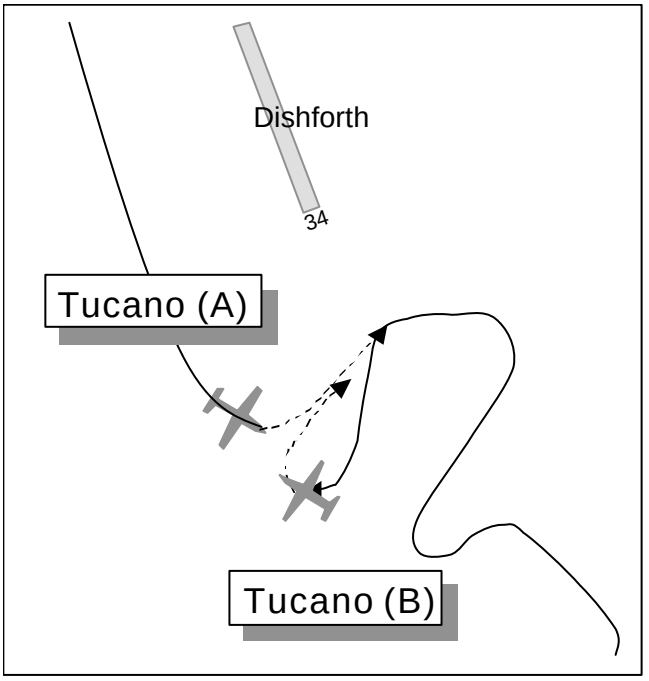
Degree of Risk: B

AIRPROX REPORT No 165/01

Date/Time: 11 Sep 1415
Position: 5407 N 0126 W (1 NM S of Dishforth - elev 117 ft)
Airspace: MATZ (Class: G)

Type:	Reporting Aircraft Tucano (A)	Reported Aircraft Tucano (B)
Operator:	HQ PTC	HQ PTC
Alt/FL:	1000 ft (QFE 1013 mb)	1000 ft (QFE 1013 mb)
Weather	VMC CLBC	VMC CLBC
Visibility:	20 km	20 km
Reporting Separation:	50 m	/200 m
Recorded Separation:		NK

BOTH PILOTS FILED



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

TUCANO (A) PILOT (solo student) reports heading 160° at 120 kt, downwind for RW 34 LH at Dishforth. As he turned finals he saw another Tucano on a reciprocal heading at the same height. He tightened the turn using full power and pulled into a climb to avoid it by about 50 m while climbing from 50 to 300 ft above it. Suspecting he had overstressed his flaps and undercarriage, he returned to base. He thought the risk of collision was high but reduced as avoiding action was taken.

THE TUCANO (B) PILOT (solo student) reports heading NW at 180 kt intending to join the Dishforth circuit for RW 34 LH but realised he had incorrectly positioned the ac for the join. He started a right turn towards E to take him onto the dead side. Midway through the turn he saw Tucano (A) which had started its final turn, and continued his turn to avoid it (hearing its pilot call 'going around') and followed it onto the dead side. Minimum separation was about 200 m at the same level; there was a possible risk of collision until avoiding action was taken.

MIL ATC OPS reports that the pilot of Tucano A was flying visual circuits to RW 34 at Dishforth talking to Dishforth Tower (TWR) on frequency 259·825, with one other ac, Tucano D, in the circuit. Tucano A had been on frequency for about 20 min and Tucano D had just landed when the pilot of Tucano B called "....request join" (1414:05). TWR replied "C/S B Dishforth Tower, join runway three four, QFE one zero one three, surface wind three zero zero, ten knots, one in." Tucano B's pilot replied "One zero one three, three four, C/S B initials" and TWR replied "C/S B roger, one ahead on the deadside" (Tucano A had just conducted a 'go around' from the final position). Ten seconds later (1414:33) the pilot of Tucano C called TWR requesting to join the circuit. TWR repeated the joining instructions that had previously been given to Pilot B but said there were "...two in." Pilot C acknowledged the call, after which pilot A reported "...downwind to roll." Shortly afterwards, TWR observed a Tucano fly at 90º across the approach to RW 34 and then turn inbound towards the live side of the circuit, against the flow. At 1415:32, believing it was pilot C that had joined incorrectly, TWR reiterated that it was a "...left hand" circuit to which pilot C responded "..initials for three four left hand." TWR advised "..one turning finals, one downwind" and pilot C reported visual, but immediately afterwards (1415:50), pilot A transmitted "C/S going around at the bottom of the downwind leg with someone flying straight down the downwind leg at me." TWR saw Tucano A turn L in avoidance and the other Tucano turn R with both ac arriving on the dead side of the circuit; halfway through his response to pilot A "C/S A that's affirmative, that's C/S C..." TWR realised he had picked the wrong ac "...correction, that's C/S B I believe." and then advised Pilot C that there were now two ac on the deadside. Fifteen seconds later, Pilot A advised TWR that he would be returning to Linton-on-Ouse and left the frequency at 1417:25. The following morning, ATC was advised that an Airprox had been filed by Pilot A.

The radar replay is not conclusive, as the ac concerned appear intermittently, wearing the same SSR code and all cannot be seen at the point of the Airprox. At 1412:53, one contact, probably Tucano B, can be seen about 3·5 NM SE of Dishforth in a L turn to track about 240º. It crosses the RW 34 approach lane at a range of about 3 NM before turning sharply R again onto a NE track, flying to a point about 3 NM ESE Dishforth. At 1414:26, the ac turns L, back toward the airfield, crossing the RW 34 approach lane again at 1415:22 on a southerly track indicating 1100 ft (QFE = Mode C datum); at this point a second contact, believed to be Tucano C, appears on radar 4 NM to the SE of Dishforth, tracking NW and indicating 1000 ft. Still indicating 1100 ft, B commences a R turn at 1415:38 in a position 170º/1·5 NM from Dishforth, with C about 1·5 NM further SE. In the next radar sweep there is a radar contact without Mode C 1 NM S of Dishforth; this contact is probably the first appearance of Tucano A at the end of the downwind leg, and B's contact has faded. By interpolation, Tucano B would be about 0·25 NM SE of A at this point. Following this, one of the ac can be seen crossing the approach lane at about 0·5 NM, indicating 700 ft. All three ac are first seen in the same sweep at 1416:33, in the dead side to the N and NE of the airfield, with the two southerly ac appearing to be the ones that remain in the circuit.

Tucano pilot B had been given accurate joining instructions and had read them back correctly. The ATC tower at Dishforth is situated adjacent to the RW 16 threshold and with no ATM, it is difficult for Aerodrome Controllers to note ac approaching on

the wrong side of the circuit when RW 34 is in use. The radar recording shows that TWR had little chance to spot this particular problem any earlier than he did. Given the abnormal track flown by the pilot of B, the intervening confusion was understandable.

HQ PTC comments that while instructors and supervisors do all they can to minimise risks, one is that, on occasions, student pilots will make mistakes which are difficult to explain. Luckily, on this occasion, the problem was resoved by the other student. Although TWR tried to provide adequate traffic information to all concerned, he was understandably fooled by the unexpected manoeuvres of Tucano B; there is little more that he could have done to identify or resolve the problem, especially at that distance from the VCR. Had an ATM been available, it might have alerted him to the problem before it developed to this critical stage.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC and operating authorities.

Members agreed that the cause of the Airprox was that the pilot of Tucano (B) did not conform with the circuit joining pattern and flew into conflict with Tucano (A), and concurred with HQ PTC's initial comment. However, it was always vital to get the joining pattern straight in one's mind before embarking upon it and if uncertainty exists, an orbit outside initials is a better place to sort it out than zig-zagging across the final approach path.

Members discussed the risk level at some length and opinion was almost evenly split; some considered that while the safety of the ac had been compromised, the pilot of Tucano A had taken avoiding action in time to remove the risk of collision, and that the pilot of B had not made matters worse at that stage. However, a small majority of members considered that despite that, there had still been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Tucano pilot (B) did not conform with the circuit joining pattern and flew into conflict with Tucano (A).

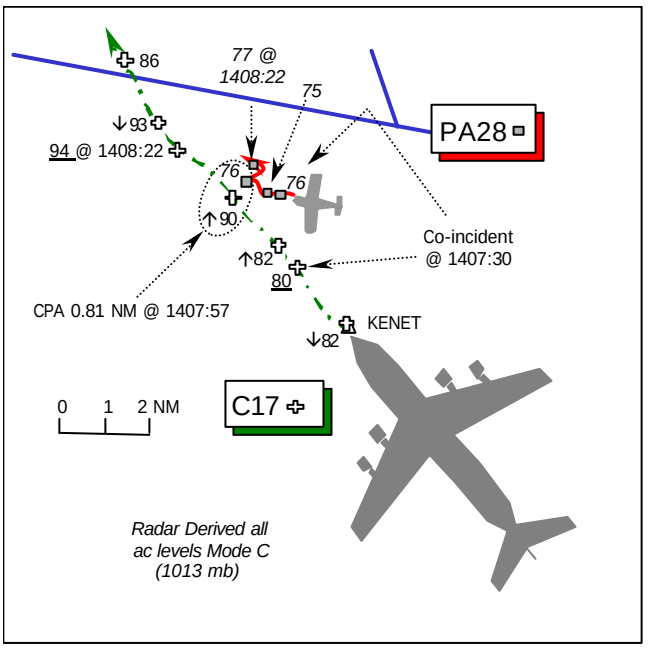
Degree of Risk: A

AIRPROX REPORT No 166/01

Date/Time: 9 Sep 1407 (Sunday)
Position: 5130 N 0140 W(4 NM NW of KENET)

Airspace: Airway G1 (Class: A)

	Reporting Aircraft	Reported Aircraft
Type:	Boeing C17	PA28-161 Cadet
Operator:	HQ STC	Civ Pte
Alt/FL:	FL 80	7500 ft (QNH 1019 mb)
Weather Visibility:	IMC CLAC 10 km+	VMC CLAC 25 NM+
Reported Separation:	400 ft V (TCAS)	1 NM H
Recorded Separation:		0·81 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BOEING C17 PILOT reports his ac is camouflage grey, but HISLs were on whilst inbound to Brize Norton at 250 kt, IMC, 3-400 ft above a thin layer of cloud. Heading 322° to leave CAS, he thought at MIMBI, (UKAB Note (1): It was actually KENET), he was just switching from London CONTROL to Brize Norton DIRECTOR (DIR) and had just levelled the ac at FL 80 when TCAS enunciated a TA and then an RA. The other ac, which he did not see at all, was shown on TCAS 400 ft below in his 12:30 position, possibly below the nose or below the cloud layer. An avoiding action L turn was passed by DIR, in addition to the TCAS RA climb, which was complied with. TCAS showed that the other ac passed no closer than 400 ft beneath his ac, with in addition, he thought about 4000 ft horizontal separation. He assessed the risk of collision as "moderate" and added that the workload was slightly higher for the PNF during the frequency change and initial call to DIR.

THE PA28-161 PILOT reports his ac has a white and blue colour scheme and HISLs were on. He was not under an ATS, but was 'listening out' on the Lyneham ZONE frequency of 123·4 MHz, and a 7000 squawk selected with Mode C.

He had planned his recreational flight from Denham to Swansea at an altitude of 4500 ft, tracking between the CPT and BCN VORs, heading WNW and climbing at a rate that kept him below the three familiar sections of the London TMA to the E of the Airprox location. Whilst heading W he observed that the clouds in the area were broken between about 3500 and 6500 ft, so instead of weaving he decided it would be safer to fly in a direct path either below the cloud level or above it, provided he could keep the ground in sight all the time. He elected to fly about 1500 ft above the broken cloud in order to avoid the Lyneham CTA and the Fairford MATZ. Heading 280° at 100 kt about 8-10 NM E of Swindon, he spotted the large four-engined transport ac to port about 1·5 - 2 NM away and on a similar course but climbing and banking to port. He immediately and rapidly descended into a R turn to avoid the C17 which passed more than 1 NM away with a "low" risk of collision as both pilots had taken avoiding action. He added that he had been paying close attention to the navigational systems; for the remainder of the flight he maintained a lower altitude below the cloud level.

The week before the flight he had purchased a software flight-planning package. He opined that he had planned the flight to Swansea very thoroughly using this software, which purported to be a complete tome of information and "the only flight-planning tool necessary" for the trip. However, he alleges that unbeknown to him at the time, the software did not show the Class A CAS in that area as beginning at 6500 ft (sic) but rather it shows class A with a base of 10,500 ft (sic - see UKAB Note (2) below). Therefore, when making his decision to fly above or below cloud, he felt it would be safer to fly above - though he was able to see the ground at all times. Throughout the flight he used several sources of information to navigate, including a Lowrance GPS (without altitude data), the maps he had printed out from the software package and their accompanying waypoint and altitude data. He also monitored the VOR signals and navigation equipment in the plane, and most importantly, was double-checking everything on the CAA 1:500,000 aeronautical chart. However, he accepted that his mistake was to trust the software 'flight plan' too much and simply did not double-check that section of CAS on the chart. He notified the manufacturer about the error with their software, who acknowledged that he was correct and the relevant data was missing, but he is waiting to hear further on this matter. He stressed that he was not trying to make excuses and he has realised that this was his mistake. He values air safety as the most important element of aviation and believes this incident was a salutary lesson.

UKAB Note (2): The base level of airway G1 to the E of KENET is FL 55, to the W it is FL 65 before it steps up further to FL 75 at MALBY. The base level of the overlying contiguous Cotswold CTA in this vicinity is FL 105 - not 10,500 ft ALT.

THE LATCC BRISTOL (BRS) CHIEF SECTOR CONTROLLER (CSC) reports that the C17 was descending to FL 80 on a radar heading and still within CAS, when it was transferred to Brize RADAR. Soon after transfer the C17 was seen to climb to FL 90 and a weak background A7000 squawk indicating FL 80 Mode C appeared behind the C17's label. The Short Term Conflict Alert (STCA) did not detect the conflict. Neither he, the SC, nor the

Brize RADAR controller saw the 7000 squawk before the incident and the during the replay it was evident that the PA28's faint SSR label was frequently obscured by brighter main mode labels.

MIL ATC OPS reports that the crew of the C17, was receiving an Air Traffic Control Service from the LATCC BRS Sector during the en route descent, inbound to Brize Norton. At 1405:25, as the C17 passed COMPTON, westbound on G1, the BRS CSC contacted Brize DIR to prenote the ac and obtain a frequency for the freecall. The CSC identified the C17 to the DIR and advised that it was descending to FL 80, adding "As soon as he is clean, we will give him to you, probably a little bit (of a) right turn as soon as he is clear of that one to the north of him (referring to another CAT ac and not the subject PA28)". DIR acknowledged the proposal and instructed the C17 crew to freecall, when released, on 127·25 MHz.

At 1407:28, the C17 crew made their initial call to DIR, level at FL 80. DIR replied "C/S, Brize, identified flight level eight zero, you have manoeuvring traffic in your twelve o'clock at three miles indicating flight level seven five; what type of service [outside CAS] do you require"? The C17 crew began to reply, but their transmission to DIR was interrupted: "C/S, roger just...(in the background intra cockpit - TCAS Advisory there)...sorry". DIR replied "C/S, roger, that traffic now...slightly right of twelve o'clock, two miles, right/left, indicating flight level seven five descending.....just confirm your type of service [outside CAS]"? The C17 crew requested a RAS and DIR immediately issued an avoiding action turn 30° to port, which was acknowledged. At 1408:12, the C17 crew confirmed that they were clear of traffic and were given a right turn onto 350° by DIR; the turn was acknowledged and the crew confirmed that they were descending back to FL 80. The C17 crew were then positioned for the ILS and descended further inbound to Brize.

At 1409:25, the BRS CSC contacted DIR and the following landline conversation ensued:

CSC:"...we never saw that seven thousand (squawk) at eight zero".
DIR: "When he came across to us he took...a TCAS Resolution Advisory".
CSC: "That's what we thought, the way he went out of there he must have been TCAS...he's (the PA28) a little bit faint you know because the, the main mode converted labels are stronger.....I think we missed it garbling...but we can see him now.....we said why...has he gone to nine, then suddenly from underneath him we saw the seven thousand squawk".
DIR: "...As it came across it was all happening...we will keep an eye on that seven thousand - he's at flight level eight (zero) now and climbing".
CSC: "It's an infringer and we just didn't see it".

DIR then passed updated traffic information to the C17 crew, who replied, "OK, yeah, we saw him...we were four hundred (ft) above him at eight zero when he appeared". The remainder of the C17's approach was uneventful and the crew filed an Airprox report after landing.

For GAT leaving CAS inbound to Brize Norton, the LATCC MATS Pt 2 requires BRS Sector to prenote the ac and then clear it to leave CAS and freecall Brize at, or descending to, FL 80 in the vicinity of MIMBI. As the base level of G1 here is FL 65, the traffic remains inside CAS until it clears the northern boundary of the airway. This procedure is mutually beneficial for BRS and Brize when the inbound traffic is clear of any conflictions - as it should be - but becomes complicated if the ac is released in confliction. DIR may not manoeuvre ac within the confines of CAS, even an ac in confliction, unless specifically cleared to do so by the airway's controlling authority, which BRS CSC had not. Therefore, DIR was not technically obliged to offer any avoiding action to the C17 crew; that said, it is unlikely that any radar controller would deliberately ignore a 'duty of care' and refuse to intervene given the proximity of the 2 conflicting ac. DIR made 2 reasonably accurate calls to highlight the conflicting traffic and ascertained from the C17 crew the type of ATS they required when clear of CAS. Once the C17 crew stated they required a RAS clear of G1, DIR had no other option but to pass an impromptu control instruction to ensure the 2 returns did not merge, which he did, albeit too late to affect the eventual outcome. With the benefit of hindsight, DIR could have prioritised and reacted a little quicker to resolve the confliction, rather than question the C17 crew unnecessarily regarding their choice of service. However, it is likely that DIR was both confused and surprised to find the C17 released in confliction, and so did not act as positively as he could have done.

When assessing DIR's actions the limited options available must be considered given that the confliction took place inside CAS. Either do nothing because the DIR is not permitted to control in CAS - or - accept that a controller has certain moral obligations regarding safety, no matter what the situation. Here DIR's instincts and intentions were correct.

UKAB Note (3): The Clee Hill radar recording shows the C17 squawking A4011, SE of KENET tracking WNW and descending from FL 130 within G1. The PA 28 - squawking A7000 - is shown to the NW of KENET in an apparent 'figure of 8' orbit at FL 81 where the base of G1 - W of KENET - is FL 65. At 1406:50, the PA28 is 4 NM NW of KENET in a descending L turn through FL 76, the C17 is 1·5 NM SE of KENET tracking towards it descending through FL 90. At 1407:30, moments after the C17 crew's initial contact with DIR, the C17 is 2 NM NW of KENET tracking NW level at FL 80, whilst the PA28 is continuing in a L turn at FL 76, passing through NW in the C17 crew's 1 o'clock at 2 NM. At 1407:34, the time of DIR's first traffic information call, the PA28 is still in the L turn passing through W in the C17 crew's 1 o'clock at 1·5 NM indicating FL 76. At 1407:45, the PA28 begins a R turn away from the approaching C17, which is 1 NM to the S climbing through FL 82. By the time of DIR's second traffic information call at 1407:50, the PA28 had turned northerly at FL 76 less than 1 NM to the N of the C17, which is climbing through FL 87 and appears to have turned slightly to port. The PA28 continues its R turn at the CPA as the C17 passes 0·81 NM SW climbing through FL 90 at 1407:56. As the 2 ac begin to diverge, the C17 is shown in a slight avoiding action L turn and ascends to FL 94 in response to the TCAS RA. At 1408:29, the C17 is shown in a gentle descent whilst the PA28 begins a L turn back onto a WSW track a few seconds later.

ATSI reports that whilst it was unfortunate that the BRS Sector controllers did not observe the unknown traffic's apparent climb into CAS before the C17 was transferred to Brize DIR, there was no specific requirement, nor perceived need, to monitor such traffic. The PA28's A7000 squawk label was displayed at reduced brilliancy in order to provide the controller with a less 'cluttered' radar picture. It is confirmed that STCA would not have been expected to activate in the circumstances, as the LATCC MATS Part 2, GEN 8-3, 3.2 explains: "SSR codes ending in double zero, such as 7000 (the conspicuity code) are not defined as discrete codes and are thus not considered by the Mode C Intruder Alert "(amongst the few exceptions are the Special Purpose Codes 7700, 7600 and 7500). This is not, however, the case within the new London Area Control Centre (LACC) at Swanwick, where traffic displaying A7000 with Mode C will trigger the STCA within the appropriate parameters. Furthermore, to ensure the visibility of SSR labels of 'other' traffic - which includes 7000 codes - it is the intention at LACC to require controllers to select the SSR label brilliancy level of such traffic at either a 'medium' or 'high' setting. In combination these initiatives should provide LACC SCs with an early warning of unknown traffic that is presenting a threat to GAT within CAS.

HQ STC comments that this incident clearly left DIR with a dilemma and his actions were both safe and sensible. Although the C17 had been released by the BRS SC, it was still in CAS and the SC had given no indication of the conflicting ac's proximity or, indeed, its existence. TCAS is by no means widely fitted to RAF ac and it is fortunate that this incident was resolved safely. All RAF multi-engined ac will be TCAS equipped by Jan 2005.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Members recognised that the LATCC STCA equipment, in use by the BRS SC at the time of the Airprox, would not have provided any warning of the PA28. Though surprised, members were gratified to learn that this was not the case at LTCC, or at LACC Swanwick - which was now open - thereby eliminating further concerns. However, some were surprised that DIR had not seen the PA28 earlier. The comprehensive Mil ATC Ops report had highlighted perceptions, voiced by some members, that Brize DIR seemed more intent on establishing the type of service required by the C17 crew when clear of CAS, than taking action to resolve an observed confliction, which only seemed to become apparent when the C17 crew called.

Whilst recognising this Airprox occurred within CAS, wherein DIR had no mandate to offer a 'radar' service, members concurred with Mil ATC Ops sage comments; it would have been preferable to proffer avoiding action and traffic information in the first instance - irrespective of what service was eventually requested. That said, when TCAS comes into play the situation alters significantly, but here it appeared the C17 pilot had not advised DIR that they were responding to a TCAS RA - only when they were clear of the conflict. Nonetheless, the Board endorsed DIR's avoiding action as entirely appropriate in the circumstances.

The Board welcomed the laudably frank and open report from the PA28 pilot, but it was clear that the advent of new technology, as ever, had introduced a trap for the unwary. The PA28 pilot had planned his flight using new software which had, (he alleged) contained an error. This error was carried forward from his planning undetected, and led him to believe that he was flying in the open FIR when the Airprox occurred, whereas the radar recording showed that the PA28 had inadvertently entered Class A CAS some time before the Airprox. Copies of the software used by the PA28 pilot were not available to the Board, but they had no reason to doubt the veracity of the PA28 pilot's comments. The Board discussed the use of such 'aids' and members were adamant that they were no substitute for a good 'in date' chart coupled with reference to the appropriate AIP; careful cross-checking within these documents would have revealed the reported discrepancy or not generated it in the first place. The Board noted that the PA28 pilot had 'double checked' his route on the CAA 1:500,000 chart, but even a cursory check of this chart should have revealed the apparent error, as the base level of CAS is clearly shown as it steps up to the W from the London TMA. A GA member opined that the PA28 pilot appeared to have over burdened himself with information from so many sources, that he had forgotten the basics principles of good airmanship. Nevertheless, reliance on 'unofficial' off-the shelf software was no excuse and some questioned the currency of the information contained therein since changes to the airspace structure occur frequently. Indeed the interval between the effective 'air information date' and the date such items are available for purchase/use could be so great as to call into question their usefulness. However, regardless of his planning method or the aids to navigation used, the PA28 pilot had entered CAS without clearance and here was the root cause of the occurrence. Members agreed unanimously that this Airprox resulted from an inadvertent, unauthorised penetration of Class A CAS by the PA28 pilot.

Some questioned the wisdom of merely 'listening-out' with Lyneham ZONE as there was little to be gained. In their view, it would have been far better to ask for an ATS and receive something positive. It was not clear if the PA28 pilot had an instrument rating; recognising that the levels of ATS vary significantly between on the one hand a FIS and on the other a RAS, if the PA28 pilot had asked for a 'radar' service from ZONE, the controller might have been able to detect the PA28 pilot's error and thereby forestall the encounter. Safe navigation of the ac was still ultimately the pilot's responsibility, however.

Turning to risk, several safety nets had come into play to prevent this situation from deteriorating further. TCAS had alerted the C17 crew to the presence of the PA28 at about the same time that DIR spotted it and proffered avoiding action. Although they had not seen it, this enabled the C17 crew to climb some 1400 ft above the PA28 at the closest point. Furthermore the PA28 pilot had also seen the C17 and was taking avoiding action himself. Consequently, members agreed unanimously that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Inadvertent unauthorised penetration of Class A CAS by the PA28 pilot.

Degree of Risk: C.

AIRPROX REPORT No 167/01

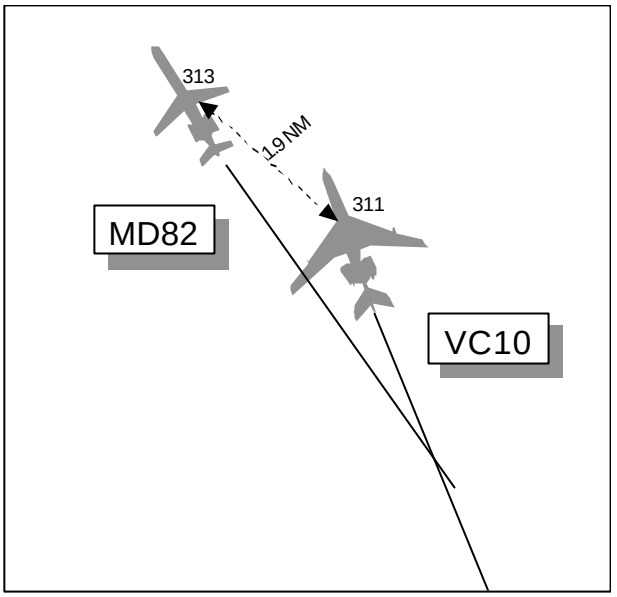
Date/Time: 12 Sep 1308

Position: 5020 N 0130 E (17 NM NW of Abbeville)

Airspace: FUIR (*Class:* A)

Reporter: LATCC Lydd SC

	First Aircraft	*Second Aircraft*
Type:	MD82	VC10
Operator:	CAT	HQ STC
Alt/FL:	↓ FL 150	FL 310
Weather Visibility:	VMC CLOC	VMC CLOC Unltd
Reported Separation:	3 NM, 500 ft	/2.5 NM, 0 ft
Recorded Separation:		1.9 NM, 200 ft



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LATCC LYDD SC reports working the Dover R3 position on the bandboxed Dover/Lydd Sector at LATCC; although she had asked for the sector to be split, no assistance had yet arrived. The MD82 was at FL 330 on a radar heading of 325° against other Gatwick inbound tracks and the VC10 was on its own navigation at FL 310 a few miles astern of it. She instructed the MD82 pilot to descend to be at FL 150 abeam BEXIL; she realised her mistake as she saw its Mode C indicate FL 324 and told the pilot to stop his descent at FL 320, repeating the instruction. On seeing it descend through FL 320 she turned the VC10 right onto 340°; the latter's pilot reported the MD82 in sight. She then gave the MD82 an avoiding action left turn onto 295° and climb to FL 320.

THE MD82 PILOT reports heading 340° at M 0·75 (about 440 kt), cleared to descend to be at FL 150 by abeam BEXIL, on a radar heading of 340°. Passing FL 322 he was asked to stop his descent at FL 320 and to turn left onto 295°. Having done this he saw on TCAS traffic at FL 310 3 NM astern. There was no TA or RA and he could not see it since it was astern. Subsequently he was cleared to descend to FL 270 on a heading of 320°.

THE VC10 PILOT reports heading 315° at 465 kt, maintaining FL 310 across France, and had been aware of the MD82 for 20 min; it was ahead and above and he was slowly overhauling it. Both ac were transferred to LATCC where it was immediately apparent that the controller was very busy. As the MD 82 began to diverge to the left he heard it being cleared to a level below his and drew his crew's attention to it; weather radar indicated it was some 2·5 NM ahead. Because there was no collision risk (it was to his left and diverging) and the controller was extremely busy, he did not challenge ATC. As it reached his level the MD 82 was asked to climb and turn left, and he was turned 10° right; he advised ATC that he could see the MD82. Once it was well clear it was given further descent.

ATSI reports that the SC was operating a combined DVR/LYD Sector. She had taken over the sector about ten minutes before the incident and described the workload on handover as low but as she could see that traffic loading was likely to increase in the near future she had asked for the sector to be split. The CSC had, in fact, already requested that this be carried out. Nevertheless, the sector was still combined at the time of the occurrence.

The MD82 pilot established communication with the DVR/LYD Sector at 1304, reporting level at FL 330, en route to GUBAR. The SC cleared the flight direct to BEXIL for a TIMBA 2B arrival for Gatwick. Shortly afterwards, the VC10 pilot made his initial call on the frequency, level at FL 310. The SC said that she realised from its FPS that the ac's SSR Mode A needed to be changed to a LATCC squawk. Accordingly it was requested to squawk 5170, 'with ident'.

The SC explained that her plan was to parallel the MD82's track with another Gatwick inbound, to facilitate descent for both ac. The MD82 was, therefore, at 1305, instructed to "*fly heading three two five degrees*". Two minutes later the MD82 requested descent. The ac was cleared by the SC to descend to FL 150, to be level abeam BEXIL, in accordance with the Standing Agreement between the LYD and TC Timba Sectors. The radar recording, when the descent clearance was issued at 1307:37, shows the MD82 at FL 330, tracking 2.6 NM ahead of the VC10, which is maintaining FL 311. The SC said that she could offer no explanation as to why she had overlooked the presence of the VC10, when she cleared the MD82 to descend. As far as she could recollect the relevant FPS were displayed correctly.

The SC recalled that, having issued the descent clearance to the MD82, she turned her attention to the traffic situation in the DVR area of the sector. Following a routine scan of the radar display, approximately thirty seconds later, the SC said that she noted that the MD82 was passing FL 324. She immediately recognised the potential confliction with the VC10 and instructed the MD82 to stop its descent at FL 320, repeating the instruction. The radar recording shows the MD82 passing FL 324 at 1308:20, with the VC10 in its half past five position, 2·2 NM away. Although the pilot read back the instruction correctly, she observed the ac descend below FL 320. As a precaution, she instructed the VC10 to turn right heading 340°, after which its pilot reported visual with the descending traffic. Seeing that the MD82 was still descending, she passed the flight an 'avoiding action' left turn heading 295°. Once the pilot had read back the avoiding action instruction correctly, she cleared the ac to climb to FL 320. Radar recordings reveal that it continued descending to FL 313, when the closest point of approach occurred (1.9 NM/200 feet), before climbing back to FL 320.

The SC added that she had not passed traffic information, at the time, as her main priority was to ensure that the flight paths of the subject ac diverged. In any case, the pilot of the VC10, which was in the optimum position to acquire a sighting, did report visual with the MD82. STCA did not activate during the encounter. Shortly after the incident, another controller was in place to split the combined sector and took control of the LYD Sector.

HQ STC comments that as this incident occurred in good VMC, the VC10 crew were fully aware of the developing situation and were content that there was no risk of collision in spite of the loss of separation. It seems that the captain had a good appreciation of the controller's increased workload and was therefore happy to monitor the MD82's progress visually, rather than immediately challenge the controller's instructions.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Members noted the high workload of the combined ATC sectors as described by the VC10 pilot and queried whether this had a bearing on the Airprox. However, the controller had been asked about this and had described her workload as low to moderate at the time of the incident. The request to split the sectors had been in anticipation of a further increase in traffic loading and the controller's request had in turn been anticipated by the CSC. The Board concluded that the cause of the Airprox was that the SC had overlooked the presence of the VC10 when clearing the MD82 to FL 150 and had cleared the latter to descend through the former's level with inadequate horizontal separation. Members noted that she had subsequently noticed and had told the MD82 pilot to stop his descent at FL 320 with 400 ft to go to that level. The radar recording showed a rate of descent of 3000 ft/min at that point but members considered that in allowing the ac to descend a further 1000 ft, the MD82 pilot had not reacted very promptly to the controller's repeated instruction to stop his descent.

It was clear that there was no risk of a collision in the event because of the existing separation with the ac on similar tracks, and the VC10 crew's attention to the situation.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The DVR/LYD SC cleared the MD82 to descend through the VC10's level.

Degree of Risk: C

AIRPROX REPORT No 168/01

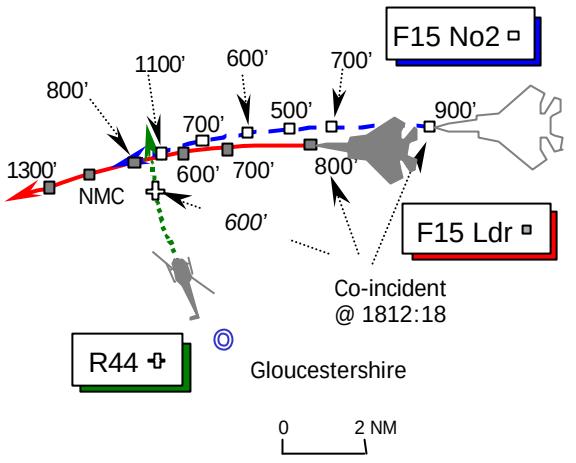
Date/Time: 10 Sep 1813

Position: 5158 N 0212 W (4 NM NNW of Gloucestershire Airport - elev 95 ft)

Airspace: FIR/UKDLFS-LFA4 (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Robinson R44	F15 x2
Operator:	Civ Pte	Foreign Mil
Alt/FL:	800 ft (RPS 1015 mb)	850 ft↑ Rad Alt
Weather Visibility:	VMC CLBC 40 km	VMC CLBC Not reported
Reported Separation:	20 ft V	4-500 ft V

Recorded Separation: Not recorded



Radar Derived.
All ac levels Mode C (1013mb) NMC - No Mode C

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ROBINSON R44 PILOT reports his helicopter has a white and blue livery and HISLs were on whilst flying home at 105 kt from Gloucestershire Airport to a private HLS at Malvern. Squawking A7000 with Mode C, he was receiving a FIS from Gloucestershire on 125·65 MHz. Heading 345°, he thought 345° GLO 6 NM, in a level cruise at 800 ft RPS (1015 mb) he was flying about 2000 ft below cloud in perfect flying conditions. Unaware of any other ac in his vicinity, he suddenly heard a very loud noise that lasted for about 1 sec, which he thought, represented something very wrong. Looking through his port side window, the undersurface and tail of a military jet – possibly an F15 – was seen going away to the W about 30 ft away. It had directly overflown his helicopter by about 10 – 20 ft from E – W on an exact collision course. He opined that no avoiding action was feasible in the time available.

A second jet also passed on a similar heading, behind and somewhat lower than the first, but the second ac did not represent a threat at the time. He assessed the risk as *"high"* and asserted that he truly believed he had missed a collision by a very narrow margin. An Airprox was reported to Gloucestershire Airport by telephone.

THE F15E PILOT reports he was leading a flight of 2 camouflaged grey F15E ac flying in 2½ – 4 NM trail, about 5000 ft below cloud. Anti-collision beacons and HISLs were on. They let down into LFA 4 to about 1000 ft amsl (850 ft Rad Alt), heading 270° - directly into the setting sun – at 450 kt, flying with terrain following radar (TFR) and additionally, the air-to-air radar in search mode. Neither of these sensors indicated that another ac was ahead. The small white helicopter was seen less than 1 sec before it was overflown. The late

sighting resulted because there was no relative motion across his windscreen to draw attention to the R44. Because it was lower than his ac the helicopter blended in with background clutter. No avoiding action was feasible – there was no time to change his ac's flightpath after seeing the helicopter – which passed about 4-500 ft beneath his ac with a *"high"* risk of collision.

UKAB Note: The LATCC Clee Hill radar recording does not illustrate this Airprox clearly as the R44 helicopter's Mode C is only shown occasionally, when it is obscured by label overlap; the contact fades completely just before the Airprox occurs. The R44 is shown tracking 345° outbound from Gloucestershire Airport squawking A7000 and climbing through 500 ft Mode C (1013 mb). At 1812:18, the F15 flight are shown westbound in trail with 2·6 NM between the two ac, the lead F15 descending through 800 ft Mode C and the No2 900 ft (1013 mb) – equating to about 860 and 960 ft respectively RPS (1015 mb). Meanwhile, the R44 is shown in the F15 leader's L 11:30 at 3·6 NM on a steady course 200 ft below the latter at 600 ft Mode C – about 660 ft RPS. The ac converge 4 NM NNW of Gloucestershire Airport, but the R44's radar contact is obscured by the F15's SSR label and then fades with no Mode C indication. Therefore, the minimum separation that pertained cannot be determined. The F15s continue in a shallow descent; at 1812:43 the lead is shown at 600 ft Mode C – the last observed level of the R44 – and overflying the projected track as reported by both pilots. The next sweep reveals that the lead F15 climbed to 800 ft before ascending to 1300 ft; simultaneously the No2 has ascended to 600 ft after bottoming out at 500 ft; the No2 passes the predicted vicinity of the R44 indicating 1100 ft Mode C, 18 sec after the leader. The next sweep shows the No2 at 800 ft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and radar video recordings.

Although the R44 pilot reported that he was not aware of the presence of the F15 until it had cleared to port, members thought it should have been within his available field of view to starboard. The F15E is a large ac in relative terms to the R44 and should have been visible – albeit at a head-on aspect - whereas the small R44 is often extremely difficult to spot visually. In this 'see and avoid' environment, members recognised that if the helicopter pilot had not seen the lead jet until it had overflown his helicopter there was nothing that he could have done at all to effect the outcome of this encounter. Here then was part of the cause of this Airprox – a non-sighting by the R44 pilot. Given the slow relative speed of the helicopter, from the F15 pilot's perspective members believed there would have been little to highlight the other ac's presence as they flew into the setting sun, where the helicopter's HISLs would have had little visual impact. Some military pilot members thought it was unwise to let down at 450 kt, into a setting sun because it left little time for any avoidance manoeuvres as shown here. They thought a slower speed was more appropriate in these circumstances. Others wondered if the F15 pilots were relying on their ac 'sensors' too much and the inability of the F15's air to air radar to detect the squawking R44 was noted. Furthermore, some military pilot members familiar with TFR wondered what mode the F15 leader was using and why his ac's TFR had not detected the R44 and taken the F15 'over' the slow moving helicopter.

Ac equipped with TFR can be flown in either 'hands-on' (manual), or 'hands-off' (automatic) mode. The Board was subsequently advised that in manual the pilot continues to fly the ac normally, while monitoring the TFR display for any climb instructions to avoid obstacles ahead. In automatic, the TFR is linked to the autopilot and will fly the ac at a height set by the pilot on a programmed heading. If an obstacle - such as an ac - is detected by the TFR, the autopilot will automatically climb at 20° to avoid it, but there are a number of reasons why the F15's TFR might not have detected the R44. Most probably, the helicopter was always outside the very narrow beam of the TFR probing ahead. The combination of the helo's slow speed and heading, importantly perpendicular to that of the F15's, meant that it was not picked up. This geometry was a recognised problem in TFR operations. Some suggested that the helicopter was always going to be outside the possible confliction 'envelope' and a collision would never have ensued in the conditions and geometry that pertained. Others were not so sure. What was indisputable was that the lead F15 pilot did not

see the small helicopter himself until 1 sec before it was overflown. The members agreed with the F15 pilot's own report that he had been powerless to effect any significant change to his flightpath in the short time available. Here then was the second part of the cause - effectively, a non-sighting by the F15 lead pilot.

In this situation, where neither pilot could have prevented a collision, it was entirely fortuitous that some vertical separation had existed. Unfortunately, this could not be determined with any certainty, as the full extent of the encounter was not shown on the radar recording, but the Board thought it was probably less than the 4-500 ft reported by the F15 pilot. Notwithstanding the unverified nature of the Mode C responses, the radar recording showed both the R44 and lead F15 at the same level seconds before the predicted merge of the two contacts. Moreover, the lead F15 was only 200 ft above the last known level of the helicopter on the following sweep. Although the R44 pilot thought the F15 flew a mere 20 ft above his ac, some members were sceptical of this figure and opined that wake vortex from the large jet at 450 kt that close would have demolished his helicopter. Others contended that it was perfectly feasible to fly that close and not suffer detrimental effects from the other ac's wake. Nevertheless, members agreed that whatever vertical separation had existed it was far too close. This, coupled with the effective non-sightings, led the members to agree unanimously that an actual risk of a collision had existed in these circumstances.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the R44 pilot and effectively, a non-sighting by the lead F15 pilot.

Degree of Risk: A.

AIRPROX REPORT No 169/01

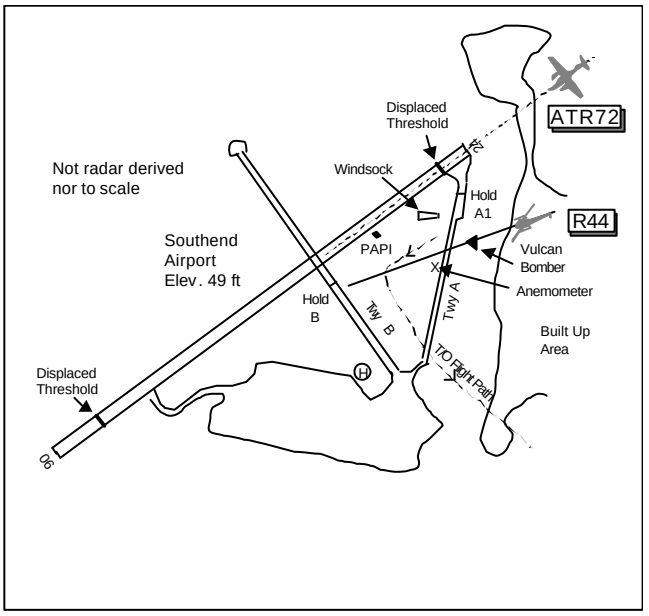
Date/Time: 15 Sep 1316 (Saturday)

Position: 5135 N 0042 E (0.5 NM FIN APP RW 24 Southend - elev. 49 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	ATR72	R44
Operator:	CAT	Civ Comm
Alt/FL:	200 ft ↓ (QNH 1012 mb)	100 ft ↓ (QFE 1011 mb)
Weather Visibility:	VMC CLBC 30 km	VMC CBLC 10 km
Reported Separation	0 ft H 100 m H	0 ft 30-40 m H

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ATR72 PILOT reports flying inbound to Southend from the Channel Islands on an ILS approach to RW 24 heading 243° at 120 kt. The visibility was 30 km 2500 ft below cloud in VMC, his anti-collision strobe and landing lights were all switched on and he was squawking 1407 with Mode

C. Prior to commencing the approach he had briefed the FO, PF, on the importance of lookout when carrying out an instrument approach outside CAS. Various contacts were seen on TCAS including one ac D/W RH for RW 24 which was pointed out by the APR. He was then transferred to Southend TOWER on frequency 127·72 MHz at approx 3 NM from touchdown; the ADC informed him of helicopter traffic "*remaining South of runway 24"*. This traffic was not seen on TCAS but the Capt, PNF, visually acquired the helicopter flying in a shallow banked descending turn, when he was about 2 NM from the RW. He assumed, from his experience of operations at London/Gatwick, that the helicopter would hold on the Southern airport boundary but it was seen to continue on a converging then parallel track. By now he was descending through 150 ft Rad Alt with the helicopter ahead displaced about 100 m to his L on a near identical vertical flight profile; it appeared to be `shadowing' his ac. He considered taking avoiding action but decided against it as the required manoeuvre, so close to the ground and the conflicting helicopter, would have been hazardous in itself. He continued the approach and landed on the RW whilst the helicopter landed on the grass just to the S of RW 24 at the Eastern end; this landing site appeared to differ from the `H' indicated on the Aerodrome Chart. He assessed the risk of collision as medium. He went on to say that had the helicopter being using its transponder, it would have assisted him by giving an early TCAS TA alert and a heightened threat awareness - a go-around may well have been executed from an earlier/safer position. The Capt had subsequently spoken to the SATCO who had agreed that the helicopter's flight path was not as ATC had anticipated.

THE R44 PILOT reports carrying out pleasure flights from the Southern Helicopter Training Area (SHTA) at Southend – the grass area SE of a line through Holding Points B and A1 to the S of RW 24. LH ccts were in use commencing from S abeam the windsock with T/O parallel to the RW and remaining S of the cut grass area surrounding the PAPI lights. On departure, these ccts were to follow a track (shown as a dashed line on the diagram) to cross the SE aerodrome boundary as agreed with ATC. He reported turning finals for the SHTA heading 258° at 70 kt and that he was visual with an ATR on about 4-6 NM final – ATC responded "*land at your discretion on the Southern HTA, remaining South of 24"*. This turn put him well ahead of the ATR who was cleared to land and was informed of his helicopter's presence. In order to avoid approaching over the same houses repeatedly, he varied his approach path throughout the day. On this occasion the wind direction led him to select a flight path which crossed over a small built up area and the Vulcan Bomber, which was surrounded by visitors. He elected to remain higher than normal to ensure that he could land clear which necessitated a steep approach. Being aware that he was flying close to max. AUW he elected to stretch out his approach and aim for the furthest possible point on the SHTA to ensure a safe ROD thereby avoiding any risk of a vortex ring. He completed his approach to just short of Holding Point B performing a quick-stop to avoid entering the Taxiway. During the approach and landing phase he had got no closer to the RW than the lateral plane of the hold at B. The ATR had been behind the helicopter during all of the approach, only passing 30-40 m clear as it landed during the helicopter's last few feet of its approach as it came to a halt. The R44 pilot believed the ATR's landing speed had been about double the approach speed of his R44 on final approach. He then turned the helicopter L away from the RW and proceeded to his landing pad. He went on to say that his projected track would have crossed the ATR's path had he continued for another 400 m across the RW C/L but it was obviously never his intention, nor within his ATC clearance, to do so. He believed that the subject ac had not been in close proximity nor had there been any risk of collision. His company had been based at Southend for 10 years whilst he had been flying from the airport for 6 years and instructing during the last 18 months. He was familiar with the SOPs for SHTA and at no time had anyone questioned that operating on the SHTA, whilst remaining S of the lateral plane at Holding Point B, gave insufficient clearance from the RW.

THE SOUTHEND ADC reports the R44 was operating a series of pleasure flights to the SE of the aerodrome from a position near the anemometer mast within the SHTA; T/O and landings were via the SE aerodrome boundary. The ATR was established on an ILS approach to RW 24 and the R44 called approaching the boundary inbound and was instructed to land at his discretion on the SHTA. TI was passed to the ATR crew who reported being visual with the helicopter. The R44

passed the landing area and made a R turn to hold short of Holding Point B, eventually repositioning for a landing near the anemometer mast.

UKAB Note (1): Met Office archive data show the Southend METARs EGMC 1250Z 31012KT 9999 FEW039 BKN070 16/05 Q1012 and 1320Z 29009G21KT 9999 FEW030 SCT040 BKN068 16/05 Q1012

ATSI comments that the R44 was operating in the Helicopter Training Area as shown in the UK AIP and Pooleys. AIP AD 2-EGMC-1-7 states that "*Helicopter training takes place in grass areas between Taxiways B and A adjacent to the north end of the Taxiway B. Helicopter circuits will normally be parallel to the fixed wing runway in use and flown at 500 ft or 1000 ft as instructed by ATC*".'

The R44 reported *"finals still on the southern HTA visual with the one (ATR72) on finals"*. The ADC cleared the helicopter to *"land your discretion the southern HTA and as I say the ATR final runway 24"*. He then passed TI to the ATR72 pilot as *"traffic you may see is a helicopter positioning from the east to remain south of the runway"*. No further comment is made on RT about the subject ac with reference to each other.

The ADC fulfilled his responsibilities by ensuring that both pilots were aware of the other pilot's intentions. Both ac were operating in accordance with Southend procedures, with the helicopter within the published HTA.

UKAB Note (2): The incident occurred outside recorded radar coverage.

UKAB Note (3): The UK AIP AD 2-EGMC-2-1 shows the RW 24/06 dimensions are 1605 m x 37 m and Holding Point B is 105 m displaced from the RW 24/06 C/L.

UKAB Note (4): The wingspan of an ATR is 24·6 m.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Pilot members wondered if the ATR pilot was fully aware of the Southend HTA, its dimensions and attaching procedures, as it appeared he became concerned with the converging R44's flight path whilst on final approach. He had been passed TI by the ADC, which he had acknowledged, but with his experience of operations at London Gatwick, it seemed that he was expecting a different form of approach by the helicopter. ATCOs thought that the ADC could have given a more specific TI call to the ATR with more details of the R44's intended path and operating area. The short AIP entry does describe the SHTA although no distance is specified as to its lateral spacing from the RW C/L or edge; the R44 had been using the Holding Point B (105 m from the C/L) as the Northern limit in accordance with his SOPs. Also, the HTA operations are described as being normally parallel to the RW but it was apparent from the R44 pilot's report that he had flown a converging approach track, owing to the surface wind conditions. Moreover, the helicopter's off-set heading to the R, allowing for the NW wind, would have given the ATR crew the visual impression initially of its high angular convergence towards the RW although the R44's actual track made good (TMG) was at lower closure angle. Some pilot members believed that the R44 pilot had not given this aspect enough thought in terms of the ATR crew's perspective during the encounter. By electing to stretch his approach and carry out a last minute quick-stop landing manoeuvre following a late descent to the furthest permissible point within the HTA (Holding Point B), members understood the ATR pilot's perception and concern that the helicopter showed few signs of stopping. The R44 pilot, however, was entirely comfortable with his operation in accordance with the HTA procedures, knowing he was always going to stop short of Taxiway B and the RW in compliance with his ATC clearance. At that stage in the incident, perceptions in the two cockpits were poles apart. Additionally, the ADC had remarked that the helicopter did not appear to land in its normal area (adjacent to the anemometer mast) although it remained within the HTA; he saw it stop short of the RW at Holding Point B and then reposition back to the landing area. The ATR crew had not received any TCAS alerts as the R44 was not squawking, in accordance with SOPs in the cct. However, the R44 did not carry Mode C, so only a TA warning would have been received if it had been squawking; all RA alerts are inhibited below 500 ft agl to avoid distraction at low altitudes while on final approach

to, or departure from, an airport. So in this incident, the ATC TI was the only information available to the subject acs' crews to supplement their visual lookout. Similar operations to these occur at many aerodromes where ATC integrates mixed traffic, flying within the ATZ, using procedures designed to maximise the use of airspace and aerodrome surfaces. Members agreed that the ATR crew had perceived that the R44 helicopter was not going to stop short/clear of the RW on its adopted flight path and this situation had, quite understandably, caused them sufficient concern to file an Airprox.

Turning to risk, the ADC had given TI to both crews. The ATR pilot had visually acquired the R44 at 2 NM and had monitored its flight path, watching the helicopter landing on the grass to his L. Although the ATR pilot had considered commencing a go-around, in the end he had elected to continue the approach and land. The R44 pilot had seen the ATR as it turned onto its final approach path and had flown into the Southern HTA remaining S of the RW; the ATR was seen again during its touchdown phase. Although the helicopter's projected track would have ultimately brought the subject ac into confliction if it had not stopped, events did not go that way. The R44 pilot had always remained to the S of the line parallel to the RW through Holding Point B, as intended, and in accordance with the HTA procedures. The Board concluded therefore that the R44 pilot's actions, although perceived as putting the ac involved into potential conflict, had by their nature ensured there was no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The perceived flight path of the R44 caused concern to the ATR72 pilot.

Degree of Risk: C

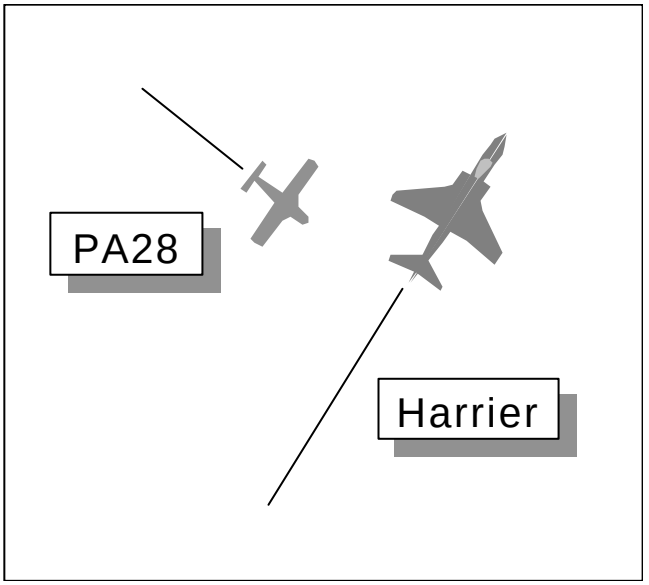
AIRPROX REPORT No 170/01

Date/Time: 16 Sep 1629 (Sunday)

Position: 5207 N 0056 W (4 NM NE of Silverstone)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Harrier	PA28
Operator:	HQ STC	Civ Trg
Alt/FL:	2000 ft (agl)	2500 ft (QNH 1019 mb)
Weather Visibility:	VMC CLOC 10 km+	VMC CLBC 20 km+
Reported Separation:	100 m	/100 m
Recorded Separation:	0.2 NM	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HARRIER PILOT reports heading 030° at 210 kt having departed from Silverstone after a display there. After levelling at 2000 ft agl from a steep climb, his nose gear indicated unlocked so he maintained speed while carrying out initial actions. He looked all round for conflictions; he

was too low for a radar service but made contact with Wittering while consulting FRCs for further actions. He looked left and saw a light ac at very close range; there was no time for avoiding action and the light ac passed just behind him at the same altitude and also without taking avoiding action. The risk of collision was high.

THE PA28 PILOT reports heading SE at 70-100 kt on a dual GH sortie. He saw the Harrier when it was about 500 m away and it passed about 100 m in front at the same level, crossing R to L; there was no time for avoiding action. He did not assess the risk of collision.

UKAB Note: LATCC radar recordings show the incident as described by the pilots. The ac were both showing 2200 ft Mode C at their closest point. Although the radar recording shows 0·2 NM minimum separation, the PA28's recorded track is irregular and both pilots estimated 100 m separation.

HQ STC comments that regardless of the reasons for pilot distraction, the consequences can easily prove fatal. The Harrier pilot clearly had a pressing need to action his in-flight emergency and his aircraft configuration had a considerable impact on its manoeuvrability. Nevertheless, without the benefits of a radar service, the requirement to see and avoid remained.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, 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.

Members had a great deal of sympathy for the Harrier pilot, for whom a combination of circumstances had conspired to reduce his ability to look out at the very moment of the confliction. It was acknowledged that there are split seconds when the eyes have to check something inside a cockpit, and also that the only means of collision avoidance available to him at that moment was 'see and avoid'. A balance had to be struck but this time it did not work. He did not see the PA28 in time to take avoiding action and the Board concluded that this was part of the cause of the Airprox. From the PA28 pilot's perspective, perhaps he was not expecting fast jet activity on a Sunday; perhaps he was concentrating his lookout towards his student on the left. In any case the Harrier had been approaching for some time from his 2 o'clock and he only saw it when it was some 500 m away. The Board concluded that the PA28 pilot's late sighting was also part of the cause.

The discussion of the risk level took account of the fact that both pilots said the miss distance was only 100 m and that they had not seen the other ac in time to take avoiding action. Some members thought the PA28 pilot would have taken instinctive avoiding action had his initial sighting indicated an imminent, actual collision and that he probably instinctively assessed that the Harrier would pass just ahead at the moment of sighting. However, members eventually concluded that there had been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by both pilots

Degree of Risk: A

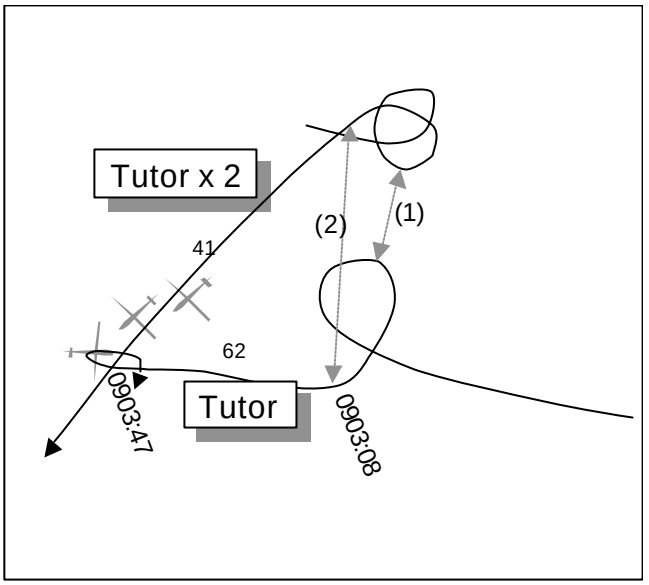
AIRPROX REPORT No 172/01

Date/Time: 21 Sep 0904

Position: 5343 N 0107 W (8 NM SSE of Church Fenton)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tutor	Tutor x 2
Operator:	HQ PTC	HQ PTC
Alt/FL:	FL 50 ↓	FL 45
Weather	VMC CLBL	VMC CLBC
Visibility:	15-20 km	15-20 km
Reported Separation:	50 ft	60 ft
Recorded Separation:		NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TUTOR PILOT reports flying a dual sortie which included spinning. The minimum entry height for a 4 turn spin had been calculated as equating to FL 65, and a large gap in the clouds (about 11 NM by 5-6) was found WNW of Eggborough power station. They performed a 360° clearing turn; thorough lookout disclosed no other ac, and the student performed a 4 turn spin to the L. Recovery action was taken and on pulling to the horizon, at 80-90 kt, a pair of Tutors was seen passing left to right, through their level. He took control and broke left at 4 g, avoiding the formation by about 50 ft. He considered the risk of collision was extremely high. He commented that the pair of Tutors, IAW formation SOPs, only showed red strobes which he only saw when below them.

THE TUTOR FORMATION No 2 reports heading 230° at 100 kt on a second formation instruction flight (dual) at FL 45. He was in the process of moving into echelon port from line astern when the student saw an ac descending from about 100 ft above and to the right; he initiated a break to the left and the other ac passed about 60 ft to the right. He did not provide an estimate of the risk of collision.

UKAB Note: LATCC radar recordings show the Tutors manoeuvring in the area of the Eggborough power station; the reporting ac at around FL 62 and the formation at FL 40-45. Just before 0903 the formation is in a continuous L turn when the reporting ac performs a single right turn, passing (1) just under 0·5 NM S of it and above. The formation rolls out on a track of 220° as the singleton steadies on a converging track of 280°, 1 NM to the S and about 2000 ft above, at 0903:08 (2). At about 0903:47 the singleton stops progressing to the W and starts losing altitude, merges with the formation and reappears to the E of it some 200 ft below, at 0904:05. The formation continues on track.

HQ PTC comments that before initiating manoeuvres involving large changes of height and/or direction, it is essential that pilots ensure that their intended flight path is clear of other traffic. From the available evidence it would appear that the student, having cleared his immediate area, then moved into an uncleared area while bleeding off airspeed prior to entering the spin. Notwithstanding the known conspicuity problems with the Tutor, the relative positions of the 'spinner' and the formation indicate that the former should have been able to see the latter relatively easily immediately prior to spin entry. Careful planning to minimise the time taken to enter the manoeuvre, together with an effective lookout scan right up to

the point of entry – and beyond – will minimise the risks of conflictions in these situations.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings and reports from the appropriate operating authorities.

The question of when an instructor should take over from a student was discussed; it appeared that the student in the single Tutor had proceeded in a straight line for over 30 sec after the clearing turn before entering the spin, demonstrating clearly why such a turn should be continued to within a very few seconds of starting a spin. The Board agreed that the primary responsibility for avoiding incidents such as this lay in the cockpit of the spinning ac and that the main cause of the incident was that its pilots had spun into confliction with the Tutor formation below them which their clearing turn had not revealed. The Board also considered that the formation leader had a responsibility to see and avoid conflictions; his aim should have been to be aware of any other ac entering a sphere around him of a size commensurate with the avoiding action he could take while leading a pair. The single Tutor was closing in his 11 o'clock 2000 ft above before it started its spin and should have been within his area of scan. While members were aware that a white tutor against the sky, with little relative angular motion, would not have been easy to spot, the fact was that it was not seen by the formation leader and the Board concluded that this was also part of the cause.

The Board assessed that since the ac only passed by some 50-60 ft after the singleton pilot had taken 4g avoiding action, there had been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The single Tutor span into confliction with the formation which his clearing turn had not revealed, and the formation leader did not see the spinning tutor.

Degree of Risk: A

AIRPROX REPORT No 173/01

Date/Time: 19 Sep 0916

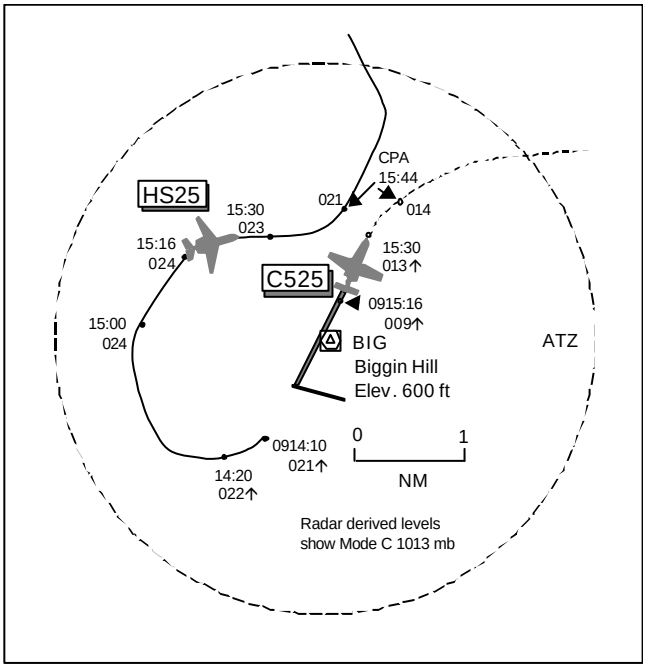
Position: 5121 N 0003 E (1·25 NM NNE Biggin Hill - elev. 600 ft)

Airspace: ATZ/FIR (*Class:* G)

Reporter: Biggin Hill ADC/APP

	First Aircraft	*Second Aircraft*
Type:	C525	HS25
Operator:	Civ Pte	Civ Trg
Alt/FL:	↑ 3000 ft (QNH NK mb)	NK (NK)
Weather	IMC KLWD	NK
Visibility:	NK	NK
Reported Separation:	NK	NK

Recorded Separation: 700 ft V 0·55 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BIGGIN HILL ADC/APP reports that the HS25 was flying a training sortie from Biggin Hill, (but eventually landing at Farnborough), and was initially carrying out a radar vectored ILS to RW 21. The pilot was passed missed approach instructions to turn R heading 350° and to climb to altitude 2100 ft QNH. The C525 was outbound to Germany from RW 03 and was released on a DVR 2 departure, by Thames Radar, after the HS25 had carried out a go-around. Once the HS25 had gone around, the C525 was cleared for an immediate take-off and he informed Thames Radar that it was rolling. The Thames Radar controller said that he was unhappy with the situation as the HS25 was only 1 NM W of the aerodrome; by now the C525 was airborne. The Thames controller told him to stop the climb of the C525 at 1000 ft, which he did, but the C525 pilot replied that he was levelling at 1200 ft, which the ADC relayed to the Thames controller. Next he was told by Thames to turn the HS25 onto heading 340°- the pilot asked whether that was a R turn, to which the ADC stated that a L turn was required. Subsequently, the C525 was cleared to climb to altitude 3000 ft and transferred to Thames. He was instructed by Thames to turn the HS25 onto heading 100°, which he did, before transferring it to the Thames frequency.

The Biggin Hill METAR shows EGKB 0920Z 31013KT 280V010 2000 RADZ SCT002 BKN003 Q1005.

THE C525 PILOT reports departing Biggin Hill IFR turning onto heading 090° at 180 kt and was receiving a TWR/APP service from Biggin Hill on frequency 129·4 MHz. He was squawking with Mode C and his landing navigation anti-collision and strobe lights were all switched on. He had heard other traffic on frequency, the subject HS25, discussing a non-standard missed-approach procedure with the non-radar TWR controller. Once airborne he became IMC in cloud and did not see any conflicting ac and he was informed of the Airprox 2 days post incident by UKAB. TCAS was not fitted to his ac. He opined that the HS25 should have been handed back to Thames Radar to ensure positive lateral separation was applied.

THE HS25 PILOT: Despite numerous requests to the HS25 operator and the Captain of the subject ac for completion of a CA1094 report by UKAB, no return has been received.

ATSI reports that at the time of the Airprox, the subject ac were both under the control of the Biggin Hill ADC/APP. Radar services for Biggin Hill traffic are provided by Thames Radar which is located at London (Heathrow) Airport. The 0920 meteorological report for Biggin Hill gave a surface wind of 310°, varying between 280° and 010°, at 13 kt. The declared RW in use was 03 but only RW 21 at Biggin is served with an ILS. The relevant ATC equipment was all reported to have been serviceable at the time of the Airprox and no other factors, which may have adversely affected the controllers' performance, were identified during the course of the investigation. Although neither ac were on the Thames Radar controller's frequency at the time of the Airprox, his involvement was discussed with him, on the telephone, as part of the investigation.

The workload of the Biggin Hill controller was described as light while that of the Thames Radar controller was light becoming moderate due to the number of functions being undertaken. The Heathrow MATS Pt 2, Page 5-1-1, lists 9 functions, in order of priority, for which the Thames Radar controller is responsible. Number 1 on this list is IFR traffic inbound to London City and Biggin Hill via airways and number 3 is IFR traffic outbound from Biggin Hill via airways. Priority over this latter function is given to traffic inbound to London City from outside CAS.

The HS25 got airborne at approx 0905:30 and was transferred to the Thames Radar controller's frequency for vectoring to an ILS/DME approach for RW 21 at Biggin Hill.

The C525 had been allocated a departure slot time of 0919 and the tolerance permitted with such departures at Biggin Hill is –5 to +10 minutes. Just after the HS25 got airborne, the C525 requested taxi for departure from RW 03. At 0908:10, the Biggin Hill controller passed a departure clearance to the C525: "*After departure right turn Dover Two departure squawking five two one one*", which was correctly read back. The Biggin Hill MATS Part 2 requires that all outbounds intending to operate IFR are released subject to Thames Radar, who in turn co-ordinate with the LATCC TC Low Controller.

(The UK AIP AD 2-EGKB-1-9 defines the Standard Departure Route – via Airways 'DVR 2' from RW 03 at Biggin Hill as: `*..after noise abatement turn right to intercept DET VOR RDL 278º to DET. When established on DET VOR RDL 278º, not above 2500 ft ALT until 9 DME DET, then to 4 DME DET at 4000 ft ALT* .)

At 0910:30, Thames Radar advised the Biggin Hill controller that the HS25 was on a base leg for RW 21, ten miles from touchdown. Shortly afterwards the Biggin Hill controller informed Thames Radar that the C525 was ready for departure from RW 03 and suggested that if the HS25 made a R turn onto a heading of 350° after his go-around, then the C525 could depart towards Detling. The Thames Radar controller replied "*... yeah alright do that*" to which the Biggin Hill controller replied "*Well if you obviously get that get the release and call me back then.*", i.e. Thames should obtain a release from LATCC TC SE Low in respect of the C525 and then advise Biggin Hill accordingly.

The Thames Radar controller told the Biggin Hill controller (0912:35) "*Release subject your traffic*", which was acknowledged and then the Thames controller confirmed the clearance for the C525 as "*..Detling three one three two seven*". The Biggin Hill controller read back the level and the frequency adding "*... so if I send HS25 c/s three fifty*" which was acknowledged by the Thames controller and the conversation ended. The Biggin Hill controller later stated that he did not hear the message "*Release subject your traffic*". MATS Part 1 requires that controllers must obtain a readback of any operationally significant information contained in telephone co-ordination messages. As the Biggin Hill controller did not offer a readback the responsibility for obtaining one rested with the Thames controller. However, if the Biggin Hill controller did not hear the restriction of 'Release subject your traffic' then no release on the C525 had, effectively, been passed and so the ac should not have been permitted to get airborne. The Thames controller later stated that he understood the heading of 350° to be a suggestion, which he could modify if necessary. However, at no time did he believe that he was being asked to separate the subject ac but was expecting the Biggin Hill controller to do this by applying an airfield separation. It should be noted that with one ac carrying out a missed approach on RW 21 turning R onto 350°, and one departing from RW 03 turning R on track Detling, no formal non-radar separation exists. The Thames Radar controller later stated that such a procedure had been suggested before as a means of separating two Biggin Hill departures but he could not recall whether he, personally, had used it previously.

At 0912:50, the HS25 pilot reported established on the ILS for RW 21 at a range of 4 miles and the Biggin Hill controller then instructed him "*After the go-around right turnout radar heading of three five zero degrees climb to maintain altitude two one zero zero feet*"; this was correctly read back. The controller then established the range of the ac (reported by the pilot as 2 miles) before clearing the HS25 for a go-around and instructing the pilot to "*...report going around*".

At 0913:20 the C525 pilot confirmed he could accept an immediate departure. Given that the commencement of the slot time for the C525 was 0914, the controller was asked to explain the apparent urgency. He said that he was keen to obtain a quick split between the tracks of the HS25 and the C525, and wanted to depart the C525 before the HS25 turned back towards N and thus became potentially conflicting traffic to the C525. The pilot of the HS25 had not reported going around, as asked, but the Biggin Hill controller heard the sound of the HS25's engines passing overhead and, at 0914:10, had instructed the pilot to report his position. The reply was "*HS25 c/s is we're one mile in the right turn*". Even though no direction, i.e. NE or SW, was specified, the Biggin Hill controller believed the ac to be SW of the airport and so clear of the climb out from RW 03. He then cleared the C525 for an immediate take-off but did not pass on the level restriction of 3000 ft, as issued by Thames Radar and read back by himself. The Biggin Hill MATS Part 2 states: *'Prior to issuing a release Biggin Approach shall ensure that the ac has been released by Thames Radar, and that any additional instructions such as turn after take off have been passed*'. The radar recording at 0914:20 shows the position of the HS25 as being 1·5 NM SW of the aerodrome turning through W with a Mode C readout of FL 022 (1960 ft QNH) at that time.

The take-off clearance for the C525 was passed at 0914:20 and, 40 seconds later, the Biggin Hill controller telephoned Thames Radar and said "*Are you happy with the C525 c/s rolling now against*

the HS25 c/s?" The Biggin Hill controller said this was a 'courtesy call' as he had not registered that the Thames Radar controller was expecting Biggin Hill to separate the ac having earlier said '*Release subject your traffic*'. Meanwhile, the C525 was accelerating down the RW at Biggin Hill and, in the opinion of the Biggin Hill controller, it was too late to cancel his take-off. The Thames Radar controller, aware that the aerodrome had been reporting low cloud, asked whether the Biggin Hill controller could see the HS25, (the reported weather at the time was a visibility of 2000 metres in rain and drizzle with scattered cloud at 200 ft and broken at 300 ft), to which the Biggin Hill controller replied that he could not. The Thames controller advised that he was not happy with the situation as the HS25 was approximately 1 mile W of the aerodrome. The Thames controller then told the Biggin Hill controller to "*Just stop release on the C525 c/s I'll get the HS25 c/s out of the way.*"

The Biggin Hill controller advised that the C525 was already rolling but he would stop him at 1600 ft, which the Thames controller acknowledged. At 0915:15, the Thames controller told the Biggin Hill controller to turn the HS25 onto a heading of 340° and to transfer the ac to the Thames Radar frequency. During this telephone conversation, the pilot of the HS25 advised that the weather was unsuitable for his training and so he wished to go to Farnborough. The Biggin Hill controller did not acknowledge this but instructed the HS25 to turn onto a heading of 340°. The pilot responded by saying, "*Okay we can turn left or would you like us to continue the turn right?*" to which the controller confirmed a L turn. The radar recording indicates that, at that time, the C525 was approx 0·5 NM NE of the aerodrome whilst the HS25 was 1·5 NM W; it had flown through its cleared heading of 350° and was now tracking 040°. At 0915:30, the HS25 is seen on the radar recording apparently tracking 080° and heading directly towards the climb out from RW 03 at Biggin Hill. The Biggin Hill controller instructed the C525 to stop the climb at 1600 ft, which was acknowledged. The Thames Radar controller, having observed the HS25 turning R towards the C525, telephoned Biggin Hill at 0915:40, and told the Biggin Hill controller to "*...stop him* (C525) *at a thousand he's* (HS25) *right on top of the C525 c/s*", which was done. The radar recording shows that at the closest point, the C525 was displaying a Mode C readout of FL 014 (1160 ft QNH) with the HS25 in his 8 o'clock at approximately 0·5 NM range with a Mode C readout of FL 021 (1860 ft QNH). The pilot of the C525 reported that he was at 1200 ft which he was told to maintain. However, 9·5 NM E of Biggin Hill, on the Biggin – Detling track, is a mast which reaches 1310 ft amsl. Stopping the C525's climb at 1600 ft would have provided 500 ft 'emergency vertical separation' from the HS25, however, the decision to stop the C525 at 1200 ft, which provides greater vertical separation, was not terrain safe, being below the level of the top of this mast. During the investigation, the Thames controller explained that his immediate priority was to prevent a collision and that terrain clearance would be addressed as soon as this initial problem was resolved. It should be noted that, despite these conversations, both ac remained on the Biggin Hill frequency.

The Biggin Hill controller asked the HS25 to report its heading to which the pilot replied that he was just rolling through N onto 350°. The controller reminded the pilot that his missed approach instructions had been a R turn onto 350°. The pilot replied, "*That's what we were doing*". The radar recording shows the HS25 turning R after the go around and tracking approximately N. Shortly after 0915, for reasons unknown, the ac appears to turn further R and track almost due E heading towards the climb out for RW 03, before making a L turn back towards the assigned heading of 340°. At 0916:40, following confirmation from Thames Radar that the two ac were now clear of each other, the Biggin Hill controller instructed the C525 to climb to 3000 ft and contact Thames Radar. The Biggin Hill controller instructed the HS25 to contact Thames Radar at 0917:00, nearly 2 minutes after he had been asked to.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from one of the pilots only, unfortunately, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members were both disappointed and critical of the HS25 crew for not submitting a CA1094 report since its absence might deny some useful lessons being learned. ATCOs pointed out that the initial

plan to separate the subject ac, although less than ideal owing to the confusion between Biggin Hill ADC/APP and Thames Radar, should have kept them apart. The missed approach instructions, a R turn onto heading 350° and a climb to 2100 ft, had been passed and acknowledged. It was clear, however, that the HS25 crew, for whatever reason, had not complied with the ATC instructions on the go-around and had turned through heading 350° onto an Easterly track and into confliction with the C525. It was this action that had caused the Airprox. Although the ATC aspects were untidy, the only person who could see the situation unfolding was the Thames Radar controller and he had eventually resolved matters safely. Unfortunately, he had been denied 'instant access' to the pilots owing to the subject ac remaining on the Biggin Hill frequency throughout the encounter, despite having requested the Biggin Hill controller to transfer them to his frequency. In the end the incident had been sorted out using the Biggin Hill controller as a 'relay' to forward the instructions to the subject pilots.

Members then addressed the 'risk' involved in this incident. Without any response from the HS25 pilot the Board could only assess events using what other information was available. The Thames Radar controller had been forced to stop the departing C525 underneath the HS25 and below MSA. This left a situation with no safety nets available (TCAS, STCA or visual sightings); both ac were IMC at the time on the non-radar frequency and the C525 was level below the top of the dominant obstacle on his track to DET, immediately after departure during a critical phase of his flight. Fortunately nothing further went wrong but the Board concluded that for a short period the safety of the ac had been far from assured.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The HS25 crew did not comply with ATC instructions and flew into conflict with the C525.

Degree of Risk: B

AIRPROX REPORT No 174/01

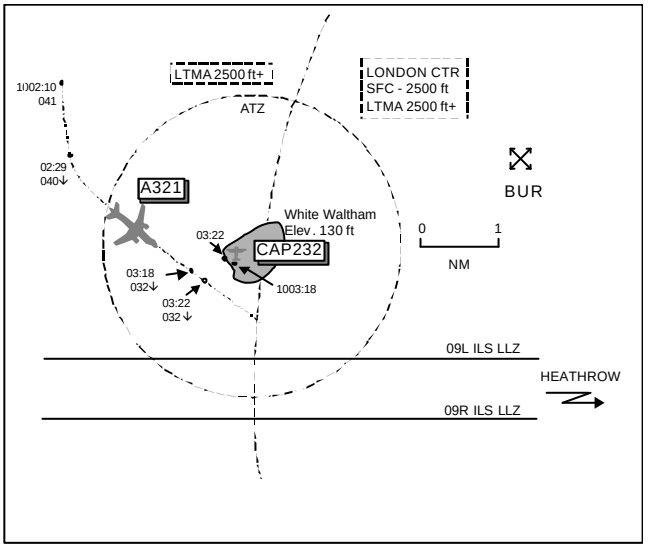
Date/Time: 28 Sep 1003

Position: 5130 N 0047 W (0·5 NM SW White Waltham – elev. 130 ft)

Airspace: TMA/FIR/ATZ (*Class:* A/G)

	Reporting Aircraft	*Reported Aircraft*
Type:	A321	CAP232
Operator:	CAT	Civ Pte
Alt/FL:	↓3000 ft (QNH 1012 mb)	2100 ft (QFE NK mb)
Weather Visibility:	VMC SKC >10 km	VMC SKC >10 km
Reported Separation:	500 ft V 500 m H	1000 ft V 900 m H

Recorded Separation: NK V 0·34 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A321 PILOT reports flying inbound to Heathrow from Ireland heading 130° to intercept the ILS LLZ for RW 09L at 180 kt in a descent to 3000 ft QNH 1012 mb, he thought, and he was

receiving an ATC service from Heathrow Radar on frequency 120·4 MHz. The visibility was >10 km sky clear in VMC, his strobe lights were switched on and he was squawking 4244 with Mode C. He received a TCAS TA alert on traffic just L of his 12 o'clock range 3 NM which he visually acquired as a dark coloured aerobatic single engined ac. It was seen to carry out vertical climbs and descents up to about 2500 ft QNH. A second TA was received on the same ac when it was in his 11 o'clock range 1000 m followed shortly by a third alert as it passed down his LHS by about 500 m. During each manoeuvre the conflicting ac remained about 500 ft below his ac. However, both he and his FO were concerned as they were unaware of the conflicting ac's intentions. He assessed the risk of collision as medium.

THE CAP232 PILOT reports flying a practice aerobatic sequence over the Western half of White Waltham airfield during which he planned to remain between 500 ft and 2300 ft agl and he was in contact with a ground safety observer on frequency 126·57 MHz. The visibility was >10 km sky clear in VMC, the ac was coloured yellow/blue, no lights were fitted to his ac, and he was squawking 7004 with NMC. During the 15 minute sortie, which involved flying line manoeuvres in the vertical plane, a number of airliners were observed passing by above him within CAS; the max. height he attained during these manoeuvres was 2100 ft QFE. The subject A321 was first seen by him, and also by his ground observer, about 0·75 – 1 NM away and it was seen to pass about 0·5 NM horizontally and 1000 ft vertically clear to the SW of White Waltham. He believed there had been no risk of collision owing to the vertical separation he utilised during his flight.

THE HEATHROW FIN DIR reports he was vectoring the A321 to intercept the 09L ILS LLZ at approx 11 NM from touchdown. Whilst the ac levelled at 3000 ft QNH 1011 mb just to the W of White Waltham, the A321 pilot reported that an ac was getting quite close to him whilst it was carrying out aerobatics. The FIN DIR informed the pilot that he was close to White Waltham airfield and that the conflicting ac was probably below 1500 ft, the cct height; the A321 pilot reported that the ac was above that level. He subsequently transferred the A321 to TOWER and was later informed that the crew would be filing an Airprox.

UKAB Note (1): Met Office archive data shows the Heathrow METAR EGLL 0950Z 12011KT CAVOK 20/13 Q1011 NOSIG.

UKAB Note (2): The RT transcript at 1003:10 shows the A321 pilot report *"London A321 c/s just be advised there's traffic on the left here he's quite close actually and he's doing aerobatics traffic traffic"* – "traffic traffic" was an automated cockpit warning message. The FIN DIR replies "*Okay is he coming up through your level"*. The A321 crew responds "*Er we're getting TAs all the time but er I'd say he's marginally below here he comes again"*. Following a brief transmission and reply to and from another ac, the FIN DIR transmits "*A321 c/s traff that traffic should be er down at fifteen hundred feet fifteen hundred feet below you and have a word with White Waltham see what's going on"* to which he replied "*Oh he's well above fifteen"*.

ATSI comments that this incident has no apparent implications for civil ATC. The Heathrow Final Director (FIN DIR) had issued the A321 with a descent clearance to 3000 ft altitude which would provide 500 ft vertical separation (the required minimum) above the base of the LTMA in accordance with MATS Pt 1 Page 1-58, which, in the area of the incident, is 2500 ft AMSL. The LATCC Unit report observes that because of the radar filters routinely set by the FIN DIR the SSR code selected by the unknown ac (7004- conspicuity aerobatics and display) was not seen although the primary radar return would have been visible. Had the unknown ac been transponding Mode C height readout, however, altitude information would have been apparent as this data was not filtered out.

UKAB Note (3): Analysis of the Heathrow radar recording at 1002:10 shows the A321 at FL 041 (4040 ft QNH 1011 mb) tracking S with the CAP232 squawking with NMC manoeuvring around the White Waltham airfield O/H. 20 seconds later the A321 commences a L turn on to SE track and a descent whilst the CAP232 is seen to manoeuvre just to the W of the London CTR on the W side of White Waltham airfield; for the duration of the A321's transit of the area there is little lateral displacement ± 0·25 NM shown by the CAP232. CPA occurs at 1003:22 as the A321 descends through FL 032 (3140 ft QNH) passing 0·34 NM SW abeam the CAP232.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Pilot members sympathised with the A321 crew. During their descent towards final approach and without any ATC warning, they had received a TCAS TA alert which had drawn their attention to traffic ahead of their track. The ac was seen 3 NM away and below carrying out aerobatics, vertical climbs and descents, which he judged was 'topping out' at about 2500 ft. As he got closer, two further TA alerts were received on the same ac and, whilst maintaining visual contact with the aerobatic ac, it had further confirmed his earlier assessment that its apogee during manoeuvre was about 500 ft below his ac at all times. His unease with the situation, in not knowing the conflicting ac's intentions, was exacerbated when ATC informed him they were also unaware. The FIN DIR had told him that he was passing close to an airfield (bisected by the London CTR) and, erroneously, that the ac should be at 1500 ft (max altitude within the ATZ E of the CTR boundary), in other words 1500 ft below his ac. Unbeknown to ATC however, the CAP232 was operating within an 'aerobatic box' over the Western half of White Waltham airfield, where the base of the LTMA is 2500 ft QNH just to the W of the CTR. Quite understandably, the A321 pilot had queried ATC's assumed level for the ac as he had seen it clearly manoeuvring above 1500 ft. Meanwhile, in the other cockpit, things were all under control. The CAP232 pilot had carefully planned his sortie always to remain below the LTMA (max planned level 2300 ft QFE but actually achieving 2100 ft QFE, 2230 ft QNH in flight) and to the W of the CTR. He had utilised a ground safety observer commendably to supplement his lookout for conflicting traffic during his manoeuvring. The CAP pilot, and ground observer, had watched several airliners transit close to his area, including the subject A321, which was seen to pass about 0·5 NM to the SW of his ac and 1000 ft above. Given these circumstances members understood the A321 pilot's unease, made worse by ATC's lack of knowledge about the aerobatic manoeuvres and the subsequent erroneous level information, and reasoned the combination had probably led to him filing this Airprox. However, despite the TCAS alerts, the investigation had revealed that both ac had been operating within their routine boundaries and that accepted separation limits were never breached. It was concluded therefore that this incident amounted to a 'sighting report'. In addressing risk, TCAS had given the A321 crew a TA alert which allowed them visually to acquire the CAP which they had then watched pass always clear and always below and to their L. The CAP232 pilot had seen the Airbus flying past whilst he had utilised a built-in vertical separation buffer to ensure always that an adequate safety distance existed. This led the Board to confirm there had been no risk of collision.

Members went on to discuss the wider implications from the incident in terms of other areas where CAS was undercut by Class G airspace. The generation of TCAS alerts during encounters like this one could become more prevalent with the wider use of Mode C and high-energy vertical manoeuvres would probably cause RA alerts. It was a watchpoint to be aware of in TCAS operations close to CAS boundaries. Finally, members wondered why the radar filters set at the FIN DIR position removed the 7004 aerobatic code used by the CAP232. Filtering out of 7000 codes was known to remove label clutter from the display but showing the 7004 code would have alerted the ATCO to the aerobatic ac thereby enabling him to pass accurate TI, when necessary, to inbound/outbound ac.

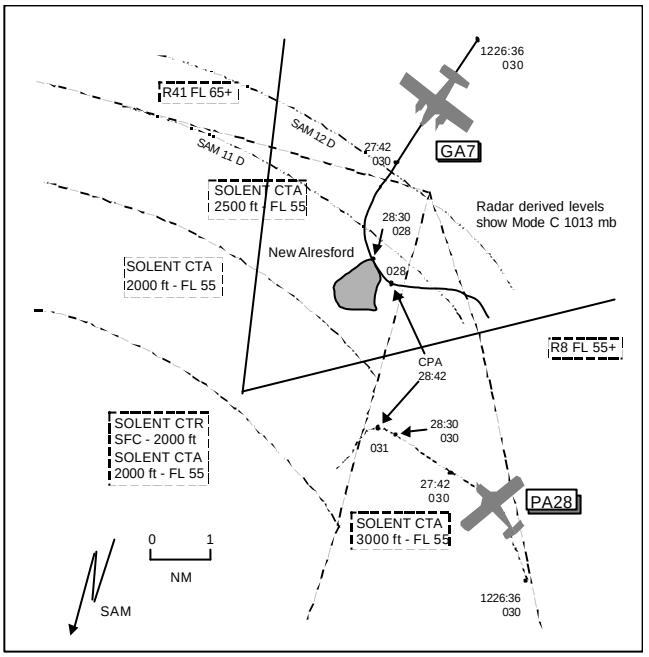
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Sighting report.

Degree of Risk: C

AIRPROX REPORT No 176/01

Date/Time:	4 Oct 1229	
Position:	5104 N 0109 W	(10 NM NE SAM)
Airspace:	CTA	(*Class:* D)
Reporter:	Solent APR	
	First Aircraft	*Second Aircraft*
Type:	GA7	PA28
Operator:	Civ Pte	Civ Trg
Alt/FL:	3000 ft (QNH 1013 mb)	3000 ft (QNH 1013 mb)
Weather	VMC CLOC	IMC KLWD
Visibility:	10 NM	NK
Reported Separation:	not seen	not seen
Recorded Separation:	300 ft V 2·3 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SOLENT APR reports that whilst vectoring the PA28 for a VOR/DME approach to RW 20 at Southampton he had received a call from the GA7 pilot who was told to remain outside CAS as he was busy co-ordinating other traffic. On returning his attention to the GA7, he noticed an ac just about to enter the Solent CTA 12 NM NE of SAM wearing a Farnborough squawk indicating 3000 ft which was in direct confliction with the subject PA28 which was on L base for RW 20. He asked the GA7 pilot to pass his details, believing that it may be the conflicting traffic, which was confirmed; he turned the GA7 L onto E and then the PA28 onto heading 230° to increase separation.

UKAB Note (1): Met Office archive data shows the Southampton METAR EGHI 1220Z 21014G24KT 190V260 9999 FEW018 SCT026 16/10 Q1013=

THE GA7 PILOT reports heading 210° at 135 kt flying VFR en route to the Channel Islands. The visibility was 10 NM 500 ft above and 1 NM horizontally clear of cloud (80% cover) and he was receiving a FIS from Solent ATC on frequency 120·22 MHz. The ac was coloured white with blue/ red stripes, strobe lights were on and he was squawking with Mode C. He had just been released by Farnborough Radar at 16 NM DME from SAM and he was asked to standby on initial contact with Solent Radar. Solent then called him at 12 D and he requested transit clearance at 3000 ft QNH 1013 mb. By now DME indicated 11 NM and the ATCO informed him that he had entered CAS and that he must turn E, which he did, and issued a squawk of 3667 (he thought). He did not see or hear any conflicting ac and was unable to assess the risk.

THE PA28 PILOT reports flying a local training sortie at 100 kt from Southampton conducting NDB holds to the E of SAM in intermittent IMC and receiving a RIS from Farnborough Radar. The ac was coloured red/white and his strobe anti-collision and landing lights were all switched on. After the training exercise was completed he was transferred to Solent Approach frequency 120.22 MHz and was cleared for an IFR rejoin at 3000 ft QNH 1013 mb and issued with a squawk; he was then vectored D/W LH for RW 20. He heard another pilot call, the subject GA7, who was told to remain clear of CAS and to standby. During the subsequent RT exchanges he realised that the GA7 was close to his position but as he was IMC and unable to see the conflicting traffic, who had been given avoiding action against his ac, he continued to follow the ATC instructions. He was unable to assess the risk.

ATSI comments that there appeared to be no apparent ATC causal factors. The GA7 pilot contacted Solent Radar at 1225:30 and was instructed *"GA7 c/s Solent Radar remain outside controlled airspace I'll call you back"*. The controller reported that he was busy at the time carrying out co-ordination. The cassette recording of the frequency (deskside not available) reveals that, in the two minute period following the GA7's initial call, the controller was busy controlling an inbound to Bournemouth and an outbound from Southampton. Another ac requesting transit was also told to remain outside CAS. The radar recordings of the event show that, at 1227:42, when the GA7 was asked to pass his message, an ac squawking 0432 (Farnborough code) was just entering the Solent CTA at 3000 ft (base level 2500 ft) in potential confliction with the PA28. The controller realised that it was probably the GA7 and instructed the ac to route eastbound immediately, before confirming the identity of the ac. TI was passed to both flights and a L turn issued to the PA28.

UKAB Note (2): Analysis of the Pease Pottage radar recording at 1226:36 shows the GA7 squawking 0432 2·85 NM NNE of New Alresford tracking 210° at 3000 ft QNH 1013 mb with the PA28 in his 11 o'clock range 8 NM at the same level. Just over 1 minute later, as the GA7 approaches the CTA boundary (1227:42), the PA28 is steady tracking 300° 5 NM to its S. The GA7 squawk changes to 3671 at 1228:30 with CPA occurring 12 seconds later as the GA7 rolls out on a track of 090°, now at 2800 ft passing 2·3 NM N of the PA28 which has commenced a L turn away at 3100 ft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

The GA7 pilot had called Solent about 2 minutes before the CTA boundary but ATC had instructed him to remain outside CAS and await a further RT call; the onus was then on the pilot to ensure he complied with the instruction. During the subsequent delay in establishing two-way communications and agreeing a 'contract' with ATC, the GA7 pilot had continued on his original track, probably anticipating clearance into CAS at 3000 ft. However, it was clear that on completion of his subsequent RT call, the GA7 pilot had entered CAS without clearance, contrary to ATC instructions, and this had caused the Airprox.

Turning to risk, members commended the ATCO's prompt action in turning the GA7 L and away when he believed the traffic calling on frequency, in confliction with the PA28, was the GA7. This action followed by him also turning the PA28 L led the Board to conclude that any risk of collision had been effectively removed.

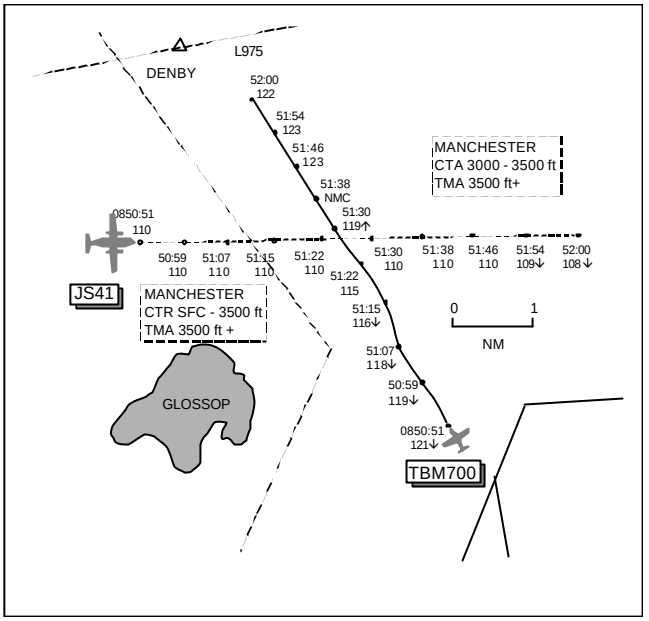
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The GA7 pilot entered CAS without clearance and contrary to ATC instructions.

Degree of Risk: C

AIRPROX REPORT No 177/01

Date/Time:	11 Oct 0851	
Position:	5329 N 0154 W (3 NM SE DENBY)	
Airspace:	TMA	(*Class:* A)
Reporter:	MACC TMA NE RADAR	
	First Aircraft	*Second Aircraft*
Type:	TBM700	JS41
Operator:	Civ Pte	CAT
Alt/FL:	↓ FL 120	FL 110
Weather	VMC CLOC	VMC CLNC
Visibility:	30 km	>10 km
Reported Separation:	not seen	not seen
Recorded Separation:	5-900 ft V 0·1 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MACC TMA NE RADAR CONTROLLER reports that the TBM700 called on frequency descending to FL 120 in accordance with a Standing Agreement whilst the JS41 had been cleared to climb to FL 110. The TBM700 was seen to descend below his cleared level and he then gave an 'avoiding action' descent to the JS41. After the event, the TBM700 pilot confirmed that he had been cleared to FL 120 but had made a mistake.

THE TBM700 PILOT reports flying IFR en route to Leeds descending to his cleared level of FL 120. The visibility was 30 km clear of cloud in VMC, the ac was coloured blue/white, strobe and pulselights were switched on and he was squawking with Mode S. He accidentally touched the CWS which tripped off the altitude hold and inadvertently descended 350 ft below his cleared level. As he was starting to climb back to FL 120, he heard the controller advise another ac on frequency to descend. The other ac's pilot queried this call and before the latter had actioned the instruction, he had regained FL 120; the controller then cancelled the descent clearance given to the other ac. He agreed that the ATCO had taken the correct course of action but he felt that he had also reacted in a timely manner, preventing any action being needed to be taken by the other pilot. He did not see the other ac he was unable to assess the risk. TCAS was not fitted to the ac.

THE JS41 PILOT reports flying IFR outbound from Manchester heading 090°, while climbing at 250 kt to FL 110 and in receipt of an ATC service from Manchester on frequency 126·65 MHz. The visibility was >10 km in VMC, he was squawking with Mode C and his HISLs were switched on. He was given an avoiding action descent to FL 100 owing to traffic, which he did not see, and, as TCAS was not fitted to the ac he was unable to assess the risk.

ATSI comments that there appeared to be no ATC causal factors. Although no RT recording was available of the TBM's previous frequency, the ATC unit confirms that the pilot was cleared by that sector (SE) to descend to FL 120 and this was correctly read back. The MACC TMA NE controller was waiting for the subject ac to cross and consequently noticed the apparent 'level bust' quickly. Appropriate avoiding action was taken, given the time scale available and although there was a slight mix up with the JS41's c/s it was unlikely to have affected the outcome.

UKAB Note (1): The RT transcript shortly after 0849:20 reveals the TBM pilot's initial call "*Manchester good morning TBM700 c/s descending flight level one two zero*". At just after 0851:10 the controller transmits "*TBM c/s maintain flight level one two zero*" to which the pilot replied "*TBM c/s maintaining one two zero*". The controller then

started a further transmission to the TBM700 pilot but then changed his call to address the JS41, unfortunately using the incorrect suffix i.e. 25 instead of the correct 26. "*TBM700 c/s correction XYZ25 descend flight level er one hundred avoiding action"*. The JS41 pilot replied "*descend flight level one hundred you mean XYZ26"*. The controller replied "*XYZ26 affirm avoiding action descend immediately flight level one hundred"*. The RT timing now indicates after 0851:40 with the JS41 reading back the descent to FL 100 but also adding "*.....where do you have the traffic"*. The controller replied at 0851:50 "*and XYZ26 in fact the other ac now has climbed so you can maintain one one zero"*.

UKAB Note (2): Analysis of the Great Dun Fell radar recording at 0850:51 shows the JS41 2·5 NM S of DENBY tracking E at FL 110 with the TBM700 in his 1 o'clock range 4·4 NM tracking 325° descending through FL 121. The TBM700 continues its descent and at 0851:07 is seen to deviate slightly to the R passing FL 118 until at 0851:22 it has reached FL 115 in the JS41's 1 o'clock range 0·6 NM. CPA occurs shortly after as the TBM700 passes just behind the JS41 (estimated 0·1 NM); the next radar sweep at 0851:30 shows the TBM700 back on its previous track of 325° at FL 119 0·47 NM to WNW of the JS41; the 400 ft height gain in 8 seconds equates to 3000 ft/min ROC. The subject ac continue diverging on steady tracks, the TBM700 is seen to continue its climb to FL 123 at 0851:46 before descending back to level at FL 120, 30 seconds later. Meanwhile, the JS41 has commenced its descent from FL 110 at 0851:54 in accordance with its avoiding action instructions.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

It was clear to members that this incident had been caused by the TBM700 pilot descending below his cleared level but they were surprised at the events that followed. Having inadvertently tripped-off the AP ALT hold, the TBM pilot had descended through FL 120 by some 500 ft before starting to recover. The TMA NE ATCO saw the 'level bust' about the time STCA would have activated and had instructed the TBM pilot to maintain FL 120, which was acknowledged, but not achieved at that point. Seeing the TBM still descending, the ATCO had then switched his attention to the JS41 crew but unfortunately had used the wrong c/s when passing them 'avoiding action' instructions. Further delay came when the JS41 crew queried the controller's instruction and the subject ac's tracks had crossed by the time the JS41 started to descend. Members fully understood the JS41 crew's concern as to the whereabouts of the conflicting traffic, particularly in the absence of ATC TI and TCAS but between them, the ATCO and crew had rendered impotent the 'avoiding action'. Meanwhile, the TBM700 pilot had reacted so sharply to recover his 'level' that he shot through it, again. In spite of all of this the ATCO/crew inter-play had little adverse effect on the outcome, which was determined more by the TBM700's flight path. In the end the Board assessed there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The TBM700 pilot descended below his cleared level.

Degree of Risk: C

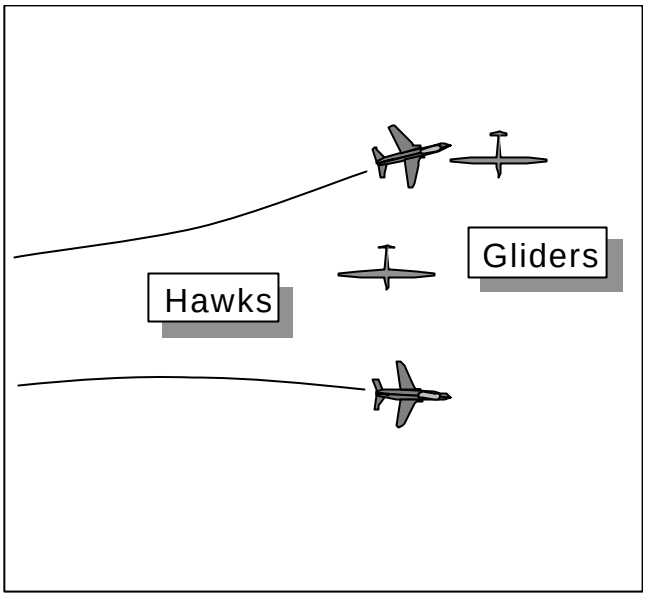
AIRPROX REPORT No 179/01

Date/Time: 11 Oct 1402

Position: 5418 N 0118 W (5 NM NNW of Sutton Bank)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Hawk	Untraced gliders
Operator:	HQ STC	Civ Club
Alt/FL:	FL 60 ↑	10000 ft (QFE)
Weather Visibility:	VMC CLNC 20 km	VMC CLAC 50 NM
Reported Separation:	100 m, 100 ft V	< 0.25 NM, 100 ft V
Recorded Separation:	NK	

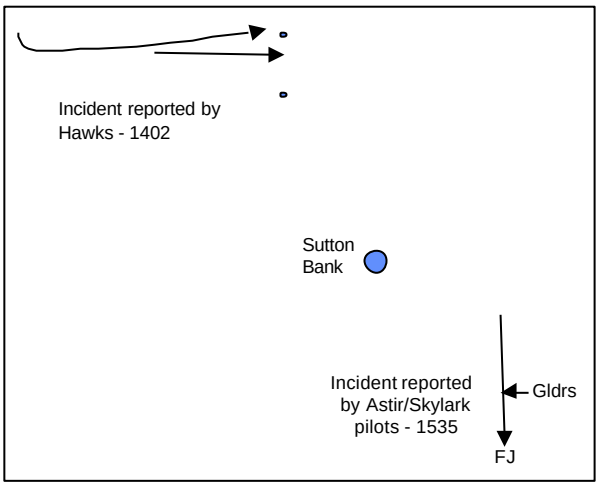


PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK PILOT reports flying as the left hand ac of a pair climbing out of Leeming at 350 kt. They were heading 090° to avoid the Sutton Bank area, notified by ATC as active; Leeming was providing a RIS. When approaching 6000 ft, ATC asked for a transponder recycle and as he looked up from this he saw 2 gliders; one passed 100 m to his right and the other 100 ft overhead before he could react and he considered the risk of collision was high.

UKAB Note: In order to trace the glider pilots the chief instructor at Sutton Bank was asked to find out if any glider pilots had been closely passed by a fast jet; he received positive responses from the pilots of a Grob Astir and a Skylark who had been soaring together and whose reports indicated that they had been climbing through 6000 ft at about the time of the Hawks' Airprox.

LATCC radar recordings show the 2 Hawks climbing on an easterly track from Leeming in a close battle formation. Ahead of them is a primary only contact with another about 2 NM to its S, tracking slowly S. The Hawks close on the former, and as they pass it they split into a wider formation and their rate of climb increases. The formation passes clear to the N of the second primary-only contact. This incident occurs at 1402:52. However, the Skylark pilot's logger showed a 5¾ hour sortie during which the ac had climbed through 6000 ft at about the time of the Airprox, but was then about 2·5 NM SE of Sutton Bank. The glider had reached the northernmost point on its sortie at 1314, 2 NM E of the Airprox position, while ridge soaring at 1700 ft amsl (7-800 ft agl below low cloud), nearly an hour before the Airprox. It is clear therefore that these were not the reported gliders; the incident they reported occurred an hour and a half later, at about 10000 ft and some 5 NM SE of Sutton Bank. The Skylark pilot advised that no other glider had



taken off before he returned to Sutton Bank to find the weather improving; he then began his climb and was joined by the Astir. Therefore the gliders involved could not have been flying from that site; the weather was clearing from the SW so they might have taken off earlier, perhaps from Rufforth. However, by the time UKAB had obtained suitable software for reading the logger and recontacted the Skylark pilot for this extra information, it was too late to take up a trace for other gliders. The gliders reported by the Hawk pilots therefore remain untraced.

MIL ATC OPS reports that the Hawk formation was receiving a RIS from Leeming Approach (APP) whilst departing on an easterly track for an air defence sortie. After clearing the Hawks to their requested level of FL 150, APP stated *"C/S, intermittent contact twelve o'clock, one mile, manoeuvring, no height"*, which was acknowledged by the lead crew; soon afterwards, at 1401:44, APP stated *"C/S, be advised, Sutton Bank appears active"*, which was also acknowledged. At 1401:59, APP transmitted *"C/S, further traffic one o'clock, four miles, manoeuvring, no height"*; the lead crew replied that they were looking for the contact. After passing the TI, APP stated that he was not receiving Mode C information from C/S 2; its crew replied that they would recycle and shortly afterwards, at 1402:39, APP stated *"C/S 2, Mode C now loud and clear, verify level passing"*. The reply a few seconds later was *"Glider right four o'clock, above us"* followed by *"Going over my head"*. At 1402:51, the crew of C/S 2 replied to APP that their ac was passing FL 65. At 1403:15, one of the Hawk crews advised APP of *"Gliders in our vicinity about 30 seconds ago at flight level six zero for information, six five"* (it is assumed that the crew were referring to their own level as FL 65). The remainder of the formation's departure was uneventful and the Hawks left APP's frequency to freecall Neatishead at 1404:56.

The Claxby radar recording shows that at 1401:35, the time of APP's first TI, the Hawks are 3·5 NM SE of Leeming passing through 2000 ft. Although no contacts are visible in the position stated by APP, 2 primary returns can be seen 10·5 NM ESE of Leeming, about 2 NM apart running N-S, the southerly of which is in the formation's 12 o'clock at 7 NM. At 1401:59, the time of APP's second TI call, the southerly contact is slightly right of the formation's 12 o'clock at 5 NM, whilst the other is between the Hawks' 11 and 12 o'clock at 6 NM; both contacts appear stationary. The 2 Hawks appear to be heading between the 2 primary contacts. At 1402:17, the formation adjusts its track by 5-10° to port, towards the northerly of the 2 contacts 3 NM ahead, and continues on this track until 1402:40 when, passing FL 60 and 0·25 NM from the northerly glider, the formation begins a turn to starboard. Just before the tracks are shown diverging (1402:46), the leader is tracking towards the southerly side of the glider's primary contact, and the second Hawk towards its northerly side. When the formation's returns re-appear, the leader is 0·5 NM SE of the glider passing FL 68 turning right, whilst the wingman is NE of the glider passing FL 66 and has stopped turning. The wingman then descends to FL 60 before his primary and secondary returns disappear for 2 minutes.

The radar recording analysed in this investigation is not the same picture that APP would have seen at Leeming on the day of the incident. The second glider was not called but its near static primary return may not have shown on Leeming's radar.

HQ STC comments that although the pilot admits to a momentary distraction from his normal lookout scan, it would be all too easy to put this incident down to a breakdown in lookout. However, despite this short period of distraction, it is highly unlikely that the pilot would have seen the gliders in time to take positive avoiding action, given their small profile. On this occasion, the formation had taken a sensible decision to avoid the area of Sutton Bank, based on ATC information of suspected glider activity. Given their position and altitude, both pilots believed that they would be clear of any glider activity – a learning point perhaps.

The location of Sutton Bank means that it is frequently passed by Leeming ac and the Station has therefore initiated a review of its ac departure and recovery procedures. There have been several significant airprox incidents involving Leeming ac during the last 12 months or so and confliction with gliders remains a major concern. After a visit by a BGA representative in Feb 01, the Station has made a concerted effort to promote better liaison with local gliding clubs so it is disappointing, therefore, that a formal approach to Yorkshire Gliding Club in Apr 01 received no response. Nevertheless, an experienced Sutton Bank operator has been invited to brief Leeming crews on local

gliding activity. The recent RAF Leeming Flight Safety Awareness Day provided an opportunity to meet with local airspace users and controllers, military and civilian alike, and is a vital element in the Station's continuing efforts to develop the more flexible and ultimately safer use of local airspace.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC and operating authorities.

It was accepted that the gliders in this incident were not flying from Sutton Bank; they could have come from anywhere and happened to be operating in an area of strong wave lift. It was unfortunate that the traffic information passed did not in this case help the Hawk pilots to acquire the gliders any sooner. The last information passed, 1 o'clock 4 NM, probably was one of the gliders but the bearing given, some 30° right of the nose, may have given the impression that there would be no confliction. Members thought this may have been reinforced in the Hawk pilot's mind by him then being asked to recycle his squawk; he might have expected the controller not to ask him to do that with a confliction pending. As it was, he was completing that task as the '4 NM' in the traffic information ran out and he was amongst the gliders. One member felt that this was a familiar set of circumstances where traffic information had been passed accurately, to be partially discounted, followed by an Airprox, and thought that there might be a lesson to be learned from it. The Board concluded that the cause of the Airprox was that the Hawk pilots did not see the gliders in time to take avoiding action. Members accepted that gliders are often extremely difficult to see and that their conclusion was simply a matter of fact, not an implication of any shortcoming. The Board agreed that there had been a risk of collision in the incident.

PART C: ASSESSMENT OF CAUSE AND RISK

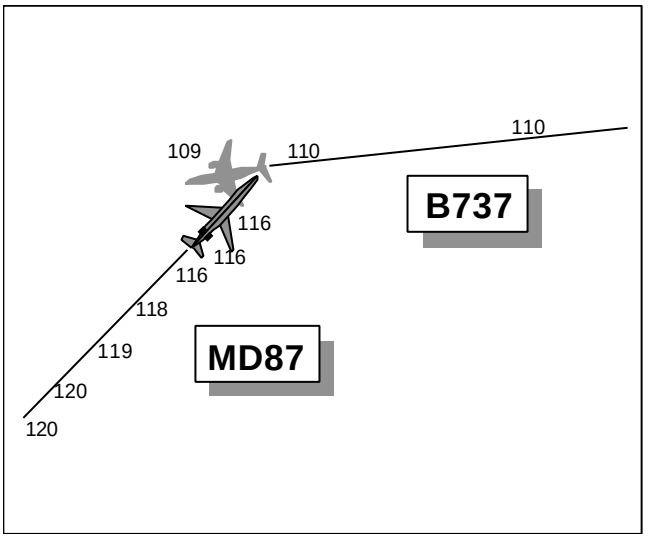
Cause: Effectively a non sighting of the gliders by the Hawk pilots.

Degree of Risk: A

AIRPROX REPORT No 180/01

Date/Time: 13 Oct 0904 (Saturday)
Position: 5105 N 0048 W (7 NM NW of MID)
Airspace: LTMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737	MD87
Operator:	CAT	CAT
Alt/FL:	FL 110	FL 120
Weather Visibility:	VMC CLOC 10 km	VMC CLOC
Reported Separation:	600 ft V	
Recorded Separation:	600 ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 265° at 300 kt, level at FL 110 under Radar Control from LATCC. He had traffic on TCAS closing from 11 o'clock in a descent; it appeared to level 1000 ft above, but then continued to descend. He received a TCAS 'Descend' and followed it; the other ac, an MD80, passed 600 ft directly above. The risk of collision was moderate to high; in the absence of avoiding action from ATC the TCAS RA had been necessary.

THE MD87 PILOT reports that due to turbulent weather conditions the autopilot disconnected itself at FL 120 and the ac had already lost 200 ft when he reacted. LATCC warned him of the lost altitude by which time he was already recovering to FL 120. TCAS had warned him of the B737.

LATCC reports that the controller concerned was the TC OCK SC. Traffic loading was moderate, all systems were serviceable. The MD87, inbound to Heathrow, was routing NE to OCK and descending to FL 120. The B737 had departed Gatwick on a SAM SID and the SC instructed the pilot to climb to FL 110 on a heading of 265° to pass under the MD87 in the region of HAZEL. As the ac approached each other STCA activated white (low severity) at 0903:48. The SC correctly instructed the MD87 to maintain FL 120 and advised that there was traffic from right to left below. The MD87 pilot acknowledged the instruction with *"4120 maintaining"* and was seen to level off. The SC then turned his attention to other ac and STCA cancelled at 0904:13. While he was listening to another transmission the MD87 descended from FL 120, and STCA went immediately to red (0904:24). The co-ordinator alerted the SC who saw that the MD87 had descended to FL 116. Straightaway, at 0904:30, he instructed the MD87 to climb immediately to FL 120 and gave traffic information. Meanwhile the B737 had reacted to a TCAS RA that demanded a descent of 300 ft and was at FL 106. Radar recordings show that the MD87 passed directly over the B737 with a separation of 700 ft and 0·1 NM at 0904:26. The B737 pilot advised that he had *"been descended by 300 ft"* and the MD87 began to climb from FL 116 at 0904:40.

UKAB Note: The Met Office advised that the situation for 30 Oct 2001 around 0900 UTC was a basically stable south-westerly flow over southern England with insufficient instability to cause turbulence through convective cloud. Also, the upper winds were increasing with height and were south-westerly at around 50 kt - there was very little wind shear. As a result it is unlikely that there was turbulence at FL 120 near Ockham on that day as a result of Met conditions. The radar recording showed that no other ac had crossed the point of the MD87's descent at a height or in a timescale that would have given rise to wake turbulence.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Pilot members of the Board suggested that the MD87 pilot was too slow to notice and react to any possible autopilot disconnect, observing that an important role for pilots was to monitor the autopilot and to prevent the ac from departing 400 ft from its cleared level in the case of a malfunction. The radar recording indicated that the pilot had also been slow to start regaining his level and had not begun to do so before the ac crossed. It also seemed strange that he had not received a TCAS RA, unlike the B737. Members also observed that any 'height bust' in the London TMA was almost certain to produce a confliction with another ac since the airspace was so busy, and that there was a particular need for scrupulous height-keeping in this area. Members agreed that the cause of the Airprox was that the MD87 crew allowed their ac to descend below their cleared level into confliction with the B737, but that TCAS and the B737 pilot's response to it had removed any risk of the ac actually colliding.

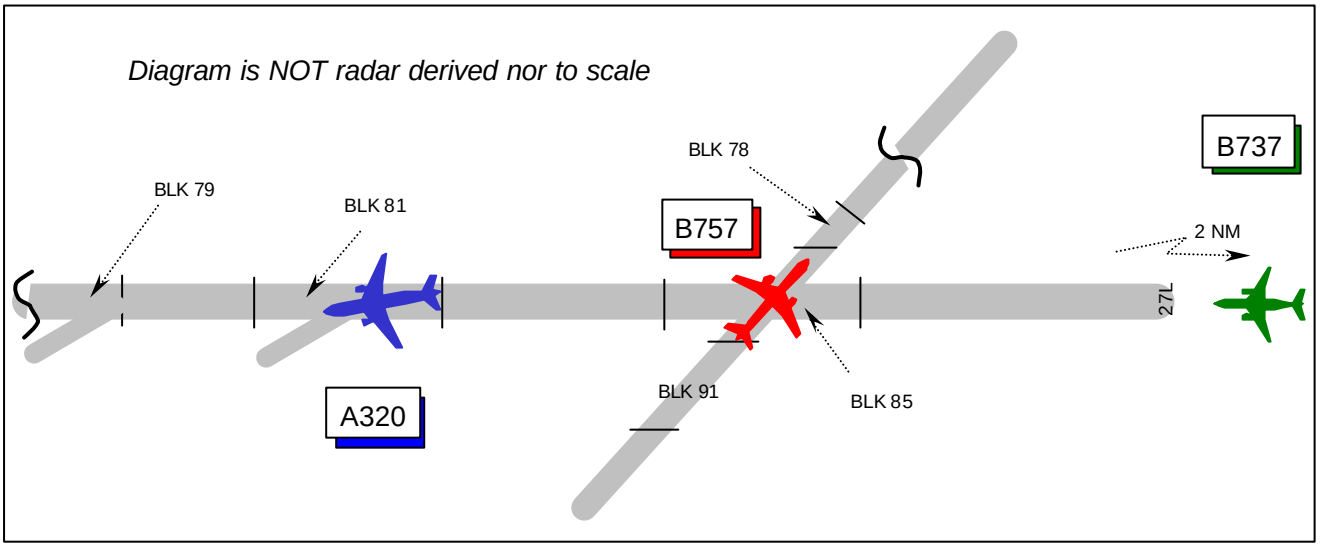
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The MD87 crew allowed their ac to descend below their cleared level into confliction with the B737.

Degree of Risk: C

AIRPROX REPORT No 181/01

Date/Time:	15 Oct 0644	
Position:	5128 N 0027 W (RW27L London-Heathrow – thld elev 77 ft)	
Airspace:	ATZ (*Class:* A)	
	Reporting Aircraft	*Reported Aircraft*
Type:	B737	B757
Operator:	CAT	CAT
Alt/FL:	200 ft ↓ (QNH 1007 mb)	0 ft
Weather Visibility:	VMC NR NR	VMC NR NR
Reported Separation:	200 ft v	NR
Recorded Separation:		Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports he was approaching to land at London Heathrow flying at 130 kt and in contact with Heathrow TOWER. At 2 NM finals for RW27L, he spotted another ac – he thought a B757 or A321 – taxying across the runway from L – R which did not vacate the RW until they had passed 200 ft London QNH (1007 mb). No avoiding action was taken and he elected to continue the approach, but he landed 'long', which resulted in late vacation of the RW and caused the following ac in the landing sequence to 'go-around'.

THE B757 PILOT could recall nothing of particular significance and was thus unable to make a constructive contribution to the investigation of this Airprox.

THE LONDON HEATHROW ARRIVALS CONTROLLER (ARR) reports that the B757 was given a crossing clearance of RW27L, at block 85, behind a landing A320. The B757 was moving and he considered the standard 3 NM gap to be sufficient. Whilst the B757 was mid block 85 (in the middle of RW27L), the B737 pilot reported visual with the B757 and was told to continue his approach. When the B757 had vacated RW27L, the B737 was cleared to land at about 200 ft. After landing, the B737 rolled slowly past the turn off at block 81, and vacated at block 79; the following ac was required to 'go around'.

LONDON-HEATHROW ATC OPS reports that the B737 was inbound on an ILS approach to RW27L. ARR instructed the B757, outbound from Heathrow to Paris, to taxy across RW27L after the landing A320 and ahead of the subject B737. Both the A320 and B737 were also under the control of ARR.

Analysis of the Surface Movements Radar (SMR) and RTF recordings reveal that the A320 was cleared to land on RW27L at 0643 when the B737

flown by the reporting pilot was at 3 NM on the ILS approach behind the A320. The B757 checked in on the ARR frequency - 118·7 MHz - approaching Block 91 S of 27L, requesting to cross the RW to the N side. ARR instructed the B757 crew *"after the landing* (Company A320)*, cross 27L at Block 85".* The B757 crew correctly acknowledged this instruction. When the B757 was part-way across RW27L the B737 crew reported short finals *"with the 757 crossing in sight".* ARR responded by instructing the B737 crew to 'continue' their approach. Shortly after this exchange the landing A320 reported clear of RW27L and observing that the B757 was also clear of the runway, ARR instructed the B737 crew *"cleared to land 27L"*.

The SMR reveals that ARR elected to cross the B757 ahead of the B737, during the landing roll of the A320. This crossing clearance was issued in the knowledge that the B757 would not stop at the holding point and the SMR recording confirms that the B757 was able to taxi continuously from Block 91 and execute an expeditious crossing. Both the A320 and the B757 vacated the runway at the same time, before the B737 was cleared to land. Although this gap in traffic was the minimum required for a crossing, ARR judged the situation correctly and the B737 crew obtained a late, but safe landing clearance, which was carried out in daylight with the crew of the landing ac reporting the crossing B757 in sight.

ATSI endorsed the London-Heathrow ATC Ops report, adding that the landing B737 received landing clearance at just under 1 NM. When the B737 crossed the RW27L threshold the B757 was crossing the line between Block 78 and Block 85 and well clear of the RW.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the pilot of the B737, an analysis of the SMR recordings, reports from the air traffic controllers involved and reports from the appropriate ATSU and ATC authorities.

From the limited information provided by the reporting B737 pilot, it was difficult to reconcile his perception of an unsafe situation whilst he was on the approach to RW27L, to the extent that the safety of his ac had actually been compromised. Whereas the landing interval was certainly not great, the B737 pilot had been 'cleared' to land in accordance with standard operating procedures, after the landing A320 and crossing B757 were clear of the runway and out of the way of the approaching B737. Those members familiar with Heathrow considered it was not uncommon to encounter this situation in day to day operations at this very busy airport and the SMR recording indicated that the separation afforded to the landing B737 was satisfactory. Members noted the B737 pilot had kept the crossing B757 in view and was cognisant of what was happening. If the B737 pilot had still considered this was an unsafe situation, the Board was at a loss to understand why he had continued with his approach to his evidently safe landing. Pilot members suggested that if he had been at all concerned, he should have executed a 'go-around' himself, with which the Board concurred. Other than the potential for his ac's landing 'long' to baulk the following ac in the landing sequence (that did 'go-around'), his report did not reveal any additional factor that had affected the safety of his landing. Go-arounds are unwelcome, but remain a safety option designed to cater for events such as this where the B737 was unable to clear the runway in time for the following ac to land safely. The Board agreed that if the reporting B737 pilot had elected to go-around there was nothing apparent here to prevent the following ac from landing safely. Evidently, the pilot of this succeeding ac had not considered the safety of his ac had been compromised otherwise he would have filed an Airprox himself. After weighing all the available information, members concluded that there had been no apparent degradation of safety, such that this was a sighting report with no risk of a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A sighting report.

Degree of Risk: C.

AIRPROX REPORT No 182/01

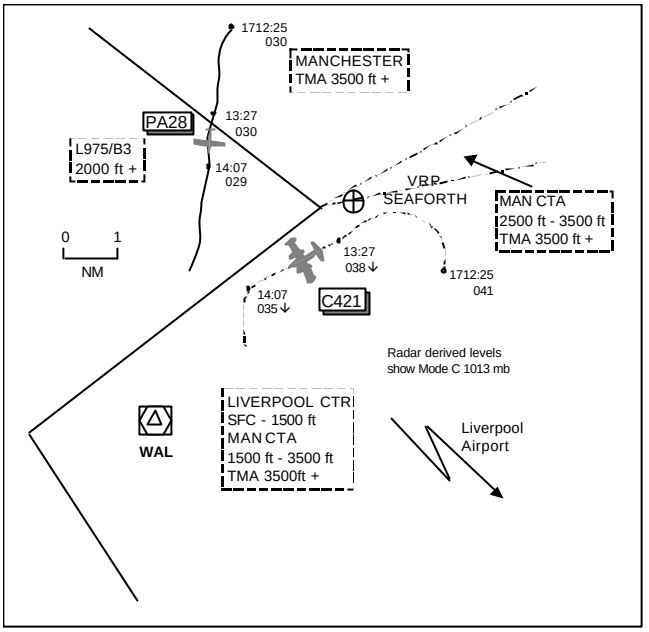
Date/Time: 14 Oct 1714 (Sunday)

Position: 5327 N 0306 W (4 NM NNE WAL)

Airspace: CTA (*Class:* D/A)

Reporter: LIVERPOOL APR

	First Aircraft	*Second Aircraft*
Type:	C421	PA28
Operator:	Civ Pte	Civ Pte
Alt/FL:	↓ 3000 ft (QNH NK mb)	2500 ft (RPS 1000 mb)
Weather	IMC IICL	VMC CBLC
Visibility:	NK	7 NM
Reported Separation:	not seen	2-3000 ft V 7 NM H
Recorded Separation:		600 ft V 2.4 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LIVERPOOL APR reports that the PA28 attempted to call at 1710, he thought, but the transmission was broken and unreadable so the pilot was asked to standby. His workload was moderate/high; there was an emergency on an adjacent TMA sector and one of his 3 IFR inbound ac for RW 09 had been unexpected and had arrived at short notice and at high speed. About 2 minutes later the PA28 pilot was asked to try another radio, which he did and became readability 5. The pilot passed his flight details including his routeing via WAL at an altitude of 2700 ft. At this point, the PA28 was seen to be approx 1·5 NM NW of Seaforth VRP tracking 200° inside airway L975/B3 with the C421 about 2 NM to his SE at 3000 ft heading 250°. He gave the C421 pilot an "*avoiding action*" L turn onto heading 180° and passed TI. The PA28 pilot was given TI on the C421 and he reported descending and visual with the traffic. The PA28 pilot was subsequently given VFR transit clearance via WAL at altitude 1500 ft or below. Both crews were informed that CA1261 reporting action would follow and he estimated the minimum separation as 300 ft vertically and 2 NM horizontally. He later spoke to the C421 pilot who had not seen the PA28 and who had expressed unease with a VFR flight being in the area at the reported levels in the prevailing weather conditions.

UKAB Note (1): The UK AIP shows SS at Manchester as 1715Z with twilight until 1750Z.

UKAB Note (2): Met Office archive data shows the Liverpool METAR EGGP 1720Z 15005KT 6000 SCT013 BKN026 16/15 Q1006 and the RPS 1700-1800 Holyhead 1000 mb Barnsley 1001 mb.

THE C421 PILOT reports flying IFR inbound to Liverpool descending to 3000 ft QNH at 165 kt and he was in receipt of a radar control service from Liverpool Approach on frequency 119·85 MHz. The weather was intermittent IMC, his ac was coloured white/red stripes, nav and strobe lights were switched on and he was squawking with Mode C. Shortly after he had been given a radar vector onto heading 250° and being told he was No 3 in traffic for RW 09, he heard another ac call, the subject PA28, whose pilot gave a long transmission which included "*out of Blackpool inbound Gloucester 2700 ft*". He remarked to his front seat passenger that it was an inopportune time for an extended RT call to be made, as the Liverpool controller was obviously busy with 3 IFR arrivals in close succession. While dealing with other traffic, APR informed the PA28 pilot that his transmission was barely readable and that he should try another radio box, if available. A second call was heard from the

PA28 pilot, slightly more abbreviated than the first, but still quite extended in length. The APR gave him an avoiding action immediate L turn onto heading 180° and TI (2 o'clock bearing but he was unable to remember the rest of the information) which he complied with; he was unable to see the conflicting ac. The controller informed the PA28 pilot that he had infringed CAS and should descend to 1500 ft; this call he thought might have been given prior to his `avoiding action' call. He had monitored the RT calls closely as he realised that the PA28 was routeing close to his position and that its altitude was reported as only 300 ft lower than his assigned level. The weather conditions were not good at the time of the incident and the PA28 pilot had sounded less than sure of his position.

THE PA28 PILOT reports flying VFR at 100 kt from Blackpool returning to Gloucestershire routeing via WAL at 2500 ft, he thought, on RPS 1000 mb, in receipt of a FIS from Liverpool ATC on frequency 119·85 MHz. The visibility was 7 NM 800 ft below cloud in VMC, the ac was coloured white/blue/red and he was squawking 7000 with Mode C. After departing Blackpool and reporting at Southport, he subsequently made a 'free call' to Liverpool. His first call on 119·85 MHz was broken, readability 4, so he repeated his call, with 9 NM to run to WAL, and requested a FIS. He was told that he had infringed CAS and he was to descend from 2500 ft to 1500 ft; he completed this manoeuvre immediately. He was also told of other traffic in his 11 o'clock, which he could see as a strobe light in the distance, about 7 NM away and 2000-3000 ft above. He believed there had been no risk of collision. He had been flying for less than one year, accruing over 100 hr, but he was extremely upset to have caused a problem. He went on to say that he telephoned Liverpool ATC after landing, firstly to apologise and secondly to find out what he had done wrong. The APR had informed him that he should have asked Blackpool to leave their frequency earlier and that he should have descended earlier to be below 1500 ft. He had wrongly assumed that being in contact with Blackpool for that length of time was OK as he was under the mistaken impression that they had wished him to stay on the Blackpool frequency; they had been busy with at least two jets' departures ahead of him. Also, he had erroneously assumed that Blackpool would pass on his flight details to the next agency, which had happened on his earlier leg in the opposite direction.

ATSI reports that there appeared to be no apparent ATC causal factors. Liverpool Approach uses primary radar only, SSR is installed but is not operational at present. Bearing this in mind, the APR had no reason to believe that the PA28 was about to or, subsequently, had entered CAS without a clearance, until the pilot was able to transmit his position using Box 2. The APR immediately issued appropriate avoiding action to the C421 and TI to the PA28. Radar recordings reveal that the PA28 infringed Class A airspace of L975/B3, where the base is 2000 ft.

UKAB Note (3): The Liverpool RT transcript at 1711:50 shows the PA28 pilot's initial call, acknowledged by the APR, was followed by a long broken transmission of his flight details ending at 1712:15. The APR did not acknowledge this immediately but passed an abbreviated TI call to another transiting ac stating that there was conflicting traffic in the opposite direction which may be the ac trying to call on frequency. The APR then called the PA28 at 1712:40 saying "*PA28 c/s you're transmissions are unreadable after your callsign so remain outside controlled airspace I'll call you back very shortly"*; a short broken unreadable transmission was received in acknowledgement. Vectors and descent instructions were given to the C421 then the APR called the PA28 pilot at 1713:10 asking if he had another radio box to try. The PA28 pilot called again for a radio check at 1713:25 which the APR acknowledged as readability 5. Flight details were then passed again by the PA28 pilot including "*....we are 17 miles South of Blackpool er four POB victor mike charlie travelling at er two thousand seven hundred feet on QNH er one thousand er request a flight information please"*. The APR immediately called the C421 pilot at 1714:00 and passed avoiding action instructions and TI. After the APR had passed TI to the PA28 pilot on the C421 and informed him that he had infringed CAS, the PA28 pilot, at 1714:20, reported that he was descending to 2500 ft. Subsequently, at 1714:50, the APR passed the PA28 pilot transit clearance via WAL at 1500 ft or below which was acknowledged.

UKAB Note (4): The Great Dun Fell radar recording at 1713:27 shows the PA28 5·8 NM NNE of WAL

approaching the edge of L975/B3 at FL 030 (2600 ft Holyhead RPS 1000 mb or 2800 ft QNH 1006 mb) with the C421 in his 10 o'clock range 3·2 NM tracking 250° descending through FL 038 (3600 ft QNH). CPA occurs shortly thereafter at 1714:07, the PA28 is now indicating FL 029 (2500 ft Holyhead RPS or 2700 ft QNH) with C421 passing 2·4 NM to its SSE descending through FL 035 (3300 ft QNH).

UKAB Note (5): The PA28 had crossed from the Holyhead ASR (1000 mb) into the Barnsley ASR (1001 mb) 5 NM N of Seaforth VRP at about 1711:30 shortly before the incident occurred.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members could add little to the recommendations given to the PA28 pilot by the Liverpool APR post incident. The PA28 pilot should have left the previous frequency early enough to establish contact with the Liverpool APR in good time but, more importantly, he should have ensured that he remained outside CAS by descending below the airway L975/B3 prior to requesting clearance to transit the Class D CTA to the S of Seaforth VRP. For whatever reason, the PA28 pilot had continued towards WAL whilst establishing RT communications but appeared not to be cognisant of the Class A airway stub ahead of his track with a base of 2000 ft, which he had entered. This caused the Airprox. Pilot members thought that 100 hr gained by the PA28 pilot in one year was commendable. However, one lesson to be learnt from this incident, with respect to ATC units, was never to assume that flight details will be passed on to the next agency but to confirm early to see if this was the case and if not to free-call.

Turning to risk, the APR had quickly associated the PA28 pilot's call with the radar return and assimilated the potential confliction with the C421, prompting him to turn the Cessna L and away. With the benefit of SSR, it was clear that the subject ac had been on crossing tracks but the C421 was above the PA28 as the former descended to its cleared level of 3000 ft QNH. Unlike the C421 pilot, who remained unsighted throughout the L turn away, the PA28 pilot had seen the C421 when passed TI by the APR. The PA28 pilot had then kept visual contact with the Cessna while descending below it. The consequent geometry involved, combined with the visual sighting, persuaded the Board that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised penetration of Class A airspace by the PA28 pilot.

Degree of Risk: C

AIRPROX REPORT No 183/01

Date/Time: 19 Oct 1258

Position: 5250 N 0121 W (1 NM W of East Midlands Airport - elev 306 ft)

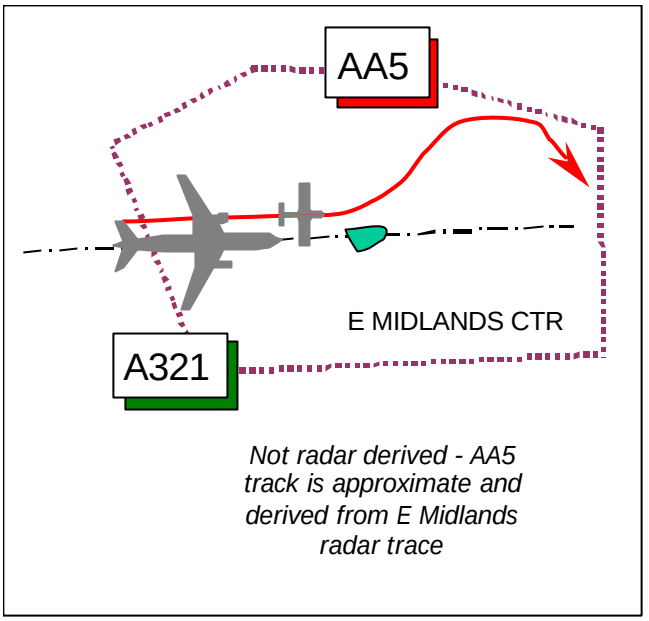
Airspace: CTR (*Class:* D)

Reporter: East Midlands ATC

	First Aircraft	*Second Aircraft*
Type:	A321	AA5B
Operator:	CAT	Civ Pte
Alt/FL:	400 ft↓ (QNH 1006 mb)	1600-2000ft
Weather	IMC IIC	NR
Visibility:	4·5 km	NR

Reported Separation: 0·5 NM H/100 ft V

Recorded Separation: Not Recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EAST MIDLANDS APPROACH RADAR CONTROLLER (APR) reports that the A321 was inbound to East Midlands Airport under radar vectors for an ILS approach to RW09. There was a significant amount of weather clutter on the radar screen, which he had attempted to eradicate by adjusting the radar, but without much effect. When established on the ILS at 6 NM finals, the A321 was transferred to TOWER on 124·0 MHz. He then observed a small, unknown primary radar contact about 1½ NM N of the extended centreline to RW09, as it emerged from an area of weather clutter. The primary contact, without any supporting SSR return, moved east and continued to parallel the final approach track - and the A321 - before he saw it change course to the N. The contact was tracked until it was lost to the SE of the airport.

UKAB Note (1): The 1250 East Midlands weather was reported as surface wind: 100/09; 4500 m - rain; SCT 600 ft; BKN 800 ft. QNH 1006 mb.

THE EAST MIDLANDS TOWER CONTROLLER (ADC) reports that the crew of the A321 contacted TOWER at 6 NM finals RW09. At 5 NM an unknown primary radar contact was showing on the Aerodrome Traffic Monitor (ATM), moving east on a parallel course 1½ NM to the N of the ac. Traffic information was passed to the A321 crew all the way down the approach about the unknown contact. The APR had no information on the unknown ac. At about 1 NM finals, the A321 crew sighted a light ac to port starting to veer away to the N. The A321 landed and the crew reported the unknown ac was a single engine low wing monoplane.

THE A321 PILOT reports he was heading 095° at 145 kt and intermittent IMC during the final stages of an ILS approach to East Midlands RW09, when TOWER notified him of a possible contact out to port at a range of 1 NM. He continued the approach and at 500 ft Rad Alt, TOWER advised him of an ac - ½ NM away and converging. The other ac was acquired visually 0·5 NM away on the port beam as they descended through 400 ft agl, it was about 100 ft above them and then turned away to the N, so no avoiding action was taken. Nothing was observed on, or enunciated by TCAS and as they had been cleared to land, the approach was continued to an uneventful landing. He assessed the risk as *"medium"*.

UKAB Note (2): The E Midlands TOWER RT transcript reveals that at 1255:30, the A321 crew called TOWER and reported established on the ILS at 6 NM. Exactly one min later TOWER reported to the crew *"...keep a very good lookout I'm not quite sure there is something in your 10 o'clock at about a mile paralleling the final approach track it maybe radar interference but looks er suspect like an aircraft".* Whereupon the crew reported they were IMC. Further information was passed 30 sec later, *"...he's a mile on your left hand side on a parallel track...radar no nothing about it and I'm a little bit suspicious of it"*. After the A321 was cleared to land, TOWER advised at 1257:20, *"...it's starting to converge now at about ½ a mile on your left hand side"*. The A321 crew reported *"...visual with the other traffic..."* at 1258.

THE AA5B PILOT reports that he was ferrying the ac VFR, from Isle-of-Man Airport (Ronaldsway) to Northampton (Sywell) for servicing, a route he had flown many times before and since the Airprox. As the ac had not been flown for some time he had chosen a short sea track, but somewhat longer route along the N Wales coast, where he experienced some severe turbulence. This disturbed the Garmin 100 GPS equipment resulting in the 'Skymap' becoming detached from its mounting. Consequently, he had to switch off this aid to navigation.

He switched from Hawarden to a Birmingham ATC frequency on his radio upon reaching the disused aerodrome at Poulton, but was only 'listening out' with them (and Shawbury) and was not in receipt of an ATS; the transponder was on standby. With DAVENTRY set on the DME and LICHFIELD selected on the ADF, when abeam Stoke-on-Trent he cross checked his instruments, which appeared to be working satisfactorily. Flying at 1600 – 2000 ft at 100 kt, he ran into a few showers, which he had to fly around. When he reached 40 DME his intention was to head direct for DAVENTRY, but to his horror, he unexpectedly saw East Midlands airport – which he recognised at once - with an ac on the RW. There was no time to change to their frequency so he elected to clear their CTR as soon as possible and then carry on to Northampton. He telephoned East Midlands ATC immediately upon landing and apologised for his inadvertent intrusion into their CTR without clearance, whereupon he was informed of their intention to file an Airprox.

Undoubtedly this error was entirely due to the failure of the ac ADF for some reason. He did see a large ac on the RW at East Midlands, but no other ac in the air in his vicinity and was, therefore, unable to assess the risk.

UKAB Note (2): This Airprox occurred outwith the coverage of recorded radar.

ATSI reports that the East Midlands radar was affected by weather and the controllers concerned remained uncertain whether an intermittent radar return was from an unknown ac, or, a weather return, until the AA5 was acquired visually. The degradation in radar performance would have been accentuated by the fact that the AA5 was a light ac at low level and not squawking. A major refurbishment of the East Midlands radar is planned for the near future.

Despite being unsure that the intermittent radar returns on her ATM was from an ac, the ADC took the precaution of alerting the A321 crew to its presence, who eventually confirmed sighting a light ac. Initially the unknown return was paralleling the A321's track and, by the time that it started to converge, the A321 was drawing ahead and visible to the controller. The ATSU has provided assurances that the controllers are well aware of their responsibilities for dealing with 'unknown aircraft' in Class D airspace. They added that the ADC would not have hesitated to send the A321 around had the unknown contact moved into a position where, if it was an ac, it might have posed an actual risk.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, reports from the air traffic controllers involved and a report from the appropriate ATC authority.

Members noted that the AA5 pilot was merely listening out on an ATC frequency and was neither in receipt of an ATS, nor squawking A7000 - the conspicuity code - with Mode C. During any flight outside the aerodrome traffic pattern, pilots should switch their transponder on to the appropriate conspicuity/special purpose code – or other code as may be required by an ATSU – invariably with

Mode C if fitted (UK AIP ENR 1-6-2-1). The Board agreed this most strongly. Firstly, it allowed an ac fitted with TCAS (as the A321 here) to alert its pilot to other ac and in a close quarters situation provide a Resolution Advisory. Secondly, it allowed controllers to discern ac on their displays more easily especially in conditions of heavy weather clutter as here. Thirdly, it allowed controllers immediately to identify ac in emergency or difficulty by the use of special purpose codes (as detailed in the AIP). For all these reasons the Board advocated the use of a squawk with Mode C unless there was good reason to do otherwise. The presence of a conspicuity squawk in this case, would definitely have alerted E Midlands controllers to the AA5 and confirmed its presence in the CTR.

The APR controller had seen the small, unknown primary radar contact as it emerged from an area of weather clutter after he had transferred the A321 to TOWER. The ADC had also seen the contact in close proximity to the airliner (at a mile rather than the 1½ NM reported) and passed traffic information to its crew. The Board found this difficult to reconcile with the ATSU's statement of controller's responsibilities with regard to 'unknown ac' in Class D CAS. Here, a single unknown primary radar contact within the CTR - moving at about 100 kt or so parallel to the A321 – was enough for some to regard it as justifiable evidence that a pilot was either lost or had made an unauthorised penetration of the CTR, which warranted avoiding action. Radar clutter can sometimes give a misleading impression of being a primary ac contact, but the reporter had filed the Airprox on the basis that the safety of the A321 was, or may have been, compromised. If that was the case then controller members thought it axiomatic that some form of avoiding action should have been proffered, in addition to the traffic information given. Indeed the provision and content of these transmissions, reinforced civilian controller members' views that positive action should have been taken rather than allowing the situation to develop, some thought, with a lack of control. Permitting the contact, which the ADC had monitored from 5 NM out – even though it had emerged unexpectedly out of weather clutter – to close to apparently ½ NM according to the A321 crew, caused all of the controller members concern. They observed that if ATC thought there was a problem, then something positive should have been done about it; breaking off the approach into a go-around or achieving a greater degree of horizontal separation - sending the A321 back to the APR if need be – were some of the potential options. Though not the main cause, members agreed that the erroneous assumption by E Midlands controllers that the contact was not an ac played an important part in the outcome of this incident.

One controller member also added as an aside that a blind broadcast by the ADC would have been appropriate for those pilots that merely monitor ATSUs' frequencies, which apparently was made by the APR the Board was later informed. However here, the AA5 pilot was monitoring Birmingham and members agreed there was little point in flying around simply listening out. 'Squawk and talk' was the important lesson and if the AA5 pilot had called E Midlands then they might have been able to offer some assistance. A civilian pilot member believed that in flying at about 5 - 700 ft agl, just below the cloud base, the AA5 pilot's ability to navigate at that height would be much impaired. This in turn would have increased his workload significantly; a highly experienced pilot member wondered whether the AA5 pilot had the spare capacity at that stage to look up the E Midlands frequency and be able to call-up the ATSU on the RT. Notwithstanding the lack of GPS, the instrument cross-check abeam Stoke-on-Trent and the reported failure of the ADF, careful reference to his chart and his compass should have suggested to the AA5 pilot that he was not following his planned track clear of CAS toward DAVENTRY. Here was a salutary lesson that over reliance on navigation aids that fail subsequently can lead pilots into awkward situations. Nevertheless, in the Board's view this uncleared entry into CAS, albeit inadvertent, was fundamental and the main cause of this Airprox.

The risk inherent in this encounter within Class D CAS was not easy to assess in the absence of a radar recording, but the radar tracing provided by E Midlands did contribute to the overall picture of events. The ADC had monitored the unknown return on the ATM 1 NM to the north during the A321's IFR approach, and had apparently seen the airliner catching it up. Nothing was done to change this situation, which civil controller members thought was not under control. Eventually the AA5 was seen by the A321 pilot as it converged to ½ NM on the port beam, when the airliner came out of cloud and was starting to draw ahead of the light ac, whose pilot did not see the A321 at all.

By then the situation was resolving itself and the A321 crew completed an uneventful landing. Whilst one member suggested that there might be insufficient information on which to base an assessment of risk this was not supported. Most members felt that the proximity of the 'unknown' contact in class D airspace, whilst the airliner approached the runway, still in cloud, should not have been allowed to develop as it did. Fortuitously, the AA5 pilot had eventually realised where he was and turned L to exit the CTR to the NE, rather than turning to the S and back toward his planned track. Avoiding action instructions to the A321 crew would have removed any risk, but none was given, leaving the Board to conclude that ac safety had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

(1) The AA5 pilot erroneously entered CAS without clearance.

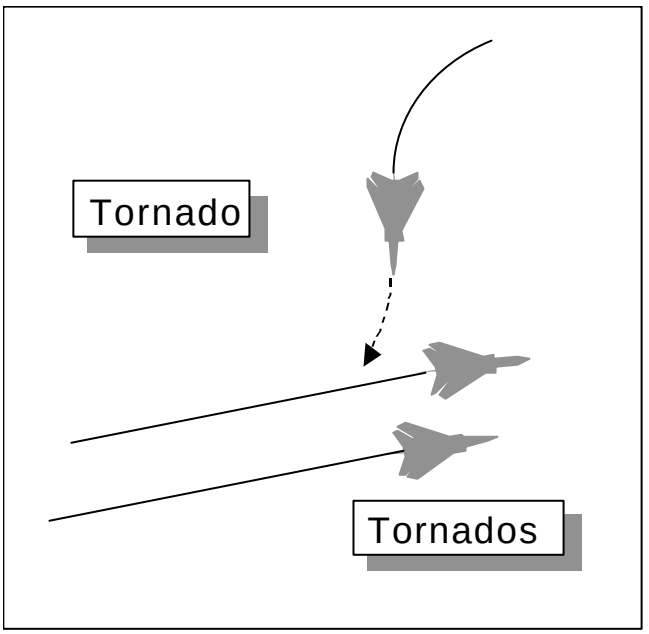
(2) East Midlands ATC erroneously assumed the primary radar return was not an ac and therefore, did not give avoiding action.

Degree of Risk: B.

Contributory Factor Lack of a conspicuity squawk/ Mode C from the AA5.

AIRPROX REPORT No 184/01

Date/Time:	22 Oct 0946	
Position:	5745 N 0340 W (7 NM NW of Kinloss)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reporting Aircraft*
Type:	Tornado GR	Tornado GR x 2
Operator:	HQ STC	HQ STC
Alt/FL:	2500 ft (QFE 1010 mb)	2000 ft ↓ (QFE 1010 mb)
Weather Visibility:	IMC HZBC 1 km	IMC HZBC 1 km
Reported Separation:	100 m	60-70 m
Recorded Separation:	NK	



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR PILOT reports flying a heavy weight circuit at 2500 ft to RW 05 at Lossiemouth and was downwind (LH) in the instrument pattern, IMC, heading 230° at 300 kt while receiving a RAS from Director (DIR). He was given avoiding action on 'pop-up traffic': left onto 100°. During the turn, passing 180°, he came out of cloud and saw a pair of Tornados in close formation about 300 yd to the right, crossing R to L ahead at the same level. He broke to the right and the formation passed at an estimated 100 m. The risk of collision was high and would have been very serious if he had not come out of cloud when he did.

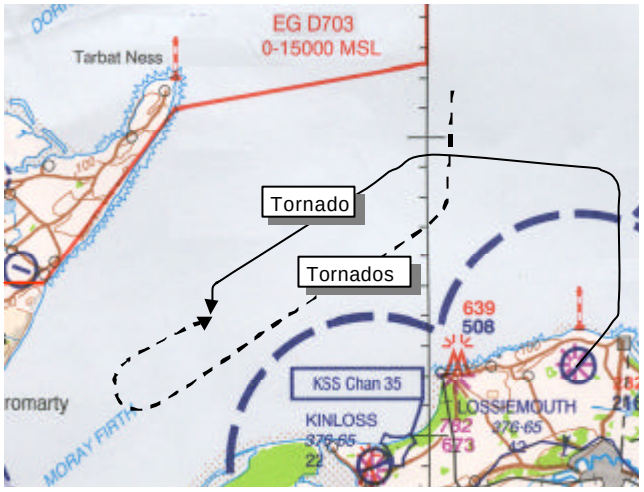
THE TORNADO PAIR LEADER reports heading 070° at 300 kt on a RAS with Lossiemouth approach, descending to 1500 ft QFE for a cloud-break. As he broke cloud another ac passed about 60-70 m behind them, L to R, at the same level. There was no time for avoiding action and the risk of collision was very high. He had received no traffic information or avoiding action from ATC.

MIL ATC OPS reports that Lossiemouth weather at 0850 was reported as: visibility 10 km, cloud 3/ 1300 ft, 5/2200 ft and full cover at 4000 ft with an easterly wind. The radar performance was poor with clutter within 20-30 NM of the overhead and radar services were being limited by APP and Director (DIR). A short while before the Airprox, traffic levels for APP and DIR had increased to the point that both they and the Supervisor (SUP) assessed their workload as reasonably high. APP was also covering departures, dealing with up to 5 tracks; his task made harder by pilots with similar callsigns responding to the wrong RT calls. The Tornado pair had been conducting air combat training on a discrete frequency, monitored by APP under a FIS. DIR had been controlling 3-4 ac in the radar patterns for recoveries to both RW 05 at Lossiemouth and RW 08 at Kinloss. Because the airfields' radar patterns overlap, the Lossiemouth and Kinloss Director tasks are always combined. The Kinloss task is normally relatively quiet, but during this week there was a Jaguar detachment at Kinloss. While APP is used to take any overload traffic from DIR, use of a third controller operating in the same area as Kinloss DIR would create excessive co-ordination. DIR's workload was further complicated by the mixed types and speeds of the ac involved (ranging from Sea King to Jaguar), and the weather clutter on PAR resulted in extra liaison with the PAR controller to identify ac correctly. Shortly before the singleton Tornado took off, and during the busiest period of the session, Lossiemouth ATC lost SSR information.

After take-off from RW 05, the crew of the single Tornado called DIR at 0942:47 on 259·97. DIR was aware of the crew's intention to fly a radar circuit for a simulated single-engine, heavy-weight approach; their departure instructions were to head 360° and climb to 2500 ft QFE. At the time, feeding for PARs, were a Jaguar (A) inbound to Kinloss and a Sea King for Lossiemouth. DIR instructed the singleton to *"...report steady and level"* while he attempted to identify it, aware at the time that APP was working extremely hard.

The Tornado pair re-called APP on 376·65 at 0943:05 and advised they were 10 NM to the north, descending to 8000 ft QFE for a radar to visual recovery. SUP reminded APP that they would require re-identification for recovery and APP turned the pair R onto a heading of 240º from a southerly track; as they turned, the leader requested a RAS. APP acknowledged at 0943:38 and advised of the lack of SSR. The track of 240º took the Tornado pair into what appeared to be clear airspace, just to the N of the combined Losiemouth/Kinloss MATZ.

By this time, the singleton was steady on a northerly track, but had not yet reported level. DIR was aware of several radar contacts to the NE of Lossiemouth and, after turning Jaguar (A) onto a closing heading for Kinloss, he noticed a contact in



confliction with what he believed to be the Tornado. At 0943:40, DIR instructed the pilot to turn left onto 270° for avoiding action and identification adding: *"we've lost SSR"* which the pilot acknowledged. DIR then vectored Jaguar (A) and transferred it to Kinloss Talkdown (at 0944:02). Looking back at the singleton's track, which had turned W as expected, DIR spotted another potentially conflicting contact, manoeuvring about 8 NM to the SW of the Tornado. He ascertained that Tain range was active; its airspace therefore was not available to him. Meanwhile, the singleton pilot reported steady on 270°; DIR confirmed identification at 0944:49 and established a RAS although the service was not limited. At 0945:14, DIR turned the singleton L onto 'downwind', heading 230º.

Meanwhile, APP had been conducting the initial vectoring of a Jaguar (B), well to the S of the airfields, whose pilot had requested a PAR to Kinloss. The leader of the Tornado pair responded to a transmission intended for Jaguar (B)'s pilot and, while correcting this mistake at 0944:23, APP confirmed that the pair was identified under RAS and instructed them to descend to 1500 ft (from 8000 ft), which was acknowledged. APP did not limit the radar service, although it is accepted that the pair had probably been advised of the general radar problems earlier in their sortie. At 0944:45, another Jaguar (C) called requesting a PAR at Kinloss. This call coincided with SUP handing over Jaguar (B), now to the SW of Kinloss, to DIR on APP's behalf; by now, the Tornado pair were to the NW of Kinloss. APP instructed the pilot of Jaguar (B) to contact DIR at 0945:12, following which (0945:18) he instructed the pair to turn R onto a heading of 070º. A R turn (the 'long way round') was used to keep clear of Kinloss. During their response, the lead crew requested an expeditious recovery and indicated that they were *"...a bit short of fuel."*

APP then resumed identifying Jaguar (C), requesting its TACAN position. At 0945:40, while Jaguar C's pilot was replying, APP can be heard speaking to someone in the radar room *"They're going right, fifteen hundred feet."* In a very short gap, a very faint voice (almost definitely SUP) is heard speaking what appears to be the last two syllables of the Tornado pair's callsign, to which APP replied *"Yeah"* immediately followed by the RT transmission *"(pair c/s) just confirm your height passing?"* The leader replied *"Three thousand seven hundred (pair c/s)"* which was acknowledged *"Roger"*. APP then spoke again, presumably to the same person *"Yeah, that's (pair c/s), I've identified them"* with again, a very faint reply possibly *"...cool"* or "*good"* after which APP immediately returned to dealing with Jaguar C's identification and initial positioning.

By 0945:54 DIR was working 3 ac, the single Tornado, heading 240º to the N of Kinloss at 2500 ft, the Sea King (No 1 in the Lossiemouth pattern), roughly overhead Kinloss heading 120º, and Jaguar B, to the SW of Kinloss, heading N and descending to 3100 ft. DIR had been aware of the Tornado pair turning to the SW of the singleton, but believed them to be level at 1500 ft and co-ordinated, hence they were 'no threat' to his ac. DIR then saw another contact, about 5 NM to the SW of the singleton tracking NE out of an area of clutter and at 0946:28 transmitted *"(singleton c/s) avoiding action, turn left heading one zero zero, pop up contact twelve o'clock, range of five miles tracking east, no height information."* The pilot of the singleton acknowledged the turn. DIR then turned the Sea King onto a final approach heading and transferred it to the Talkdown frequency.

A few seconds later, at 0946:58, the singleton pilot transmitted *"Director c/s"* and then, *"We're IMC, we went within about half a mile of two Tornados down the left hand side co-alt."* DIR replied *"Affirm, I gave you avoiding action against that"* to which the pilot responded, *"You turned us straight into them"* with DIR then adding *"Roger, unfortunately I had no other way to turn you."* Subsequent partially audible conversation between SUP and APP attempts to resolve the situation. As APP finished speaking, the leader of the pair transmitted *"Do you have any other traffic in this area?"* APP mentioned that there were two contacts 4 NM to the SW, but the pilot replied *"Yeah, we've just had an aeroplane just pass us really close."* APP acknowledged this and then asked what level the pair was passing, to which the leader replied *"c/s's level."*

The ScACC Allanshill Radar recording shows the Tornado pair until they descend through an indicated FL 40 and go below radar cover. No radar contacts can be seen in the vicinity which relate to the contact DIR attempted to avoid when issuing the L turn at 0946:28.

Both DIR and APP had occupied their controlling positions without a break for a longer period than would have normally been ideal. While neither controller remarked on it, it is most likely that both were affected by a degree of fatigue as the intensity of the workload increased. Due to manning shortages at Lossiemouth at the time, such periods on console had become fairly commonplace so this was not unusual to the controllers. All the available controllers were occupying controlling positions at the time of the incident.

The radar performance, primary and secondary, was a significant contributory factor to the Airprox. Primary radar performance had deteriorated over the previous months, particularly in poor weather, apparently coinciding with the replacement of radar

displays during the summer. Routine Watchman 3rd Line servicing had taken place in the week before the Airprox, and the radar was declared serviceable on 18 Oct. By the morning of the incident however, 4 days later, the radar picture had again become very noisy and was partially obscured by large amounts of clutter, particularly inside 20 NM of the radar head. SUP had not selected any radar filters because the SSR was operating and track identity could be maintained through the cluttered areas. Her decision was also affected by local experience with the new radar displays where, even without any filtering selected, the radar returns within 20 NM were considered to be very small. When the SSR failed, both APP and DIR were busy and she felt that adjusting the radar settings could result in the loss of ac returns and added confusion. Since the Airprox, further investigation has been carried out into the radar and (possible) display problems. The current state of the radar is much improved and the difficulties experienced at the time of the Airprox are no longer apparent. The problem with the small size of radar returns inside 20 NM is to be addressed with a trial update to the radar display software.

After the loss of SSR both controllers experienced a sudden and significant increase in their workload. Normally, the SSR equipment will re-set itself automatically within 3-4 aerial rotations; however, a manual re-set, required in this case, can take 10-15 mins. As a result, the controllers were forced to use other methods to identify the ac, adding to their workload. The radar clutter made it increasingly difficult both to maintain ac identity, and to see conflicting traffic. In addition, without SSR, SUP found it difficult to assist either controller, as she could not follow which ac was under the control of which controller. The situation quickly deteriorated to the point where neither APP nor DIR could communicate with each other, and SUP could not commit either to a specific course of action (ie. co-ordinate on their behalf).

DIR could see the Tornado pair being worked by APP in a R turn as the singleton approached them, however he believed that they were at 1500 ft (1000 ft below the singleton) and co-ordinated, although afterwards he could not remember exactly what was said (or by whom) and SUP had no recollection of passing such information to DIR. APP's microphone was live throughout and there was no formal co-ordination agreement recorded between them. It is most likely that DIR assumed that co-ordination had been effected, believing that the conversation between APP and SUP which included APP saying *"...they're going right, fifteen hundred feet..."* was directed at him. Believing that the pair was 1000 ft below the single Tornado, DIR concentrated on avoiding the 'pop up' contact that he saw in the singleton's 12 o'clock, which was not 'known traffic'. Without a radar recording, it is not possible to analyse DIR's decision to turn the Tornado L. Tain Range would have made him reluctant to turn it R. APP commented out loud *"..what's the traffic to the north east of the (pair c/s)"* and *"...what's the pair north of them?"* as the Airprox was taking place; the latter question could indicate that there was some form of additional moving contact displayed on the radar at the time. This turn, however, was the final action that brought the 3 ac together.

APP had not seen the single Tornado's radar contact before the merge and believed that he had descended the pair in the clearest airspace available. Afterwards, he felt that the singleton might have been partially obscured by radar clutter while he was concentrating on his other traffic. He therefore did not realise that co-ordination was required, or that his message to SUP could have been misinterpreted. Although a person's perception of time can be distorted when busy, less than 1·5 min had elapsed since APP had instructed the pair to descend to 1500 ft from 8000 ft and it was probably a little too ambitious to assume that a pair of ac would achieve such a descent rate in poor weather. Having either realised this after telling SUP that they were at 1500 ft, or noting that he had not logged the pair as level on his FPS, APP sensibly went back to the pair to confirm their height passing and received a reply of 3700 ft (ie. about 2/3 of the descent had been completed). Unfortunately however, he did not inform SUP.

HQ STC comments that this incident is a salutary reminder of just how quickly a dangerous situation can develop, particularly in constrained airspace such as that around the Lossiemouth area. Whilst the loss of SSR and the poor performance of the primary radar were without doubt the causal factors, there were also a number of contributory human factors that exacerbated the outcome. Both

controllers were clearly particularly busy at the time, they did not communicate as effectively as they could have (although several misidentified calls did not help the situation), and the lead crew's request for an expeditious recovery applied additional pressure.

As the Ops Spt (ATC) staff have indicated, a substantial amount of work has been undertaken on the radar in the weeks following the incident. Likewise, the SATCO is reviewing procedures and training for the busy radar pattern, and co-ordination between the APP and DIR positions.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies and reports from the appropriate ATC and operating authorities.

The Board was advised that the immediate problems with Lossiemouth's radar had been much improved but the system software still caused radar returns inside 20 N to be displayed too small. There were other problems peculiar to Lossiemouth where displayed radar ranges of up to 60 NM were sometimes required.

Members appreciated the situation the controllers found themselves in, already with a high workload which became an overload when the SSR failed. It was clear that APP cleared the descending inbound turn of the pair without being aware of where the singleton was, closing on a downwind track at a height through which the pair was descending. Similarly, DIR was busy and, aware that APP was busier, did not positively check the level of the pair before issuing the single Tornado a left turn towards them. Members agreed that the cause of the Airprox was that DIR and APP did not maintain separation between the single Tornado and the pair.

It was clear that a contributory cause was that the controllers suddenly found themselves too busy to co-ordinate when the SSR failed. Controller members agreed that before the introduction of SSR, this sort of workload could be handled safely with the use of more procedural separation, but that controllers nowadays are not formally trained to operate without SSR and have no fall-back procedures to call up when it failed. Civilian members stated that such a failure could not be tolerated in many environments and there was radar overlap or SSR source overlap to prevent controllers being put into such a situation. As it was, the control team tried to continue operating as if with SSR. Members thought that the Supervisor's first action in this situation should have been to concentrate on reducing the load on APP and DIR rather than trying to help them cope with it, which she could not do anyway as explained in Part A. Ac could have been told to hold off and been dealt with in a more orderly fashion, and the service to ac on purely training tasks, such as the heavy weight circuit, could have been terminated. However, all agreed that these thoughts were the product of hindsight; SUP had had seconds to react and no fall back plans to deal with what should have been accepted to some extent as an emergency situation.

The Board was advised that all this had been taken on board at HQ STC and that discussion was under way with Stations to develop plans to deal with this sort of situation.

In discussing the risk level, some members gained the impression from the single Tornado pilot's report that he had come out of cloud, seen the pair and taken avoiding action which had removed the risk of them actually colliding. Others took note of his first sighting range of 300 yd and questioned how much effect a pilot could have on his flightpath in that distance at 300 kt. The Board concluded that the separation had been more by luck than intervention and agreed that there had been a risk of collision.

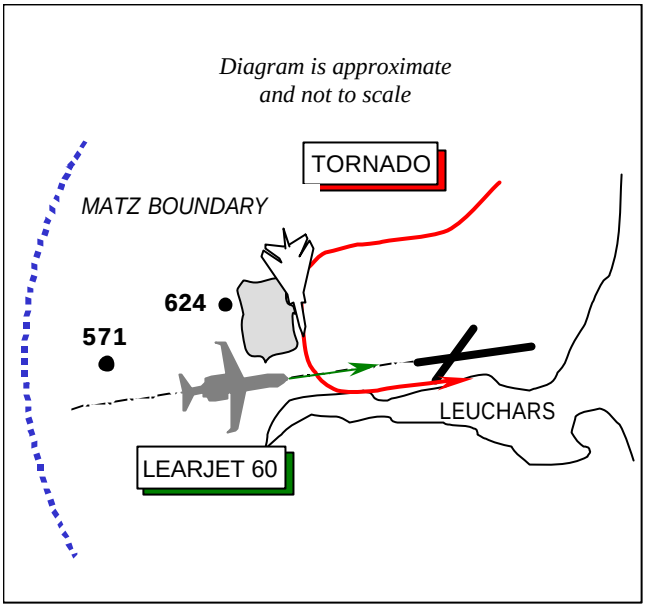
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: During a high workload period, with degraded radar performance and no SSR, DIR and APP did not maintain separation between the singleton Tornado and the Tornado pair.

Degree of Risk: A

AIRPROX REPORT No 185/01

Date/Time:	22 Oct 1440	
Position:	5622 N 0256 W (1·5 NM finals elev 38 ft) RW09 Leuchars	
Airspace:	MATZ	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Learjet 60	Tornado F3
Operator:	Civ Comm	HQ STC
Alt/FL:	800-1000 ft (QFE 1009 mb)	800 ft (QFE 1009 mb)
Weather Visibility:	IMC In Cloud 70–100 m	IMC 100 – 2000 m
Reported Separation:	50-100ft H, nil V	Not seen
Recorded Separation:	Not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LEARJET 60 PILOT, the PNF, reports his ac has a red/cream livery and anti-collision beacons, HISLs and landing lights were all on whilst inbound to Leuchars. A squawk of A5045 with Mode C was selected and they were in communication with Leuchars TALKDOWN on 123·3 MHz. TCAS is fitted. His co-pilot was flying the PAR approach to RW09, heading 092° at 150 kt, while he was looking for the runway in poor visibility as they descended in cloud and light rain through 800 - 1000 ft Leuchars QFE (1009 mb). At about 3 NM finals he thought, he was shocked to see what looked like a Tornado crossing L – R, 50 - 100 ft ahead at the same height, in a steeply banked turn. There was no TCAS alert and no time to take avoiding action; he assessed the risk of collision as *"high"*.

The approach was conducted in accordance with instructions given by TALKDOWN, but he thought that they were not informed of any other traffic in the area at any time and were not aware that there had been up to 4 Tornados in the visual circuit, apparently on a different frequency. He did not believe it was appropriate that in deteriorating weather conditions military jets were allowed to operate in the visual circuit.

THE TORNADO F3 PILOT reports his ac is camouflage grey but HISLs were on. He had just completed a radar recovery to RW09 at Leuchars as a singleton and was in communication with Leuchars TOWER (TWR) on 259·125 MHz. The prevailing weather was overcast at 600-700' agl with reducing visibility and lower cloud moving towards the aerodrome from the S, which forced him to fly his visual circuit at low level. After "going around" from finals as a result of a confliction with landing traffic, TWR informed him that there was further radar traffic at 8 miles. He turned downwind early to sequence ahead but as soon as he had steadied downwind the range of the radar traffic was corrected by TWR to be 6 miles. Despite a delaying "dogleg" he arrived at finals at 500 ft as TWR reported the radar traffic – the Learjet - at 2 miles. Due to low cloud he was not visual with this ac so he declared that he was going around again. He climbed his jet at 220 kt to 800 ft Leuchars QFE (1009 mb), the maximum height he could achieve whilst remaining visual with the ground and descended again once on the dead side. The Learjet was only spotted on short finals when he had reached the 'deadside'. One further circuit was made to land.

He assessed that the risk – based on mental DR – was "medium" and added that the weather had deteriorated rapidly during the 5 min period he was in the Cct.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

MIL ATC OPS reports that the Tornado F3, was the lead ac of a Tornado pair that had joined the Leuchars RW 09 Cct from a PAR, shortly after 1434. Whilst in contact with TWR, both ac completed a low level Cct during which the crews were informed, as they turned onto final, of a second pair of F3s that were conducting a PAR to overshoot and join the circuit. The subject lead F3 rolled for a further circuit, whilst, his wingman landed. At 1436:35, TWR broadcast that the second pair was at a range of 3·5 NM to overshoot. The F3 pilot reported *"...downwind, low level to land"* about 15 sec later and TWR advised the pilot of the surface wind and that there were *"...two ahead"* adding shortly afterwards at 1437:12, *"...two ahead are pairs instrument."* The second pair called TWR at 1437:30 and advised that they had changed their intentions and now intended to land from their approach. After TWR had cleared the pair to land, the F3 pilot transmitted *"C/S is going around from finals, visual with the pair ahead"* which TWR acknowledged.

At 1438:20, after a range call from the PAR controller (T/D), TWR broadcast *"Learjet, eight miles to land"* after which the F3 pilot advised *"...turning downwind low, to land."* TWR responded at 1438:30, *"C/S surface wind one two zero at ten, instrument traffic six and a half miles"* (having checked the range on the ATM) to which the F3 pilot queried *"It's not at eight?"* TWR then confirmed that the Learjet was *"...now approaching six miles"* to which the F3 pilot replied *"C/S just reversed downwind for spacing, we'll come back.....down west and be number two to this radar"* and TWR replied *"C/S roger, thanks."* TWR advised T/D that the Learjet was cleared to land via the intercom and, at 1439:33, broadcast *"Learjet, three and a half miles to land"* on the TWR frequency. At 1439:57, 24 secs later, the F3 pilot transmitted *"Tower, C/S not visual with radar, going around from finals"* and TWR responded *"C/S instrument traffic at two miles."* At 1440:31, the F3 pilot reported *"C/S is dead side and visual with radar"* and subsequently completed a further circuit to land.

The crew of the Learjet was in communication with T/D on frequency 122.1 MHz. Descent was commenced late as T/D had not heard the pilot's initial RT call, so the Learjet was well above the glidepath - but correcting slowly - as the talkdown progressed. After receiving the clearance from TWR, at 1439:30 (about 3¼ NM from touchdown), T/D transmitted *"(Learjet C/S) cleared to land, one in* [the Tornado in the Cct]*, surface wind one one zero, ten knots."* T/D continued the PAR, with the ac still *"...well above glidepath, correcting slowly*." With the Learjet at 1½ NM from touchdown, a contact – the Tornado - appeared ¼ NM ahead at 1¼ NM range, crossing from L to R at about the same height as the Learjet. Before the controller could call the confliction the Learjet pilot reported at 1440:21, *"OK, we just had a...military jet go right in front of us very very close Sir."* T/D acknowledged this, and shortly afterwards the Learjet pilot reported visual with the RWY, whereupon TWR took over communications with the Learjet crew on the same frequency. Whilst taxiing in, the Learjet crew expressed their concerns about the proximity of the Tornado.

The 1350 UTC Leuchars weather observation reported a surface wind of 110/09; visibility 5000 m [2·7 NM] in haze; cloud cover 2 @ 500 ft, 6 @ 900 ft and full overcast at 1700 ft; equating to a Military Aerodrome Availability/Weather State colour code of GREEN. The subsequent weather report timed at 1450 - about 10 min after the Airprox - painted a similar picture, although haze had been replaced by drizzle and the overcast level had risen to 5000 ft. The recovery state was declared as 'Instrument Recoveries Mandatory' (IRM), whereas the Leuchars FOB stipulates this recovery state in weather conditions that are *worse* than GREEN (min vis 3.7 km [2 NM]/min cloud [3/8 or more] 700 ft agl). However, as occurred in this case, the Duty Authorising Officer (DAO) is permitted to impose a more restrictive recovery state if considered appropriate. With an IRM recovery state in force, an instrument recovery is to be made to the RW, but ac may subsequently join the visual Cct. Furthermore, at the DAO's discretion the normal visual circuit may be closed but low level Ccts are permitted to continue.

The F3, therefore, was flown in accordance with local orders and the pilot's 'delaying dog-leg' downwind so as to sequence No2 behind the Learjet were well intentioned. The pilot had been required to go around from his previous Cct because of the confliction with the landing F3 pair, which he had seen in good time and he was no doubt also expecting to be able to see the Learjet in sufficient time to position himself accordingly. However, as reported, the F3 pilot's first go around corresponded with a rapid weather deterioration as the cloudbase lowered. This probably prompted the second pair to land from their approach rather than overshooting into the Cct. Throughout the PAR, the Learjet was well above the glidepath, correcting slowly, the descent having been started just over 1 NM beyond the normal descent point. Although it is not clear precisely how far above the glidepath the Learjet actually was, but at 1·5 NM from touchdown - the range the pilot reported on RT sighting the F3 - an ac on the glidepath should have been passing about 450 ft QFE.

Circumstances produced a situation where the F3 pilot had been baulked twice in worsening weather conditions. Despite making an attempt at spacing his ac behind the radar traffic, he arrived at the end of the downwind leg probably expecting to see the Learjet, but couldn't because it was higher than normal and still in cloud. Extending - even slightly - downwind to sequence behind the Learjet was not an option because of Lucklaw Hill (elev 624 ft, 586 ft aal) 2·5 NM WNW of the aerodrome. Therefore, the F3 pilot probably had little option other than to fly the track that he did. Furthermore, he reports that he climbed from 500 ft at the end of the downwind leg to 800 ft during the go-around to stay as high as possible while still remaining visual with the ground. Unfortunately, this probably brought the two ac even closer together but having been informed by TWR that the Learjet was at 2 NM as the go around was being commenced, the F3 pilot was probably anticipating that the Learjet would pass beneath him.

It is difficult to assess whether the developing situation could have been detected sooner by ATC. To TWR, after rectifying the initial confusion over the Learjet's range, the F3 pilot appeared to have the situation well in hand, having taken the decision to delay on the downwind leg. TWR was probably expecting the Learjet to be visible to the F3 pilot by the time he reached the finals point and when the F3 pilot called *"...going around from finals"* there was little he could do apart from advise the range of the other ac. Both he and the F3 pilot may have made their assessments based on an F3 making the radar approach, which they would normally experience, rather than the slightly slower Learjet.

Within the Approach Room, the DIRECTOR had been busy, with a further three ac to feed behind the Learjet. Without the benefit of a radar replay, it cannot be determined whether the ac had been fed too tight or the initial approach unduly rushed. The RW09 radar pattern is however, always rather compressed near the descent point, due to the presence of high ground to the W, which requires a stepped descent as the ac are turned onto a base leg/converging heading. A comparison of the TWR and PAR transcripts indicate that the Learjet crew made their initial RT contact with T/D at almost exactly the point that the ac was intercepting the glidepath. The Learjet crew checked in at 1438:25 *"...about to level 2000 ft"*, while 5 sec later, TWR advises F3 pilot that the Learjet is at 6·5 NM. T/D did not hear the initial transmission and, having waited for the crew to call over 15 sec passed before two-way communications was established, with a further 12 sec elapsing (during the QFE check) before the descent instruction. Just because an ac had started its descent above the glidepath would not necessarily lead to the approach being broken off for repositioning. However, in hindsight, this was probably close to the absolute limits of being 'recoverable', as the ac was constantly *"...well above glidepath, correcting slowly."* Alone, neither the TWR, nor the T/D situations should have presented any major problems, but the combination of the two resulted in an extremely close encounter.

Immediately following this incident, Leuchars identified a weakness in their FOB, which has been amended. When instrument recoveries are mandatory, the revised orders now require visual circuits to be curtailed as soon as an instrument approach is notified inbound at 15 NM. Any traffic in the visual circuit is either to land, or carry out an instrument approach. In light of this Airprox and the fact that the potential for a similar incident could unknowingly exist at another aerodrome, Flying Units have been provided with a brief synopsis of this incident and instructed to review their local procedures accordingly.

HQ STC comments that this incident has highlighted a weakness in local procedures that allowed a series of unfortunate coincidences to result in a near mid-air. The Mil ATC Ops report has identified all the salient features of the incident and the findings have been disseminated widely. More importantly, the unit involved has been swift to address the issues raised by making an immediate and permanent amendment to their FOB.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

In essence, this was an encounter in quickly deteriorating weather conditions between the circuiting VFR F3 and the IFR Learjet, both of whose pilots wanted to land. The Board recognised that the high ground within the vicinity of the visual Cct at Leuchars created an additional unwelcome hazard in such conditions. However, this should all have been taken into account by local procedures. The STC member believed that a series of poor judgements had laid the foundations for this Airprox, the first being the decision to allow visual Ccts to continue as the weather got worse. A military pilot member familiar with Leuchars thought that the clues were there, especially with the easterly wind, which, with a deteriorating met situation should have presaged a decision by the F3 pilot to land. The Mil ATC Ops advisor briefed the Board on the changes to procedure that had already been introduced as a result of this Airprox, and these alleviated many members' concerns. The STC member advised further that station flying orders on this topic would be scrutinised closely at future Command flight safety inspections. Some members thought that more responsibility should be given to RAF ATCOs to initiate restrictions to flying operations in rapidly deteriorating weather, but such matters of policy were not for the UKAB to become involved in.

From the Learjet pilot's perspective there was little he could do to effect the outcome of this encounter on finals. He was complying with ATC instructions, but was mistaken in thinking that he had not been told about the circuit traffic. The Leuchars Talkdown transcript revealed the salient words – *"one in"* - indicating that there was one ac in the visual Cct - but the Learjet pilot may have been unfamiliar with this terminology. However, the STC member questioned the F3 pilot's decision to continue in the visual Cct when the weather deteriorated. But this was with the benefit of hindsight and having been baulked from completing his earlier Cct by the returning Tornado pair, the approaching Learjet on radar had then put him in an awkward situation with few options. Some wondered if there had been a pressing need to practise Ccts in these conditions if they were not essential. Indeed, here was a salutary supervision lesson - mixing visual training Ccts with IFR traffic in marginal weather invites difficulties unnecessarily. It was not clear if the F3 pilot had sufficient fuel to climb out of the visual Cct into the radar pattern for an instrument approach, or whether fuel constraints had forced him to continue circuiting after being baulked. If fuel was short he could have declared it and been given priority over the radar traffic to land. As it was the F3 pilot was pushed into a corner – literally at the end of the downwind leg - approaching rising ground of 624 ft at a height of 800 ft QFE in 'GREEN' conditions. Moreover, despite attempts at spacing he found himself flying in opposition to another ac known to be somewhere on final but unseen. Some wondered if the F3 had extended downwind – this was not completely clear – but experienced pilot members were in no doubt that this should not be done. It appeared to the Board that with nowhere else to go (apart from clearing the Cct), the F3 pilot had turned base leg and crossed the approach from N to S to gain the deadside – evidently without sighting the Learjet and apparently just as it emerged from the cloud. Some reasoned that if forced to do so, it would have been better to have turned onto base leg earlier so as to cross directly above the RW threshold, where separation would have been at its greatest with landing traffic. Others contended however, that it was no safer as the Learjet pilot – possibly unfamiliar with the aerodrome and high on the glidepath in poor weather - could very easily have initiated a missed approach. The Board concentrated on what had taken place and agreed, that this Airprox happened because the F3 pilot had flown into confliction with the approaching Learjet, which he could not see.

Turning to risk, the Board noted that Talkdown had initiated the Learjet's descent at a late stage. Hence, it was well above the glidepath and higher than the 450 ft nominal height expected at 1·5 NM from touchdown, when the F3 crossed ahead, as the ac emerged from the cloud. Unfortunately the lack of recorded radar coverage in this area prevented independent assessment of the minimum separation that pertained. The Learjet pilot's estimate that both ac were at the same height tallied and there was no reason to doubt his estimate of 50-100 ft horizontal separation. With "no time to take avoiding action" by the Learjet pilot and the unsighted F3 pilot belly up in a turn neither pilot was able to effect the outcome of this dangerous encounter in marginal weather. Thus any separation that did exist was purely fortuitous. Weighing all these factors together the Board agreed unanimously that an actual risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F3 pilot flew into confliction with the approaching Learjet which he could not see.

Degree of Risk: A.

AIRPROX REPORT No 186/01

Date/Time: 23 Oct 1049z

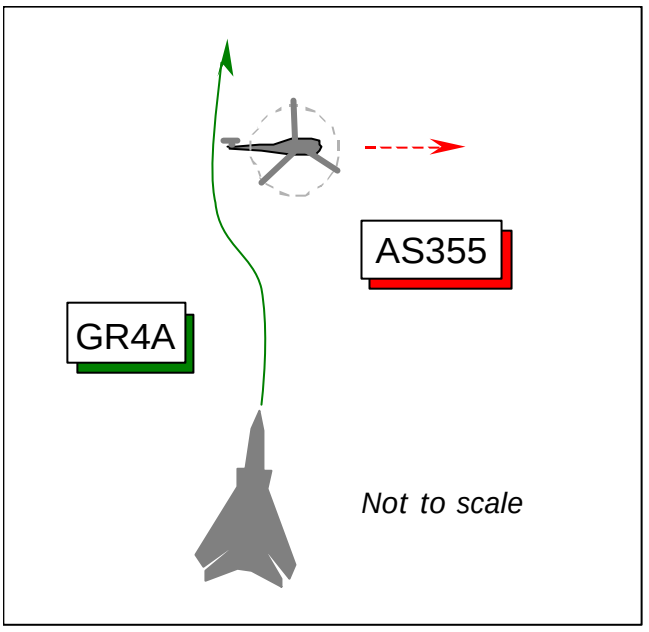
Position: 5237 N 0405 W (1 NM N of TYWYN - elev 40 ft)

Airspace: UKDLFS – LFA 7/FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR	Twin Squirrel
Operator:	HQ STC	Civ Comm
Alt/FL:	400 ft (Rad Alt)	500 ft (agl)
Weather Visibility:	VMC CLBC 10 km	VMC CLBC >10 km

Reported Separation: 1-200 ft V, 30-60 m H Not seen

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR4A PILOT reports his ac has a camouflaged colour scheme, but HISLs were on whilst flying a high workload low-level evasion sortie in LFA 7. A squawk of 3/A 1317 was selected with Mode C and he thought he was receiving a tactical service from a controller aboard an AEW ac (UKAB Note (1): 2-way RT had not been established at the time of the Airprox). About 3 NM N of Tywyn, heading 010° (T) at 420 kt he spotted a red helicopter – late - directly ahead about 1 NM away and slightly above his ac. The helicopter appeared to be moving from L – R, so to avoid it he bunted and turned to port as the helicopter passed about 1 - 200 ft above and 30 - 60 m to starboard, with a medium risk of collision. He estimated the helicopter was flying E at about 450 - 500 ft agl and added that no CANP had been noted for any helicopter activity in the area.

THE AS355 TWIN SQUIRREL PILOT reports his helicopter has a red livery and HISLs were on whilst in transit at 100 kt to pick up a film crew from the NW side of Cadair Idris. He had been unable to establish RT contact with Valley or Llanbedr and was, therefore, operating under a FIS from London INFORMATION. A 7000 squawk was selected, but Mode C, whilst available, was not switched on. Flying single pilot from the RHS at 500 ft Rad Alt, more than 2000 ft below cloud, the Tornado flown by the reporting pilot was not seen at all. However, he thought the reporting pilot's playmate was seen about 2 NM away.

UKAB Note (2): This Airprox occurred outwith the coverage of recorded radar.

ASACS SSU comments that a NATO E3A AEW ac had been tasked to participate in this Offensive Counter Air exercise involving 8 ac, including the Tornado flown by the reporting pilot. At the time of the Airprox, the Tornado crew was not under an AD radar service.

HQ STC comments that although the Tornado crew was planning to obtain a tactical service from an E3A, they had not been able to establish 2-way RT with the controller when the Airprox occurred. This was an extremely late sighting by the Tornado pilot and it is fortunate that there was just enough time for him to take avoiding action.

UKAB Note (3): FOI (H) comments that the limitations of the CANP have been exposed again. The helicopter operator had contacted the LFBC to notify the extent of his task and to request that a notification be issued. However, the operator was unable to provide accurate timings with the co-ordinates of this airborne filming task, as only general areas of interest to the client were known before the flight. The Operator commented that with the type of filming they had been tasked to do, timings would be almost impossible to give as each shot would vary depending on the success rate. This problem was similar to that when trying to notify low-level survey work or other large scale filming.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and a report from the appropriate operating authority.

It was readily evident to the Board that each pilot had been legitimately proceeding about their respective tasks within the FIR. From the AS355 helicopter pilot's perspective, although he was probably well positioned to see the Tornado closing rapidly from starboard, for whatever reason, he did not see it at all. However, members pointed out that the lack of relative crossing motion, the camouflage colour scheme coupled with the jet's relatively small frontal cross-sectional area, all probably contributed to masking its presence from the helicopter pilot. Even so, the non sighting was one part of the cause. The Tornado pilot alone saw the encounter and was able to take positive action to avert a collision. Nevertheless, he had spotted the helicopter at a late stage, which the Board determined was the other part of the cause. This late sighting – 1 NM ahead - equated to just over 8 sec at 420 kt, but had been enough to allow the Tornado pilot to alter his flight-path sufficiently to avoid the helicopter by 30-60 m and 1-200 ft – not a comfortable margin to ensure safety, but evidently enough to avert a collision. The Board concluded, therefore, that the safety of the ac involved had been compromised.

The Tornado pilot had reported that no CANP warnings had been promulgated for any helicopter tasks in this area. Enquiries with the LFBC and HQ STC Ops (LF) had revealed that the helicopter pilot had endeavoured to notify his flights to LFBC, but was unable to provide sufficient detail on timings and location for a CANP to be promulgated to military users of the UKLFS. The unpredictable nature of many civilian pilots' tasks – as here – was understood but meant that meaningful information could not be disseminated in an appropriate time span to be of use to military crews planning low-flying sorties. Consequently, military crews must always be alert to unexpected low-level helicopter activity in the UKLFS. Nevertheless, the Ops LF advisor briefed the Board that with over 3000 CANP filed annually, the system, whilst not perfect, does provide useful and effective warning

of the multitude of activities conducted by civilian pilots in the UKLFS. The situation in this instance was not a failing of the CANP system, but more the result of unpredictable flying tasks.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non-sighting by the AS355 pilot, and a late sighting by the Tornado pilot.

Degree of Risk: B.

AIRPROX REPORT No 187/01

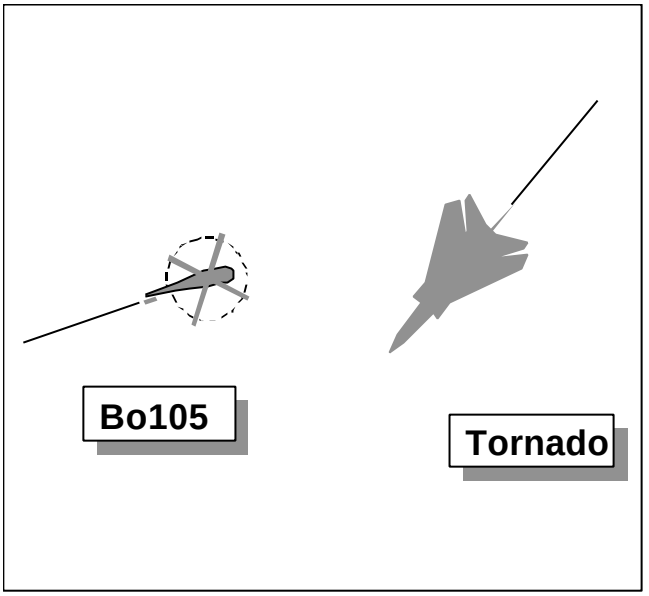
Date/Time: 24 Oct 1021

Position: 5819 N 0521 W (20 NM SSW of Cape Wrath)

Airspace: LFS/FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR	Bo105
Operator:	HQ STC	Civ Comm
Alt/FL:	300 ft (Rad Alt)	750 ft (RPS)
Weather Visibility:	VMC CAVK 20 km	VMC
Reported Separation:	1000 ft H	300 m

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO PILOT reports heading 190° at 420 kt on a TF training sortie; while the navigator was heads-in taking a radar fix he cleared the area ahead visually and performed a TF step down from 500 to 300 ft and completed routine checks. On looking up he saw a red helicopter closing at the same level in his 2 o'clock in a hard left turn; his navigator saw it at the same time but it was too late for avoiding action. The risk of collision had been high but the helicopter's avoiding action prevented a collision. The helicopter passed about 50 ft above and 300 m away.

THE BO105 PILOT reports flying from Stornoway to Stromness (Orkney) at 110 kt, cruising at 750 ft RPS. The helicopter is coloured red. He was listening out on a company frequency and not receiving an ATS. He saw a Tornado crossing left to right about 300 m ahead; while there was no time for avoiding action, it was obvious on seeing the Tornado that they were not going to collide with it and he took no avoiding action. He did not give a position for the Airprox but said he had flown right of a direct track to remain clear of D802/3 Garvie Island.

UKAB Note: The incident occurred below recorded radar coverage, but an ac is visible in the Garvie Island range pattern.

HQ STC comments that from the relative positions and speeds of the 2 ac it is likely that the helicopter appeared relatively stationary and slightly low in relation to the Tornado, in about the 1 o'clock position. This would have made the helicopter, a small apparently stationary object against the sea,

difficult to see. However, the pilot, by going 'heads down', albeit for a short time, to conduct instrument checks while the navigator was also 'heads down' reduced the probability of detecting the helicopter. Good work-sharing practices in a two seat ac should mean that there is always one crewman 'heads-up' when flying VFR. Furthermore, when in a descent in VFR, the pilot should always be 'heads-up' to continually clear the flight path, which is obscured to the back-seater. A relatively stationary helicopter, effectively camouflaged against a dark sea background, is always difficult to see, and requires a continuous and vigilant scan. The importance of sharing lookout and of looking behind canopy obstructions has been re-emphasised to crews at RAF Lossiemouth.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and reports from the appropriate operating authorities.

There were inconsistencies in some details of the 2 pilots' reports which had caused a particular search to be made for any other helicopters that may have been in the area at the time. None was found and the Bo105's colour matched that seen by the Tornado crew so members accepted that the ac concerned was the traced helicopter. The heights and positions given were both considerably adrift but if the incident had occurred slightly earlier in the Tornado's short SW leg that could be accounted for. Despite their different reported heights, both pilots agreed they were at the same level so one of their reports must have been mistaken. As to the 'avoiding action', the helicopter pilot was quite clear he had not taken any, but the Tornado pilot was convinced he saw the helicopter turn left. This could, however, have been an optical illusion as the helicopter flashed past the Tornado's beam having had little relative angular motion up to that point.

The Board appreciated the open report submitted by the Tornado crew who would have been reminded that lookout required CRM so that both crew members were not heads in at the same time. A helicopter pilot member pointed out that helicopter pilots felt very vulnerable to the activities of fast jets at low level which, with their dispensation to operate above the national speed limit of 250 kt below FL 100, had by far the greater responsibility to see and avoid ac such as helicopters which had, by comparison, very little capability to manoeuvre. In addition, camouflaged ac were designed not to be seen and this hampered their early acquisition by helicopter crews, who at low level would usually be equally busy on an operational task which would compete with a continuous lookout. In this instance the helicopter pilot was in transit and the Board considered he had an equal responsibility for collision avoidance. Members concluded that the reason the ac came so close to each other was a late sighting of the other ac by both crews.

Because the ac passed relatively closely at the same level without the Tornado pilot being in a position to take avoiding action, the Board assessed that the safety of the ac had been compromised.

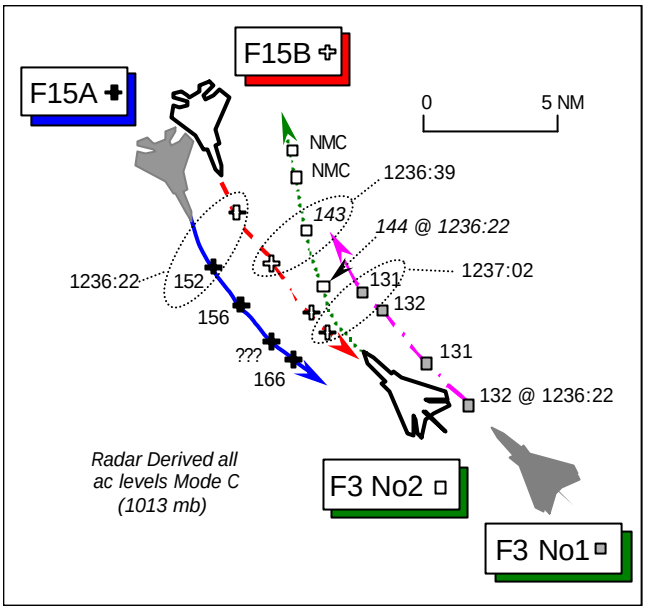
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting of the other ac by both crews.

Degree of Risk: B

AIRPROX REPORT No 188/01

Date/Time:	25 Oct 1236	
Position:	5520 N 0158 W (13 NM WSW of Boulmer)	
Airspace:	London FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado F3x2	F15Ex2
Operator:	HQ STC	Foreign Mil
Alt/FL:	14,000 ft (RPS 1002 mb)	FL 145
Weather	VMC CLBL	VMC
Visibility:	10 km+	Not reported
Reported Separation:	½ NM H/2000 ft V	2 NM H/1000 ft V
Recorded Separation:		2 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO F3 PILOT reports he was flying as No 2 of a pair of camouflage grey F3s; HISLs were on. They were booked into Operational Training Area (OTA) C and operating under a RIS from Neatishead, squawking 3/A 2432 with Mode C.

They were aware of a flight of F15s that was also operating within the confines of OTA C at similar levels [F15s C & D]. Therefore, the leader requested that the F15 flight leader call on the OTA C frequency - 300·55 MHz – to deconflict the two formations' activities. At 1231, it was agreed that F15s C & D would operate above 14,000 ft and his F3 pair would operate 14,000 ft and below to engage a low level target in the vicinity of Berwick. At this point he, the No 2, was leading the pair at 14,000 ft Tyne RPS (1002 mb), with his No 1 at 13,000 ft in 5-6 NM trail, flying at 450 kt in good VMC in between cloud layers, 9000 ft below and 5000 ft above cloud respectively. They were aware that a 4 ship of F15s was slightly L of the nose, about 15 NM away, but were concentrating on detecting a pair of targets to the R at a range of 40-50 NM; the No 1 F3's radar was u/s. About 13 NM W of Boulmer, heading 349°, Neatishead called in a pair in their 10 o'clock. His AI radar detected a pair of F15s on a reciprocal heading L of the nose 5 NM away, the nearest ac at 12,000 ft. The crew of the No 1 F3, was concentrating on the other targets and formation station keeping and did not notice the F15s, which flew down the port side ½ NM away on a reciprocal heading in 'battle' formation at 12000 ft ALT, thereby outside the co-ordinated and agreed altitude bracket. He assessed the risk as "low", but added that they did not expect the F15s to be operating below 14000 ft in the same OTA. RAF AD ac must be booked into and de-conflicted within OTAs, but the USAF does not. He opined that a mid-air collision will occur if procedures are not changed.

THE F15E PILOT reports he was the No 2 (F15B) of a flight of two camouflage dark grey F15E ac flying in wide battle formation to port of his leader; no HISLs are fitted. His flight lead (F15A) was squawking 3/A 4621, but his ac was not transponding. They were conducting practice intercepts with another flight of 2 F15Es (F15s C & D) under a FIS from ScATCC (Mil), who assigned the flight a block FL 140 – FL 240 (29·92 in/1013 mb) to the N of Newcastle, but his flight leads (F15A) radar was u/s. Whilst proceeding northbound he avoided an ac to the W by 3 NM and the flight then turned about onto a heading of 160° at 330 kt. Scottish advised him of a 2-ship formation – the F3 pair - 10 NM to the S climbing

through FL 145. F15A (with u/s AI radar) maintained FL 150, but he obtained a radar contact with the first F3 (the No 2), he thought at FL 147, so he descended to FL 135 to avoid it. He then obtained AI radar contact on the second F3 in trail (the No 1) at FL 135 and climbed above it. He thought the first F3 had been above FL 145, possibly flying on the RPS. No ac was closer than 2 NM nor within 1000 ft of his ac, which the ac mission tapes on file confirmed. He did not witness another ac in close proximity, where safety of flight was a factor.

He added that a conversation with the leader of the F3 pair after landing, revealed the other pilot's frustration with airspace co-ordination, with which he concurred, but he did not believe this was an Airprox, nor the proper forum to air these complaints.

UKAB Note (1): For clarity, the F15 flight which had agreed co-ordination with the F3 pair was F15 C & D in the Mil ATC Ops report. These were not the F15s reported by the No 2 F3 pilot, which were F15s A & B. At the reported time of the Airprox, F15s C & D were opening to the N to set up for the next PI and which the F3 pair descended well below.

THE TORNADO PILOT'S UNIT comments that the use of the OTA system by RAF fighter ac was formalised following a mid-air collision between 2 Tornado F3 ac in the late 1990s. The USAF does not have to book the use of OTAs. Tornado F3 crews continually book and operate in OTAs in which F15 ac are also flying. In this particular case, the crew of the No 2 F3 attempted to deconflict the 2 formations in height. Although no actual risk of collision occurred, the F15s were still operating at an altitude that the F3 pair could have expected to be clear of other fighters following the verbal co-ordination. A formal arrangement for the use of the OTA system by <u>all</u> fighters needs to be implemented and this issue will be progressed.

MIL ATC OPS reports that ScATCC (Mil) Controller 2 (CON2) was providing a FIS to a pair of F15s (C and D) on 259·77 MHz; the lead a/c (C) was squawking 3/A 4620 with Mode C. Pilots C and D had agreed with ScATCC (Mil) to operate with a base level of FL 140. During this period, CON2 had also discussed C and D's activity with Neatishead Controller 3 (NEAT3), in connection with the F3 pair under NEAT3's control working in the same area. No co-ordination was agreed between the controllers, but NEAT3 asked that the F15 pilots call him on the notified OTA C frequency to agree deconfliction. This was done, and pilots C and D returned to CON2's frequency at 1232:30. Immediately afterwards, at 1232:40, F15 pilots A and B freecalled CON2 stating *"...with you just north of Newcastle, request general handling MARSA, with* (C/S C and D) *flight."* A and B were eventually provided with a FIS between FL 140 and FL 240 (the same level block as C and D) and the lead ac (A) assigned a squawk of 3/A 4621.

At 1235:46, shortly after C and D had completed an intercept on the other pair, with A and B turning S, pilot A requested to operate between FL 130 and FL 240. CON2 responded *"Roger, you do have opposing traffic at Flight Level one three zero routeing sixty miles to the north of you coming southbound this time...you also er...all stations, you got traffic south east, ten miles, north west bound indicating Flight Level one four five with another aircraft six miles in trail indicating Flight Level one three zero..."*. The latter part of this message referred to the F3 pair, although their ac type was not known at this stage. Just over 1 min later, F15 pilot A confirmed that his flight would remain in the FL 140 to FL 240 block. During this RT exchange at 1237:03, (after the incident) CON2 updated the position of the F3s to F15 pilot A *"...most southerly contact is now north of you by three miles, north west bound still indicating Flight Level one three zero."* Straight after this, CON2 asked F15 pilot A if he had the OTA C frequency (previously used by F15s C and D) but he did not. CON2 therefore, asked F15 pilot C to call Neatishead to advise them of A and B's presence and intentions. Pilot C passed his apologies, stating that this had already been done, but he had not passed this on to the pilots of A and B.

The LTCC Great Dun Fell radar recording shows F15 (A), squawking 4621, tracking about 150º at FL 152 Mode C, with the non squawking F15 (B) about 2 NM to port (NE) in a wide-battle formation on a similar heading. At 1236:22, the closest F3 – the No 2 - squawking 3/A 2432, is in F15 B's 11:30 position at a range of about 4 NM, having just turned R 10º to track about 340º indicating FL 144 Mode C. The trailing F3, squawking 2431, is about 6·6 NM further to the SE. The first CPA, between B and the 'front' No 2 F3, occurs at 1236:38, the ac passing 'port to port' with a horizontal separation

of 2 NM. The F3 is indicating FL 143. At this point, F15 A is in B's 2 o'clock - 2 NM at FL 156 and both F15s are now tracking about 135º. The second CPA, between B and the 'trailing' No 1 F3, occurs at 1237:02, again passing 'port to port' with a horizontal separation of 2 NM. The F15s maintained a track of 135º, with A now indicating FL 166, whilst the No 1 F3 is tracking 315º at FL 131. After the pass, the trailing No 1 F3 also commences a descent. After both F3s pass, their Mode C indicates a rapid descent to about 2000 ft. The recording indicates that the traffic information passed by CON2 was accurate and painted a sufficient picture to pilots A and B for them to decide their own vertical avoidance manoeuvres. The radar shows that the 'front' No 2 F3 climbed to FL 144, which was above the lower limit of the F15 'block'. There may be an element of 'altimetry' to consider in this incident, as the F15 had 29.92in (1013mb) set, whilst the F3s were using the Tyne RPS 1002mb with a difference of 330 ft; thus, 14,000 ft RPS equates to FL 143 - 144. The vertical deconfliction between the sorties took place on the OTA C frequency, involving F15s C and D rather than A and B. Moreover, the 'deconfliction' that took place on the OTA C frequency did not appear to build in any 'buffer' between them. Nevertheless, horizontal separation was not less than 2 NM, within Class G airspace. The overall situation, regarding the potential for confliction between AD operations within unregulated but (to some) 'reserved' airspace clearly needs to be addressed.

ASACS SSU comments that it has not been possible to review the radar data recordings of this Airprox due to a technical failure. The F3 pair was operating on CAP within OTA 'C' and Neatishead Controller 3 (NEAT3) was providing an Air Defence Information Service (ADIS) 5000 ft. Stipulated as:

Below 5000 ft Tyne RPS (1002 mb) (deemed by the controller to be the base of radar coverage in this area) - a FIS. From 5 - 7000 ft a Limited RIS and 7 - 24000 ft the service provided was a RIS.

NEAT3 initiated a call to CON2 stating that he was *"looking for...de-confliction your 4620 series".* CON2 indicated that his first pair of F15s – C & D - was operating under a FIS FL 140 – FL 240. No co-ordination was agreed and NEAT3 requested that the F15s call up on the notified OTA 'C' frequency. The subsequent conversation between the crews indicates that a 'de-confliction' plan was agreed between the respective aircrew. The F15s C & D agreed to operate *"above 140",* with the F3s stating *"we'll remain below 140".* However, as soon as the F15s departed the OTA 'C' frequency the F3 transmitted *"Neatishead* (F3 C/S) *top height for us now 14000 the Eagles will operate above that".* (UKAB Note (2): Here it is not clear if the F3 was referring to the ac type or callsign of the F15s).

This negotiation between the formations was entirely aircrew led. Subsequently the F3s stated to NEAT3 that they would operate with *"top height for us now 14000"*. This arrangement made no allowance for the fact that 14000 ft RPS would place the F3s above FL 140. Therefore, the aircrews made a plan that failed to agree any vertical 'buffer' and did not take account of an agreement based solely on the SAS, while the F3s were operating with the RPS. Subsequently, the reported F15s – A & B - entered the area to work with C & D.

HQ 2 Gp GASOs requires that when flights are conducted under the 'control' of ASACS units, the Fighter Allocator (FA) is to ensure that sorties are separated, either in plan or "by height layering". If both the F3 pair and F15 flights had been operating under Neatishead's 'control', the FA would have been required to build in a vertical 'buffer' between them. On this occasion, only the F3 pair was under Neatishead control and by virtue of their operating positions within the OTA, de-confliction from the F15s was left to the aircrew. The fact that the aircrew did not build in a vertical buffer and had based their de-confliction on different altimeter settings is evident from the transcript and it is disappointing that neither the Neatishead WC or his supervising FA picked this up. Nonetheless, the Neatishead WC provided traffic information on the conflicting ac in accordance with the ADIS.

This Airprox will be publicised to ASACS controller's, during future ASSU 'Roadshow' presentations, in order to raise awareness of the need to monitor 'aircrew de-confliction' carefully and intervene when necessary to prevent a recurrence of this Airprox.

UKAB Note (3): HQ 3AF advises that the second F15 flight - A & B – was unaware of the 'co-ordination' effected between the F3 pair and F15s C & D.

HQ STC comments that the Tornado crew had attempted to deconflict with the F15E formation in altitude, but without an adequate buffer between the 2 agreed blocks, the co-ordination was

unsound. Furthermore, with the Tyne RPS some 11 mb below the SPS, the likelihood of a confliction was increased. In reality, there was no risk of collision but, having discussed the incident with the Tornado pilot, it is apparent that he perceived the F15E formation to be operating at an altitude that he otherwise expected to be free of other fighters following the verbal co-ordination. He thus believed the safety of his ac to have been compromised. It is unfortunate that the political undertones behind the Tornado pilot's report outstrip any issue of proximity.

HQ STC Note: The Air Defence OTA System is a geographical system of areas promulgated for the tactical co-ordination and management of Air Defence formations conducting training missions in UK airspace. The areas only exist within Class G airspace and their vertical extent is bounded only by the limits of the regulated airspace within the OTA boundaries. As a result, while the System deconflicts STC Tornado F3 and Hawk formations, it does not deconflict the multitude of other military and civilian ac that use the airspace. Therefore, under the current arrangements, the potential for further incidents arising from this kind of airspace confliction still exists. HQ STC Flight Safety has initiated work to identify a more comprehensive solution.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the appropriate ATC, Air Defence and operating authorities.

The ASACS SSU report clarified the nature of the 'co-ordination agreement' between the F3 pair and the first flight of F15s (C & D) on NEAT3's frequency. From their RT transmissions it was evident to the Board that the arrangement did not provide any safety buffer between the F3s *"below 140"* and F15s C & D *"above 140".* It also confirmed that no account was taken of the different pressure datums in use by the respective ac at the time, which placed the F3s above Flight Level 140 when they subsequently reported to NEAT3 *"top height for us now 14000"* RPS. Moreover, this co-ordination took place with the first pair of F15s – C & D – and was not passed on to the pilots of the F15s which the F3 pair encountered – A & B – who were completely unaware of this arrangement. Even if C & D had passed on this agreement to A & B, when they first called on the frequency, as no buffer existed, the incident could still have occurred. Thus any perceived 'co-ordination agreement' was rendered ineffective.

With regard to the Airprox report itself it was clear that the F3 pilots had been warned of the presence of the F15s by NEAT3; the No2 Tornado pilot had detected the pair on AI radar at 5 NM and subsequently sighted F15s A & B. It was not clear if he had warned his No1 whose radar was u/s but who, nonetheless, should have been looking out for them after NEAT3's traffic information in the good weather conditions that pertained. The F15 pilots had also received pertinent traffic information from CON2 and F15B took avoiding action to maintain separation on the F3 pair. Whereas the F3 pilot reported ½ NM horizontal separation, the radar recording showed that a minimum of 2 NM was maintained throughout. In the end it seemed to military pilot members that the 'system' had worked to provide appropriate warning to all the pilots involved, so that they could take appropriate action to avoid each other by a suitable margin. This view led the Board to conclude that this was a sighting report and no more. Hence, in the circumstances that pertained, the Board assessed that no risk of a collision had existed.

This encounter between two pairs of military ac had occurred in the 'Open FIR' – Class G airspace - where 'see and avoid' applied. Although in this environment the OTA structure was established for use by RAF Air Defence units, the Board recognised that no other military operators were compelled to use it – not even other groups within the same Command – let alone another Air Force. Whilst members understood the F3 pilot's sense of frustration and his desire to encourage better and safer airspace co-ordination, they felt that using the Airprox system in this particular instance was not appropriate. Within the chain of command other more appropriate avenues existed to recommend changes to procedure to ensure that flight safety is enhanced for all airspace users.

PART C: ASSESSMENT OF CAUSE AND RISK

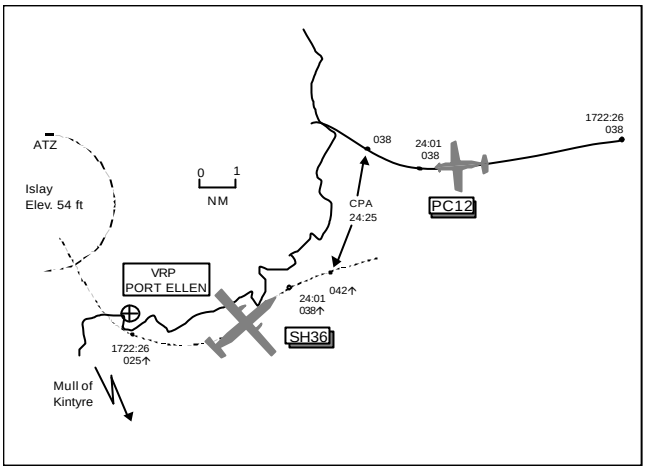
Cause: Sighting report.

Degree of Risk: C.

AIRPROX REPORT No 189/01

Date/Time:	4 Oct 1724	
Position:	5541 N 0601 W (8·3 NM E of Islay - Elev. 54 ft)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	SH36	PC12
Operator:	CAT	Civ Pte
Alt/FL:	↑ FL 70	3000 ft (RPS NK)
Weather Visibility:	IMC KLWD	IMC KLWD 2000-3000 m
Reported Separation:	0 ft V 3 NM H	0 ft V 3·7 NM H

Recorded Separation: 400 ft V 3·5 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SH36 PILOT reports that prior to departure from Islay for a flight to Glasgow, the AFISO notified him of inbound traffic from the direction of the Mull of Kintyre at 3000 ft. Once airborne from RW 13, he turned L onto heading 082° towards ROBBO climbing at 140 kt to FL 70. He contacted Scottish on frequency 127·27 MHz and, once identified squawking 6240 with Mode C, he was provided with a RIS. ATC then passed TI on the PC12 to the NE of him, not from the expected direction, but no traffic was seen on TCAS. After a further update of TI, the PC12 appeared on TCAS in his 10 o'clock; the PC12 turned R to avoid and TCAS indicated that it passed 3 NM clear on his LHS at the same level. The traffic was not seen visually as throughout the climb, when working Scottish ATC, he had been IMC in cloud and rain. He had not received any alerts from TCAS and had taken no avoiding action but he had considered that his airspace had been compromised. He went on to say that his operations at Islay were approved by the CAA and he felt that the interaction between the AFISO unit and Scottish ATC had been less than ideal. He assessed the risk of collision as low.

THE PC12 PILOT reports flying with one passenger inbound to Islay from Glasgow at 245 kt and he was squawking 7000 with Mode C. The ac was coloured cream/blue and his strobe lights were switched on. He had departed Glasgow on a VFR clearance initially at 1000 ft following the S bank of the Clyde via Greenock where he turned S. He could see the Isle of Bute but to avoid high ground on his track towards the Mull of Kintyre, he requested climb to 3000 ft from Scottish ATC on frequency 127·27 MHz. He was in receipt of a RIS, he thought, and on reaching 3000 ft he turned direct towards Islay. ATC warned him of traffic outbound from Islay (the subject SH36) at 6000 ft possibly 7000 ft so he felt appropriately safeguarded as he was 3000-4000 ft lower. However, his TCAS showed an ac from the Islay direction but it was flying at a lower altitude and was not indicating a continuous climb - in fact its relative altitude varied up and down. During this period, he had reset the Belfast RPS which may explain, to some degree, the variation in relative levels between the subject ac. The other ac on TCAS now indicated at the same level as him (3000 ft), heading towards him from about his 11 o'clock position. When the conflicting ac came within the 5 NM circle on TCAS, he informed ATC that "*I was turning sharp right to avoid*", which he did by executing a 45° R turn. He did not see the other ac visually, as the visibility was 2000-3000 m in IMC, but TCAS showed the traffic passing on his port beam almost at the

extreme edge of the 5 NM circle. The other ac's pilot was heard to ask Scottish ATC how close the two ac had passed and was told 3·7 NM; the SH36 pilot then reported that he would be filing an Airprox. He went on to say that during the encounter, although the SH36 pilot had also reported a TCAS `sighting' with his ac on his L, the former had made no attempt to avoid. Furthermore, he would have expected the SH36 pilot to have climbed as high as possible outside CAS and to have called ATC for joining clearance but he had not heard the reporting pilot do any such thing.

UKAB Note (1): The RT transcript at 1725:30 shows the Scottish SC's reply to the SH36 pilot's request about how far apart subject ac passed *"SH36 c/s it be about er two and half er three miles".*

UKAB Note (2): Met Office archive data shows the Islay METARs EGPI 1650Z 15015KT 9000 RA FEW008 SCT030 13/13 Q0999= EGPI 1750Z 15015KT 6000 RA FEW005 SCT018 BKN055 13/13 Q0998.

ATSI comments that the PC12 established communication with the Scottish Antrim/West Coast Radar Controller, at 1710, reporting at 1000 ft and estimating Islay at 1725. The controller said that a pending fps for this flight was in his display. The pilot's message was answered with a 'Roger' i.e. no mention was made of the ATC service being provided or the flight conditions under which the flight was being conducted. The controller's CA1261 reports the service as a FIS and the flight conditions as VFR. The PC12 pilot reported levelling at 3000 ft QNH 1001 and then adjusting onto the Belfast RPS 988 mb, at 1717:30, and was passed TI on an SH36 shortly to depart from Islay climbing to FL 70. As the SH36 had already been issued with an IFR departure clearance from Islay, to climb to FL 70 with 'no known traffic', the airport AFISO was informed of the position, altitude and ETA of the inbound ac. The AFISO said that the SH36 would be airborne in a couple of minutes and he would inform its pilot of the traffic. Although no recording was obtained from Islay, the pilot did mention in his report that he had been informed about the PC12, prior to departure.

On first contact with Scottish, the controller identified the SH36 and passed it TI about the PC12, which was believed to be (not identified) 12 NM to its NE, at 3000 ft VFR, inbound to Islay. The pilot was informed that he was being provided with a RIS. The crew queried the PC12's flight conditions, which were confirmed as VFR.

Shortly afterwards, the PC12 pilot was asked to report his altitude. He replied *" three thousand feet on nine eight eight and that other (SH36 company) looks as though it's only three hundred ???? two hundred below me"*. Further TI was passed to the SH36 pilot *"SH36 c/s that traffic believed now in your left eleven o'clock at a range of four miles three thousand feet on nine eight eight"* (Belfast RPS). Both ac reported sighting the other on TCAS, with the pilot of the PC12 saying he was turning sharp R because the SH36 was at about the same altitude.

The incident occurred in Class G airspace. A controller does not have to provide standard separation between ac operating VFR/IFR (MATS Part 1 1-13). On this occasion, the radar controller fulfilled his responsibilities to both ac by passing appropriate TI to the SH36, which was on a RIS (MATS Part 1 1-41), and to the PC12, which was being provided with a FIS (MATS Part 1 1-2).

UKAB Note (3): Analysis of the Tiree radar recording at 1722:26 shows the SH36 4·3 NM SE of Islay in a L turn through heading 120° passing FL 025 (1750 ft RPS 988 mb) with the PC12 16 NM E of Islay tracking 260° maintaining FL 038 (3050 ft RPS). At 1724:01 the SH36 is steady tracking 080° passing FL 038 (3080 ft RPS) with the PC 12 in his 11 o' clock range 5 NM at the same level; the PC12 has just commenced a R turn. CPA occurs at 1724:25, the SH36 is passing FL 042, 400 ft above and 3·5 NM S of the PC12.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

From the outset, there appeared to have been some assumptions and misunderstandings by all parties and these had caused the incident. The Antrim/ West Coast Radar Controller was expecting the

PC12 on a VFR plan and, although no formal contract was agreed between both parties, the ATCO assumed that it was VFR and provided it with a FIS. Conversely, the PC12 called on frequency, did not request a specific ATC service but believed he was being provided with a RIS and was given generic TI on the SH36 departing Islay in the opposite direction climbing to FL 70. The SH36 pilot was given TI by the Islay AFISO on the PC12 assumed to be inbound from the Mull of Kintyre direction (SE) and, once airborne and identified by the ScACC ATCO, was given a RIS with updated TI; albeit the PC12 was approaching from a different direction than that previously anticipated. Concerned that the conflicting traffic (the subject PC12) was reported as VFR, the SH36 pilot asked if this could be confirmed since he was climbing in IMC; he was told by the ATCO that the traffic was VFR and, after checking with the PC12 pilot, that it was at 3000 ft RPS. Meanwhile, the PC12 pilot had not informed the Antrim/West Coast controller that he was now flying in IMC; he became concerned that the SH36 was showing on his TCAS ahead of him just 200-300 ft below him. The PC12 pilot then informed the ATCO of his R turn to avoid the SH36 (using TCAS) which was by now at the same level; the SH36 also reported a TCAS 'sighting'. Members agreed that this had been an untidy sequence of events but ultimately was no more than an encounter in Class G airspace with both ac crews apparently expecting more separation from the ATC service being provided. After ATC TI and good situational awareness from the PC12 pilot, the situation had been resolved by the latter's R turn ensuring that he passed well clear to the N of the SH36 who, in turn, watched the encounter on TCAS. Throughout all of this the distance between the ac was always more than 3 NM, leading the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Misinterpretation of the Air Traffic service being provided.

Degree of Risk: C

AIRPROX REPORT No 190/01

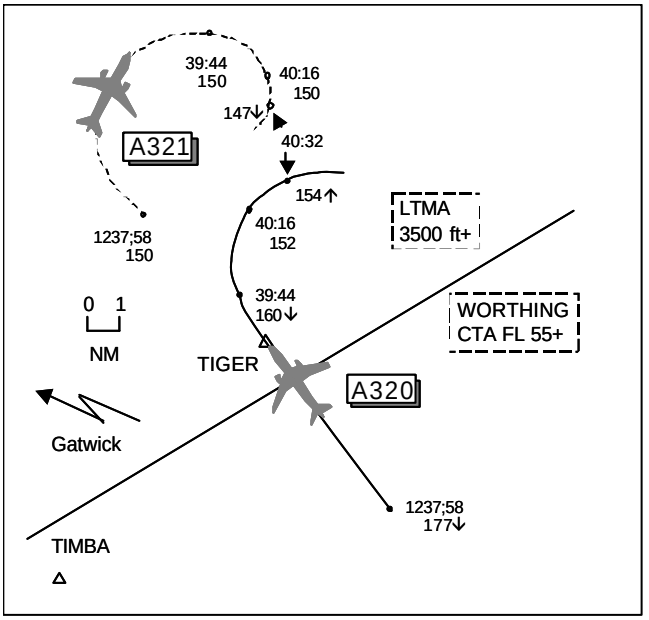
Date/Time: 30 Oct 1240

Position: 5109 N 0028 E (5 NM N TIGER)

Airspace: TMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	A320	A321
Operator:	CAT	CAT
Alt/FL:	↓ FL 150	NK
Weather Visibility:	VMC NK NK	NK NK
Reported Separation:	200 ft V < 3NM H	NK

Recorded Separation: 700 ft V 2·4 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A320 PILOT reports flying inbound to Heathrow from France at 210 kt and he was cleared to route via BIG descending to FL 150 to be level abeam TIGER. Approaching TIGER he was told to

enter the TIGER hold for about 20 minutes. During the first turn entering the hold passing heading 060° and FL 156 in descent, ATC told him to maintain FL 160; he asked for confirmation that he was required to climb FL 160. Simultaneously, he received a TCAS RA *"climb"* on traffic in his 11 o'clock which he complied with, arresting descent at FL 154 and rapidly climbing to level off at FL 160; *"clear of conflict"* annunciated passing FL 158. He did not see the other ac visually although TCAS indicated that it had passed within 200 ft vertically and <3 NM horizontally clear on his LHS.

THE A321 PILOT reports that regretfully he is unable to contribute any information towards the incident. He apologised for initially promising ATC to complete a report but then omitting to do so; he had not generated any paperwork at the time and after finally being contacted by his Flight Operations Dept. three months later he was unable to remember any details of the situation. Various events had contributed to the delay. Immediately after the incident the company had also suffered operational difficulties and despite further requests from the UKAB this meant Flight Operations had delayed contacting the Captain until after they had completed a thorough search of reports filed by their Flight Crews. The Flight Operations Area Manager apologised for this situation; their pilots normally filed reports when requested or when the situation warranted it, but they had been overtaken by an unusual set of circumstances.

ATSI reports that the TC SE Sector, which was combined at the time of the incident, was described by both the SC and Co-ordinator as busy with workload assessed as moderate to high. Although it had been considered manageable, a decision to split the sector had been made, just prior to the occurrence, because of a build up of BIGGIN (BIG) stack traffic. It was still combined when the Airprox occurred.

The A321 established communication with the SE Sector at 1231, reporting passing FL 233 descending to FL 150. This was in accordance with the Standing Agreement for traffic inbound to Heathrow, from the LYD Sector, to be level FL 150 at TIGER. The flight was instructed to maintain FL 150 and expect to hold at BIG. Because inbound delays were in excess of twenty minutes, Expected Approach Times (EATs) were about to be issued. The A321 was the first flight to be so affected but an EAT had not yet been allocated. As it became apparent to the SC that the A321 was catching up the previous inbound (AC3), which was still maintaining FL 150, a speed restriction of not greater than 220 kt, was applied to the flight. A protracted distracting RT exchange then took place between the SC and the pilot of AC3, with reference to speed control application.

The SC explained that she realised levels were not becoming available at BIG as expected; the Heathrow Intermediate (INT) Director (DIR) South position was being operated by a trainee, resulting in the stack not being managed as effectively as normal. Realising that it was not practical for the next Heathrow ac to be transferred to her frequency, descending to the agreed level of FL 150, the SC asked the Co-ordinator to contact the DVR/LYD Sector to arrange for that flight, the A320, to be descended to FL 160, to hold at TIGER. As she believed that the Co-ordinator was in the process of telephoning that sector to carry out the co-ordination, she annotated the A320's fps with FL 160 in Box B, the level box. (The LATCC-TC MATS Part 2, Page DAT-5, shows that Box B is to be used for 'assigned' levels). However, the Co-ordinator, seeing that the flight's fps was marked FL 160, assumed that the ac was in contact with the sector and had been cleared by the SC to stop its descent at FL 160. Accordingly, when he spoke to the DVR/LYD CSC, he only informed him that the A320 was going to enter the hold at TIGER at FL 160, rather than requesting that sector to issue the instruction. Consequently, both the SC and the Co-ordinator believed that action had been taken to ensure that the A320 would hold at TIGER at FL 160.

Meanwhile, just before the Co-ordinator telephoned the DVR/LYD Sector, the A320 made its initial call on the TC SE frequency. The pilot reported passing FL 200 descending to FL 150 and was instructed to route to TIGER to hold. The SC could not explain why she did not notice that the pilot had reported his cleared level as FL 150, rather than what she was expecting (FL 160). The pilot was subsequently advised to expect a delay in excess of twenty minutes.

Because she had been unable to clear AC 3 for descent below FL 150, due to FL 140 still being occupied at BIG, the SC decided to give the A321 a RH orbit. The radar timed at 1237:58, as the

orbit instruction is issued, shows the A321 at FL 150, with the A320 12·2 NM behind it passing FL 177. The SC was unaware of the potential confliction which had now been created between the subject ac. She mentioned that, at about this time, she was aware that the Heathrow INT DIR South was calling down the control room, offering to accept AC 3 at OCKHAM (OCK). She said that she allowed the Co-ordinator to carry out the co-ordination and, subsequently, she cleared the ac to set course for OCK at FL 150. As this level was now vacant at BIG, she instructed the A321 to turn R direct to BIG. The radar timed at 1239:44 shows the A321 in a R turn passing through an Easterly heading with the A320, at FL 160 passing through a Northerly heading also in a R turn, 8·1 NM S of it. Immediately afterwards, the SC noticed that the A320's SSR Mode C readout showed FL 159. She did not think that this necessarily indicated that the ac was going to descend below what she believed was its cleared level and routinely instructed it to maintain FL 160, informing its pilot of an EAT, from BIG, of 1302.

On receiving this transmission the pilot of the A320 replied, somewhat hesitantly, *"we have the clearance one five zero we climb now one six er zero"*. The SC, aware that the A320 was still descending, immediately instructed the A321 to *"descend now"* FL 140. This was followed by an instruction to the A320 to *"expedite climb to flight level one six zero expedite now"*. STCA then activated, at 1240:17, when the two ac were 4·2 NM apart. The A320 was at FL 152 (the lowest level it reached before climbing back to FL 160) and just about to pass through the A321's 12 o'clock; the latter was still maintaining FL 150 and was instructed to expedite its descent. The closest point of approach, horizontally, occurred at 1240:32, as the tracks of the two ac were diverging. The A321, descending through FL 147, was 2·4 NM NNW of the A320, which was climbing through FL 154. Although the SC did not use the term 'avoiding action' during the incident, she did issue positive instructions to both pilots to expedite their respective climb or descent. It is open to conjecture whether either pilot would have reacted sooner had the 'avoiding action' term been used. The pilot of the A320 reported, later, that he had received a TCAS RA to climb to FL 160 after ATC had already cleared him to that level; TI was not passed to either flight.

The LATCC-TC MATS Part 2, Page SEA 2.3, describes the TIGER hold as being established for the en-route holding of Heathrow and Northolt inbounds, via BIG VOR, as the preferred alternative to LYD VOR. It is positioned on the centreline of Airway T420 at BIG VOR RDL 140°, DME22. The holding pattern is RH and is to be used from FL 180 to FL 240 only. LATCC-TC Operations advise that the tactical use of FL 160 at TIGER is acceptable, as it does not conflict with any other stack. The lower restriction of FL 180 was written into the MATS Part 2 to assist in reducing the potential for confliction with departing ac which are given climb to FL 170 before transfer to the AC sector.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the A320 pilot, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

ATCO members were aware of the scenario when the BIG and TIMBA positions were bandboxed into the TMA SE sector. The situation was not unusual but the incident had occurred prior to the sector being split and the increased build up of traffic into the BIG holding stack had undoubtedly made the position busy. In the chain of events, there had been an apparent misunderstanding between the SC and Co-ordinator and both ATCOs had assumed that the appropriate action had taken place to ensure that the A320's descent had been stopped at FL 160. Firstly, the SC had asked the Co-ordinator to contact the DVR/LYD Sector to arrange that the A320 be descended to FL 160 to hold at TIGER. However, she had prematurely entered FL 160 into the fps 'assigned level' box prior to the co-ordination taking place. Members agreed that this had been a part cause of the Airprox. Secondly, the Co-ordinator, who was not plugged in to the console and unable to hear the RT, on seeing FL 160 written in Box B on the fps, had then wrongly assumed the A320 had called on frequency and had been assigned that level by the SC; on the basis of this erroneous assumption he had then only 'informed' the DVR/LYD of the A320's intentions. These actions meant that the appropriate co-ordination, as requested by the SC, was never carried out,

which was another part cause of the Airprox. Thirdly and crucially, the SC had missed the A320 pilot saying he was descending to FL 150 on his initial RT call. Irrespective of the previous assumptions by both ATCOs, if the SE SC had assimilated the A320 pilot's level report, it would have enabled her to take earlier remedial 'stopping-off' action. This omission was the final part cause of the Airprox.

Moving on to risk assessment, the SE SC noticed the A320 had descended through FL 160 and had instructed its pilot to maintain that level. Commendably, on seeing the A320 still descending, she had instructed the A321 pilot to descend to FL 140 before returning her attention to the A320 by instructing its crew to *"expedite climb to FL 160"*. The A320 pilot had reported receiving a TCAS RA after being given ATC climb clearance. Although neither TI was passed (to either ac) nor `avoiding action' phraseology used, the timely `recovery' actions by the SE SC combined with the geometry of the subject ac persuaded the Board that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

1) The SE SC entered information on the A320's assigned level, on the fps, prematurely.

2) The Co-ordinator assumed erroneously that the FL entered on the fps by the SE SC had been assigned.

3) The SE SC did not notice the A320 pilot's report that he was descending to FL 150.

Degree of Risk: C

AIRPROX REPORT No 191/01

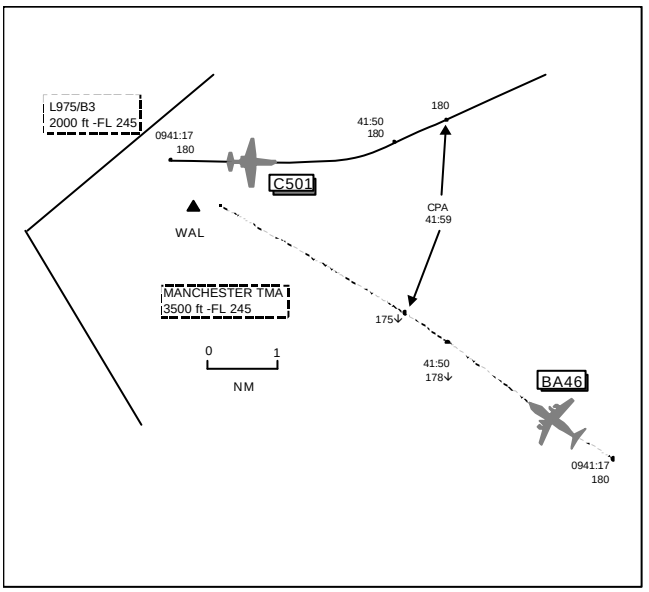
Date/Time: 29 Oct 0942

Position: 5323 N 0302 W (3·5 NM E WAL)

Airspace: TMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	BA46	C501
Operator:	CAT	Civ Pte
Alt/FL:	FL 180	FL 180
Weather	VMC CLOC	VMC CLNC
Visibility:	NK	>10 km
Reported Separation:	200 ft V 2-3 NM H	100 ft V 2-3 NM H

Recorded Separation: 500 ft 2·8 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BA46 PILOT reports flying en route to the Isle of Man heading 290° at FL 180 and 285 kt and was receiving an ATC service from Manchester on frequency 128·05 MHz. Approaching WAL, with ATC clearance to turn R at the VOR onto heading 315°, an ac was seen on TCAS directly ahead at the same level. TCAS very quickly annunciated a TA alert followed by an RA *"descend"*, ATC then

issued descent clearance to FL 170; he adhered to the RA instructions. The conflicting traffic was seen as it passed abeam, about 200 ft above and 2-3 NM away. He assessed the risk of collision as medium and thought the ATC descent clearance had been given too late.

THE C501 PILOT reports flying en route to Leeds heading 090° at 270 kt and he was cleared to descend to FL 190 by Manchester ATC. Approaching FL 190 he was cleared for further descent to FL 180, which he readback. Subsequently, he was then issued with an avoiding action 30° L turn followed by TI and he saw a BA46 pass slightly below him about 2-3 NM clear on his RHS. He told ATC that he could see the traffic who then queried his level; they thought he should have been at FL 190 and he confirmed that he had readback his cleared level FL 180. The BA46 pilot had reported a TCAS RA manoeuvre on the frequency. TCAS was not fitted to his ac and he assessed the risk of collision as low/none.

ATSI reports that the Radar Controller was operating the combined West/IOM Sector and he described his workload as moderate at the time of the incident. Another controller was available if it had been considered necessary for the sector to be split.

The C501 established communication with the West/IOM Sector at 0934, reporting at FL 240, in accordance with the Standing Agreement between LATCC Sector 7 and MACC. The ac was on radar heading of 090°, positioned on the S side of Airway L975, again in accordance with the Standing Agreement. It was instructed to continue on its heading and shortly afterwards the flight was cleared to descend to FL 190. The controller explained that this level was to ensure that it was below MACC Sector 29's airspace (FL 195-FL 275) and to provide vertical separation from the subject BA46, which was opposite direction at FL 180 on Airway B3 and not yet on his frequency.

In order to resolve a potential confliction between another ac northbound on Airway A25 at FL 180 and the BA46, the radar controller issued the former with descent clearance to FL 170. Subsequently, the BA46 made its initial call on the frequency, at 0938, routeing direct to WAL and was instructed to leave WAL heading 315°. As he had ensured that the subject ac, together with the traffic on A25, were appropriately separated, the radar controller turned his attention to the situation elsewhere in the sector.

At 0939, when the subject ac were on conflicting tracks, about 23 NM apart, the radar controller instructed the C501 to descend to FL 180 i.e. the same level as the BA46 and this clearance was read back correctly by the pilot. The controller could offer no possible explanation for his action or recollect having issued this clearance, although the RT recording establishes that he made the call. He confirmed that he was well aware of the BA46's presence, having taken it into account previously, both in respect of the C501 and the A25 traffic. Additionally, from his recollection, the fps display would have shown the confliction, as fpss for both ac were displayed under the appropriate WAL designator. It was noted that the new cleared level was not annotated on the C501's fps and, again, the controller could offer no explanation for this omission. He stated that he was certainly not aware of the confliction he had created.

The controller became aware of the situation just before the STCA activated, by which time the subject ac were both at FL 180. He immediately instructed the C501 to turn L heading 060°, followed by an instruction to the BA46 to turn L heading 270° and to descend to FL 170. These instructions, other than the heading change issued to the BA46, were read back correctly by the pilots concerned. The radar controller explained that he decided not to use the term 'avoiding action' as he assessed that the two ac were never going to get in close proximity to each other. The radar photograph timed at 0941:17, about the time the remedial action is started, shows the subject ac at FL 180, the BA46 is 7·6 NM SE of the C501. The pilot of the C501 reported visual with the traffic, having been given information on an ac just passing on his R side. Separation reduced to 2·8 NM and 500 ft (0941:59), by which time the tracks of the two ac were diverging. The MACC MATS Part 2, Page RSEP 1-1, allows the use of 3 NM radar separation, subject to certain conditions, which were met on this occasion. The controller said that he believed that the situation occurred as a result of a level bust by the C501, because, as previously stated, he could not recollect having cleared it to descend to FL 180 and the fps still showed it as cleared to FL 190. Consequently, he transmitted to the C501 *"we have your cleared level one nine zero just*

confirm maintaining one eight zero." The pilot confirmed that he had read back a descent to FL 180.

The radar reveals that the BA46 did not take the L turn as instructed by ATC. The pilot commented in his report that he had received a TCAS TA, followed by an RA 'descend', at which time ATC gave descent clearance to FL 170. He had seen the other ac.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members were puzzled by this encounter as it appeared there had been 'no rhyme or reason' to the controller's actions. He had formulated then executed his plan vertically to separate the subject ac and further traffic Northbound on airway A25. His attention had then been taken up with the traffic situation elsewhere in the sector for a short period after which he had issued a descent clearance to the C501 pilot from FL 190 to FL 180. He was unable to recall this action post-incident nor was the fps annotated accordingly. Suspecting the possibility of a 'spoof' the RT transmission had been checked and verified for authenticity, which revealed nothing unusual. The ATCO had been concerned at the time, quite understandably, as he had been convinced a 'level bust' by the C501 had caused the situation. In the absence of any further concrete information and having exhausted possible hypothesis to fit 'the picture', members agreed that the West/IOM radar controller had inexplicably descended the C501 to the same level as the BA46 and this had caused the Airprox.

Looking at risk, after noticing the confliction the controller had initially given the C501 pilot a 30° L turn and TI on the BA46; the pilot saw it passing 2-3 NM clear on his RHS. The controller then followed up with a L turn and descent instructions to the BA46 crew, who by that stage had already received TCAS TA and RA alerts and were following the RA *"descend"* instructions; the BA46 crew saw the C501 as it passed abeam by 2-3 NM. Members noted the lack of turn by the BA46 but understood the crew's primary preoccupation of manoeuvring in the vertical plane in response to TCAS. However, ATCOs felt that the words `avoiding action' should have been used to elicit a more rapid response from both pilots in the circumstances. At the end of the day, the combined actions by all parties to recover the situation had led to only a marginal loss of standard separation. From this the Board concluded that any risk of collision had been effectively removed.

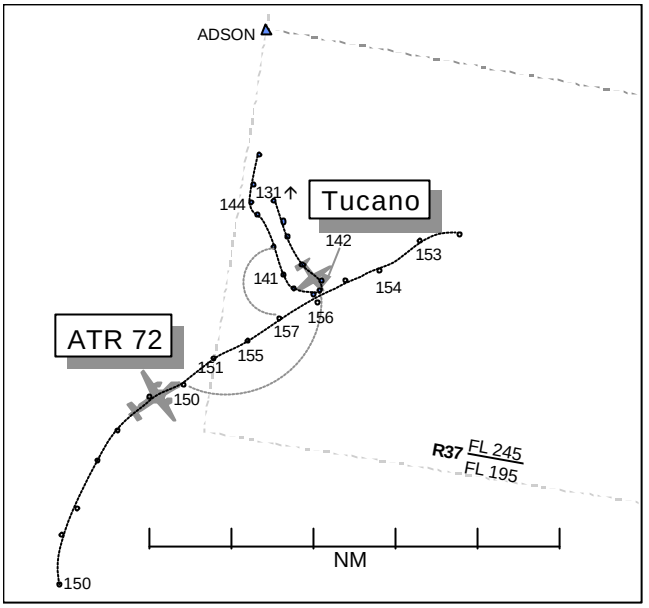
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The MACC West/IOM Radar controller inexplicably descended the C501 to the same level as the BA46.

Degree of Risk: C

AIRPROX REPORT No 192/01

Date/Time:	23 Oct 0847	
Position:	5101 N 0215 W (2 NM W of Shaftesbury)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	ATR72	Tucano
Operator:	CAT	HQ STC
Alt/FL:	FL 150	FL 110-150
Weather Visibility:	VMC CLAC 10 km+	VMC CLOC 10 km+
Reported Separation:	3-400 ft V	NK
Recorded Separation:	0.8 NM, 1500 ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ATR72 PILOT reports heading NE at 220 kt while conducting an engine airtest in class G airspace under a RIS from Yeovilton at FL 150. He was advised of an ac, possibly a military jet, manoeuvring just ahead of him; he could not see it. Initially TCAS displayed it climbing 1200 ft below, almost underneath, and continuing the climb. A 'Climb' RA was followed to FL 156 and 'Monitor VS' followed. He levelled at FL 157 with the other ac close behind showing 3-400 ft below on TCAS. When clear of the conflict he returned to FL 150, the other ac then being 4-5 NM astern and 200 ft above. He considered the risk of collision was high.

THE TUCANO PILOT reports flying a GH and aerobatics (including spinning) sortie under a RIS from Boscombe Down. He remembered that the Airprox traffic was called by Boscombe, but not as close as suggested in the Airprox report. He and his passenger saw the ATR but at a distance which suggested that the sighting was not at the time of the Airprox; he suggested radar recordings might provide better information.

MIL ATC OPS reports that at about 0832 the ATR72 was prenoted to Yeovilton Approach (APP) by the LATCC (AC) Hurn Sector Assistant; its pilot was conducting an airtest and wished to operate within the 'Open FIR' in the Yeovilton area. The workload was light at the time and APP was working both UHF and VHF frequencies. At 0841:12, the ATR72 pilot checked in with APP on 127·35 at FL 150. The pilot came on frequency much earlier than APP had expected; the ac was still well within Airway R8, at the extreme edge of the radar display and so APP provided the pilot with a FIS *"...until clear of Controlled Airspace "* which was acknowledged. At 0845:30, as the ac was just clearing the northern edge of the Airway, the ATR72 pilot transmitted *"c/s, we've now finished with our Air Test, we'd like to return to Gatwick please."* This required clearance back into CAS and so APP advised him he was clear of controlled airspace, suggested a heading of 080° to parallel the Airway and asked where he would like to join CAS. The pilot acknowledged the turn and stated that he wished to join at Southampton anywhere between FL 150-100. APP's attention was diverted briefly while he spoke with his Assistant about the clearance. As he returned to the ac, he noted that it was turning into confliction with Boscombe Down traffic which was now tracking S and, at 0846:50, transmitted *"c/s, traffic north east by five miles, manoeuvring, er, believed jet traffic, Flight Level one three five"* and the pilot replied that he was looking. Shortly afterwards, at 0847:17, APP

updated the TI *"…that traffic's now in your twelve o'clock at two and a half miles, indicating Flight Level one four zero"* to which the pilot replied *"c/s TCAS climb"* and APP replied *"Roger."* At 0847:37, the pilot advised that the conflict was clear and that he was readjusting to FL 150.

About 30 sec later, the Boscombe Down Approach controller (BDN) contacted APP on the landline and requested traffic information on the ATR72's radar contact; APP informed BDN that it was a civil ac on an air test and that it was returning to Gatwick at FL 150. APP subsequently received instructions from LATCC (AC) to remain clear of controlled airspace and contact London Control on frequency 134.12; this instruction was relayed to the ATR72 pilot and he left APP's frequency at 0851:10. It was some days later before the incident was filed by the ATR72 pilot's company as an Airprox.

By the time the BDN controller was informed of the Airprox, almost 2 weeks had passed and the controller had little recollection of what had been a fairly routine event. The Tucano pilot was conducting a GH exercise and in receipt of a RIS from BDN on frequency 276·85. At 0845:00, BDN transmitted *"…traffic south, eight miles, northwest bound, Flight Level one five zero"* to which the pilot replied *"…roger, shortly spinning."* At 0846:30, BDN updated the TI, *"…previously reported traffic now south west, seven miles, just turned onto a northerly track, still indicating Flight Level one five zero,"* immediately after which the pilot reported that he was visual. About 1 min later, BDN checked, and confirmed, that the Tucano pilot was still visual.

The LATCC radar recording shows the ATR72 leaving R8 10 NM S of ADSON at FL 150 with the Tucano manoeuvring about 7 NM to the N, also at FL 150. The ATR72 begins a gentle R turn, during which the Tucano descends rapidly to about FL 110, before climbing again on a northerly track. At 0846:27, the ATR72 is turning through N, with the Tucano about 6·5 NM NNE in a L turn through W indicating FL 129. At 0847:08, the ATR72 is turning through a heading of about 060º, although the rate of turn appears to have reduced, with the Tucano 2·5 NM NE, tracking 150º indicating FL 139. At 0847:21, the ATR72's Mode C indicates FL 154 as it climbs in response to the RA, whilst the Tucano, about 1·5 NM to the NE, appears to have turned sharply R after levelling at FL 141 (FL 142 in the previous sweep). The closest point of approach observed on radar occurs in the next sweep, at 0847:27, with the Tucano, tracking 320º, in the ATR72's 11 o'clock at a range of just under 1 NM and 1400 ft below (ATR FL 155, Tucano FL 141). Both ac have maintained track in the following sweep, with the Tucano now 1 NM N of the ATR72 (9:30 position) and 1500 ft below, after which the tracks continue to diverge.

While ascertaining the ATR72 pilot's requirements, APP forgot to upgrade the FIS he had been providing (to a radar service) but in effect he had actually upgraded the service to RIS and passed TI accordingly. Realistically, APP had little other option than turning the ATR42 R, due to the proximity of CAS to the S. While he was aware of the Boscombe Down track to the N a confliction did not initially appear to be likely but the ATR72's radius of turn was greater than expected.

The radar recording indicates that the TI passed to both pilots by their respective controllers was reasonably accurate and, although the ATR72 pilot did not see the Tucano, the Tucano pilot became visual with the ATR72 at an early stage and remained 1000 ft below the ATR72's level, as reported to him by BDN.

HQ STC comments that the Tucano pilot, visual with the ATR72, reacted appropriately to the traffic information passed by the BDN controller. Furthermore, TCAS alerted the ATR72 crew to the Tucano's proximity and provided an effective solution to eliminate any risk of collision.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC and operating authorities.

Members agreed that this incident was simply an encounter in the FIR which was resolved safely by all concerned. The Tucano pilot was warned about, saw, and remained below the ATR72, turning away from it before resuming his exercise and the ATR72 pilot responded to his TCAS RA which performed its designed purpose; these 2 actions removed any

risk of collision. The radar recording indicated an avoidance somewhat in excess of the requirement, presumably because the ATR72's TCAS detected that the Tucano was climbing on its southerly leg, and it subsequently stopped climbing. Its turn and level-off resulted in much greater separation than TCAS would normally require. It was not clear why the ATR72 pilot reported the Tucano above him as it passed astern; the radar recording showed it well below. Members assumed that either the TCAS had misread the separation in the latter stages or that the pilot had misinterpreted the indications.

In addition to the pilots and the TCAS, the Board acknowledged the contribution to a safe outcome provided by the Boscombe Down and Yeovilton controllers. Both were providing a RIS and gave accurate traffic information which, with TCAS, enabled both crews to acquire and avoid each other. Members wondered if the ATR72 pilot had misinterpreted his ATS, thinking he was under Radar Control and expecting radar separation from other traffic. (Under a RIS it is a pilot's responsibility to see and avoid other traffic with the assistance of traffic information from the controller.)

The small separation quoted by the ATR72 pilot had led the Tucano pilot to suspect that the ATR72 had approached much closer than he had recollected, at a time other than when he saw it. The radar recording confirmed that this was not the case and that he had maintained an adequate separation from the ATR72's track and level, with or without the TCAS climb that it followed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction in Class G airspace, resolved by both pilots.

Degree of Risk: C

AIRPROX REPORT No 193/01

Date/Time: 7 Nov 0905

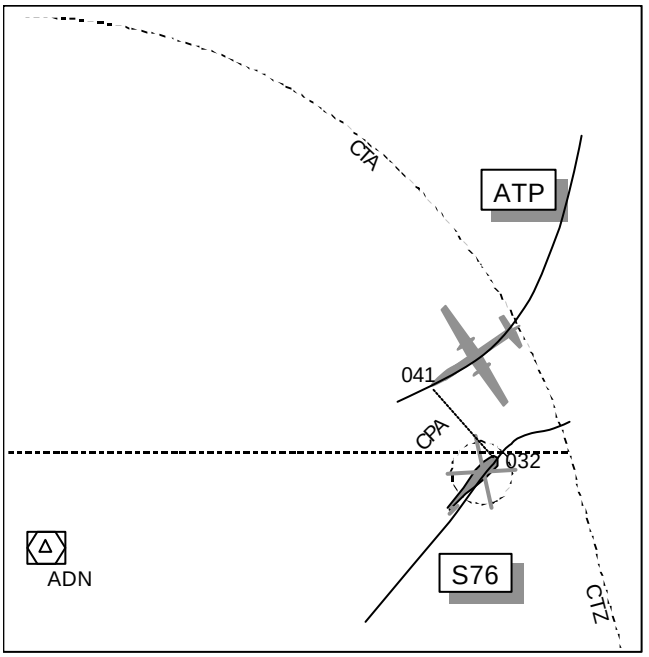
Position: 5722 N 0201 W (ADN 073/8.5)

Airspace: CTA (*Class:* D)

Reporter: Aberdeen ATC

	First Aircraft	*Second Aircraft*
Type:	BAe ATP	S76
Operator:	CAT	CAT
Alt/FL:	↓ 2000 ft (QNH 1003 mb)	3000 ft (QNH 1003 mb)
Weather Visibility:	VMC CLNC 60 km	VMC CLNC 10 km+
Reported Separation:	NK	NK

Recorded Separation: 1·7 NM, 900 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ABERDEEN FIN DIR reports that the ATP was inbound from 20 NM to the NE and was instructed to remain at 4000 ft due to the outbound S76 at 3000 ft. Fin Dir then co-ordinated with INT and HELS to vector the ATP around the helicopter and instructed the ATP to turn right onto 230° and

descend to 2000 ft. The ATP did not turn so it was passed further traffic information on the S76 which was now 5 NM to the S. Fin Dir then asked HELS to turn the S76 E and gave the ATP a further turn onto 260°, requesting its level. The ATP pilot said he was leaving 4000 ft so Fin Dir stopped his descent and asked him to report his level; the pilot reported being level at 3800 ft as the ATP passed about 2 NM N of the S76.

THE ATP PILOT reports heading 240° at 180 kt in good contact with Aberdeen airport which he reported to the controller. He was initially instructed to maintain 4000 ft due to helicopter traffic at 3000 ft which he could see on TCAS. He was then told to turn right and descend to 2000 ft. The FO (handling) started a slow descent but was a little tardy in starting the turn. He was then given a further right turn and told to stop descent at his current altitude which was 3800 ft. The other traffic was visible at all times on TCAS which gave no alerts.

THE S76 PILOT reports heading 040° at 140 kt outbound from Aberdeen when he was told to turn right onto 090°. Once this was established he was cleared back onto track. He was not aware of an Airprox and did not see the other ac.

ATSI reports that the FIN controller's workload and traffic loading were both light at the time of the Airprox. The HELS position, controlling the S76, was operated by a low hours trainee under supervision, and was "fairly busy". The crew of the ATP established communication with the Aberdeen FIN Controller at 0900:50. At that time, they were outside controlled airspace, descending to 4000 ft, on course for the 'ATF' NDB. Previously, the flight had been in communication with the INT controller who had placed it under a RAS. The crew were not advised of the change to a radar control service as they entered the Aberdeen CTA a short time later. When, as on this occasion, the runway in use is 34, it is common practice to route traffic, inbound via the 'SHD' NDB, to the ATF, since this conveniently positions the traffic downwind right hand for either an ILS or visual approach.

At 0903:10, the pilot of the ATP reported: *".... if you've no traffic we are visual with the field".* The FIN controller recognised immediately that an outbound helicopter at 3000 ft, the S76, was likely to affect the ATP descending for a visual approach. FIN instructed the ATP to maintain 4000 ft and advised on the presence of the S76. The controller subsequently explained that, under such circumstances, normal procedure would be to wait for the two ac to pass before clearing the ATP for a visual approach. On this occasion, because of a light workload and in the interests of expedition, FIN decided to radar vector the ATP behind the S76. With this in mind, at 0903:50, FIN instructed the ATP to turn right heading 230º and descend to 2000 ft. However, the controller did not inform the crew of the plan. At that time, the S76 was in the ATP's 1230 position at about 10 NM. At 0904:10, the ATP was advised that the helicopter was in its 12 o'clock, range 8 NM at 3000 ft. The pilot reported *"looking"* and the controller, becoming concerned at the lack of a perceptible turn, enquired: *"Are you in the turn?"* The pilot responded: *"Affirmative now."* Just under half a minute later, the FIN controller instructed the ATP to turn further right heading 260º and advised that the helicopter was 5 NM south of it at 3000 ft. It is at about this time that the ATP's right turn becomes apparent on the radar recording.

When it became clear that the 3 NM minimum radar separation required between the two ac was unlikely to be achieved, the FIN controller asked the pilot if he was still at 4000 ft, to which he replied that he had vacated 4000 ft for 2000 ft. In response the controller instructed the flight to: *"... report your level stay at that level."* The pilot reported staying at 3800 ft. A short time later, the controller updated the traffic information to the ATP: *"....traffic is now past you maintaining three thousand feet two miles abeam."* The pilot advised: *"...negative contact."* The radar recording indicates a minimum separation of 1·7 NM as the flights passed port to port. Following the loss of separation, the FIN controller was promptly relieved from position; the ATP was transferred back to the INT controller, who took over the vectoring of the flight and the remainder of its approach was uneventful.

In the meantime, the S76 was in communication with the trainee HELS controller. The FIN controller had co-ordinated and obtained the HELS controller's agreement to vector the ATP behind the S76 in order to descend it below 4000 ft. However, not envisaging that this would create any problem, the HELS trainee and mentor, who were "fairly busy" at the time, then turned their attention to traffic

elsewhere in the sector. They were alerted to the developing conflict a short time later by the FIN controller, who requested that the S76 be turned right onto an easterly heading. The S76 was instructed to turn right onto heading 090º, at 0905:10. At that time, the ATP had not left 4000 ft and, although the crew of the S76 responded to this instruction, the radar recording indicates that the turn was commenced too late to prevent a loss of lateral separation. The words "avoiding action" were not employed and no traffic information or explanation for the turn instruction was given to the crew of the S76. However, the ATP was always going to pass clear of the S76. Approximately 40 seconds later, the flight was instructed to resume its own navigation.

The radar replay supports the view that the FIN controller's plan would have been successful, with 3 NM lateral separation being achieved, provided the ATP had commenced its turn in a reasonably timely manner. The replay indicates that the turn was only commenced about 1 minute after the original instruction was issued. In a written report from the operator of the ATP, the Commander commented: *".... that the handling pilot was a little slow initiating the initial heading given by the Air Traffic Controller."* The report also states that the crew *"... had the other traffic on TCAS at all times."*

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC authorities.

Controller members of the Board were quick to point out that the FIN controller had dispensed with vertical separation between the ac before ensuring that horizontal separation would be maintained, and that this was a cause of the Airprox. Members also wondered why FIN had not amended the plan when it became apparent that it was not being complied with. All members agreed that the ATP pilots were unusually slow to comply with the controller's instructions and that this was also part of the cause. Fortuitously, however, it was their slowness to start descending which allowed FIN eventually to stop their descent while some vertical separation remained. The ac eventually passed by 8-900 ft and over 1·5 NM, and the Board assessed that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Aberdeen FIN controller dispensed with vertical separation between the ac before ensuring that horizontal separation would be maintained, and the ATP pilots were slow to comply with ATC instructions.

Degree of Risk: C

AIRPROX REPORT No 194/01

Date/Time: 7 Nov 1021

Position: 5122 N 0318 W (2 NM SE Cardiff - elev 220 ft)

Airspace: Cardiff CTA (*Class:* D)

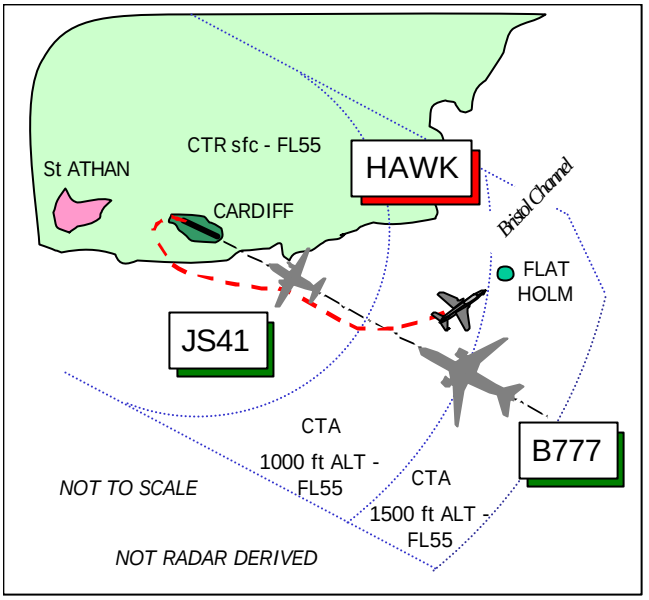
Reporter: Cardiff ATC

	First Aircraft	*Second Aircraft*
Type:	Jetstream 41	Hawk
Operator:	CAT	COMNA
Alt/FL:	600 ft ↓ (QNH 1012 mb)	500 ft (QNH 1012 mb)
Weather Visibility:	IMC NR NR	VMC below cloud 10 km

Separation reported by Cardiff:

½ NM H & 300 ft V

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CARDIFF APPROACH RADAR 2 CONTROLLER (APR2) reports that the Hawk was conducting an ILS approach to RW 30 at Cardiff for an overshoot and 'go-around'. On contact the ac was identified and fitted into the traffic pattern after co-ordinating its position in the sequence with APR1. He requested the pilot's intentions and issued the 'go-around' instructions, which, he thought, he specified as "to leave the CTR low-level to the SW". When the Hawk pilot reported he was established on the LLZ, he transferred the flight to the TOWER on VHF - 125·0 MHz.

Just as the Hawk pilot commenced his 'go-around' he saw the ac on his display turn L onto a SE'ly track, whilst two other ac were on the approach – a Jetstream followed by a B777. He contacted TOWER via the intercom to ensure that the jet remained clear of the RW30 approach, but the ADC advised that it had already been transferred back to APR 2 on UHF - 277·225 MHz. He tried to contact the Hawk pilot on UHF without response. Meanwhile, the Hawk appeared to be passing about 300 ft below and ½ NM to port of the Jetstream, which was at about 2 NM finals – 600 ft Mode C with TOWER. The Hawk then turned NE below 500 ft Mode C and passed 1 - 1½ NM down the starboard side of the B777, which was at 6 NM finals - 2000 ft Mode C - also with TOWER. A Yeovil APPROACH squawk - A0212 – then appeared, so he called on the direct line and they reported the Hawk pilot was working them.

THE CARDIFF AERODROME CONTROLLER (ADC) reports that during the 10 mile check, the APR2 advised him that the Hawk pilot wanted to make an early L turn and depart low level to the SW. He was asked to confirm that RAF St Athan had no traffic to affect the Hawk's departure, which they did not.

The Hawk pilot then called on the TOWER frequency followed by the Jetstream crew, who was instructed to continue their approach, No 2 to the Hawk. At about 3 miles finals, the Hawk pilot was cleared for his low approach and 'go around', and responded by repeating his request for an early L turn, which was approved. The visibility was poor (3000 m in showers) and as the Hawk pilot started to turn L at the upwind end of RW30 he transferred it back to APR2 on 277·225 MHz, which the pilot read back. He then cleared the Jetstream crew to land. About

20-30 seconds later, APR2 advised on intercom to 'watch' the L turn of the Hawk. Before checking the ATM, he replied that the pilot should have switched to the APR2 frequency already. When he looked at the ATM, he observed the Jetstream descending through 600 ft Mode C at about 1 – 1½ miles on finals, whereupon the Hawk was shown at 500 ft Mode C, approaching the final approach track of the Jetstream from the S. Almost immediately thereafter the Hawk made a sharp manoeuvre and passed behind the Jetstream.

Several attempts were made to contact the Hawk pilot, without success. The jet continued at low level, back along the approach to RW 30 towards the next ac in the landing pattern, a B777, which was also on the TOWER frequency and passing 6 miles finals at 2200 ft Mode C. Both the Jetstream and the B777 landed safely without further incident; neither crew reported sighting or being aware of the Hawk.

THE JETSTREAM 41 PILOT reports that he completed an ILS to RW 30 at Cardiff, behind a Hawk. On arrival at the stand ATC informed him that the Hawk had passed very adjacent to his ac, when they were about 2 NM finals. As they were IMC at 600 ft at the time, (he reported 1-2 oktas@600 ft) neither he nor the first Officer, saw, heard or felt any indication of another ac in close proximity to them. Consequently, he was unable to assess the risk. The ac was not fitted with TCAS.

THE HAWK PILOT provided a very comprehensive and frank report, stating that his ac has a black 'high conspicuity' colour scheme and HISLs were on. Yeovilton ATC handed him over to Cardiff RADAR and contact was established on a VHF frequency for an ILS to overshoot and depart. Cardiff vectored him to position behind traffic ahead in the ILS pattern and then turned him in to pick up the LLZ.

When Cardiff RADAR asked for his intentions after the 'go around', he responded "to go around, L turn to depart low level up the Bristol Channel to the NE". Cardiff RADAR acknowledged these intentions in apparent approval and handed him over to Cardiff TOWER on VHF, who subsequently cleared him to conduct a low approach and 'go-around'. At about 800 ft on finals he could see low cloud beyond the airfield and asked TOWER for an early L turn to depart low level, which was approved. Upon going around, he informed TOWER and added he was turning L to depart low-level; TOWER instructed him to contact RADAR on UHF - 277·225 MHz, which he thought he did, telling them he was departing low level up the Bristol Channel. He heard an acknowledgement, he thought from Cardiff RADAR, and believed he had been cleared to continue at 400 ft Cardiff QNH (1012 mb). He then heard a call from RADAR to remain below 500 ft, which was acknowledged. At about this stage he heard Cardiff TOWER calling on VHF, telling him to contact RADAR on a VHF frequency, so he switched to VHF and told TOWER he was already in contact with RADAR on UHF. He then spotted an ac - a Jetstream - above and to the L of his ac, obviously on an approach into Cardiff. Jinking R to avoid under flying the other ac directly, he continued outbound as cleared at 400 ft Cardiff QNH flying between the 2 small Islands in the Bristol Channel 9 NM E of Cardiff (Flat Holm). RADAR then contacted him on UHF and asked for his intentions, to which he responded that he was continuing up the Bristol Channel to enter low-level to the NE. Once clear of the islands, he called on UHF reporting switching 'on-route' and proceeded to fly low level as planned. Upon landing, he discovered that after going around, he had spoken to Yeovil APPROACH rather than Cardiff RADAR as a result of a switching error, which he had not realised at all whilst airborne.

MIL ATC OPS reports that at 1020:56, the Hawk pilot checked in on the Yeovil APPROACH (APP) UHF frequency of 369·875 MHz thinking it was Cardiff Radar: *"Cardiff RADAR, C/S with you."* Unsurprisingly, this call was extremely distorted and was almost unreadable owing to the Hawk's range (35 NM from Yeovilton) and low altitude. APP responded *"Station calling Yeovil RADAR, say again the callsign?"* The pilot answered stating *"C/S departing low level over the sea"* following which, APP allocated a Yeovilton SSR code to the pilot and advised him of the Portland RPS adding *"…what's your altitude, you're not showing on radar."* The pilot then advised that he was at 500 ft over the sea and so, thinking that the ac was returning to Yeovilton, APP passed the airfield recovery details to the pilot. In response, at 1021:39, the pilot transmitted that he was *"…*(indecipherable words) *descending low level up the Bristol Channel, then descend low level in Wales."* Shortly afterwards, in a brief landline conversation with Cardiff, it was reported that the

Hawk had flown near traffic inbound to Cardiff during its departure. APP however, reaffirmed that she did not know where the Hawk was as she could not see it on radar.

ATSI reports that the Cardiff APR2 described his workload as light at the time of the Airprox. The Cardiff Airport weather was reported as: Visibility 3000 m in rain showers; scattered cloud at 700 ft and broken cloud at 1000 ft.

The Hawk pilot's training approach, for the ILS 'go around' (overshoot and clear), had been prenoted to Cardiff by Yeovilton ATC, in accordance with local procedures. At 1007, Yeovilton telephoned Cardiff Approach to arrange a handover for the Hawk. The Approach Assistant answered and was informed that the ac was squawking A0211, 10 NM NW of Yeovilton. A Cardiff squawk of 3622 was issued, together with a VHF contact frequency of 125·85 MHz (the APR2 position). This squawk was paired, using the Cardiff code/callsign conversion with the Hawk pilot's callsign, who called the Cardiff APR2 at 1008 and whose VHF frequency was cross-coupled with UHF. The ac was identified and vectored for an ILS Approach to RW 30 and the Hawk's position in the traffic sequence co-ordinated with APR1. APR2 confirmed that his intention was to provide the flight with a RAS outside the CTR, (and what should have been a RCS inside CAS) but this was not agreed with the pilot. The APR2 also made the assumption that, in view of the inclement weather, the Hawk pilot would be operating IFR, at least until the 'go-around'. The Cardiff weather was not passed to the pilot on RTF, as required by MATS Pt 1, Page 3-6. The Hawk pilot was given further instructions to position it on the RW 30 ILS and was asked his intentions after the 'go-around'. He replied: *"Intention I'd like to er make a <u>left</u> turn to depart low level five hundred feet <u>up</u> the Bristol Channel if possible please"*. APR2 responded with a clearance for the Hawk pilot - *"cleared to leave the zone low level the QNH one zero one two".* which the Hawk pilot read back as *"cleared depart low level"*. APR2 thought, erroneously, that the pilot had requested to leave the CTR to the SW and, mistakenly believed he had issued a clearance in that direction. It was only after listening to a recording of the frequency that he subsequently realised his error that he could not readily explain, as he could not recollect being distracted at the time. He could only surmise that he had made an assumption about the Hawk pilot's intended routeing. At 1013, the APR2 informed the ADC, via intercom, of the Hawk pilot's intentions *"he's going to go low level to five hundred feet below...with a left turn"*. Again, no mention was made about the Hawk's routeing, other than that the ADC should check with St Athan - situated 3 NM W of Cardiff Airport - in case the Hawk routed through its overhead. St Athan ATC confirmed that there was no traffic to affect the flight. The Hawk pilot was transferred to the ADC frequency at 1014, once the pilot had reported *"Localiser established"* in accordance with standard practice at Cardiff.

After establishing contact with TOWER, the ADC informed the Hawk pilot that St Athan had no traffic to affect an early L turn so at 1017, once the preceding ac had vacated the RW, the Hawk pilot was cleared for a low approach and 'go-around'. Shortly afterwards, the Jetstream crew having been vectored to the ILS behind the Hawk by RADAR 1, made their initial call on TOWER, reporting at 6·5 NM. The flight was instructed to continue its approach, No2 to the Hawk at 2·5 NM final. At 1019, whilst on the 'go-around', the pilot of the Hawk requested an early L turn, remaining low level, which was approved. The ADC reported that the ac turned at the upwind end of the runway and was transferred back to radar on UHF. The Jetstream crew was then cleared to land. However, the Hawk pilot did not establish contact with APR2, and the controller said that he became aware that the Hawk was not departing to the SW when he saw it on his radar display about 1 NM from the airport, on a heading equivalent to a downwind for RW30. He immediately contacted the ADC, via intercom, warning *"...watch the track of the* [Hawk]*"*. Though the ADC advised that it had already been transferred both APR2 and the ADC attempted to contact the pilot. Although the former was unsuccessful, the latter did establish contact with the pilot who reported that he was already in contact with Cardiff Radar on UHF. However, it would appear that the Hawk pilot was inadvertently in contact with Yeovil APPROACH.

APR2 recalled that the Hawk had made a L turn to track NE and passed about ½ NM to the L and then behind the Jetstream, separated vertically by about 300 ft. Cardiff does not record radar data and the incident occurred below LATCC's recorded radar coverage. APR2 believed that the Hawk had altered course to pass behind the Jetstream, whose pilot subsequently reported that neither

crewmember had sighted the jet. The ADC reported, that he observed the Jetstream on the ATM descending through about 600 ft Mode C at about 1 – 1½ NM finals, when the Hawk was at 500 ft approaching the Jetstream from the S, whereupon it made a sharp manoeuvre and passed behind the Jetstream. There had been no time to warn the Jetstream crew about the Hawk.

APR2 did not ascertain which flight rules the Hawk pilot was operating under when he first called APR2 on VHF. The controller made the assumption that the Hawk pilot was operating IFR, though subsequently, once it had carried out its go-around, he assumed that it would depart the Class D CTR under VFR although no clearance to this effect was issued. The MATS Part 1, Page 1-5, states that:

"The pilot of an aircraft is responsible for determining whether or not the meteorological conditions permit flight in accordance with visual flight rules".

The criteria for determining VMC in Class D CAS, below FL 100, are: 1500 m horizontally and 1000 ft vertically from cloud with an in- flight visibility of 5 km. Additionally, Pages 2-2, 2-3, state that:

"ATC shall advise pilots of fixed wing aircraft intending to operate under VFR, inbound to or outbound from aerodromes in Class D airspace, if the reported meteorological visibility reduces to less than 5000m and/or the cloud ceiling is less than 1500 feet. ATC will then take the following action (i) Request the pilot to specify the type of clearance required. (ii) If necessary, obtain SVFR or IFR clearances from approach control."

Clearly, in the circumstances, the Hawk pilot should have been issued with a SVFR or IFR clearance and, consequently, should have been separated from other ac operating IFR in the Class D CTR. MATS Part 1, Page1-13 refers. Equally, it is a radar controller's responsibility to advise pilots:

"if a radar service commences, terminates or changes when: (a) they are operating outside controlled airspace or, (b) they cross the boundary of controlled airspace."

Again, no mention was made on RTF of the service being provided to the Hawk pilot.

Some discussion took place within Cardiff ATC as a result of this incident, as to whether it would have been prudent for the Hawk pilot to have been vectored to the ILS on the same frequency as the other inbounds. This may have alerted the pilot that there was traffic following his ac on approach and the need to avoid the approach path after the 'go-around'. For various reasons including the high workload resulting from additional co-ordination with military ATC, it was decided that it was preferential for the APR2 controller to work such flights. In any case the Jetstream crew contacted the ADC and was instructed to continue No 2 in traffic to the Hawk, whilst the latter was still on the same frequency.

As a result of this Airprox, a Unit Supplementary Instruction entitled "Instructions for military aircraft requesting low level departure" was published. This addressed the need for controllers to establish whether ac were operating VFR/IFR; to pass an appropriate clearance, including a specific track to leave the CTR which would keep it clear of built-up areas, the St Athan Local Flying Zone and the final approach track and to inform TOWER of that clearance.

COMNA comments that the Hawk pilot believed he was flying in conformity with an ATC clearance when he overshot from the ILS at Cardiff. He had passed his departure details, (a L turn to depart low level **up** the channel to the NE) to the Cardiff APR2, during his initial approach for the ILS and interpreted the clearance received as conforming to his request. Additionally, during the latter stage of the ILS at about 2 NM finals, concerned at the cloud base to the W, he requested the same departure clearance from Cardiff TOWER, but with an early L turn in order to remain VMC. Again he is convinced he received a clearance to do that. On commencing the overshoot and early L turn, the Hawk pilot was instructed to contact Cardiff RADAR - this time on a UHF frequency - not the VHF frequency he had been working initially. At this stage, with a relatively high cockpit workload, he inadvertently selected the 'pre-set' UHF selection and not the 'manual' selection on the radio selector – apparently a simple error to make in the Hawk. Consequently, he inadvertently called Yeovil APPROACH not Cardiff RADAR. Unfortunately, the controller did not pick up the transmission and asked the pilot to pass callsign again (initially hearing the word "Yeovil" from the Hawk pilot's

callsign) and did not pick up that the pilot was actually calling Cardiff. Similarly, the Hawk pilot did not notice that Yeovil APPROACH had answered him, and presumed he was talking to Cardiff. Irrespective of the frequency selection error, the Hawk pilot was following a departure profile he believed he had been cleared to fly. Although without any traffic information he was slightly surprised to see the Jetstream, he was operating in VMC and took appropriate action to remain clear and assessed that there was no risk of collision. He did not see the following ac – the B777 – apparently 1500 ft above his ac.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The HQ STC pilot member endorsed COMNA's view that the radio pre-set/manual selector switching error was a simple mistake for a student to make and not uncommon. When the Hawk pilot erroneously switched from TOWER to the Yeovil APPROACH frequency, this prevented APR2 from intervening when the Hawk turned outbound after the ILS approach and started to follow the clearance instructions that APR2 perceived would direct him to exit the CTR to the SW. This 'simple' switching error inadvertently set the scene and allowed the subsequent chain of events to go unchecked. However, though the switching error forestalled resolution of the problem, members agreed it was not intrinsic to the cause, which lay more with the departure clearance issued.

Some members thought the Hawk pilot's original request was less than precise, but this was no reason for ATC to respond with a vague clearance in return. Given that the Hawk pilot had said *"...a left turn to depart low level five hundred feet up the Bristol Channel..."*, civilian controller members thought that APR2's departure clearance to the Hawk pilot following his 'go-around' - *"cleared to leave the zone low level..."* - was entirely unsatisfactory and not specific enough. Evidently, APR2 expected the Hawk to clear the CTR to the SW – hence his comment to the ADC about checking with St Athan – but there was nothing in anything that the Hawk pilot had said to support this view unless he had confused the term *"..up the Bristol Channel.."* with a south-westerly heading – indeed even the cleared altitude was open to interpretation. Pilot and controller members alike were disappointed at the standard of RT phraseology used by both the Hawk pilot and APR2 in that their choice of words were very likely to be misunderstood – and they were. However, the main concern was that no measure of direction or altitude restriction was placed upon the Hawk pilot by APR2. This imprecise departure clearance effectively allowed the Hawk pilot to exit the CTR wherever he wanted and moreover, imposed no restriction on him to prevent him flying through or up the approach. Military pilot members thought that the Hawk pilot exhibited questionable airmanship when he flew back up the approach lane inside CAS without knowledge of any inbound traffic, but acknowledged that he had not been prevented from doing so. Others agreed. With regard to flight rules, if APR2 believed that the Hawk pilot was flying IFR, then separation should have been ensured against other IFR flights within Cardiff's CAS. If APR2 was going to treat the Hawk flight - after the 'go-around' - as operating under VFR, then traffic information should have been given on the IFR traffic. In the event neither was provided and separation against other inbound traffic was not afforded by the clearance. Members concluded, therefore, that this Airprox resulted, following a misunderstanding of the Hawk pilot's intentions by APR2, who did not issue a departure clearance that ensured separation from inbound traffic.

Turning to the risk inherent in this encounter, the absence of a radar recording prevented independent assessment of the minimum separation that pertained, and the Hawk pilot had neither quantified the separation nor assessed the risk. The distances reported by both the ADC and APR2 were slightly at variance - the former reporting 100 ft between Mode C indications and the latter 300 ft vertical separation and ½ NM minimum horizontal separation. Neither the Jetstream nor the B777 crew had seen the Hawk at all, which led one member to conclude that the safety of the ac had been compromised. Conversely, the Hawk pilot had only seen the Jetstream but had taken action he thought appropriate to remain clear, passing to port and crossing through the approach astern of the turbo-prop. It was reported that this was about

1500 ft below the B777 (that the Hawk pilot was unaware of) at 2200 ft Mode C, at around 6·5 NM from touchdown – and there was nothing to suggest the B777 would have been any lower on an ILS 3° glidepath at that range from touchdown. This led the Board to conclude that no risk of a collision had existed between any of the ac involved in the circumstances that pertained here, but this was not, in this instance, a unanimous decision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Following a misunderstanding of the Hawk pilot's intentions, APR2 did not issue a departure clearance that ensured separation from inbound traffic.

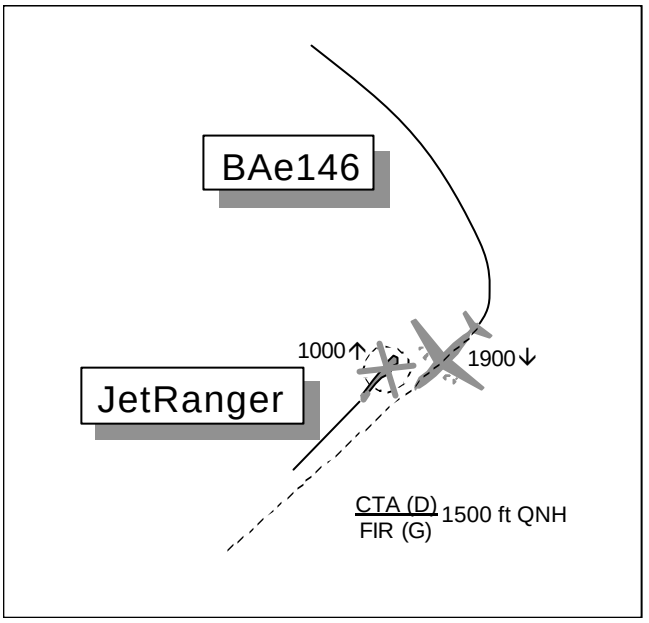
Degree of Risk: C.

AIRPROX REPORT No 195/01

Date/Time: 5 Nov 0740

Position: 5201 N 0027 E (11 NM NE of Stansted)

Airspace:	CTA/FIR	(*Class:* D/G)
	Reporting Aircraft	*Reported Aircraft*
Type:	BAe146	JetRanger
Operator:	CAT	Civ Pte
Alt/FL:	2000 ft ↓ (QNH)	↑ 1400 ft (QNH)
Weather Visibility:	VMC CLOC 10 km+	VMC CLNC 10 km+
Reported Separation:	300 ft V	NK
Recorded Separation:	1/3 NM, 900 ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BAE146 PILOT reports heading 230° at 180 kt on ILS approach to RW 23 at Stansted. Passing 2000 ft he received a TCAS TA on traffic 700 ft directly below but climbing; it cleared to the rear and separation reduced to 300 ft. ATC reported the traffic was a helicopter which was not on frequency and which may have been on the wrong QNH. He considered there had been a medium risk of collision.

THE JETRANGER PILOT reports heading NE at 60 kt after departure from his landing site 8·5 miles under the Stansted 23 ILS localiser. This has been the operational base for the helicopter for the past 2½ years; he is consequently well aware of the controlled airspace at 1500 ft above the landing site and the continuous flow of traffic into and on the ILS to Stansted.

On the day of the flight, departure information was received from the Stansted ATIS (127.17) which can be heard on the ground at the landing site and allows the Stansted QNH to be set prior to departure. The standard departure profile is to climb as quickly as possible (60 kt and 1500 ft/min) to 1400 ft on a northeasterly heading. This is a self enforced noise abatement procedure for the local residents.

In addition to the altimeter the ac has a Mode C readout on the transponder which is used as a cross-reference to ensure there has been no gross error in the altimeter or its sub-scale settings.

On the day in question the ac would have been flown in accordance with the profile as detailed above. He had no specific recollection of that

particular flight, having operated the ac on the 3rd, 4th and 5th of November. On one of these departures after lifting off and listening out on Essex Radar 120·62, he heard an ac announce a TCAS alert and guessed it would be him that triggered the TCAS (this has happened on a previous occasion). On the occasion in question he announced his position and altitude to Essex radar. He had no recollection of any Stansted traffic being any lower than normal on the ILS profile or the vertical separation between himself and inbound traffic being compromised.

LATCC TC reports that SMF (Separation Monitoring Function) did not activate and no Airprox report was made on RT, although the BAe 146 crew did enquire as to the proximity of the traffic and an explanation was given by the Stansted controller. No ATC reporting action was required or taken.

The BAe 146 was in the Class D CTA with a base of 1500 ft. While it was on base leg a helicopter got airborne from its private site, climbing below the stub and tracking away from final approach. The BAe 146 overflew the helicopter with 900 ft vertical separation. Subsequently as the BAe 146 continued its descent through 2100 ft the helicopter climbed momentarily to 1800 ft, although by now it was in the 6 o'clock of the BAe 146 at a range of 2 NM.

Subsequently the JetRanger pilot established contact with Essex radar, having been monitoring the frequency and hearing the query from the BAe 146.

UKAB Note: LATCC radar recordings show the BAe146 in a continuous descent and the JetRanger climbing towards the point where the airliner rolled out on the localiser. The radar shows the JetRanger passing about 1/3 NM N of the BAe 146, the former showing 1000 ft Mode C and the latter showing 1900 ft. The QNH was 1027 mb; 1000 ft Mode C equated to 1380 ft QNH, however the JetRanger is seen subsequently to climb to 1700 ft QNH before clearing to the E of the CTA stub.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC authorities.

The ac had passed with 900 ft of vertical separation and members agreed that there had been no risk of collision in the incident. While the helicopter had subsequently infringed the CTA by a small amount this was a separate issue; members suggested that its pilot should be encouraged to pay attention to this point in future. The Board considered that this was more of a TCAS generated event than an Airprox but considered that there were points that the helicopter pilot could address to make such nuisance alerts less likely. The helicopter pilot member suggested that the rate of climb quoted by the pilot was very high and was probably the factor that generated the BAe146's TA. It was suggested that the purpose of such a climb could be achieved by moderating the RoC at about 700 ft and leaving Mode C off until that point. Also, some members thought that, while perfectly legal, it was somewhat inconsiderate of the helicopter pilot to fly directly along the Stansted approach path. A slight deviation from his take off track at the start might well alleviate future problems.

It was also observed that the BAe146 was well below the descent profile and appeared unnecessarily close to the base of the CTA at that point. Members agreed that sometimes such vectoring might be necessary at busy times, but suggested that controllers should try to avoid doing so when possible.

The Board concluded that the incident was effectively a 'sighting report' with the sighting made on TCAS rather than visually. Since the introduction of TCAS this had been an occasional occurrence which members considered worth noting in the cause to facilitate tracking them. A lengthy discussion of a suitable phrase discounted the term 'nuisance alert' because of a reluctance to associate the word nuisance with something as useful as TCAS; 'Sighting Report (TCAS)' has been assumed as a substitute.

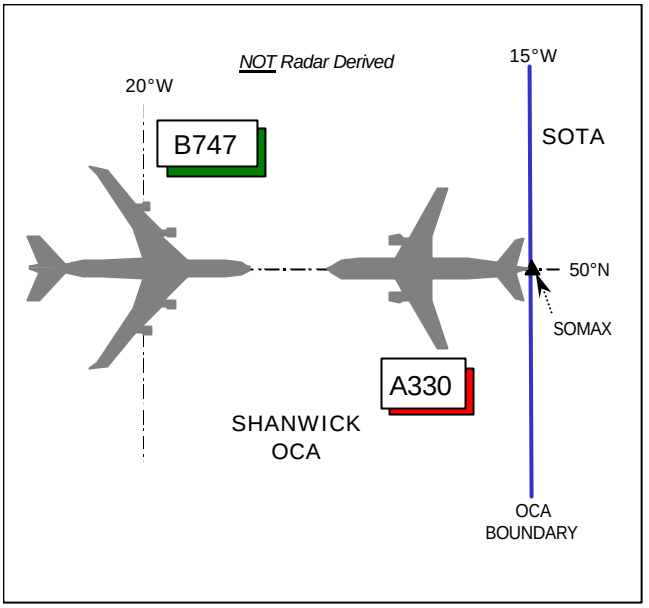
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Sighting Report (TCAS)

Degree of Risk: C

AIRPROX REPORT No 196/01

Date/Time:	10 Nov 1059 (Saturday)	
Position:	5000N 1630W (NAT TRACK 'E')	
Airspace:	OCA	(*Class:* A)
	Reporting Aircraft	*Reported Aircraft*
Type:	B747-400	A330-200
Operator:	CAT	CAT
Alt/FL:	FL 370	FL 370
Weather Visibility:	VMC NR NR	VMC NR >10 km
Reported Separation:	1200 ft V, nil H	1000 ft V, 2½ NMH
Recorded Separation:		Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B747-400 PILOT reports he was cruising at FL 370, eastbound on North Atlantic (NAT) Track ECHO at M 0·85 and in receipt of an ATC Service from SHANWICK Oceanic. Another ac was following the same track westbound at the same level. A TCAS TA was received and at a range of 20 NM the other ac descended to FL 350. At the closest point the other ac – an A330 – passed about 1200 ft directly below his ac at about 16°30' W. Later on, SHANWICK informed him that the other ac was 1 hour earlier than its estimate for the OCA entry point. He did not assess the risk.

THE A330-200 PILOT reports he was flying from Gatwick to Cancun and cruising at FL 370 on a heading of 272° at M 0·81. From a SELCAL, SHANWICK gave them a "PRIORITY" descent from FL 370 to FL 350, as avoiding action against another ac flying in the opposite direction. The other ac - which he saw and identified as a B747-400 - passed them at 17°28' W, within 2·5 NM and 1000 ft above his ac as they descended through FL 360. A TCAS TA was received in the descent and he mentioned that the 'controller's' tone (UKAB NOTE (1): it was actually an RT operator not a controller) gave a very good hint of the priority of the descent. He assessed the risk as "high", but added that he was unaware of the cause as they had been cleared "NAT E, FL 370 at M 0·81".

UKAB Note (2): This Airprox occurred outwith the coverage of NATS recorded radar.

ATSI reports that ATS for the Class A SHANWICK Oceanic Control Area (OCA) is provided by ScOACC at Prestwick, supported by the communications station at Ballygirreen near Shannon, Ireland. Before entering the OCA westbound at SOMAX – 50°N 15°W – as the A330 here – ac are within the Shannon Oceanic Transition Area (SOTA) from west of 8°W and are under the control of SHANNON ACC. The Clearance Delivery Operator (CDO) – an Air Traffic Services Assistant - and the PLANNER controllers (1 & 2) described their respective workloads as light. The ENROUTE Controller stated that he was moderately busy and was operating with a trainee, who was in the final stages of training.

In accordance with the Oceanic procedures promulgated within the UK AIP at ENR 2-2-4, westbound ac departing from UK airports should request OCA entry clearance from SHANWICK on VHF RT, "as soon as possible after departure". Accordingly, the A330 crew contacted SHANWICK at 0946:40, requesting a clearance from the CDO *"...estimating Oceanic entry point at SOMAX at er one one one four five* (sic) *requesting Flight Level three seven zero maximum of three seven zero track Echo mach decimal eight one"*, thereby

passing an erroneous SOMAX estimate of ***1145***. The LATCC radar recording shows that the A330 was passing NW of GIBSO on ROMEO 8 at the time and, consequently, the correct SOMAX estimate should have been ***1045***. The UK AIP warns pilots that, as clearances issued by SHANWICK are based on the crew's estimate for the OCA Boundary, it is essential that this estimate is correct. The Oceanic MATS Part 2, Page DUT 10-1, lists the duties of a CDO, one of which includes *"confirm any estimate which is more than one hour from the time of request".* The CDO said that she routinely checks OCA entry estimates and could not explain why she had not noticed the A330 pilot's error on this occasion. She mentioned that the A330 was the only ac requesting a clearance at the time and reasoned that, had other flights been passing estimates, she might have realised the discrepancy by a relative comparison of these times.

The CDO, in accordance with local procedures, input a Request Clearance Message (RCL) into the Flight Data Processing System (FDPS). The A330's details, as passed by the crew, including his inaccurate SOMAX estimate, were input and sent to the Oceanic Planner Controller. PLANNER 1 said that he called up this information shortly after receiving the message in his computer queuing system. Although the MATS Part 2 does not require the PLANNER to check an ac's boundary estimate for accuracy, it is his practice to make a credibility check. However, on this occasion he did not notice the A330 crew's error. His only possible explanation was that he concentrated more on the ac's level than its OCA boundary estimate. He explained that, although Oceanic flights were predominately westbound at that time of day, FL 370 could still be one of the levels used by GANDER for eastbound flights up to the changeover period. Consequently, he wanted to make sure that the westbound A330 would cross 30°W following NAT E after the eastbound flow had ceased. Having decided that it was unlikely that there would be opposite direction traffic at FL 370 he predicted the flight i.e. requested the system to 'conflict probe' the clearance determined by the controller, based on the crew's erroneous SOMAX estimate of 1145. Finding no conflictions, he cleared the A330 on its requested routeing. The CDO passed this clearance to the crew at 0950:20 – over one hour before the Airprox occurred - *"...SHANWICK clears you to Cancun on track Echo from SOMAX maintain Flight Level three seven zero mach decimal eight one over".* The A330 crew immediately read back the clearance issued *"okay clear to Cancun via track Echo from SOMAX er to maintain Flight Level three seven zero at Mach decimal eight one..."*. It is not a requirement to mention an ac's estimate for the OCA boundary in an Oceanic clearance message. A procedure was introduced some years ago whereby the estimate was included in the clearance transmission. Although it was promulgated appropriately, it was found that this led to some confusion with aircrew who asked if the time was a 'restriction'; this had increased RT workload. Consequently, the procedure was rescinded.

No further messages were received concerning the A330 until 1046:50, when SHANNON telephoned ScOACC to pass a revised time for the A330 of 1148, at SOMAX. (Any time revision of 3 min or more has to be notified to SHANWICK.) This revision was input into the system at the Flight Plan Reception position. By this time, PLANNER 1 was on a break so PLANNER 2 called down the information onto his display at 1048:29. He said he had no reason to believe that this estimate - one hour ahead - was incorrect. Although an ac would be in SHANNON's airspace for less than this time period, he reasoned that this unit could be relaying a revised time passed on by LATCC. No conflictions were predicted.

A position report message was received from Ballygirreen at 1049:17, stating that the A330 was at SOMAX at 1047. PLANNER 2 explained that a position report message is only classed as low priority but, because he was not busy, he displayed it straight away. He added that there was nothing to indicate the importance of the message. On operating the 'NEXT' key at 1050:44, technically, because the A330 was now in the OCA, control passed to the ENROUTE controller. However, a message was received immediately afterwards, revealing a conflict with the B747 at **1059**, which had reported passing 50°N 20°W eastbound at 1046, at FL 370 and estimating SOMAX (15°W) at 1109. PLANNER 1 then returned to take over the position again. Realising the situation, he first checked the latitude & longitude of SOMAX, and then went to the ENROUTE position to warn the controller of the confliction. OCA entry points had recently been given five-letter designators instead of being referred to by their co-ordinates, consequently, he was not immediately familiar with its position.

The ENROUTE Controller confirmed that he received an urgent warning about the situation from PLANNER 1 and a conflict message had appeared on his display at 1050:45. Realising that he had about 8 min until the ac crossed, he immediately probed his computer for a safe level to which he could descend the A330. Through experience and training, he was aware that it was quicker to resolve the situation by issuing a descent clearance, rather than a climb. Meanwhile, other members of the ATC team telephoned SHANNON, to check the credibility of the ac's position report and Ballygirreen radio stn, to warn them that a priority descent message may need to be issued shortly. The computer revealed no conflicting traffic at FL 350, although a potential confliction did exist at FL 360, but as this was only by 1 min it was considered acceptable to issue a descent instruction through that level. Consequently, a PRIORITY message was passed to DISPATCH at 1054, for onward transmission to the A330 crew by Ballygirreen. The content of this message was *"priority due traffic descend now flight level three five zero report leaving report reaching"*. The message was read back correctly and sent to Ballygirreen via the direct teleprinter circuit. It was transmitted on HF to the A330 crew at 1057:29. The pilot reported leaving FL 370 at **1057:39** and 13 sec later sighting the B747. Both messages were relayed back to the ENROUTE Controller. The pilot of the A330 reported reaching FL 350 at 1058:50. Meanwhile, a PRIORITY message was passed to Ballygirreen, at 1056, for the B747 crew to climb to FL380. However, this was only transmitted to the flight at 1101:50 i.e. after the subject ac had passed.

With a closing speed of about 16 NM/min, the A330 commenced its descent when they were about 20 NM (1·25 min) apart (which concurs with the B747 pilot's report). Vertical separation of 1000 ft was established at about 10 NM. In these circumstances Oceanic separation requires vertical separation to be achieved at least 15 min before the ac are due to cross.

Discussion took place as to whether any more effective action could have been taken when it was realised that a conflict existed, between the subject ac, as a result of the A330 crew's SOMAX position report. It was pointed out that trying to telephone Ballygirreen, with the priority re-clearance, would not have been beneficial as the call would have to be re-directed to the appropriate radio operator. The Oceanic MATS Part 2, Page COM 2-1, reinforces this point: *'It is much more expeditious to relay messages via traffic dispatch when communicating instructions/messages for aircraft in emergency, as a direct telephone call has to be re-directed to the appropriate operator.'* The use of the PRIORITY message was appropriate to the MATS Part 2 procedures: *'If a message is of such urgency that information on its delivery status is required within a lesser period of time than normal, Shanwick is to insert the word "PRIORITY" at the beginning of the text of the message'.* Although no criticism of Ballygirreen was implied, speculation arose as to whether the use of an EMERGENCY message might be more appropriate in alerting the radio stn to the expeditious passing of an instruction, which will be explored by the units concerned. The ENROUTE controller agreed that, with hindsight, it might have been advantageous to prefix the descent instruction with the term 'avoiding action'. Nevertheless, it was considered that including traffic information in the same message would have delayed, unnecessarily, the transmission of the descent instruction to the A330, because of the extra time taken to pass and obtain a readback of the additional wording. A delay of even a few seconds, with ac closing at 16 NM/min, could have been significant.

As a result of this occurrence an Operational Notice (POON 26/01) was issued to remind staff to remain vigilant and check that the boundary estimate, in any clearance request, is credible. Additionally, a Supplementary Instruction (SI 02/02) was published stating that: *"PLANNERS and CDOs are to confirm any estimate for the Oceanic Entry Point that is 90 minutes or more ahead of the time of request. Time revisions from Shanwick are to be passed using hours and minutes and time revisions from adjacent Units are to have the hour requested, if not given".* A software change request has also been raised to introduce a credibility check of the requested time versus the current time. There are no immediate plans to introduce a system, which would allow ScOACC controllers to communicate verbally with pilots and/or to provide them with an operational visual display of an ac's actual position in the OCA.

When the incorrect estimate for SOMAX was passed by the crew of the A330, it is surprising that this was not noticed before the ac reached SOMAX, especially taking into account the number of people

involved i.e. ATC personnel at Prestwick and Shannon and the crew of the flight involved. Both the CDO and PLANNER 1 agreed that they should have checked the credibility of the estimate given, particularly as the flight had departed from Gatwick and was estimating the OCA boundary some 2 hours later, i.e. twice the normal time for that section of the flight. Furthermore, Shannon ATC also had a responsibility to verify the estimate, especially as a time revision was passed, still using the wrong hour, as the A330 approached the OCA entry point at SOMAX.

It was fortuitous that, due to light workload, PLANNER 2 quickly selected the A330 crew's 'low priority' position report at SOMAX. Had he not done so, it is possible that the confliction could have remained undetected until either after the ac had passed, or, it was too late to take any action to resolve the situation. The only safety net left to prevent the ac coming into close proximity was TCAS and both pilots reported receiving TAs. The action taken by ScOACC should help to reduce the likelihood of this type of incident happening in future but it does not eliminate completely the possibility of recurrence because of the human interface involved. It is surprising that a more technologically advanced system, for controlling ac in the OCA is not available.

UKAB Note (3): As a result of this Airprox, the A330 crew's company issued a Flight Crew Notice regarding reporting procedures. It emphasised the importance of good flightdeck crew discipline when requesting Oceanic entry clearances and monitoring position reports. It reinforced the company SOP that:

Both pilots must monitor the position report and agree any estimate given for OCA boundaries.

To record the hour as well as the mins when completing the elapsed time and estimates.
Full use must be made of ac equipment to ensure accuracy of reporting, together with an accurate timecheck before departure for non-GPS equipped ac.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of available VHF RT frequencies, reports from the ScOACC air traffic control staff involved and a report from the UK ATC authority. The Board was briefed that the Irish Air Accident Investigation Unit was conducting an enquiry into this occurrence, but unfortunately, no information was available to the UKAB from Shannon ACC, who had been providing an ATC Service to the A330 crew within the SOTA, just before the airliner entered the SHANWICK OCA.

The crux of this Airprox was the inaccurate estimate, which was one hour out, passed to the CDO on VHF by the A330 crew. A civil airline pilot member familiar with this operation explained why such mistakes were easy to make because of archaic procedures, and reliance on outdated and outmoded technology. There is a particular problem in ac crewed with only two pilots as in this case. They knew that they had to ask for their Oceanic clearance as soon as possible after take-off or risk missing their place in the 'entry queue'. This meant one of them had to talk to the ScOACC CDO at a time when other tasks ought to take priority in the busy period during climb-out. While the PF worked domestic ATC on VHF, the PNF contacted the CDO on another VHF box to pass the request for OCA entry clearance. These 'split' priorities meant that it was very difficult to cross-monitor compliance with ATC instructions, which was required by their SOPs. Additionally both pilots were required to determine and agree the OCA entry estimate and monitor its request; similarly, both must listen to and agree the subsequent clearance issued. Missing from the clearance however, is any mention of the cleared entry time, so there is no way of spotting any mistake that may have been made on timing. Members agreed that this system did not appear to be practicable on a 2-crew flightdeck, and brought into question several related safety questions – such as "level – busts".

In the procedural non-radar environment of the OCA, timing is critical; a civilian controller expert explained that traffic density made strict adherence to entry timings essential to achieve the required separation. If timing was essential to achieve longitudinal separation between ac following the same NAT and FL, members were amazed that it was always omitted from the OCA entry clearance. They reasoned that a readback of the clearance time would provide an opportunity to detect errors at an early stage. The Board noted that time had been included in clearance transmissions previously,

but had been removed later because it promoted questions from pilots. Controller members understood the argument – questions increased the workload for the CDO ATSA - but there was an overwhelming consensus amongst the Board that this issue should be re-examined. Whilst recognising that a clearance could be obtained via the data-linked Aircraft Communication and Addressing System (ACARS) onboard those ac so equipped, this did not remove entirely the possibility of the same error being input. What made the mistake more difficult to notice was the 'whole' hour aspect; this had been accepted, unchallenged by the CDO, then relayed to PLANNER 1 who in turn unwittingly issued the OCA entry clearance - an hour adrift. Events for the Airprox then firmly were set in train with no systemic safety nets left.

A controller member said that undetected errors such as these, involving timing estimates for Oceanic entry points, whilst not uncommon were fairly infrequent (he thought in the order of 2-3 a year). He added that others went unreported because the inaccurate estimate was picked up and corrected. In UK domestic airspace, in a radar environment, ScOACC SCs routinely check OCA entry fps estimates with the domestic fps estimates and ensure that the timings agree, which is sound practice and works well. He opined that once an error enters the system unnoticed, it becomes difficult to detect and resolve. The ATSI advisor explained that there were two 1 hour error occurrences reported during February 2002, but both went undetected until the ac reached the OCA boundary, whence corrective action was taken. Members wondered why the incorrect revised SOMAX time of "1148" went unnoticed at Shannon ACC, especially in the radar environment of the SOTA. Furthermore, SHANNON should have been comparing this time with the eastbound B747's estimate for SOMAX, but without any report from the Irish ATS authority further debate would have been speculative. Members concluded that by passing an inaccurate OCA entry time (by 1 hour) for SOMAX, which went undetected by the CDO and apparently, also by Shannon ATC, the A330 crew had caused the incident to unfold. Though the responsibilities of PLANNER 1 did not then include a gross error check of estimates, the Board was not reassured by the revisions to procedures at Prestwick. This occurrence was almost a 'carbon copy' of Airprox (C) 54/97 and members were briefed on the virtually identical scenario that had occurred in 1997. Though the Board welcomed the introduction of a software update that would include a timing credibility check, members agreed the potential for a recurrence remained – as highlighted by ATSI. Hence, the Board was moved to recommend a review of ATC and aircrew procedures and arrangements to eradicate errors in OCA entry estimates. A further recommendation was made to include a check of the entry clearance time, as part of the OCA entry clearance message, to forestall errors.

It was fortuitous that this Airprox occurred during a lull in traffic and that PLANNER 2 had interrogated his data display and looked at the A330 crew's position report when he did. This was the first occasion that the correct time was used in a message to Prestwick and the following computer message immediately revealed the true situation and conflict with the B747. Once spotted, action to resolve the conflict was taken immediately by the ENROUTE controller, but the Board recognised that this was a protracted business in the arcane Shanwick methodology. Noting that the predicted conflict (at 1059) was first displayed to ENROUTE at 1050:45, and the Ballygirreen RT operator transmitted the avoiding action descent instruction to the A330 crew at 1057:29, it took almost 7 min to initiate the resolving descent manoeuvre. The A330 pilot reported reaching the assigned level of FL 350 at 1058:50, 10 sec before the predicted conflict. Meanwhile, both pilots had spotted each other's ac in time, which had removed the risk of an actual collision. Nevertheless, longitudinal separation was grossly eroded and it was very fortunate that PLANNER 2 picked up the conflict when he did; a controller member explained that the conflict message was not displayed like an STCA with audible and flashing warnings – just an plain text entry in a data line. Though TCAS remained as a 'back-stop' – with both pilots receiving TAs, under the rules for Oceanic separation this was a very close encounter and though not a unanimous decision, a majority of members considered that safety had been compromised.

The ATSI advisor added that 'avoiding action' had now been introduced to Oceanic controller training as a result of this Airprox, a term not in regular use in the OCA before. Nevertheless, members were very concerned that this system using SELCAL, RT operators, and teleprinters between ATC and RT stations was still in daily use and endorsed ATSI's

view that a more technologically advanced system for the provision of ATC services to oceanic flights should be made available. Pilot members cited passengers using satellite phones in the cabin, whereas aircrew were still not able to speak directly and instantly to controllers from the flightdeck using this archaic set-up. Thus, the Board resolved finally, to recommend that a review should take place of procedures and equipment used to transmit emergency messages immediately to ac in oceanic airspace.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The A330 crew passed an inaccurate OCA entry time, by 1 hour, for SOMAX, which went undetected by the CDO and Shannon ATC.

Degree of Risk: B.

Recommendation: That the CAA considers:

(1) A review of ATC and aircrew procedures and arrangements to eradicate errors in OCA entry estimates.

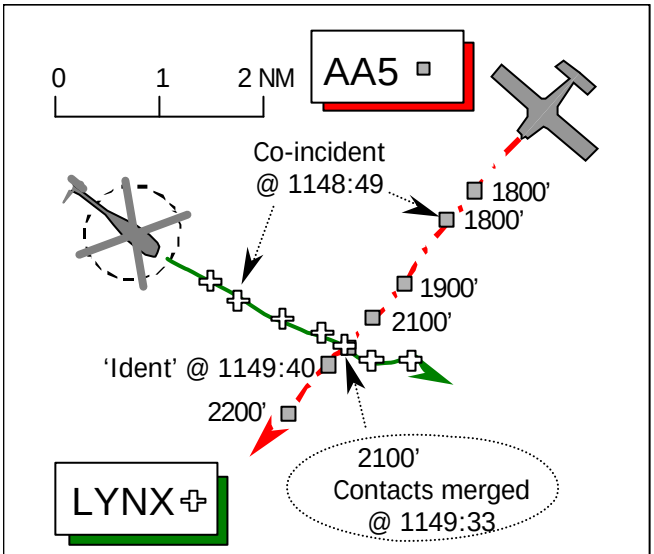
(2) Including a check of the entry clearance time as part of the OCA entry clearance message.

(3) A review of procedures and equipment used to transmit emergency messages immediately to aircraft in oceanic airspace.

AIRPROX REPORT No 198/01

	Reporting Aircraft	Reported Aircraft
Date/Time:	13 Nov 1149z	
Position:	N5110 N 0123 W (Barton Stacey)	
Airspace:	MATZ (*Class:* G)	
Type:	Lynx	AA5
Operator:	DAAvn	Civ Trg
Alt/FL:	2500 ft (RPS 1019 mb)	2300 ft (RPS 1019 mb)
Weather Visibility:	Nil Sig 25 km	VMC CLBC >10 km
Reported Separation:	Not Reported	300 ft V

Recorded Separation: Contacts merged



Radar Derived. AA5 levels Mode C (1013 mb)

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LYNX PILOT, a QHI, reports his helicopter is camouflaged grey/green, but both upper and lower HISLs were on whilst instructing a training sortie in the vicinity of Barton Stacey – just within the Middle Wallop MATZ stub - carrying out rapid descent exercises. Operating on a quiet training frequency, they were not under an ATS but were squawking A2672 – he thought; no Mode C is fitted.

On completion of the first exercise a level turn into wind and down sun was carried out at 2500 ft RPS and the 'HASEL' checks updated. The helicopter was decelerated to 80 kt and descent initiated in a speed stable attitude, 10° nose-down – he thought heading 360°. As the ac was starting to push to dive, a light fixed wing ac, white in colour with a blue stripe, was spotted he thought at 2 o'clock –

about 200 m away and slightly below his helicopter in a banked L turn away. He took control of the helicopter from his student to avoid the other ac and turned L at about 20° Aob and levelled his ac.

He assessed there had been a *"low"* risk of collision at first sighting the other ac, as the other pilot already appeared to be taking avoiding action. An Airprox was subsequently reported to Middle Wallop APPROACH (APP).

UKAB Note (1): The UK SSR Code Assignment Plan within the UK AIP at ENR 1-6-2-4, specifies that A2672 is allocated to Middle Wallop. However, the Lynx appears to have been erroneously squawking A2652, which is allocated for use by Boscombe Down, though the crew was not in communication with that ATSU at the time of the Airprox.

THE AA5 PILOT, a flying instructor, reports his student was flying the ac on his first NAVEX. The ac has a white livery with a blue stripe and a squawk of A2660 was selected with Mode C, whilst under a FIS from Boscombe Down ZONE on 126·7 MHz. A MATZ crossing of Middle Wallop had been approved at 2300 ft RPS (1019 mb) and they were heading 224° at 93 kt. The first helicopter he spotted within the Middle Wallop MATZ (not the subject Lynx) was 2 NM S of Stockbridge at 11 o'clock – 2 NM away below, which passed 300 ft below his ac as it flew into their 4 o'clock, but no avoiding action was required. He added that his student's height keeping was generally +/- 100 ft, which may have confused the pilot of the helicopter.

UKAB Note (2): A subsequent telephone conversation with the AA5 pilot revealed that he had not seen the subject Lynx at Barton Stacey before it overflew his ac. This Airprox occurred just as the Boscombe Down SSR code was set and 'ident' selected. The Student was operating the RT and setting the SSR transponder for the first time, whilst ensuring that the student carried out these actions correctly he probably did not detect the Lynx.

UKAB Note (3): It is not possible to resolve the geometry of the encounter reported by the Lynx pilot with that shown on the radar recording. At the Airprox location reported by the Lynx pilot the encounter is shown with the subject AA5 but closing on a steady bearing from about 10 o'clock – not 2 o'clock as reported. The AA5 pilot originally reported an entirely different encounter, 2 NM S of Stockbridge a few minutes later.

MIL ATC OPS reports that the AA5 pilot freecalled Boscombe ZONE on 126·7 MHz just to the NE of the non-standard Middle Wallop MATZ stub (3 NM) requesting a FIS and MATZ crossing. ZONE placed the pilot under a FIS, instructed him to squawk A2660 and requested the AA5's transit altitude - 2300 ft Portland RPS (1019 mb). Despite waiting a short while, ZONE could not see the AA5's squawk and so, at 1149:30, he asked the pilot to squawk 'ident'. The squawk appeared as he said this and at 1149:35, ZONE transmitted *"...there's traffic in your area at similar altitude, keep a good lookout."* At 1149:55, ZONE contacted Middle Wallop APP on the landline, to negotiate the MATZ crossing. Which APP approved at 2300 ft on the Portland RPS (the MATZ was fairly quiet, so ZONE left the ac on the RPS) At 1150:20, ZONE told the AA5 pilot *"C/S, your transit of the Middle Wallop MATZ is approved, maintain your present track at 2,300 feet on the Portland pressure one zero one nine.."*. Shortly afterwards, ZONE warned the pilot to keep a look out for what he believed was fixed wing traffic manoeuvring beneath the AA5 within the Middle Wallop circuit.

During the MATZ crossing, ZONE had a brief discussion with both APP (on the landline) and the AA5 pilot (on RT) about the AA5 pilot's height keeping, as APP felt that the ac's Mode C had been *"...edging down a bit occasionally."* At 1154:35, the AA5 pilot left the frequency and freecalled Bournemouth APPROACH. Boscombe Down ATC was not aware of this Airprox report until contacted by HQ STC Staff some days later.

The LATCC radar recording shows the AA5 at 1148:18, tracking 210º and squawking A7000 at 1800 ft Mode C (1013 mb); the Lynx is shown squawking A2652 without Mode C (not A2672 as reported) in the AA5's 1 o'clock - 3·5 NM, tracking about 120º. Both ac appear to have a similar groundspeed. The AA5's squawk changes to A2660 at 1148:49, with the Lynx now at 12:30 - 2·25 NM, having turned a further 20º R. Thereafter, the AA5 commences a gentle climb. The tracks merge ½ NM W of Barton Stacey at 1149:33, with the AA5 tracking 220º at 2100 ft Mode C – about 2280 ft Portland RPS - and the Lynx tracking 120º. In the following sweep, whilst the contacts are still

merged, the AA5 squawks ident and the Lynx turns about 20° L before resuming the original track.

This Airprox occurred during the identification process and thus, ZONE had no opportunity to offer any useful form of warning to the AA5 pilot. As an observation, when the AA5 student freecalled, he did not provide any indication of his present position, merely stating *"...outbound Blackbushe, inbound Bournemouth via Whitchurch, request FIS and MATZ crossing."* In general, when an ac freecalls a military ATSU, the three items of information that the controller is most interested in so as to quickly update his/her mental picture are, the ac's *position*, its *heading* and its *level.*

LYNX PILOT'S UNIT comments that this honest and open report by a conscientious flying instructor, highlights the need for good lookout before and during ac manoeuvres in a congested flying area.

Considering the AA5 was not seen until after its pilot had apparently begun evasive action, it would seem that a risk of collision was likely and further highlights the poor visibility forward and below from Lynx helicopters.

Action has been taken to emphasise to unit aircrew the increasing density of light ac traffic within the area bounded by LFA 1; the need for enhanced lookout during 'unusual' ac manoeuvres; awareness of the problems associated with reduced lookout during instructional flight.

HQ DAAvn comments that this manoeuvre is taught to aircrew so that they can descend through the small arms threat band (2000 – 200 ft agl) as quickly as possible. This involves a very high rate of descent in a "wings" level attitude, which combined with the poor downwind visibility in a Lynx, makes the need for an "enhanced" lookout prior to initiating the manoeuvre even more important than usual. During operations the threat of being under-flown is almost non-existent.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the appropriate ATC and operating authorities.

It was difficult to reconcile the Lynx QHI's commendably frank and honest report with the occurrence shown on radar, but the HQ DAAvn pilot member explained why this might be. The exercise being taught was a demanding one that involved a repeated series of climbs, turns and sharp descents and it was entirely feasible for the geometry of the encounter to become confused in the reporter's mind - especially when it occurred fairly early in the sortie as here. There was no doubt as to the identity of the two ac however, or the location and the incorrect transponder setting could easily be explained in colloquial terms as 'finger trouble'. The radar recording illustrated the encounter quite clearly; the AA5 had approached the Lynx from 10 o'clock – not 2 o'clock as reported – and had remained unseen by either the student or QHI until 200 m away. The reported avoiding action L turn is also shown, but moments after the contacts merged. No discernable alteration of the AA5's track is shown at all and the instructor pilot's report reveals that he did not see the subject Lynx at the Airprox location.

Some members questioned the Lynx crew's decision to listen out with Middle Wallop ATC - they though an ATS might have been more useful - but they did acknowledge the need to fly the exercise in question with minimum interruption on the RT. The HQ DAAvn member pointed out that ATC had access to the training frequency in use and could have broadcast any warnings on, for example, MATZ crossings. That said no such warning was apparently given here. Notwithstanding views on incompatibility issues raised when an ATS is mixed with certain training exercises, some members thought that a RIS would have been useful if the pilots' view from the Lynx cockpit is as poor as suggested here. Additionally, as an aside on MATZ crossings, it was noted that the AA5 pilot had left his initial call to Boscombe Down somewhat late. This did not give ZONE much time to co-ordinate with Middle Wallop; the recommended period is 15 NM or 5 min flying time before reaching a MATZ Boundary.

Although all of the foregoing points were apposite, analysis showed that this incident could be narrowed down to a late spot by the QHI, who had then effected avoiding action, albeit late. In

contrast, the other pilots saw nothing. The Board concluded, therefore, that this Airprox resulted from a non-sighting by the AA5 pilots and a late sighting by the Lynx pilots.

Turning to the inherent risk, the Lynx QHI reported that *"the other pilot already appeared to be taking avoiding action"*, but this was not the case and put into question the Lynx pilot's assessment of a *"low"* risk. Nevertheless, the latter had seen the AA5 in sufficient time to take control of the helicopter and fly his avoidance manoeuvre – though horizontal separation was minimal at the time as the radar recording revealed that the contacts merged. It was not possible to verify the vertical separation that pertained precisely, as the Lynx was not fitted with Mode C, but it was probably in the order of a few hundred feet. This persuaded members that the safety of the subject ac had been compromised.

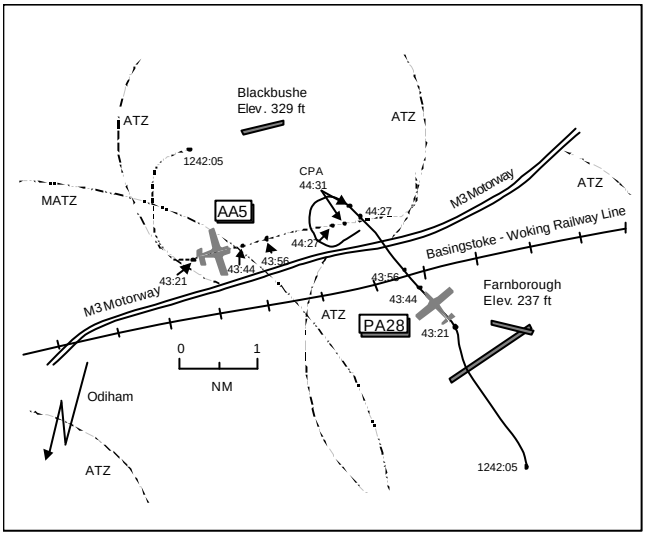
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the AA5 pilots and a late sighting by the Lynx pilots.

Degree of Risk: B.

AIRPROX REPORT No 200/01

Date/Time:	11 Nov 1244 (Sunday)	
Position:	5118 N 0049 W (1·5 NM SE Blackbushe - elev. 329 ft)	
Airspace:	ATZ	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	AA5	PA28
Operator:	Civ Trg	Civ Pte
Alt/FL:	800 ft (QFE NK mb)	800 ft (QFE NK mb)
Weather Visibility:	VMC CBLC >10 km	VMC CAVOK >10 km
Reported Separation:	100 ft V 50 m H	100 ft V 800 m H
Recorded Separation:	NK V 0·22 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE AA5 PILOT reports flying a dual cct training sortie (Ex. 12 & 13) at Blackbushe for a student, with limited cct experience, who was having problems. The visibility was >10 km 1600 ft below cloud in VMC, the ac was coloured white/blue and the strobe lights were switched on. He was receiving a FIS from Blackbushe Information on frequency 122·3 MHz and his transponder was switched off. Whilst D/W at 800 ft QFE heading 080° and 95 kt, having just supervised the conduct of the student's pre-landing checks, the instructor spotted a converging ac (the subject PA28) in his 2 o'clock range 400 m about 100 ft below. As he took control of the ac the PA28 passed underneath, quickly clearing away to his L and behind; it was seen then to carry out a steep LH turn. He had not heard a radio call from the PA28 pilot requesting to rejoin or any further calls giving his position. He completed his cct for a touch and go and reported the incident on the subsequent climb-out; after his final landing the AFISO also expressed concern to him about the incident. He had been under a high workload at the time of the incident and he thought the safety of his ac had been compromised.

THE PA28 PILOT reports returning to Blackbushe on a solo local sortie and in receipt of a FIS from Blackbushe Information on frequency 122·3 MHz. The visibility was >10 km in CAVOK conditions, the ac was coloured red/white/blue, strobe lights were switched on and his transponder was u/s. Whilst approaching Blackbushe, with the intention of joining D/W, at 800 ft QFE heading 360° and 100 kt, he was transferred from Farnborough ATC to the Blackbushe frequency and was told by the FISO of one other ac in the cct; he did not remember the other ac making a D/W call. He then noticed a single engined low wing ac, coloured blue/white, in his 0930 position range 800 m about 100 ft above flying straight and level; it was seen to pass about 800 m behind. As a matter of courtesy he decided to position behind the traffic in the cct. At no time did he consider either ac to be in danger and he thought that there had been no risk of collision.

THE BLACKBUSHE FISO comments that the encounter was observed from the VCR with the PA28 passing close to and underneath (estimated <100 ft below) the AA5 in the D/W leg.

ATSI comments that a RT cassette of Farnborough/ Blackbushe frequencies reveals the following:

The PA28 contacted Farnborough at 1221 after departure from Blackbushe, reporting passing 1000 ft for 1500 ft, routeing to the Dogmersfield area then returning a short time later to Blackbushe. At the pilot's request he was provided with a FIS. A squawk was issued but, presumably due to ac unserviceability, it did not appear on the radar display. At 1241, when N of Farnham, the pilot requested routeing back to Blackbushe. He was cleared to route E of the Farnborough RW 24 threshold because of departing traffic. Subsequently, having reported sighting the departure, the PA28 was cleared direct to Blackbushe and was transferred at 1243:45. Recorded radar at 1243:44 shows the PA28 1·2 NM NW of Farnborough with Blackbushe cct traffic, believed to be the AA5, 2·4 NM to the WNW. The RT call was repeated and acknowledged at 1243:56, when the PA28 is 1·5 NM from Farnborough (still within the ATZ) and 1·8 NM from the AA5.

The PA28 pilot contacts Blackbushe at a recorded time of 1245. However, correlating another ac's call from Blackbushe-Farnborough would seem to indicate that the Blackbushe timings are about 1-2 min ahead of Farnborough. Blackbushe does not have to record its RT, being an AFIS unit, but credence should be given that Farnborough timings are correct. The PA28 pilot requests to rejoin from the S and is informed by the FISO that the RW in use is 26 with LH cct *"with one in"*. Shortly afterwards the AA5 pilot reports late D/W. After being asked to report final the pilot comments about an ac joining on L base. The FISO answers that it should be giving way.

The Farnborough MATS Part 2 states that ac on a FIS *'will be warned of their proximity to Blackbushe and advised to route around the ATZ or communicate with Blackbushe'*. There are no specific procedures on when to transfer inbound ac to Blackbushe that have transited through the Farnborough ATZ.

Arguably in hindsight, it would have been of benefit if the Farnborough controller could have warned the PA28 pilot about the Blackbushe cct traffic before transferring it but under a FIS was not obliged to. However, information was passed to the PA28 pilot, by the Blackbushe FISO, that the cct was active.

UKAB Note (2): The UK AIP AD 2-EGLK-1-2 describes the Blackbushe ATZ as a circle 2 NM radius centred on longest runway (08/26) 511926N 0005051W, except that part of the circle located south of the M3 Motorway.

The UK AIP AD2-EGLK-1-3 describes the Blackbushe Flight Procedures: -

a) All circuits are to be flown south of the aerodrome.

Circuit heights:
Light single engined aircraft - 800 ft (AD QFE).
Twin-engined and executive aircraft - 1200 ft (AD QFE).

At night the circuit height for all aircraft is 1000 ft (AD QFE).

b) Pilots approaching Blackbushe should remain north of the Woking - Basingstoke railway line to avoid conflict with aircraft using Farnborough.

UKAB Note (3): The Rules of the Air Regulations 1996 Rule 17 Rules for avoiding aerial collisions para. (5) Flight in the vicinity of an aerodrome states '*Without prejudice to the provisions of rule 39, a flying machine while flying in the vicinity of what the commander of the aircraft knows or ought reasonably to know to be an aerodrome, shall unless, in the case of an aerodrome having an air traffic control unit that unit otherwise authorises:*

a) conform to the pattern of traffic formed by other aircraft intending to land at that aerodrome, or keep clear of the airspace in which that traffic pattern is formed; and

b) make all turns to the left unless ground signals otherwise indicate.'

Rule 39 Flight within aerodrome traffic zones para. (2) states '*An aircraft shall not fly, take-off or land within the aerodrome traffic zone of an aerodrome to which this paragraph applies unless the commander of the aircraft has obtained from the aerodrome flight information service unit at that aerodrome information to enable the flight within the zone to be conducted with safety'.* Para. (3) states *'The commander of an ac flying within the aerodrome traffic zone of an aerodrome to which this paragraph applies shall;*

a) cause a continuous watch to be maintained on the appropriate radio frequency notified for communications at the aerodrome or, if this is not possible, cause a watch to be kept for such instructions as may be issued by visual means;

b) where the aircraft is fitted with means of communication by radio with the ground, communicate his position and height to the aerodrome flight information service unit on entering the zone and immediately prior to leaving it.'

UKAB Note (4): Analysis of the Heathrow radar recording at 1243:20 shows a primary only return, believed to be the PA28, just to the NW of Farnborough on a steady NW track towards Blackbushe with another primary only return, believed to be the AA5, in the D/W LH position tracking 080°. The PA28 crosses 0·36 NM ahead of the AA5 at 1244:27 with CPA occurring 4 seconds later, the PA28 in the AA5's 10 o'clock range 0·22 NM diverging; the PA28 is seen to enter a tight L turn immediately thereafter positioning into the D/W leg behind the AA5.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, recordings of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC authorities.

The PA28 pilot had called on the Blackbushe frequency and had been informed by the FISO of the cct details and activity status *"one in"*. The AA5 had called D/W but this went unheard by the PA28 pilot. Similarly, the AA5 pilot had missed the PA28 pilot's joining call and had been taken by surprise when he saw the PA28 joining from the SE between D/W and base leg positions. The onus was on the PA28 pilot to *"conform to the traffic pattern formed by other aircraft intending to land at the aerodrome"*. Members agreed that the PA28 pilot did not integrate safely into the cct and flew into conflict with the AA5.

Turning to risk, the AA5 pilot saw the PA28 at 400 m (he thought, but radar suggested the range was in excess of 800 m) to his R and below; this led some members to believe that safety may have been compromised during this incident. The PA28 pilot, however, had seen the AA5 from 800 m and had decided to pass ahead and slightly below before positioning behind it into the cct; in spite of the unconventional join, the PA28 pilot was always in a position to steer clear of the AA5. This element persuaded the majority of the Board that there had been no risk of collision.

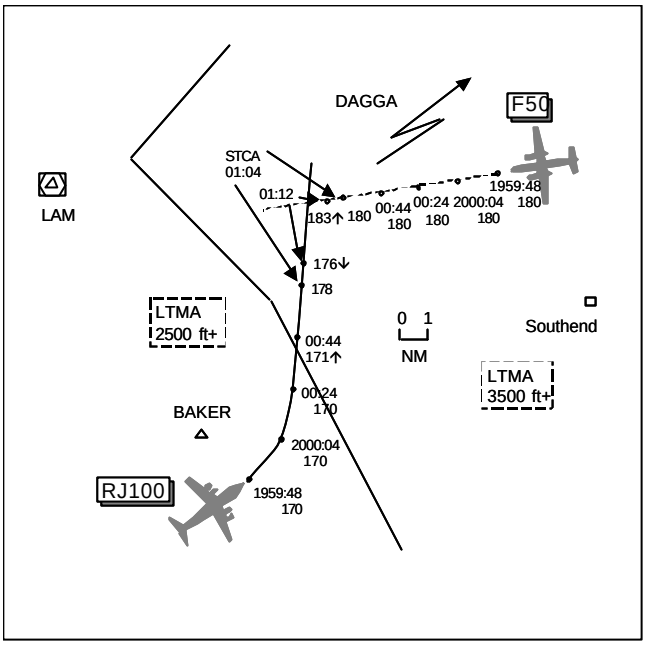
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA28 pilot did not integrate safely into the circuit and flew into conflict with the AA5.

Degree of Risk: C

AIRPROX REPORT No 201/01

Date/Time:	12 Nov 2001 Night	
Position:	5137 N 0025 E (10 NM E LAM)	
Airspace:	TMA	(*Class:* A)
	Reporting Aircraft	*Reported Aircraft*
Type:	RJ100	F50
Operator:	CAT	CAT
Alt/FL:	↑ FL 230	FL 180
Weather Visibility:	VMC CLOC 40 km	VMC CLOC >10 km
Reported Separation:	500 ft V 600 ft H	600 ft V 0 H
Recorded Separation:	700 ft V 2·4 NM H	



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE RJ100 PILOT reports flying a CLN 8M SID from Gatwick en route to Amsterdam heading 010° at 290 kt and in receipt of an ATC service from London on frequency 124·92 MHz. About 12 NM SW of DAGGA he was given radar heading 010° and climb clearance from FL 170 to FL 230. Shortly after initiating the climb he saw traffic on TCAS closing from his 2-3 o'clock with vertical displacement reducing to 600 ft. TCAS then generated an RA alert *"descend"* which he complied with by disconnecting the AP and AT and descending at 2300 ft/min to FL 170. He visually acquired the conflicting traffic as it passed about 500 ft above and 200 yd ahead; it quickly receded down his LHS and he informed ATC of his TCAS manoeuvre. He assessed the risk of collision as high.

THE F50 PILOT reports flying en route to Bristol in the cruise at FL 180 heading 285° at 200 kt and in receipt of an ATC service from London on frequency 127·95 MHz. Approaching LAM at 10 DME TCAS gave a TA alert on crossing climbing traffic, which he saw below, in his 0930 position, followed quickly by an RA *"climb, climb"*. He pitched the ac 4° nose up and climbed 500 ft following TCAS indications whilst the FO, PNF, informed ATC of his actions; TCAS quickly gave subsequent *"monitor vertical speed"* and *"clear of conflict"*. The other ac passed about 600 ft underneath, no ATC instructions or traffic information were received.

ATSI reports that at the time of the Airprox, the RJ100 was under the control of the TC East SC and the F50 was under the control of the TC Capital SC. The TC East SC was operating TC DAGGA and SABER in a 'band boxed' mode and reported his workload as light to medium at the time of the Airprox.

The F50 was en route from Amsterdam to Bristol International cruising at FL 180. It had established RT contact with the TC East SC at 1948, confirming its level and reporting on a heading of 270°. This was acknowledged and, at 1955:10, the flight was cleared direct to COMPTON VOR. At 1957:10, the ac was instructed to contact the TC Capital sector. The SC reported that he had drawn a line through the fps but left it in place in his strip display to serve as a reminder of its presence.

The RJ100 was outbound from Gatwick to Amsterdam, and established contact with the TC East SC at 2000:20. The crew reported level at FL 170, the agreed level for the transfer of such outbounds, and on a heading of 010°. At that

time, the position of the ac was 12 NM SE of Lambourne (LAM), whilst the F50 was 18 NM E of LAM.

The TC East SC stated that prior to the RJ100 calling on his frequency, he had seen the ac on radar, shortly after its departure from Gatwick, tracking NE. He had made an initial plan to climb it to FL 230, the agreed level for transfer to the next sector, and assessed that, on the north-easterly track, the ac would pass well behind the F50. When the RJ100 called on his frequency, the TC East SC apparently did not register the fact that the crew reported they were now on a heading of 010°, even though he correctly annotated his strip.

At 2000:25, the SC instructed the RJ100 "*... continue on that heading and climb flight level two three zero*". The F50 was in the 1 o'clock position of the RJ100, at a range of 9·6 NM, when this instruction was given. The SC said that he had given this instruction based on his earlier assessment of the relative positions of the ac, rather than updating this by reference to the radar. The RJ100 did not commence its climb for some 20 seconds, by which time the F50 was in its 1 o'clock at 6·2 NM.

The TC East SC stated that, at 2001:00, three things happened almost simultaneously. Firstly, someone else within the Operations Room had seen the confliction and shouted a warning. Secondly, the SC himself saw the confliction and transmitted "*RJ100 c/s er expedite your climb through flight level two correction two zero zero*" and, thirdly, whilst he was transmitting this instruction, STCA activated changing from white to red at 2001:04. At 2001:10, the RJ100 reported that he had received a TCAS RA and was descending. The SC did not pass any TI to the crew of the RJ100 and he had considered that the best course of action he could take was to expedite the climb of the RJ100 and did not consider any other form of avoiding action. Although he had completed his Training in Unusual Circumstances and Emergencies (TRUCE) training, this did not include any scenarios involving the passing of avoiding action. He stated that he had been rather shaken by the incident and, essentially, was content to let TCAS resolve the confliction.

Meanwhile, on the TC Capital frequency, the F50 reported a "*...TCAS climb*" at 2001:00. The Capital SC acknowledged this and, at 2001:40, the pilot reported that he was clear of the traffic and returning to FL 180. Although the SC did not pass any TI, he did advise that the conflicting traffic was on another frequency and should not have climbed through the F50's level. At 2001:45 the pilot reported "*Roger we have him visual and he's er right behind us now*".

UKAB Note: The TC Capital SC had said in his CA1261 report that shortly after the F50 had called on his frequency maintaining FL 180 he had noticed the STCA activate with the RJ100 in the F50's 10 o'clock position 4-5 NM at FL 175; he told the TC East SC to keep the RJ100 climbing. The F50 pilot then reported a *"TCAS climb"*; the next radar sweep indicated the F50 at FL 184 and the RJ100 at FL 177, which both ac maintained.

Separation reduced to a minimum, at 2001:12, when the F50 was in the RJ100's 1 o'clock position at a range of 2·4 NM and the vertical separation was 700 feet. Thereafter, lateral separation continued to reduce, however, standard vertical separation was rapidly restored as the ac climbed and descended in response to the TCAS RAs. At 2001:35, the TC East SC instructed the RJ100 to turn R onto 055°, which the crew confirmed they were able to do, as they were clear of the traffic. The SC then instructed the RJ100 crew to climb to FL 230 and, at 2003:30, transferred them to the next sector frequency.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

ATCO members commented on the TC East SC's TRUCE training as it had not included any 'avoiding action' scenarios. From previous incidents, there appeared to be some reluctance by some civil ATCOs in using the appropriate phrase when the situation warranted it. The NATS advisor said that LTCC staff intended to ensure that similar 'avoiding action' scenarios would be included in all their ATCOs' TRUCE training during 2002. Another point noted concerned the TC Capital SC. After noticing

the conflict and telling the TC East SC to keep the RJ100 climbing, he had not passed any TI or avoiding action instructions to the F50 crew; it was hoped that the future TRUCE training would improve matters here too. Reconstructing events in this incident, it seemed that the SC's plan to climb the RJ100 through the F50's level had been based solely on the RJ's previous NE track, the one followed until immediately before calling on his frequency. For whatever reason he did not then assimilate the RJ100 pilot's call saying he was now heading 010°, even though he had written the new heading information on the fps. Instead the erroneous notion that the RJ100 would pass safely behind the F50 was still firmly lodged in the forefront of his mind. Members agreed this perception made him issue climb instructions to the RJ100 which led to the Airprox.

On receiving a warning of the confliction from the TC Capital SC and on seeing the confliction himself, the TC East SC had told the RJ pilot to expedite his climb; STCA activated almost simultaneously. The RJ100 crew had reported receiving a TCAS TA shortly after commencing the climb, followed by an RA *"descend"* which they had complied with; they acquired the F50 visually as it crossed ahead and above. Meanwhile the F50 crew had received a TCAS TA and saw the RJ visually followed shortly thereafter by an RA *"climb"* which was complied with; they in turn watched the RJ100 pass 600 ft below. Although neither TI nor avoiding action instructions were passed to either crew by either controller, the prompt actions by the former in response to TCAS RA alerts persuaded the Board that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The TC East SC did not assimilate the radar heading reported by the RJ100 pilot and climbed the latter into confliction with the F50

Degree of Risk: C

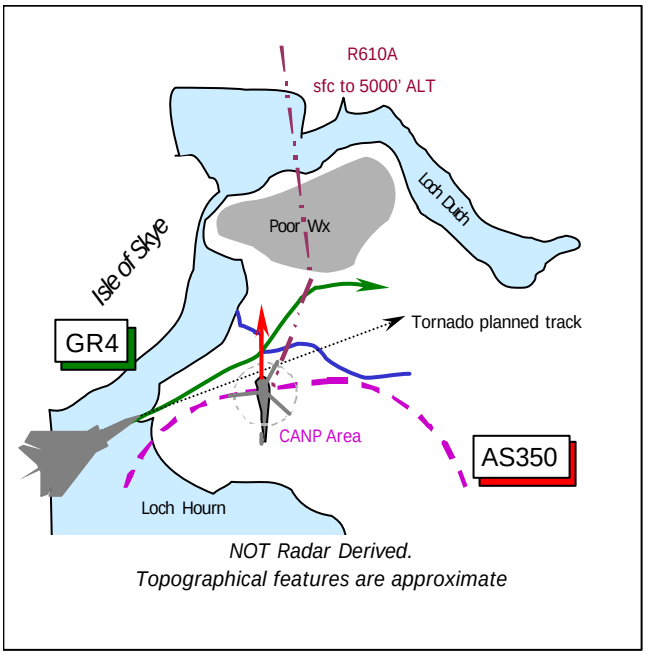
AIRPROX REPORT No 202/01

Date/Time: 13 Nov 1510Z

Position: 5711 N 0537 W (1 NM S of Gleneig)

Airspace: UKDLFS/Scottish FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR4	AS 350
Operator:	HQ STC	Civ Comm
Alt/FL:	400 ft (RadAlt)	~ 600 ft (agl)
Weather Visibility:	VMC CLOC 6 km	VMC 6 km
Reported Separation:	200 m H, 1-200 ft V	100 ft V
Recorded Separation:		Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR4 PILOT reports his ac is camouflage grey, but HISLs were on whilst flying an IP to target run at 480 kt in LFA 14, about 1800 ft below cloud with an in-flight visibility of 6 km. Heading 060° straight and level at 400 ft RadAlt, just SE of the Isle of Skye, the navigator saw a small helicopter close aboard on the starboard side and called for avoiding action. He broke left and

up and as he did so he became aware of a helicopter on his starboard side which passed 2 – 300 m away and slightly above his ac. The risk of collision was assessed "medium" and he added that the helicopter had blended in with the background and was difficult to detect because it was not skylined when he saw it. He was aware of the NOTAM'd CANP activity to the R of his track, which had been planned for so as to avoid it and he provided a copy of his chart which illustrated the encounter and poor weather to the N of his track.

THE AS 350 PILOT reports his helicopter has a burgundy colour scheme and anti-collision beacons and HISLs were on whilst he was positioning from an underslung load-lifting (USL) task at Loch Hourn around the coast to a private HLS at the mouth of Loch Duich at about 600 ft agl. A CANP had been filed for the USL task. Flying at 110 kt heading 360° about 1800 ft below cloud with an in-flight visibility of 6 km he first spotted the Tornado at 10 o'clock as it crossed from L – R about 500 ft away and 100 ft below his helicopter. As it had approached from behind them no avoiding action was taken because it was not seen until it had passed his ac; he assessed the risk of collision as "minor".

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

UKAB Note (2): A mandatory military UKDLFS avoidance was promulgated for the USL task noted above under CANP NOTAM 5275. This required the crews of military ac to avoid an area of 3 NM radius, centred on 57° 08·1" N 005° 33·7" W and 57° 07·5" N 005° 37·8" W - joined by a corridor 3 NM either side of the centre-line, extending from the surface to 1000 ft agl. This CANP was notified in force from 13 - 16 Nov, 11-1600 UTC daily. The reported position of the Airprox was just to the N of the CANP boundary and to the W of the boundary to the HRA – R610A.

HQ STC comments that viewing the relative positions and speeds of both ac it is likely that the helicopter appeared virtually stationary and slightly high in relation to the Tornado, in approximately the 1 o'clock position. This would have made the helicopter, a small apparently stationary object, difficult to see against the dark hillside. Furthermore, looking at the terrain and ac tracks it is likely that the helicopter was terrain masked until about 10 sec before the Airprox. It is likely that the Tornado crew viewed the helicopter at the first possible opportunity and took the only possible avoiding action of up – because of terrain - and L - to increase the horizontal separation. It is unfortunate that the helicopter pilot, having correctly protected his USL task with a CANP, was then at risk as he transited away from the protected area. The RAF continues to investigate possible measures to improve the advisory notification of ac movements. It is also noted that high-conspicuity paint schemes and higher sky-lining flight profiles can aid early visual detection of ac.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and reports from the appropriate operating authority.

The Board recognised that this was a good visual pick up albeit at close range by the alert Tornado navigator who would have been busy during this 'IP to target run'. Although it was difficult to determine with any certainty if the helicopter had been hidden behind the high ground to the S of the Airprox location as the Tornado approached from the W, HQ STC believed it had. It was certainly below the skyline for a long period and it was evident that the AS350's HISLs do not appear to have materially effected its conspicuity in this instance. Although dark colours – particularly black – are reputed to provide the best all-round compromise for conspicuity, it is contrast against the background that determines how well they stand out. Here, the burgundy colour scheme had apparently provided little contrast against the local terrain making the helicopter difficult to see from the jet's cockpit. For these reasons the Board agreed with the STC comment that the Tornado crew probably saw the AS350 at the first reasonable opportunity. It may have been that the navigator, who was aware of the AS350's USL activity from the CANP, was looking into that area as they passed, unaware the helicopter crew had finished their task for that day and were moving to another location. Nevertheless, that was merely speculation. Some members thought that the Tornado crew might have given the CANP a wider berth, but the STC Ops LF advisor mentioned the large number of notifications filed throughout the FIRs – it was explained this

was in excess of 2300 this year - and contended that if still greater margins were applied to existing buffers there would be less and less room for other activities. However, it was clear to members that the CANP was only relevant to this situation insofar as the Tornado crew had planned their track to avoid the CANP and the USL task it protected and by chance happened to pass by, just as the helicopter pilot was leaving the area en-route to another landing site, which he was perfectly entitled to do. This was not a case of a Tornado flying too close to a CANP or a helicopter pilot flying outside his notified area, more a chance encounter in the LFS/FIR, where 'see and avoid' applied. From the helicopter pilot's perspective he was completely unaware of the jet as it approached from abaft the port beam. Unsurprisingly he did not see it until it had moved into his 10 o'clock – 500 ft away and probably while the Tornado pilot was reacting. Therefore, the Board agreed that this Airprox resulted from a conflict in the LFS/FIR resolved by the Tornado crew.

Turning to risk, although this was a late spot by the navigator, his pilot's prompt avoiding action while still unsighted initially enabled them to fly away from the AS350; the jet pilot then saw the helicopter during the manoeuvre. Meanwhile in the other cockpit, effectively, the non-sighting by the helicopter pilot prevented him from materially effecting the outcome of this close encounter at all. Without a radar recording it was not possible to determine with any certainty the actual separation that pertained, but both pilots were in general agreement over the vertical separation of no less than 100 ft, which was still very close. Although the Tornado pilot's robust avoiding action removed the actual risk of a collision, the Board agreed that the safety of the subject ac had been compromised.

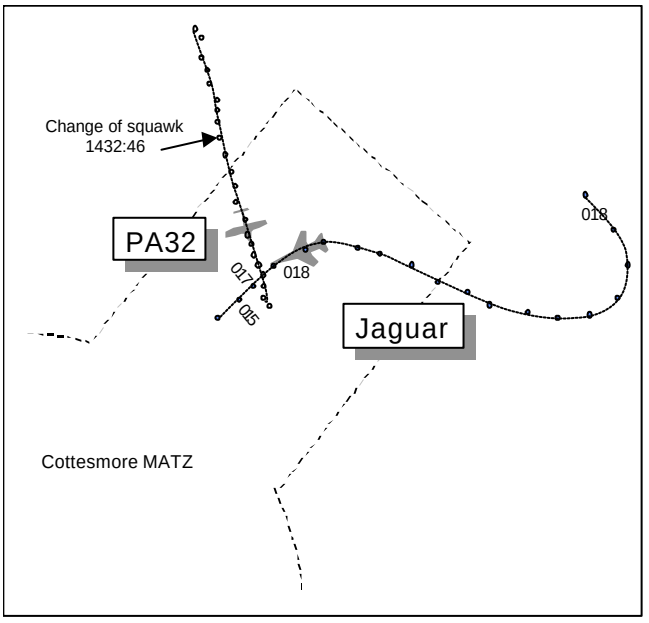
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in the LFS/FIR resolved by theTornado crew.

Degree of Risk: B.

AIRPROX REPORT No 203/01

Date/Time:	14 Nov 1434	
Position:	5220 N 0032 W (7 NM NE of Cottesmore - elev 461 ft)	
Airspace:	MATZ	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Jaguar T4	PA32
Operator:	HQ STC	Civ Pte
Alt/FL:	2000 ft (QFE 1020 mb)	2000 ft (QFE 1020 mb)
Weather Visibility:	VMC CLBC 30 km+	VMC CLBL 10 km+
Reported Separation:	100 ft H, 200 ft V	100 ft V
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JAGUAR PILOT reports heading 270° at 220 kt following radar vectors to the ILS for RW 23 at Cottesmore while undergoing an IRT; he was under a RIS at 2000 ft QFE. ATC called a contact NE of him at 4 NM which was not seen in part due to the light grey overcast. He was vectored 300° and after a short time a left turn was started to intercept the localiser. While the IRE in the rear seat was looking into the turn towards the airfield, passing 270° in the turn, he instinctively looked right for a 'belly-check' and saw a light ac at his 4 o'clock at the same level. He bunted to avoid a collision; the light ac appeared to take no avoiding action and passed 100 m away and 200 ft above with a high risk of collision; he considered they were lucky.

THE PA32 PILOT reports heading 180° at 110-120 kt steering between clouds at 2500 ft on Cranwell's pressure setting; Waddington ATC had earlier asked him to climb 500 ft to avoid Cranwell traffic. He was squawking Mode A as requested by ATC, with Mode C off. Cranwell eventually asked him to squawk 4640 and to call Cottesmore on 130·2 which he did. The Cottesmore controller asked him to fly on their QFE which gave him 1900-2000 ft and he asked if he could fly at 2000 ft which the controller approved, but as he was doing so he saw a military jet pass about 100 ft below from left to right with a high risk of collision. It was flying fairly slowly with pronounced wingtip vortice trails, in a left turn. It was closer than he expected; he flies this route regularly and the controllers normally co-ordinate everything. He was later informed that an Airprox had been filed 'against' him. He felt that the Cranwell controller had 'kept' him for longer than normal before inviting him to call Cottesmore; he had not been checking precisely where he was in relation to the Cottesmore Zone because he assumed the controllers were aware of his position, and thought he may have been in Cottesmore's zone before Cranwell handed him over. He suspected that the non-specific squawk did not give the controller time to form an accurate picture of where he was. Normally he gets an impression of positive, informative and very helpful ATC when transiting these MATZs.

MIL ATC OPS reports that the Jaguar crew was receiving a RIS from Cottesmore Approach (APP). APP was providing both Approach and Director services on 385·72, with a light traffic loading. At 1430:50, APP instructed the Jaguar crew to fly at 2000 ft on the QFE (1020 mb). At 1432:16, the Jaguar was turned (right) inbound onto a heading of 300° and, shortly afterwards, the crew were instructed to report their cockpit checks complete. At 1433:23, APP stated *"c/s, traffic right one o'clock, four miles, crossing right/left, no height"*; 12 sec later, APP updated the previous TI with *"c/s, that traffic believed to be at two thousand five hundred feet"*. At 1433:39, APP instructed the Jaguar crew to turn left onto 270° and report the localiser established; the crew acknowledged the turn with checks complete. The Jaguar crew continued inbound until, at 1434:32, they stated "(Cottesmore) *Confirm you've got that light aircraft on radar that we've just missed?"*; APP replied *"Affirm…that's the traffic I called* (to) *you; believe it was at two thousand five hundred feet"*. The Jaguar crew continued *"Copied, it's at two thousand feet"*. At 1437:27, whilst the Jaguar crew were climbing away, APP transmitted *"c/s, …reference that track you, er, mentioned, I tried to check with my Zone controller,* (but) *he was too busy to talk to me. I checked his flight strip and the flight strip said two thousand five hundred feet, that's why I called it at a level; I wasn't aware that it was actually at two thousand feet"*. The Jaguar crew replied *"Copied that, it might have been at that height, we were at two thousand* (and it) *just appeared a lot closer than that"*. At 1438:59, whilst departing to the NE, the Jaguar crew stated they would file an 'airmiss'.

The PA32 pilot was en-route from Sturgate to Little Staughton at 2500 ft Cranwell QFE 1028 mb whilst receiving a FIS from Cranwell Zone (CWL ZONE). Once clear of Barkston Heath MATZ, CWL ZONE attempted to hand the ac directly to Cottesmore Zone (COT ZONE); however, the line was busy. At 1432:25, CWL ZONE finally made contact with COT ZONE and began the handover on the PA32, stating its position as *"North-east Cottesmore seven miles, correction, nine miles tracking south…two thousand five hundred feet, one zero two eight"*. The handover was completed at 1433:14 without any change to the PA32's flight details other than a change of squawk and frequency. COT ZONE was manned by a qualified controller who was being screened by a Local Examining Officer (LEO) as part of a progress check. COT ZONE's workload

was high at the time of the handover and background traffic levels were high enough for the Supervisor to be actively monitoring his U/VHF frequencies. After initially contactacting COT ZONE at or around 1433:40, the PA32 pilot was instructed to set Cottesmore QFE (1018 mb) and fly at 2500 ft. (Note: There is a difference of 1-2 mb between the threshold of RW 23 and RW 05, the active RW) the PA32 pilot responded *"One zero one eight – can I make it two thousand?"*, which was approved by COT ZONE. At 1434:12, COT ZONE transmitted *"PA32 c/s, traffic left, nine o'clock, half a mile, crossing left to right indicating one thousand eight hundred feet"*; the PA32 pilot replied *" That's copied; I've just seen him go underneath me".* Over the next 3 min, COT ZONE made continuous transmissions to the 5 other ac on his frequencies, although none was made to the subject PA32. The remainder of the PA32's transit was uneventful until, at 1452:02, COT ZONE asked *"…the aircraft that we, er, called to you as you came onto our frequency has just filed an Airmiss against you; at what stage did you see that aircraft?"*; the PA32 pilot replied *"Eh, I would say that I saw him, er, give me a minute.....I'd asked the controller if I could make it two thousand feet rather than two five zero* (zero) *and he said that was approved…I would say at that point I saw the aeroplane, er, go underneath me…I didn't feel that there was, er, any particular danger, but yes, I did see him"*. When asked by COT ZONE to estimate how far beneath the Jaguar was, the PA32 pilot replied *"I would say two hundred* (feet)*, he looked as if he was descending into the circuit at Cottesmore"*. The PA32 pilot was asked to contact Cottesmore Supervisor after landing, then left the frequency at 1454:26.

The Claxby Radar recording shows both the PA32 and the Jaguar transiting from N-S from the vicinity of Cranwell towards Cottesmore. At 1432:16, the Jaguar is 10 NM NE of Cottesmore tracking 140° indicating 2800 ft and squawking 4646. As it begins its inbound turn onto 300° a few seconds later, the PA32 is 9 NM NNE of Cottesmore tracking S squawking 2635 (CWL ZONE) with no Mode C; the Jaguar is in the PA32 pilot's 10 o'clock at 6·5 NM. At 1433:33, the time of APP's first TI call to the Jaguar pilot regarding the PA32, the Jaguar is 9 NM NE of Cottesmore passing through 280° and indicating 1800 ft; the PA32 is 5 NM NW of the Jaguar. At 1433:35, the time of APP's second TI call, the Jaguar is steady heading 300° indicating 1800 ft, whilst the PA32 is in the Jaguar's 12 o'clock at 2·5 NM tracking 170°. A few seconds later, the Jaguar crew turns left onto its assigned heading of W, directly into confliction with the PA32. As the Jaguar turns, the PA32 pilot is receiving approval to adjust to 2000 ft QFE (1018 mb). The 2 ac merge at 1434:49; the Jaguar continuing a left turn towards Cottesmore; it appears to be passing 255° and indicating 1700 ft as the primary returns touch. As the ac begin to diverge, the Jaguar crew has continued a turn onto 230° and is descending through 1500 ft; the PA32 pilot has maintained track.

APP twice provided timely and accurate TI to the Jaguar crew IAW current regulations for the provision of RIS. Under FIS, COT ZONE was not obliged to sequence or separate recipient pilots, although the PA32 pilot could have expected to receive any information useful for the safe and efficient conduct of flight. COT ZONE did pass TI regarding the Jaguar, albeit when the 2 ac were 0·5 NM away. Both ac were in Class G airspace and both pilots were ultimately responsible for their own separation from other traffic. Nonetheless, it appears that a series of unforeseen factors and a number of shortcomings led to the 2 ac passing each other by just 200 ft (V).

CWL ZONE's handover to COT ZONE was initially hindered by a busy landline. CWL ZONE decided to persevere rather than freecall the PA32 to a busier colleague at Cottesmore. At the time of the handover, which was slightly later than usual, the Jaguar was 7 NM clear of the PA32, diverging on a similar heading and therefore not a factor. However, the busy COT ZONE accepted the PA32 at 2500 ft on the Cranwell QFE of 1028 mb, some 10 mb different to the Cottesmore QFE of 1018 mb (RW 05). In the meantime, APP had turned the Jaguar inbound to RW 23 and into confliction with the PA32, now squawking 4640 NMC. After passing TI to the Jaguar crew, APP checked COT ZONE's FPSs, noting that the PA32 was logged as level at 2500 ft; APP passed this information to the Jaguar crew believing it to be both accurate and helpful. Unfortunately, whilst APP was checking the flight strips, COT ZONE was approving the PA32 pilot's request to adjust to 2000 ft on 1018 mb. With hindsight, had the PA32 been recognised as a potential problem earlier, APP may have decided to give the Jaguar pilot a left turn inbound rather than right, or even suggest a non-conflicting

heading. Additionally, COT ZONE could have adjusted the PA32's height/pressure whilst the handover was in progress, rather than on a live frequency when TI may have been more apt. Neither of these factors was inherently dangerous, but both were unnecessary shortcomings.

Whilst the 2 subject ac were now adjusting to a similar height, the Jaguar *had* been provided with 2 accurate TI calls, both ac were flying in excellent weather conditions and, most importantly, the Jaguar's heading of 300° was sufficient to pass 1-2 NM astern of the PA32; here again, lessons can be learned. Whilst APP's TI calls would have been timely and accurate enough for the Jaguar crew to gain sight of the PA32, both calls came while the crew was conducting cockpit checks. Having called the PA32 twice and convinced that the conflictor was 500 ft above his traffic, APP turned the Jaguar inbound onto W. Again, with the full benefit of hindsight and all of the facts to hand, it may have been prudent for APP to highlight the presence of the PA32 one last time prior to giving a turn, or even confirm that the Jaguar crew was happy to turn against a conflictor, especially as no 'visual' call had been made. Whilst APP had fulfilled his duties under RIS and had no other obligations, a final call to the Jaguar crew (after completing checks) may have been just enough to accentuate the proximity of the PA32.

HQ STC comments that the Jaguar involved in this incident was a 2-seater with the front-seat pilot (PF) undergoing an IRT. The rear seat was occupied by the IRE (captain). On examining the geometry of this encounter, it becomes apparent that the Jaguar pilot did not see the PA32 until after the CPA. His avoiding action therefore, albeit instinctive and understandable, was superfluous since the risk of collision had passed. Ops Spt (ATC) has identified a number of controller-related factors that should have averted this incident; nevertheless, given that the Jaguar was operating under a RIS in Class G airspace, the responsibility for separation from other traffic lay ultimately with the crew, specifically the PNF as the PF would have been simulating IMC.

UKAB Note: The PA 32 pilot was asked why he had been flying with his transponder Mode C switched off. He said that he normally only switched it on when asked, assuming that controllers would otherwise not want it on. He has been advised that it is always useful, even when not receiving an ATS, and that had his Mode C been on, this incident may well not have happened. He accepted this and, being in a position to help make this often misunderstood point clear to the wider GA community, indicated that he will do so.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings and reports from the appropriate ATC and operating authorities.

Pilot members of the Board were critical of the Jaguar being turned into confliction in plan with the PA32 without having called visual with it. They considered the trust with which APP had accepted Zone's FPS for the PA32 was misplaced, in the absence of a verbal check with Zone on its accuracy. Controller members were asked when a controller should be able to trust what was written on another controller's FPSs - the universal reply was "Never!", except when verified strips were specifically displayed for other controllers' reference. Members were asked if the pilots in this case, under RIS and FIS, had a responsibility in the MATZ to see and avoid each other; the general view was that the matter was not clear-cut. Under a radar service in a MATZ, most pilot members said they would expect to be separated from other traffic. The Board suggested that under the circumstances, with an IRT candidate in the front seat of the Jaguar, it would have been better to request a RAS.

In assessing Zone's part in the Airprox, members accepted that the late handover restricted the time available for him to deal with the PA32. In the UK AIP section on MATZ crossings it states that a radar service will be applied whenever possible and traffic will be separated from other MATZ traffic. However, while this is not reflected in JSP 318A, the Board agreed that Zone still had a responsibility to separate the PA32 from other traffic while crossing the MATZ. However, Zone may have had no warning of the Jaguar approaching in the climb out area of the active RW 05 although it was wearing a Cottesmore squawk; he appears to have become aware of it just too late to take effective action with the PA32. Members agreed that the late handover was a significant factor in this and discussed other options. If Cranwell Zone had invited the PA32 to free call Cottesmore much

earlier, and the pilot had been unable to make contact, it would have been more likely that APR would have steered the Jaguar clear of what would have been an unknown return. The handover had occurred at about the worst moment possible.

The Board concluded that the cause of the Airprox was that Cottesmore ATC did not ensure safe separation between the Jaguar and the PA32 and, because the ac passed within 200 ft or so without either pilot seeing the other ac in time to take avoiding action, there had been a risk of collision between them.

It was noted that Zone had incorrectly advised the PA32 that the Jaguar had filed an Airprox 'against' the PA32. This confrontational remark had unsurprisingly upset the PA32 pilot. The expression 'file against' has connotations of blame and is invariably inappropriate in a flight safety context; the UKAB habitually observes that one has an Airprox *with* another ac, not *against* it; it is an event that affects the safety of both ac equally.

Finally, members re-emphasised the importance of switching on Mode C if it is fitted. The PA32 pilot was subjected to a near-fatal experience which would almost certainly not have happened if he had switched it on. Best practice should be to switch Mode C on when airborne unless a controller asks for it to be switched off, rather than the other way round. Members were advised that there was a perception abroad that squawking Mode C might make a prosecution for infringing airspace more likely than if it could be argued that a NMC return was, say, below a section of CAS. Members invited the Chairman to find out if this was more than rumour, as prosecutions in such circumstances run counter to flight safety. Indeed, at the same meeting an incident had been assessed (166/01) in which a light ac had flown deep into an airway because of inadequate flight planning and into confliction with a C17 whose TCAS was able safely to resolve the conflict. While the Board took a dim view of the flight planning aspects, there was hearty support for the pilot's use of Mode C which was instrumental in achieving a safe outcome. It was also suggested that when controllers ask a GA pilot to squawk a Mode 3/A code they should add "with Mode C" to the instruction. Both Waddington ATC and Cranwell ATC had missed this opportunity to break the chain that led to the incident.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Cottesmore ATC did not ensure safe separation between the PA32 and the Jaguar.

Degree of Risk: A

AIRPROX REPORT No 206/01

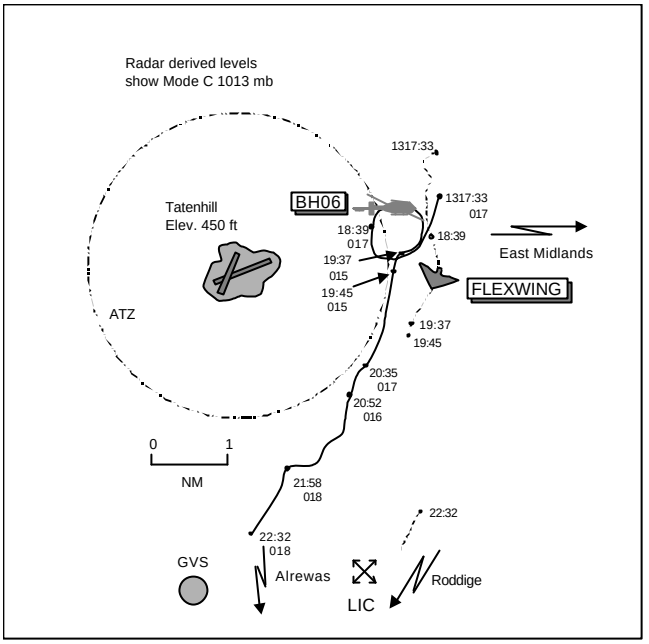
Date/Time: 13 Nov 1320

Position: 5247 N 0142 W (2·5 NM SE Tatenhill - elev. 450 ft)

Airspace: ATZ/FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Pegasus Quantum Flexwing M/L	BH06
Operator:	Civ Trg	Civ Comm
Alt/FL:	2300 ft (QNH 1025 mb)	1800-2000 ft (agl)
Weather	VMC SKC	VMC CAVOK
Visibility:	50 km	>10 km
Reported Separation:	50 ft V 0 H	not seen

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PEGASUS QUANTUM FLEXWING M/L PILOT reports flying a dual training sortie from Roddige Airfield non-radio at 2300 ft QNH 1025 mb. The visibility was 50 km with no cloud in VMC. Passing about 3 NM E of Tatenhill heading 180° at 52 kt he saw a helicopter 2 NM ahead and below fly overhead Tatenhill and enter the RH cct for RW 26 turning then onto a 2 NM final. As the helicopter reached 1 NM from touchdown, it was seen to break-off its approach into a climbing L turn. The helicopter continued this flight path, approaching him from his 4-5 o'clock position, until it passed 50 ft directly underneath him. The helicopter was coloured white with a red stripe and it was then seen to turn onto a Westerly track. He took no avoiding action as he had kept the helicopter in sight throughout. After landing, he contacted Tatenhill to identify the subject helicopter which had just landed for a refuel.

THE BH06 PILOT reports that he had only been informed of the encounter by the UKAB 3 days post-incident. During his sortie he had not seen any microlight near to Tatenhill or heard any transmissions from its pilot addressed to Tatenhill or to him. The visibility was >10 km CAVOK in VMC he was squawking 0036, he thought, and was in receipt of an A/G service from Tatenhill Radio on frequency 124·07 MHz. The helicopter was coloured maroon/white with anti-collision strobe and landing lights all switched on. He had departed Tatenhill at 1245Z to commence flying a 'high level' (1500-2000 ft) thermal-imaging photographic sortie of a gas pipeline between Ashleyhay, near Belper, to Alrewas, 4·5 miles S of Tatenhill. Normally this would have been flown out of sun but the camera had been calibrated for 100 kt and owing to the wind strength on the day, this speed could only be achieved flying Southbound. Adjacent to Tatenhill, the pipeline tracks approx 030/210° and passes just outside the SE edge of the ATZ by 200 m; he estimated that would have been at 1800-2000 ft agl on task in that position. On reaching Alrewas he turned N and informed A/G that he was inbound and commenced a descent towards the airfield. During the recovery, he overflew a land feature 1 NM E of the airfield prior to landing at the Eastern end of the airfield.

UKAB Note (1): Met Office archive data shows the East Midlands METAR EGNX 131320Z 36009KT 9999 FEW022 06/01 Q1028= and the Barnsley RPS 1300-1400 UTC was 1021 mb.

UKAB Note (2): Analysis of the Clee Hill radar recording at 1317:33 shows the BH06 squawking 7000 indicating FL 017 (2150 ft QNH 1028 mb) 3 NM ENE of Tatenhill tracking 190° 0·6 NM S of a primary only contact, believed to be the Flexwing M/L tracking SW. 30 seconds later the BH06 enters a RH orbit. At 1319:37 the Flexwing is 2·5 NM SE of Tatenhill tracking 200° as the BH06 is seen in a L turn at FL 015 (1950 ft QNH 1028 mb); 8 seconds later the Flexwing fades from radar 0·85 NM S of the BH06. The BH06 continues on a nominal SSW track up to a max. level of FL 018 (2250 ft QNH) towards Alrewas Gas Venting Station (GVS) with the Flexwing re-appearing on radar at 1322:32 2·3 NM E of the helicopter. The close encounter, as described by the reporting Flexwing M/L pilot, is not seen on recorded radar but from correlation of his report to the recorded radar replay it is believed to have occurred after the Flexwing fades from radar at 1319:45 to the SE of Tatenhill.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and radar video recordings.

It was clear to members from his report that the BH06 pilot had not seen the Flexwing during this incident. The Jet Ranger pilot had been on a pipeline/photographic sortie which may have degraded his lookout at some stage whilst he was on task. Additionally, he was flying into sun and had approached the Flexwing from behind, tail on and from below; the Flexwing would have presented a small target aspect from that angle making it particularly difficult to see. The Flexwing pilot may have assumed that the helicopter pilot would see him and pass with a safe margin, as he was required to do in accordance with the Rules of the Air Regulations 1996; this assumption was proved subsequently not to be the case and members were in no doubt that if the BH06 pilot had seen the Flexwing the Airprox could have been avoided.

The Flexwing pilot had seen the BH06 at an early stage ahead of him to the E of Tatenhill. He had watched the helicopter whilst it carried out an orbit to the R after which it climbed and turned L to track SSW bound (on the pipeline). This meant it was approaching the Flexwing pilot from his 4-5 o'clock with about 50 kt overtaking speed differential. Electing to continue on track, the latter monitored the BH06's flight path as it passed, he estimated, 50 ft below. Still believing the helicopter pilot could see him, he took no avoiding action. Aware that the BH06 pilot had not seen the Flexwing, one member argued that safety had been compromised. However, the majority of the Board noted that the M/L pilot had watched events throughout and was always in a position to take action to avoid the overtaking helicopter if he thought it was necessary but had not done so. This persuaded the Board that there had been no risk of collision.

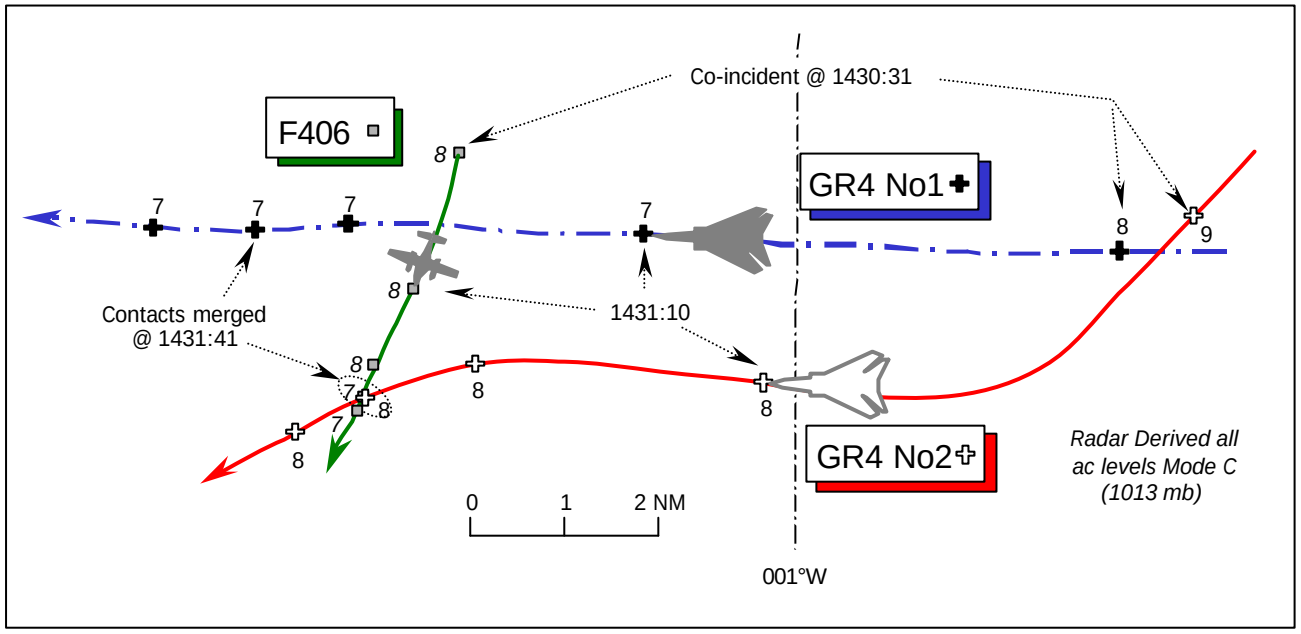
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non-sighting by the BH06 pilot.

Degree of Risk: C

AIRPROX REPORT No 207/01

Date/Time:	27 Nov 1431	
Position:	5508N 0108 W (21 NM ENE of Newcastle)	
Airspace:	London FIR (*Class:* G)	
	Reporting Aircraft	*Reported Aircraft*
Type:	F406 Caravan	Tornado GR4A
Operator:	Civ Comm	HQ STC
Alt/FL:	200 ft (Rad Alt)	460 ft (Rad Alt)
Weather Visibility:	VMC SKC 20 km +	VMC SKC 10 km+
Reported Separation:	50 ft V	Not Seen
Recorded Separation:	Contacts merged - 100 ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE F406 CARAVAN PILOT reports his ac has a blue/white livery and anti-collision beacons and HISLs were on whilst conducting a fisheries protection flight in the N Sea about 20 NM E of Newcastle. He was listening out with Newcastle APPROACH on VHF and Boulmer RADIO on UHF, squawking A4100 – the allotted fisheries protection/ maritime patrol ac conspicuity code - with Mode C, but was not in receipt of an ATS.

Whilst heading 180° at 140 kt, and 200 ft Rad Alt flying past a fishing vessel to establish its identity, they heard the "roar" of jet engines. He then spotted at 1 o'clock a Tornado GR flying away on a steady heading after it had directly overflown his ac by about 50 ft. No avoiding action was taken and he assessed the risk of collision as *"high"*.

UKAB Note (1): In a subsequent telephone conversation with the F406 pilot's Company Operations Director, it was established that these fishery protection flights are notified to several authorities including ARCC/MRCCs, Northwood Ops and Anglia RADAR. It is also common practice for their pilots to contact AEW/MPA when operating in their vicinity and in some instances obtain a FIS. The company is keen to co-ordinate their flights with military low-level operations and promulgate their activities to enhance overall flight safety. However, their tasks are often conducted at short notice over variable routes and of indeterminate timing. He sought guidance on a suitable point of contact for co-ordination and notification of their flights in the low-level airspace. STC Ops (LF) staff suggest that it may be appropriate to promulgate these flights by UK (L) NOTAM.

THE TORNADO GR4A PILOT reports his ac is camouflaged dark grey, but all ac lighting - including HISLs - was selected on. He was flying as the No2 of a formation conducting a very demanding tactical flying exercise, during a combined QWI course operational phase, which included opposing fighter ac and EW communications jamming. A squawk of 3/A 2600 was selected with Mode C and they were operating under a FIS from a controller aboard an AWAC ac. The ac flown by the reporting pilot was not seen at all.

Videotape from the mission shot through the Head-Up Display (HUD) was reviewed to see what had been recorded. At 1431:00, he was heading 275° at 516 kt flying straight and level at 440 ft RadAlt. At 1431:19 the ac was turned L into sun at 10° Aob - increasing to 30° at 1431:39, before rolling out onto a heading of 242° at 465 ft Rad Alt. No ac are shown within the Head-up Display (HUD) or Forward Looking Infra Red (FLIR) field of view. An ACN was promulgated for the exercise.

UKAB Note (2): This QWI exercise was promulgated within NOTAM H6211 as an unusual aerial activity following co-ordination under ACN 01-11-0040 and included within the UK Daily Navigation Warning Summary (UKDNWS) for 27 Nov, promulgated at 261514 Nov. This included a warning of the exercise taking place within specified co-ordinates covering a large portion of Northern England and Scotland, clear of regulated airspace from the surface to FL 550, between 13 – 1600 UTC and encompassed the Airprox location.

UKAB Note (3): A review of the Great Dun Fell radar recording reveals that this Airprox occurred at about 1431:41, as the No 2 Tornado GR4 steadied on a heading of 242°. The F406 is shown at 700 ft Mode C (1013 mb) as it is overflown by the GR4 at 800 ft Mode C.

HQ STC comments that this Airprox occurred at low-level over the sea 20 NM from the coast, where no radar service was available. The Airprox appears to be a case of neither crew seeing the other ac in Class G airspace, despite the best intentions of both crews. The military ac was NOTAM'd; however the large area covered and non-specific nature of the NOTAM prevented it from affording any real protection. Likewise the fisheries ac reports that it could only notify its activities in a non-specific way, however it is encouraged to do so in future. A further point of radio contact that the fisheries flight should consider using is London/Scottish Mil, as the military radar service is frequented by many military flights and could relay information to operators such as AWACs.

AWACs have not been able to provide any record of the incident, and were unaware that it had occurred. There have been several Airprox when military crews have been receiving a FIS from AWACs who have not alerted the crews to stranger traffic. It will be re-emphasised to crews that AWACs will not 'see everything', and while concentrating on a tactical scenario will not necessarily alert them to stranger traffic. When receiving a FIS from AWACs the crews are still primarily de-conflicting by the 'see and avoid' rule.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings, and reports from the appropriate operating authorities.

It was evident that both operators had taken appropriate measures to promulgate the nature of their respective flights to other airspace users. However, the non-specific nature of the warning in the NOTAM for the QWI exercise over a large part of the UK airspace and the limited distribution of the information on the fisheries protection flight provided little tangible benefit. Additionally, the Board recognised that the nature of both flights probably prevented any closer definition of their respective operating areas or intentions, and both were clearly proceeding about their legitimate activities. A ScOACC controller member observed that they received faxed information on fishery protection flights. Noting the comments from the F406 pilot's company and STC Ops LF, the Board agreed it could be helpful if the F406 operator added LFBC and LATCC (Mil) to the list of addressees informed of their flights. Military pilots were quick to comment that a military UK (L) series NOTAM might ensure that information on these flights was available to all military crews, who are required to check such NOTAMs before conducting flights in the UKDLFS. However, it should be noted that military FJ crews operating over the sea in the UKDLFS more than 3 NM from the coast do not

have to book into the UKDLFS, so there was no simple, clear cut solution to this difficult issue and it was suggested that it would be beneficial for the F406 operator to start a dialogue with STC Ops LF staff at LATCC (Mil).

Some thought a general NOTAM would be useful but this Airprox remained a question of flying in the FIR where 'see and avoid' was the primary method of separating the various operations of the disparate airspace operators. From the Tornado crews' perspective none of the four pairs of eyes in the two jets had seen the F406 which the radar recording showed had flown across their noses from R to L. The Board tried to reconcile this non sighting with the good weather conditions reported and several reasons were put forward; one pilot member opined that blue/white was not a good colour for conspicuity over the sea, but the HQ STC member added that it was significant that the F406 was operating below the normal minimum height of the military jets. He opined that, importantly, fast-jet crews at that height would not normally expect to encounter a threat from below and this might be why they had not seen the F406. This seemed plausible and as they got closer the F406 might possibly have been masked by the ac nose as the No2 GR4 turned L onto 242° and closed rapidly. Although the GR4 should have been visible to the F406 pilot, it appeared to the Board that the negligible change in relative bearing of the jet, its camouflage grey colour scheme and small head-on aspect all contrived to mask its presence. This resulted in all three ac approaching each other entirely unseen, until their tracks crossed, after which the F406 pilot saw the jets opening at 1 o'clock. From this the Board determined the cause of this Airprox was a non-sighting by the crews of the GR4 pair and the F406.

Turning to risk it was mentioned that the F406 pilot would only fly at 200 ft when necessary and for the minimum time consistent with his task in attempting to identify vessels. The F406 pilot could have climbed up at any time; hence it was purely fortuitous that the Tornado had overflown it, with 100 ft separation as shown on the radar recording when the crew unwittingly turned towards it. The Board recognised that there were no other safety nets to prevent a collision apart from the pilots unseeing eyes. The Board concluded, therefore, that an actual risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the crews of the GR4 pair and the F406.

Degree of Risk: A.

AIRPROX REPORT No 208/01

Date/Time: 12 Dec 1426

Position: 5408 N 0244 W (6 NM N of Lancaster)

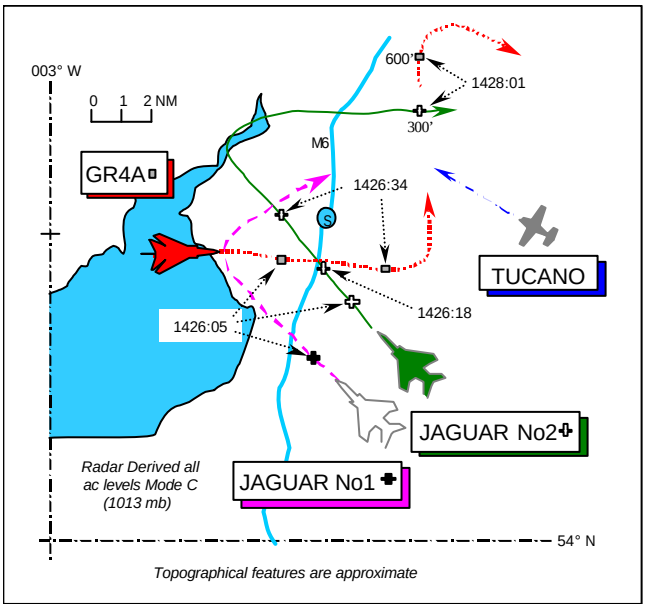
Airspace: UKDLFS – LFA 17 (*Class:* G)

	First Aircraft	*Second Aircraft*
Type:	Jaguar GR3	Tornado GR4A
Operator:	HQ STC	HQ STC
Alt/FL:	380 ft Rad Alt	350 ft Rad Alt
Weather Visibility:	VMC CLOC 30 km+	VMC CLBC 10 km+

Reported Separation:

30 ft V & 100 m H Not reported

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JAGUAR PILOT reports he was flying as No 2 on a pair's low-level evasion sortie with a third Jaguar acting as the bounce. HISLs were on and a squawk of 3/A 7001 was selected with Mode C.

He was flying to starboard of his leader in a wide battle formation at 450 kt, in a 2° descent passing 380 ft Rad Alt. About 5 NM N of Lancaster, heading 318° (T), "*he became aware"* of a Tornado in his 1 o'clock (going away) on a reciprocal heading at the same height about 300 ft away, but at that late stage there was no possibility, or need, for avoiding action.

After landing the HUD video was examined. It was apparent that the Tornado had crossed obliquely L – R from 11 o'clock to 2 o'clock, where he had first spotted it, about 300 ft ahead and 30 ft above his ac, with a high risk of a collision.

THE TORNADO PILOT reports his ac is camouflage grey but HISLs were on whilst conducting a low-level sortie in LFA 17 at 450 kt. Flying at 350 ft Rad Alt just after completing a target run, he turned onto N and sighted a Tucano about 1 NM to the E, also northbound. Initially it was difficult to assess the Tucano's heading so to give it a wide berth due to the significant speed differential he side-stepped his ac to the W. At the same time a Jaguar was sighted about 2 NM to the W, heading NE. Following a discussion with his navigator, they concluded (erroneously) that the Jaguar pilot had not seen them and was on a collision course. He accelerated to 480 kt and jinked R then L to go ahead of the Jaguar, which crossed astern from L – R more than 800 m away. When they regained their planned track the Jaguar was observed continuing to the NE.

UKAB Note (1): Analysis of the Great Dun Fell radar recording, coupled with the HUD video recording supplied by the Jaguar pilot, reveals that the Tornado GR4A pilot has not reported the same occurrence as that reported by the Jaguar pilot. It would appear that the Tornado crew did not see the No 2 Jaguar during their eastbound IP - target run at the Airprox location. The radar recording shows the subject ac converging at 1426:05. However, radar contact is lost on the Tornado two sweeps before and on the No 2 Jaguar just before the Airprox occurred at about 1426:18, as described by the Jaguar pilot. The minimum separation cannot be determined from the radar recording, but the Airprox is shown clearly on the HUD recording and is in general accord with that reported by the No 2 Jaguar pilot, as the Tornado crosses obliquely from L – R about 30 ft above the No 2 Jaguar. The Jaguar pair is shown during a 'cross-over' R turn, rolling out eastbound, but radar contact is then intermittent. Afterwards at 1428:01, the Tornado is shown turning R at the end of the northbound leg of his route 'off-target' after the second encounter, which is where the Tornado pilot saw the Jaguar closing from the W. It is not clear if the Tornado crew saw the ac flown by the reporting pilot or his No 1, whose track is not shown after the pair's eastbound turn.

THE JAGUAR PILOT'S UNIT comments that 3 Jaguar/Tornado mid-air collisions have occurred during unrelated sorties at low-level during the past 18 years; this was nearly the fourth. The provision of an adequate Collision Warning System (CWS) to the ac involved in this incident would have provided sufficient warning to alert the aircrew to the inherent danger. The lack of an adequate system clearly contributed to the increased risk.

The issue of a deconfliction-planning tool at the low-level booking stage, such as the Joint Mission Planning (JMP) device currently employed within the Jaguar Force, must also be progressed. Such a tool should be made available across all military low-level users with the minimum of delay. If we do nothing, statistics suggest that there will be another mid air before the Jaguar retires.

UKAB Note (2): The JMP device allows Jaguar pilots to compare their planned route within the UKDLFS with those entered into the JMP by other Jaguar pilots. Additionally, it does allow comparison with the routes of some C130 and support helicopter flights as well. It is not, however, in use service wide as other ac operators have their own generic devices.

MIL LOW FLYING OPS comments that whilst there are some merits in a planning deconfliction tool such as the JMP, there are clear disadvantages. The UKDLFS has many users and the military shares the airspace with many other operators. Such a system cannot be real time without a data link and only deconflicts system participants from each other

when on track and on time - not other non-participating operators. A more holistic solution would be a wider implementation of a TCAS style CWS.

HQ STC comments that the ac involved have been identified correctly, but after studying the reported headings of each ac it is clear that the respective pilots are not commenting on the same occurrence. The routes flown by both ac intersect at 2 points: the first occurring 5 NM N of Lancaster (the location of the Airprox reported by the Jaguar pilot), when the Tornado was established on an IP to target run, and subsequently, 9 NM further NE some 2 min later. From the narrative of the Tornado pilot, it appears that he is referring to the second convergence of their tracks, which was almost certainly a lower risk event as indicated in his report. The Tornado pilot was therefore, seemingly unaware of the first occurrence where the risk of a collision was significantly higher.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, radar video recordings and the Jaguar pilot's HUD recording, together with a report from the operating authority.

The Board concurred with the STC view that the Tornado pilot had not seen the No2 Jaguar when their tracks first crossed at about 1426:18. This was the occasion that caused the Jaguar pilot to report his Airprox and assessments by the Board on cause and risk were based on this episode, although the later occurrence as reported by the Tornado pilot, was also shown on the Jaguar pilot's HUD recording.

It was evident from his laudably frank and honest report that neither the No2 Jaguar pilot nor his leader had seen the Tornado before their paths crossed. Therefore, the No2 pilot was unable to affect the outcome of the encounter. From this analysis the Board agreed unanimously that this Airprox was caused by a non-sighting on the part of the Tornado crew and effectively, a non-sighting by both Jaguar pilots. The No2 Jaguar pilot's HUD video was shown to the Board, which graphically illustrated the speed and proximity of the encounter, leading members to conclude that an actual risk of a collision had existed.

A wide-ranging discussion arose on the relative merits of the JMP and other devices such as RAIDS, versus a CWS; the HQ STC LF advisor also mentioned the development of a replacement for ALFENs, which may improve deconfliction. However, no definitive consensus was achieved between the members on this issue.

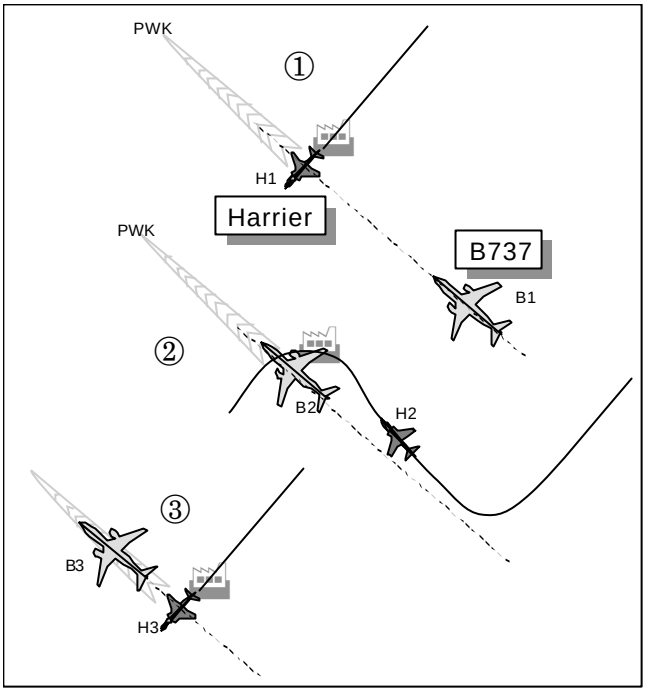
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the Tornado crew and effectively, a non-sighting by both Jaguar pilots.

Degree of Risk: A.

AIRPROX REPORT No 209/01

Date/Time:	18 Dec 1431	
Position:	5527 N 0425 W (7 NM SE of Prestwick)	
Airspace:	FIR/LFS	(*Class:* G)
Reporter:	Prestwick ATC	
	First Aircraft	*Second Aircraft*
Type:	B737	Harrier
Operator:	CAT	HQ STC
Alt/FL:	1700 ft ↓ (QNH)	250-500 ft (Rad Alt)
Weather Visibility:	VMC CAVK 40 NM	VMC CLNC 10 km+
Reported	1 NM, 1500 ft V	
Separation:		1 NM 1500 ft V
Recorded Separation:		1100 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PRESTWICK RADAR CONTROLLER reports that the B737 was given descent clearance to 5000 ft for a straight in approach to RW 31 and having reported on the localiser at about 30 NM, was then cleared to 4500 ft. With about 20 NM to go the controller noticed 2 7001 squawks about 10 NM to the S, showing 1500 ft Mode C and tracking 080° so he passed traffic information and advised that the approach might have to be broken off. At about 15 NM from touchdown, he gave the pilot a right turn onto 060° to reposition as the 2 LL returns were then crossing the FAT at 10 NM; at this point the Tower controller could see the B737 and one of the unknowns, a Harrier. As the LL returns cleared to the NE he turned the B737 R onto 270° to re-establish the localiser and 3000 ft separation was maintained. At 10 DME the B737 was cleared for the ILS approach but then a further 7001 appeared 8 NM E of the airfield tracking SW at 900 ft to cross about 2 NM ahead of the B737 and below. He passed traffic information and the pilot advised that he had the traffic on TCAS, was VMC and wished to continue the approach. Once the 7001 had cleared the approach path he transferred the B737 to Tower at about 8 NM. He then saw another 7001 return at 10 NM on the final approach tracking towards the airfield indicating 1500 ft and Tower passed this information to the pilot who elected to continue, with the traffic showing on TCAS. The 7001 return closed to 4 DME before turning L about 1000 ft beneath the B737 and clearing to the SE. Both controllers saw this ac, a Harrier. Both controllers were very concerned at the potential danger posed by military ac manoeuvring on the final approach area of a busy airport, possibly needing to pull up in any emergency.

THE B737 PILOT reports heading 310° at 200 kt on approach to Prestwick RW 31, under 'radar control' from Prestwick Approach (APR). At about 12 NM final, APR requested a right turn onto 060° to avoid low level military traffic which he could not see in the approach area, and then to continue round onto W as it cleared. After completing the turn back onto the localiser he could see traffic below on TCAS; as he continued the approach it did not appear to come closer than 1500 ft below and about 1 NM ahead. The risk of collision was low. He commented that the area of uncontrolled airspace S of Prestwick is frequently used by military traffic. Any future incidents could be avoided if they would advise Prestwick ATC of their intentions.

THE HARRIER PILOT reports leading 4 ac attacking, at 43 sec spacing, an HQ STC simulated target F which is 1 km right of the Prestwick RW 31 approach path at 6·5 NM from the threshold. As he came off target, at 480 kt, he saw the B737 on approach some 2000 ft above. He ordered the Nos 2 and 3 not to pull up on their attacks in order to remain deconflicted and all ac attacked at between 250 and 500 ft agl. Apart from that, no avoiding action was taken due to the B737 not presenting a threat to flight safety; separation was in the order of 1 NM and 1500 ft.

UKAB Note: The Lowther Hill Radar recording shows the B737 approaching Prestwick from the SE while at least 10 military LL contacts are manoeuvring in the area covered by LFA 20T, between the B737 and Prestwick. With about 16 NM to go to the airport, at 1425:40, the B737 starts a right orbit at 4700 ft while 2 LL contacts start manoeuvring beneath its orbit at 1200 and 700 ft. The B737 rolls out passing 3700 ft as these LL contacts move off to the E. As the B737 approaches 7 NM to run the reported Harriers close on their target from the NE. The first passes ahead of and well below the B737 ¬, the 2nd crosses astern and attacks up the final approach track beneath the B737, overhauling it and passing directly beneath by 1000 ft at the point of attack before clearing to the S -. The 3rd Harrier then attacks from the NE passing just astern of the B737 with 1100 ft vertical spacing ®. The 4th Harrier's attack took place after the B737 had cleared the target area.

ATSI comments that there are no apparent civil ATC causal factors in this Airprox; the incident took place in Class G uncontrolled airspace after the B737 had descended below the base of Class D controlled airspace (CAS) of the Scottish TMA in preparation for the approach and landing at Prestwick. The RT recording reveals that the Prestwick APR did not advise the pilot that the aircraft had descended below the base of Class D CAS into Class G airspace, as required by MATS Part 1, 1-40: *"Pilots must be advised if a radar service commences, terminates or changes when: (a) they are operating outside controlled airspace or, (b) they cross the boundary of controlled airspace."* Furthermore, although APR reported that he was providing the B737 with a RAS at the time of the incident, the RT recording shows that a 'contract' to this effect had not been agreed with the pilot concerned. The MATS Part 1, 1-40 (Type of Service) states*: "Outside controlled airspace it is the responsibility of the pilot to request the radar service he requires. However if the pilot fails to specify the type of service the controller must ask the pilot which radar service he requires. The controller must also obtain a readback of the service from the pilot".* However, the Prestwick APR would appear to have fulfilled his obligations under the terms of a RAS. He provided the B737 pilot with pertinent traffic information and timely avoiding action instructions although this was difficult given the unpredictable manoeuvres being carried out by the unknown traffic to the south of Prestwick airport. Following transfer to Prestwick Tower, a single target which had previously passed astern of the B737, then turned to follow the latter along the final approach track. The Prestwick ADC alerted the B737 to the presence of this traffic, the pilot reporting that he had acquired the traffic on TCAS.

HQ STC comments that this incident took place in an area of Class G airspace that is frequently transited by fast jet formations skirting the high ground to the south. This high ground will often put an ac at 250 ft agl at 1500 ft amsl or above. The ac involved in this incident saw each other and maintained 1000 ft height separation. The Harrier formation reports using an HQ STC library target, however the target library was abolished some years ago. Simulated targets are chosen at a unit's discretion. The cancellation of the target library will be repromulgated.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Members observed that the Prestwick APR had provided an effective RAS in preventing a confliction with the first set of 7001 returns and was put in an invidious position regarding the Harriers which began their attack at the worst time as far as his responsibilities under a RAS were concerned. However, the Harriers had seen the B737 and gave it what the Board agreed was entirely satisfactory avoidance in Class G airspace. In fact members agreed that there had been no risk of collision, the

Harrier pilots having seen and avoided the B737 by sensible margins. The controllers, of course, had no way of knowing that, and the Board concluded that the incident was a controller perceived confliction.

Nevertheless, the Board thought that the Harrier formation's plan to do a pop-up attack on that target position was most inconsiderate, especially as they gave Prestwick no warning of their intentions, either before take off by phone or on RT before reaching their IP. The chevron markings on the LFC make obvious the target's position vis-à-vis the Prestwick RW 31 FAT. If it was essential to practise on this target, both calls would have been preferable. Military members particularly regretted this seeming lack of thought towards the responsibilities of airliner pilots and controllers; further publicity was recommended to IFS (RAF).

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Controller percieved confliction.

Degree of Risk: C

AIRPROX REPORT No 210/01

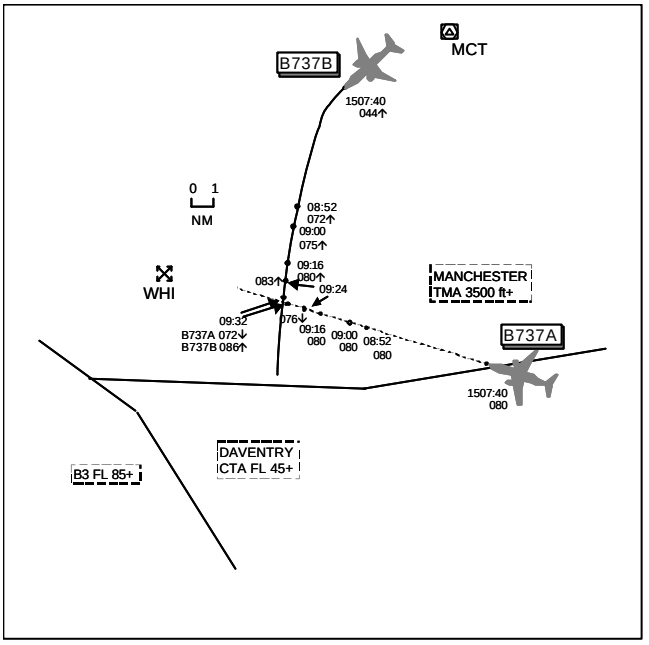
Date/Time: 19 Dec 1509

Position: 5310 N 0028 W (14 NM SW Manchester)

Airspace: TMA (*Class:* A)

Reporter: MACC TMA SE Radar

	First Aircraft	*Second Aircraft*
Type:	B737-300 (A)	B737-300 (B)
Operator:	CAT	CAT
Alt/FL:	FL 80	FL 80↑
Weather Visibility:	VMC CLOC 10 km	VMC CLOC 10 km
Reported Separation:	1500 ft V 200 m H	not given
Recorded Separation:	700 ft V 1·5 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

MACC TMA SE RADAR CONTROLLER reports that the B737(B) pilot called him on departure from Manchester following a HON1R SID and he instructed him to climb to FL 190; he then turned his attention to a complicated situation in the STAFA area. Later, B737(A) pilot, who was about 10 NM SW of MCT tracking W, reported that he had traffic climbing through his level; B737(B) was seen on radar 5 NM N of B737(A) tracking S and climbing through FL 73. He instructed B737(B) pilot to expedite his climb and then told B737(A) to descend; both crews subsequently reported TCAS RAs. He was unable to assess the minimum separation and the SMF did not activate during the encounter.

THE B737(A) PILOT reports flying inbound to Liverpool heading 300° at 250 kt level at FL 80 and receiving an ATC service from Manchester. Passing abeam MCT en route WHI NDB he saw

traffic on TCAS below him in his 2 o'clock position climbing towards him. When vertical separation reduced below 1000 ft, he asked ATC if he was aware of the other traffic, B737(B); ATC was then heard to instruct B737(B) to increase his ROC. He was then told to descend to FL 60, which he commenced after disconnecting the AP, whilst simultaneously TCAS annunciated an RA *"climb"*. Since he had seen the other ac visually long before the TCAS RA alert was received, had maintained visual contact and was following an ATC instruction, he continued descent crossing 200 m ahead and 1500 ft below the B737(B). He opined that in IMC this incident would have been more critical and he assessed the risk as medium.

THE B737(B) PILOT reports climbing on departure from Manchester to Gatwick at 280 kt. At position SANBA (approx 14 NM SSW MCT) with the ac accelerating, a TCAS TA alert was received on traffic below, he thought, the subject B737(A). ATC asked him to expedite his climb through FL 100 but TCAS annunciated an RA *"descend, descend"* followed immediately by *"monitor vertical speed"* as he continued the climb. He could see the other ac visually, B737(A), which was descending; *"clear of conflict"* was then received and he continued with a normal climb.

ATSI reports at the time of the Airprox, the subject ac were under the control of the MACC SE Sector, which was manned by a Radar Controller and Co-ordinator. The sector traffic loading was light, however, the Radar Controller's workload became moderate as he attempted to descend a Birmingham inbound through the level of a military ac, crossing CAS via the Lichfield Radar Corridor (RC).

The pilot of B737(A) established communication with the MACC SE Sector at 1458, descending, the Radar Controller cleared the flight initially down to FL 170 and, a minute later, to FL 120. B737(A) was inbound to Liverpool, following the 'LPL 2A' STAR which required it to route 'TNT' VOR – 'WHI' NDB – 'LPL' NDB i.e. across the departure track of any southbound departures from Manchester's RWs 24R/24L. The Radar Controller's task was to descend B737(A) to FL 80, the agreed level associated with the Standing Agreement for the transfer of such traffic to the MACC West Sector. At 1501:40, with approximately 10 NM to run to 'TNT', B737(A) was cleared to route direct to 'WHI' and, at 1502:50, the flight was cleared to FL 80, with a *"... good rate through one two zero".* The latter instruction was issued in order to ensure vertical separation from a southbound JS41 into Birmingham, descending to FL 130.

At 1503, AC3, an A319 also inbound to Birmingham, contacted the sector. This flight, although not involved in the Airprox, was to prove central to subsequent events. The flight was locked onto radar heading 170° and, a minute later at 1504:30, cleared to descend to FL 110. The plan was to release the preceding JS41 to Birmingham, descending to FL80, and AC3 descending to FL 90. This presented a slight problem for the Radar Controller because, while not fast enough to overtake and be positioned ahead of the JS41, AC3 was, nevertheless, catching up quite quickly. Consequently, the Radar Controller instructed AC3 to reduce speed to 250 kt. In complying with this instruction, the flight's ability to provide a high rate of descent, which would become necessary a short time later, was limited.

While the Radar Controller was instructing AC3 to reduce speed, at 1505:46, the Co-ordinator received a telephone call from the London Radar West Allocator, who wished to co-ordinate the use of the Lichfield RC for eastbound military traffic at FL 110. The Lichfield RC is 12 NM wide and is aligned on the Coningsby TACAN 260° radial. Procedures for the use of the RC are described in the MACC MATS Pt 2 (page GEN 15-1). The procedures state*: "MACC SE Radar is responsible for providing standard separation between airways traffic and military traffic on notified SSR codes using the RC at FL110/100".* In addition, the following is stated: *"The London Radar West Controller will inform the MACC SE Co-ordinator giving at least 3 minutes advance notification whenever the RC is to be activated.*
Note: Due to this short notice Controllers are to exercise caution before issuing instructions which might bring an ac into conflict with the RC.

At 1506:13, the Co-ordinator accepted the co-ordination for the military ac to cross at FL 110 using the RC. Thus, having cleared AC3 to descend to FL 110, the Radar Controller had a potential confliction problem. The military ac entered the RC at 1507:50 and, therefore, the requirement to provide at least 3 minutes notice had not been complied with.

At 1506:30, prior to becoming aware of the Lichfield RC traffic, the Radar Controller cleared AC3 to continue descent to FL 90 and resume its own navigation to CHASE. In addition, B737(B), which was to be involved in the Airprox, was departing from Runway 24R at Manchester. On becoming aware of the Lichfield RC traffic, the Radar Controller's attention became focussed on the conflict which had arisen involving AC3. The pilot of B737(B) established communication with the Radar Controller at 1507:20 and reported in the L turn onto radar heading 200°. (The Manchester ADC had instructed the flight to take up this heading, after reaching MCT 5DME following the HON IR SID, in order to expedite the departure of a following ac on a LISTO SID). This was in accordance with published procedures but was unfortunate on this particular occasion because, had the B737(B) remained on the SID routing, it would have probably passed behind B737(A).

The Radar Controller explained that he had wanted to deal with B737(B) as quickly as possible, so that he could concentrate on AC3. Therefore he cleared the flight straight to FL 190, the agreed level for the transfer of such traffic to LACC. He readily admitted that, in issuing this clearance, he overlooked the presence of B737(A), which was approximately 15 NM to the S at the time, just levelling at FL 80. Both ac were clearly displayed on the radar, with no others in the vicinity. The appropriate fpss were in the strip display, with a 'STAFA' strip on each ac; B737(A) was showing a time of 1508 and B737(B) 1512. Again the Radar Controller put this oversight down to his pre-occupation with the conflict in the Lichfield RC. One further consideration is that the Radar Controller stated that he would not normally have cleared B737(B) above FL 70 on first contact, because of a MATS Pt 2 requirement (Page WEST 1-8, para 'e'):

"In order to ensure that traffic departing from Runway 24L/R does not conflict with traffic operating within the MACC West Sector, STAFA Radar must not climb above FL 70 until south of the extended runway 24L centreline".

The radar recording indicates that, fortuitously, B737(B) did not climb above FL 70 until S of the extended RW C/L, however, if the controller had only cleared the flight to FL 70 initially, it would have levelled off 1000 ft below B737(A). Hopefully the controller would then have made further checks of his radar and strip displays before clearing B737(B) to a higher level.

The Radar Controller continued with this original plan, to descend AC3 below the Lichfield RC, rather than electing to stop its descent at FL 120 to remain above the RC traffic. He eventually achieved this but not without considerable difficulty, eventually having to turn AC3 R onto heading 260° to provide the requisite separation.

Meanwhile, the subject ac were continuing to converge and, at 1508:50, the pilot of B737(A) reported traffic in his 2 o'clock position, coming directly towards him at the same level. At that point, B737(B) was at range 6 NM climbing through FL 72 with a rate of climb of approx. 3000 ft/min. The Radar Controller did not reply to the B737(A) pilot but addressed the B737(B) crew and instructed them to expedite their climb through FL 100. He then instructed B737(A) to descend to FL 60. The pilot asked the controller to repeat the flight level, which he did. At 1509:20, the pilot of B737(B) advised that he had received a TCAS *"descend"* RA but reported that he was now above the traffic. 20 seconds later, the pilot of B737(A) again requested confirmation that FL 60 was his cleared level. The controller confirmed FL 60 and then instructed the flight to contact the MACC West Sector. Prior to changing frequency, the pilot advised that he had also received a TCAS RA but did not indicate whether it had called for a climb or descent. In his subsequent written report, the commander of B737(A) recorded that the RA had called for a climb but he added that he had had the conflicting traffic in sight *"long before the TCAS/ RA"* and had already commenced a descent, in accordance with the controller's instruction. The STCA activated at 1508:58, just as the Radar Controller was alerted to the conflict and was instructing B737(B) to expedite its climb.

The Radar Controller had dismissed the possible options of instructing the B737(B) to level off below the B737(A) and/or issuing turn instructions to resolve the conflict. Given B737(B)'s ROC, the former decision is understandable but the second is open to debate. The RT and radar recordings indicate that there were less than 45 seconds between the time the controller became aware of the conflict and the point where the radar returns of the ac merged. Whatever the case, it is disappointing that the words 'avoiding action' were

not employed and that TI was not passed to B737(B). It only became evident after the Radar Controller had issued the climb and descent instructions that the B737(B) had received a *"descend"* RA and only some time later that the pilot of B737(A) reported receiving an RA, so the controller cannot be criticised for issuing instructions that were contrary to the TCAS RA demands. The radar recording confirms that this was a close encounter, in plan at least, with the radar returns of the subject ac almost merging. Lateral separation at 1509:16 was 2·6 NM as B737(B) passed FL 80 and B737(A) still maintained that level. Thereafter, the ac continued to converge but vertical separation quickly increased as B737(B) continued its climb and B737(A) commenced its descent. When lateral separation was 1·5 NM (1509:24), vertical separation was 700 ft and at (1509:32) when it was 0·3 NM and 1400 ft. By the next sweep of the radar, the B737(B) had flown almost directly overhead the B737(A) and the separation was 0·8 NM/1700 ft and increasing.

UKAB Note: The Clee Hill radar recording shows B737(A) commencing descent with 400 ft between successive radar sweeps indicating an initial ROD of 3000 ft/min.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

It was clear that the MACC TMA SE Radar controller, who was being as helpful as possible, had become pre-occupied and distracted by the 'fluid' traffic situation in another part of the sector partly of his own making. In endeavouring to afford as much time as possible to those events he had cleared B737(B) pilot, on his initial call, to climb to FL 190 through the level of B737(A). This started events that led to the Airprox. Members were disappointed that TI was not passed by the controller and that the alerting phrase "avoiding action" was never used despite the deteriorating situation. Pilots also believed the removal of speed control on the departing B737(B) had played an adverse role. They wondered if such removal had become a habitual/automatic response borne out of every day use. They thought keeping ac speed down initially within busy and sometimes confined TMA airspace, should be the norm unless there was good reason to do otherwise. This incident was a case in point where removal made things worse.

Having decided what triggered the Airprox discussion moved on to the piloting aspects. Both B737 crews had elected to ignore the TCAS RAs received as their SOPs allowed, provided they were in visual contact with the conflicting traffic. Pilots reminded colleagues, however, that there could be occasions when the wrong ac was identified visually, making matters worse, not better. However in this instance, there were no other ac nearby. Moreover, both ac were on the same frequency and the pilots could hear the Radar controller's transmissions to the other aircrew further reinforcing the crews' 'situational awareness' of the 'big picture'. This had been a conflict which was resolved by visual avoiding action, but equally, the potential collision (as calculated by TCAS) could have been resolved also by following the RA demands. The important point to make was that two equally good options had been open to the pilots.

Turning to risk, members reconstructed the dynamics of the encounter. The Radar controller only became aware of the confliction when the B737(A) pilot told him of the crossing/climbing B737(B). The ATCO had immediately instructed B737(B) crew to expedite their climb followed by descent instructions to B737(A) crew; STCA activated as he had commenced his remedial action. Members commended the crew in B737(A) for their awareness as separation reduced below 1000 ft. They had next heard the ATCO's RT call to B737(B) to increase its ROC, saw B737(B) visually (still below at that point), took manual control of the ac but waited (while TCAS annunciated an RA *"climb"*) until clarification was received from ATC on instructions to descend to FL 60; then they dived. As they continued down they watched B737(B) pass ahead and above. Meanwhile, the B737(B) crew recalled that the TCAS TA received was on traffic below them but they may have been mistaken about the order of events. Certainly the radar recording shows that at that stage B737(A) was still above them, which would explain the subsequent *"descend"* RA. It was not entirely clear if the crew in B737(B) acquired the other ac visually before they climbed through its level. Pilot (B)'s

report merely states they saw B737(A) descending. Some members thought that as both ac crews had avoided each other following a combination ATC climb/descent instructions and visual acquisition, any risk of collision had been removed. Others thought there was more to it than that. They believed the robust dive on the part of B737(A) and the climb through its nose by B737(B) had successfully removed the possibility of colliding but the outcome of this encounter had been far from benign in Class A airspace. In their view the safety of the ac involved had not been assured. In the end these split views sustained, but a majority agreed that safety had been compromised.

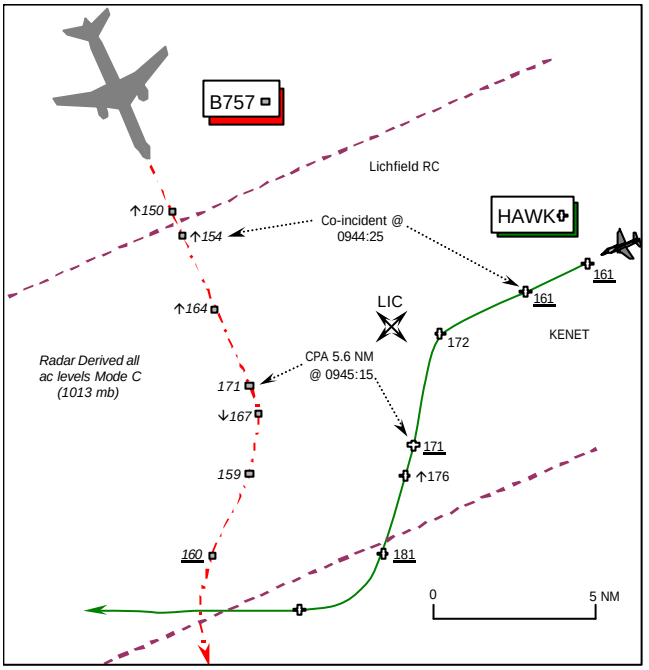
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: While resolving other conflictions, the MACC TMA SE Radar controller climbed B737(B) through the level of B737(A).

Degree of Risk: B

AIRPROX REPORT No 211/01

Date/Time:	12 Dec 0944	
Position:	5242 N 0145 W (3 NM SW of LIC)	
Airspace:	DAVENTRY CTA (*Class:* A)	
	Reporting Aircraft	*Reported Aircraft*
Type:	B757-200	Hawk
Operator:	CAT	HQ PTC
Alt/FL:	↑ FL 190	FL 160
Weather Visibility:	VMC CAVOK >10 Km	VMC >10 Km
Reported Separation:	Not Seen	1 NM H
Recorded Separation:		5·6 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B757 PILOT reports he was climbing outbound from Manchester heading 160° at 305 kt and under a RCS from MACC on 124·2 MHz. Passing through FL 159 for his assigned level of FL 190, he was instructed to level off at FL 150. He had already passed this level and advised MACC who then instructed him to expedite the climb to FL 190. Immediately thereafter, MACC passed avoiding action instructions to turn R onto 230° and descend to FL 150. The autopilot and autothrottle were disconnected, the ac turned manually onto the heading of 230° and descended to FL 150, as instructed. Traffic information was given on another ac at 11 o'clock – 5 NM climbing to FL 180, but it was directly into the sun and not seen at all. After about 20 sec he was instructed to turn L direct HON VOR and stop descent at FL 160, whereupon the autopilot and autothrottle were re-engaged.

He assessed the risk as *"low"*; no TCAS alerts were enunciated or displayed.

THE HAWK PILOT reports his ac has a distinctive red/white colour scheme and both the landing light and HISL were on. Whilst westbound through the LICHFIELD Radar Corridor (RC) at FL 160 and in receipt of a RCS from London MILITARY a B757

was first seen at 1 o'clock about 1-1·5 NM away he thought, crossing from R – L and slightly below his ac. At about the same time London MILITARY issued avoiding action to turn 40° L onto 220° and climb to FL 180, which he did as the airliner banked to the R and descended below the RC. The B757 passed about 1 NM away he thought, climbing through his assigned level, before the avoiding action climb was initiated. He assessed that there had been a *"low"* risk of collision, but added it could have been *"high"* if he had been IMC.

THE MACC SE STAFA SECTOR CO-ORDINATOR (STAFA CO-ORD) reports that the TRENT sector had been closed onto the STAFA Sector. The trainee STAFA controller was quite busy and the session overall was "messy" with a potential medical emergency. Previously whilst TRENT Sector was active, he and the TRENT Co-ordinator had agreed that the Hawk, which was not airborne at the time, could cross via the RC E - W at FL 160. He had then annotated the crossing strip under the LICHFIELD (LIC) 'bay' in the fps display and advised the trainee controller verbally "another 160 crosser (Hawk c/s)", or something similar, but the trainee may not have heard him. He had intended to tell the radar trainee specifically later - nearer the crossing time - but due to workload did not do this.

He was alerted to the incident by the STAFA SC and saw the Hawk climb on a westerly heading, then turn L to avoid the B757. He spoke to the London MILITARY controller and they agreed the Hawk's avoiding action L turn and climb to FL 180. Meanwhile, the trainee instructed the B757 crew to expedite the climb to miss the crossing Hawk at FL 160 when the SC observed the latter's climb. The STAFA SC then took control and instructed the B757 to descend to FL 160 to pass underneath the Hawk, which had by then climbed to FL 180. He did not believe that separation was eroded.

THE MACC SE STAFA SECTOR CONTROLLER (SC) reports that the B757 was climbed by his trainee to FL 190, as there was no conflicting traffic displayed in the STAFA fps 'bay'. When the B757 approached the northern edge of the LICHFIELD RC his trainee noticed the Hawk (from the displayed SSR label) west bound through the RC at FL 160. Avoiding action was given to the B757 crew by his trainee, whereupon it became apparent that the Hawk pilot had also been given avoiding action. Before he took control of the situation his trainee gave further avoiding action twice, plus traffic information. It transpired that the fps for the Hawk's crossing of CAS within the RC was displayed in the LIC fps 'bay' not STAFA. Prescribed separation was not eroded and the STCA did not operate.

MIL ATC OPS reports that the Hawk pilot was routeing from E - W through the LICHFIELD RC at FL 160, under a RCS from London MILITARY Controller 31 (CON31). The RC had been booked with Manchester in the normal way, and a clearance at FL 160 obtained. CON31 observed the B757 in the Hawk's 2 o'clock at a range of about 10 NM, tracking S and climbing through FL 154 Mode C. CON31 instructed the Hawk pilot *"...avoiding action, climb Flight Level one seven zero"* which was acknowledged, followed by *"...expedite your climb, turn left avoiding action, turn left heading two zero zero, traffic right, one o'clock, ten miles crossing right left climbing."* The Hawk pilot acknowledged this and shortly afterwards called *"Steady and level...and I'm visual with that traffic."* While CON31 was transmitting the avoiding action to the Hawk pilot, he opened the landline to MACC and then attracted the Supervisor's (SUP) attention. While waiting for the line to be answered, he advised the SUP *"Got a level buster...I've avoided...and I'm just about to co-ordinate it out."* When the landline was answered, CON31 then exchanged information on the quickly changing dynamics of the situation with an unidentified MACC controller - believed to be the STAFA CO-ORD. Between them the two controllers after slight confusion agreed the action needed to resolve matters safely. Subsequently, the SUP used the landline to Manchester to discuss what had happened. At 0945, CON31 transmitted to the Hawk *"C/S maintain* (heading) *two zero zero I'll keep you clear of traffic, it's now co-ordinated descending"* and the Hawk pilot replied *"Copied and visual."* Seeing the B757's Mode C passing FL 160 however, CON31 issued the Hawk pilot with a further climb to FL 180, to which the pilot responded. SUP noticed the B757 continue to climb while he was talking on the landline and said to the Manchester controller *"We we're, I mean is he climbing ex- is he expediting up through one seven 'cause we've gone up to one seven"* to which the Manchester controller replied *"Hang on a minute, I think he asked him to descend, he's he's descending."* In confirmation, SUP asked *"Did you say descending?"* and, on receiving confirmation

of this, advised Manchester *"Okay, we're going up to one eight and we'll turn back."* Shortly afterwards, the B757 was observed to be descending on radar. Both CON31 and the London MILITARY Supervisor believed that separation of 5 NM and 1000 ft had just been maintained.

CON31 had no idea at the time whether the B757 had been climbed intentionally through the RC ahead of the Hawk (ie. with the Manchester controller planning to 'take 5' on his traffic), or if it had been an unintentional 'level bust' that would shortly be corrected by the B757 returning to FL 150. Whatever, CON31 reacted well to a situation that had developed quickly. Moreover, the Hawk pilot's rapid actions and the subsequent liaison between the controllers/supervisors concerned ensured that the situation was contained.

ATSI reports that at the time of the Airprox the MACC SE Sector was split, but agreement had already been reached for TRENT to be bandboxed onto the STAFA Sector, which was completed shortly after the incident had occurred. Both the STAFA CO-ORD and STAFA SC described their respective workloads as moderate, although the SC, who was operating as mentor to a trainee, added that he considered that the traffic situation was complex. The trainee had completed over 240 hours training at the time of the incident.

The Airprox occurred following activation of the 12 NM wide Lichfield RC at FL 160. The RC is provided to permit the crossing of CAS in the vicinity of Lichfield. Military ac using the RC are co-ordinated and controlled by London MILITARY, who will inform the CO-ORD giving at least 3 min advance notification whenever the RC is to be activated.

The TRENT Sector Co-ordinator answered a telephone call from London MILITARY, at 0936, requesting a crossing clearance of the Lichfield RC at FL 160, E - W, for the Hawk, which was just departing. This was the second occasion that this flight had been requested, the original clearance having been cancelled, due to an ac malfunction, 15 min previously. The MACC MATS Pt 2, GEN Chapter 15, describes the procedures for activation of the Lichfield RC, which is relevant to this Airprox: *"There are 2 telephone lines provided for contact with London Military. One is for requests for the FL 110 corridor (labelled LIC LO) and one is for the FL 160 corridor (labelled LIC HI). When the MACC SE Sector is split, either sector - STAFA or TRENT - may answer the LIC HI telephone. However, co-ordination between both STAFA and TRENT Co-ordinators must take place before permitting use of the corridor"*. Accordingly, before agreeing to the request from London Military, the TRENT Co-ordinator co-ordinated its use with his STAFA CO-ORD colleague. Having agreed to the London MILITARY controller's request, STAFA CO-ORD said that in accordance with local procedures, he wrote the Hawk's callsign, together with an arrow to indicate the direction of flight, on a piece of paper which was attached to an orange blocking strip. He said that he inserted this strip in the active fps display under the LIC designator and verbally informed the radar trainee of the Hawk's details. Neither the mentor nor trainee heard this message. STAFA CO-ORD admitted that the SC and his trainee were rather occupied at the time and he did not receive a positive acknowledgement of this communication. The MATS Part 2 requires that after the blocking strip is placed in the active display it must be brought to the attention of the controller. *"The Radar Controller is required to acknowledge this information by ticking (ü) the details of the crossing traffic"*. No tick was made on the copy of the crossing fps in question. The co-ordinator said that he intended to remind the SC of the crossing Hawk as it approached the RC but had not done so having been distracted by other operational tasks. STAFA CO-ORD commented that, if the military ac had already been airborne and visible on the radar display, he would have 'hooked' its SSR label, also adding a predict vector, to ensure that it showed conspicuously on the radar display. This would have facilitated the co-ordination process. STAFA CO-ORD added that it is SOP to position the RC blocking strip under the STAFA designator. He could offer no definitive reason for placing it in the LIC bay, but could only surmise that he had located it under the LIC designator because, with the Hawk routeing westbound through the RC, that would be the first point of confliction in the Sector.

The B757 crew established communication with the STAFA Sector at 0937:38, just after the co-ordination for the activation of the LIC RC had been completed. At 0939, the trainee cleared the flight to climb to FL 190 on a heading of 160°. The SC confirmed that neither he, nor his trainee were aware of the activation of the LIC RC at the time and would have expected the blocking strip to be placed in the STAFA bay of the fps display. Had it

been so, the confliction would have been detected, as the fps for the B757 would also have been displayed under the STAFA designator.

The SC only became aware of the situation when his trainee spotted the Hawk in the RC. The trainee immediately instructed the B757 crew to stop their climb at FL 150. The SC recollected that the ac was passing FL 149 as the trainee issued this instruction but was climbing quickly, with the next update showing it at FL 154. The radar photograph, timed at 0944:25, shows the B757 at FL 154, southbound, just passing the northern edge of the RC, with the Hawk at FL 161, in its 10 o'clock, 11·8 NM away. Realising straight away, from the crew's reply to the level off instruction and observation of the Mode C, that the ac had already passed through FL 150, the trainee issued an "avoiding action" climb to FL 190, to expedite through FL 170. However, it was soon apparent that the Hawk had been climbed above the co-ordinated level of FL 160, in accordance with an avoiding action instruction issued by London MILITARY. Accordingly, the SC took control of the RTF and instructed the B757 crew to descend to FL 150 and to turn R heading 230°. Traffic information was then passed on the Hawk in the pilot's eleven o'clock about 5 NM away. When the instruction to descend was passed, the radar photograph shows that the B757 was passing FL 164, with the Hawk, 7·4 NM ESE, steady on 200º at FL 172. At the same time, STAFA CO-ORD liaised with London MILITARY about the developing situation; the latter was turning the Hawk L and climbing whilst CO-ORD advised that the airliner was descending. The radar photograph, timed at 0945:15, reveals that at the CPA, the B757 had ascended to FL 171 - the same level as the Hawk – as the latter turned S, 5·6 NM away. Thereafter, the B757 commenced its descent as the Hawk climbed to FL 180, which, following further co-ordination, was maintained whilst it crossed the airway. It is understandable why the pilot of the B757 was concerned about the incident - having received three separate instructions to resolve the situation in a short space of time - but the action taken is deemed appropriate in reaction to the changing scenario.

The activation of the LIC RC was carried out correctly. London MILITARY co-ordinated with the TRENT Co-ordinator, who, in turn received agreement from the STAFA Co-ordinator. In the end, the co-ordinated action taken by both the civil and military controllers ensured that separation was not lost.

HQ PTC comments that the Hawk pilot was clearly conforming properly with the correct service in this case. His controller was commendably alert and timely in his reaction. With the current and increasing density of traffic in controlled airspace we wonder how much longer we can continue to rely on human intervention in such knife-edge situations.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The PTC member emphasised that this situation relied on the prompt intervention of the controllers concerned and while STCA and the B757's TCAS remained as 'back-stops', the Hawk pilot had no similar advantage that some form of collision warning system would have afforded. However, the thorough analysis provided by ATSI and Mil ATC Ops had revealed that the catalyst to this Airprox was the co-ordination agreed by the STAFA Co-ordinator, but not brought to the attention of the mentor SC and his trainee. Thus unaware of the impending transit through the activated FL 160 Lichfield RC by the Hawk, the trainee unwittingly instructed the B757 crew to climb to FL 190 and thus through the Hawk's cleared level. Fortunately, the alert LATCC (Mil) CON31 spotted the B757 as soon as it climbed above FL 150 and promptly transmitted avoiding action to the Hawk pilot. It was evident from the radar recording that the Hawk pilot had complied in extremely short order as the ac's Mode C was seen to climb 1000 ft from FL 161 in one sweep of the radar. The further avoidance climb to FL 180 ensured a suitable margin in this fluid situation and was a wise precaution. Meanwhile, the observant trainee spotted the Hawk and made a prompt decision to avoid it by expediting the climb of the B757, which was then countermanded by the SC with an instruction to turn and descend. This avoiding action, whilst possibly confusing to the B757 crew was well founded. The combined actions of CON31 and the

SC seem to have forestalled any form of TCAS alert and ensured that separation was maintained.

Nevertheless, none of this would have been necessary if the STAFA co-ordinator had brought the activation of the RC to the controller's attention immediately; delay, in the end, led him to forget, and the absence of the appropriate tick mark *(ü)* evinced this omission. The Board agreed what had caused the Airprox; the MACC SE STAFA Co-ordinator did not ensure that the STAFA SC and his trainee were aware of the co-ordination agreed for the activation of the RC for the Hawk, as he should have done. It was explained by the ATSI advisor that two blocking strips were required here – one in the STAFA fps bay and one in the LIC bay. This system normally works satisfactorily, except here where it did not and, its omission was a contributory factor to this occurrence.

In assessing the risk the Board noted that the Hawk pilot was aware of the situation and was monitoring the B757 throughout; moreover, standard separation had been maintained. Therefore, the Board concluded unanimously, that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The MACC SE STAFA Co-ordinator did not ensure that the STAFA SC and his trainee were aware of the co-ordination agreed.

Degree of Risk: C.

Contributory Factors: Absence of 'blocking' strip in the STAFA fps 'bay', contrary to local procedures.

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159/01	31 Aug	A321/JS41	11 NM ESE POL	C	140
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165/01	11 Sep	Tucano (A)/Tucano (B)	1 NM S of Dishforth	A	153
166/01	09 Sep	Boeing C17 /PA28-161 Cadet	4 NM NW of KENET	C	155
167/01	12 Sep	MD82/VC10	17 NM NW of Abbeville	C	160
168/01	10 Sep	Robinson R44 /F15 x2	4 NM NNW of Gloucestershire Airport	A	162
169/01	15 Sep	ATR72/R44	0.5 NM FIN APP RW 24 Southend	C	164
170/01	16 Sep	Harrier/PA28	4 NM NE of Silverstone	A	167
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173/01	19 Sep	C525/HS25	1·25 NM NNE Biggin Hill	B	170
174/01	28 Sep	A321/CAP232	0·5 NM SW White Waltham	C	174
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177/01	11 Oct	TBM700/JS41	3 NM SE DENBY	C	179
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189/01	04 Oct	SH36/PC12	8·3 NM E of Islay	C	210
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193/01	07 Nov	BAe ATP/S76	ADN 073/8.5	C	220
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195/01	05 Nov	BAe146/JetRanger	11 NM NE of Stansted	C	228
196/01	10 Nov	B747-400/A330-200	NAT TRACK 'E'	B	230
198/01	13 Nov	Lynx/AA5	Barton Stacey	B	235
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201/01	12 Nov	RJ100/F50	10 NM E LAM	C	241
202/01	13 Nov	Tornado GR4/AS 350	1 NM S of Gleneig	B	243
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206/01	13 Nov	Pegasus Quantum /BH06	2·5 NM SE Tatenhill	C	250
207/01	27 Nov	F406 Caravan/Tornado GR4A	21 NM ENE of Newcastle	A	252
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CIVIL AVIATION AUTHORITY

AIRCRAFT PROXIMITY (AIRPROX) REPORT

Instructions for use

AIRPROX IN UK AIRSPACE

UK Airspace comprises the UK FIRs, UIRs, the Shanwick Oceanic FIR / UIR and Channel Islands Regulated Airspace

Pilots should use this form to initiate an AIRPROX report or to respond to one initiated by another pilot or a controller. (The shaded areas inside the form indicate those items which should be included in an initial RT report.) The completed form should be sent to:

UK Airprox Board
Hillingdon House
Uxbridge
UB10 0RU

If you have any queries about AIRPROX reporting procedures please call or fax UKAB on:

Tel: (01895) 815121/2/5

Fax: (01895) 815124

AIRPROX OCCURRING OUTSIDE THE UK

This form may be used in the absence of a State's or a CAA approved company form. It satisfies the information requirements of ICAO reporting procedures. The original report should be submitted to the relevant overseas authority and a copy sent to the:

CAA Safety Data Department, Aviation House,
Gatwick Airport South, West Sussex RH6 0YR

Tel: (01293) 573699/573211 Fax: (01293) 573972

NOTES

1. **AIRPROX reporting procedures** for civil pilots are detailed in the UK AIP ENR Section 1.14.
2. **Civil controllers** should use Forms CA1094A & 1261 to report any AIRPROX in UK airspace.

WARNING! - TIME OF INCIDENT

AIRPROX investigation is severely hindered if the date or time of the incident is reported inaccurately. Please be as accurate as you can with the minutes, but make CERTAIN you enter the correct DATE, HOUR and TIME ZONE at Section M of the report. If you are unsure, please take advice from UKAB or SDD staff as appropriate.

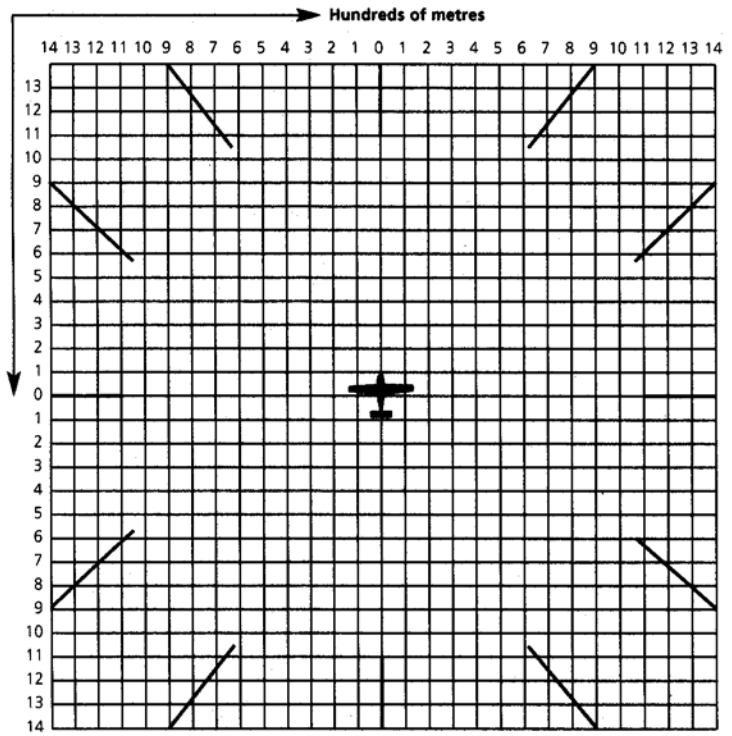
	A	AIRPROX REPORT (*= *Select words as appropriate*)
1 Name of pilot in command 2 Flight deck crew complement	**B**	1 2
Operator – include address and telephone no.	**C**	
Aircraft registration and type	**D**	
Colour scheme and external lighting in use – strobes etc	**E**	
1 Radio call sign 2 In communication with 3 Type of ATC service 4 RT frequency 5 SSR transponder	**F**	1 2 3 4 5 *Fitted / Not fitted. Code: Mode C – *On / Off / Not fitted
Aerodrome of departure	**G**	
Aerodrome of first intended landing	**H**	
Type of flight plan	**I**	* IFR / VFR / None CANP Filed YES / NO*
1 Position of Airprox 2 Aircraft heading 3 True airspeed	**J**	1 ..... 2 ..... * True/Magnetic 3 ..... knots
1 Flight level, altitude or height 2 Altimeter setting 3 Aircraft attitude 4 Phase of flight	**K**	1 *FL ..... /..... ft 2 ..... mb (* Standard / RPS / QNH / QFE) 3 *Level/Climbing/Descending/Turning (*Right/Left) 4 *Take-off / Cruise / En route descent / Overshoot Initial climb / Aerobatics / Holding / Circuit En route climb / Gen Handling / Final descent / Landing
Flight weather conditions at time of Airprox	**L**	1 *IMC/VMC 2 Distance ..... ft *Above/Below *Cloud/Fog/Haze 3 Distance ..... *km/NM horizontally from cloud 4 In *Rain/Snow/Sleet/Fog/Haze/Cloud/Between layers 5 Flying *into/out of sun 6 Flight visibility ..... *km/NM 7 *Day/Night/Twilight
DATE and TIME of Airprox	**M**	DATE: TIME: Which time zone / clock?* GMT / UTC* Br Summer Time*
Description of other aircraft if seen: 1 Type, high/low wing, number of engines 2 Radio callsign, registration 3 Markings, colour, lighting 4 Aircraft attitude – other available details	**N**	1 2 3 4
1 First sighting distance / radar contact 2 Minimum horizontal and vertical separation at time of Airprox 3 Form of avoiding action taken; if none, state reason 4 Assessment of risk 5 Other relevant factors, ie workload, emergencies, vision from cockpit, etc	**O**	1 2 3 4 5

6 Airborne Collision Avoidance System (eg TCAS)	**O**	6 *Fitted / not fitted. TA indicated? ..... RA indicated? ..... RA followed? .....
How did you report the Airprox, or hear about the Airprox report	**P**	*NO / YES by RADIO To / from whom? ..... FREQ? ..... *NO / YES by PHONE To / from whom? .....
Classification of flight	**Q**	1 PUBLIC TRANSPORT *(a) Scheduled Passenger *(b) Non-scheduled Passenger *(c) Scheduled Freight *(d) Non-scheduled Freight 2 *COMMERCIAL *EXECUTIVE *CLUB/GROUP *PRIVATE *TRAINING *GLIDING

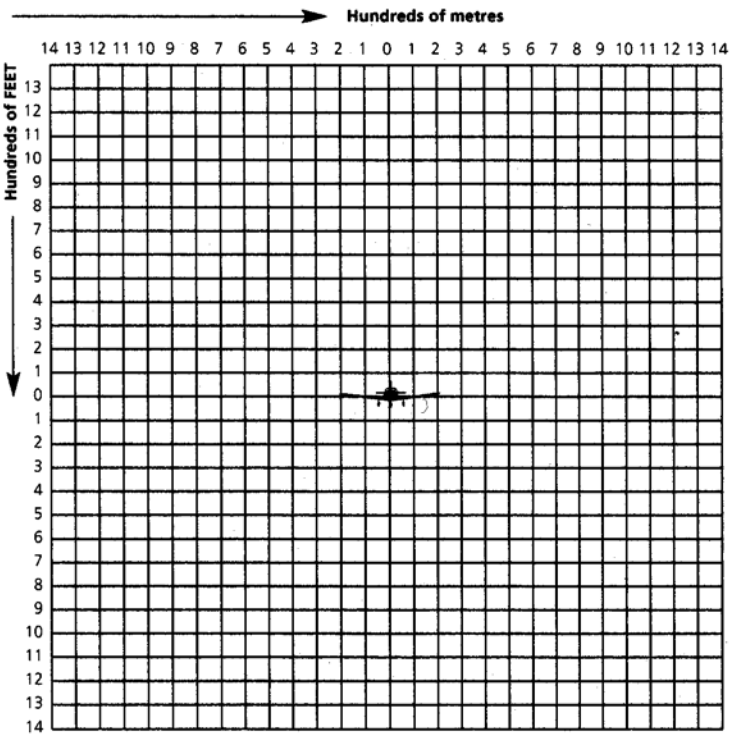
DIAGRAMS OF AIRPROX

Mark passage of other aircraft relative to you, in plan on the left and in elevation on the right, assuming YOUR AIRCRAFT is at the centre of each diagram.

VIEW FROM ABOVE



VIEW FROM ASTERN



CHANGE THE SCALE IF THIS ONE IS INAPPROPRIATE

DESCRIPTION OF AIRPROX

Include any details you think relevant or which will help the UK Airprox Board to understand what happened.

Continue over page if necessary

Date ..... Signature of Pilot .....
of completion of form

Contact Tel. No.
and Address.....

Please print the form, complete it in as much detail as you are able, and return the form to the UK Airprox Board.

Alternatively, complete the form using Powerpoint text boxes, save it, and return e-mail it.